AAOS
AMERICAN ACADEMY OF
ORTHOPAEDIC SURGEONS

# Management of Carpal Tunnel Syndrome

## Evidence-Based Clinical Practice Guideline

*Adapted by*:
The American Academy of Orthopaedic Surgeons Board of Directors
February 29, 2016

*Endorsed by:*

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## Disclaimer

This Clinical Practice Guideline was developed by an AAOS physician volunteer Guideline development group based on a systematic review of the current scientific and clinical information and accepted approaches to treatment and/or diagnosis. This Clinical Practice Guideline is not intended to be a fixed protocol, as some patients may require more or less treatment or different means of diagnosis. Clinical patients may not necessarily be the same as those found in a clinical trial. Patient care and treatment should always be based on a clinician's independent medical judgment, given the individual patient's clinical circumstances.

### Disclosure Requirement

In accordance with AAOS policy, all individuals whose names appear as authors or contributors to Clinical Practice Guideline filed a disclosure statement as part of the submission process. All panel members provided full disclosure of potential conflicts of interest prior to voting on the recommendations contained within this Clinical Practice Guidelines.

### Funding Source

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### FDA Clearance

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# I. SUMMARY OF RECOMMENDATIONS

The following is a summary of the recommendations of the AAOS Clinical Practice Guideline on the Management of Carpal Tunnel Syndrome. All readers of this summary are strongly urged to consult the full guideline and evidence report for this information. We are confident that those who read the full guideline and evidence report will see that the recommendations were developed using systematic evidence-based processes designed to combat bias, enhance transparency, and promote reproducibility.

This summary of recommendations is not intended to stand alone. Treatment decisions should be made in light of all circumstances presented by the patient. Treatments and procedures applicable to the individual patient rely on mutual communication between patient, physician, and other healthcare practitioners.

**Strength of Recommendation Descriptions**

| Strength | Overall Strength of Evidence | Description of Evidence Quality | Strength Visual |
|---|---|---|---|
| **Strong** | Strong | Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention. | ★★★★ |
| **Moderate** | Moderate | Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention. | ★★★☆ |
| **Limited** | Low Strength Evidence or Conflicting Evidence | Evidence from two or more "Low" quality studies with consistent findings **or** evidence from a single "Moderate" quality study recommending for against the intervention or diagnostic or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention. | ★★☆☆ |
| **Consensus** | No Evidence | There is no supporting evidence. In the absence of reliable evidence, the guideline development group is making a recommendation based on their clinical opinion. Consensus statements are published in a separate, complimentary document. | ★☆☆☆ |

## OBSERVATION

Strong evidence supports Thenar atrophy is strongly associated with ruling-in carpal tunnel syndrome, but poorly associated with ruling-out carpal tunnel syndrome.

Strength of Recommendation: Strong Evidence ★★★★

*Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.*

## PHYSICAL SIGNS

Strong evidence supports not using the Phalen Test, Tinel Sign, Flick Sign, or Upper limb neurodynamic/nerve tension test (ULNT) criterion A/B as independent physical examination maneuvers to diagnose carpal tunnel syndrome, because alone, each has a poor or weak association with ruling-in or ruling-out carpal tunnel syndrome.

Strength of Recommendation: Strong Evidence ★★★★

*Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.*

## MANEUVERS

Moderate evidence supports not using the following as independent physical examination maneuvers to diagnose carpal tunnel syndrome, because alone, each has a poor or weak association with ruling-in or ruling-out carpal tunnel syndrome:

- Carpal Compression test
- Reverse Phalen Test
- Thenar Weakness or Thumb Abduction Weakness or Abductor Pollicis Brevis Manual Muscle Testing
- 2-point discrimination
- Semmes-Weinstein Monofilament Test
- CTS-Relief Maneuver (CTS-RM)
- Pin Prick Sensory Deficit; thumb or index or middle finger
- ULNT Criterion C
- Tethered median nerve stress test
- Vibration perception – tuning fork
- Scratch collapse test
- Luthy sign
- Pinwheel

Strength of Recommendation: Moderate Evidence ★★★☆

*Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.*

## HISTORY INTERVIEW TOPICS

Moderate evidence supports not using the following as independent history interview topics to diagnose carpal tunnel syndrome, because alone, each has a poor or weak association with ruling-in or ruling-out carpal tunnel syndrome:

- Sex/gender
- Ethnicity
- Bilateral symptoms
- Diabetes mellitus
- Worsening symptoms at night
- Duration of symptoms
- Patient localization of symptoms
- Hand dominance
- Symptomatic limb
- Age
- BMI

Strength of Recommendation: Moderate Evidence ★★★☆

*Description: Evidence from two or more “Moderate” strength studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.*

## PATIENT REPORTED NUMBNESS OR PAIN

Limited evidence supports that patients who do not report frequent numbness or pain might not have carpal tunnel syndrome.

Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from* two *or more “Low” strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## HAND-HELD NERVE CONDUCTION STUDY (NCS)

Limited evidence supports that a hand-held nerve conduction study (NCS) device might be used for the diagnosis of carpal tunnel syndrome.

Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from* two *or more “Low” strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## MRI

Moderate evidence supports not routinely using MRI for the diagnosis of carpal tunnel syndrome.

Strength of Recommendation: Moderate Evidence ★★★☆

*Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.*

## DIAGNOSTIC ULTRASOUND

Limited evidence supports not routinely using ultrasound for the diagnosis of carpal tunnel syndrome.

Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from* two *or more "Low" strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## DIAGNOSTIC SCALES

Moderate evidence supports that diagnostic questionnaires and/or electrodiagnostic studies could be used to aid the diagnosis of carpal tunnel syndrome.

Strength of Recommendation: Moderate Evidence ★★★☆

*Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.*

## INCREASED RISK OF CTS

A. Strong evidence supports that BMI and high hand/wrist repetition rate are associated with the increased risk of developing carpal tunnel syndrome (CTS).

Strength of Recommendation: Strong Evidence ★★★★

*Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.*

B. Moderate evidence supports that the following factors are associated with the increased risk of developing carpal tunnel syndrome (CTS)

   a. Peri-menopausal
   b. Wrist Ratio/Index
   c. Rheumatoid Arthritis
   d. Psychosocial factors
   e. Distal upper extremity tendinopathies
   f. Gardening
   g. ACGIH Hand Activity Level at or above threshold
   h. Assembly line work
   i. Computer work
   j. Vibration
   k. Tendonitis
   l. Workplace forceful grip/exertion

Strength of Recommendation: Moderate Evidence ★★★☆

Description: Evidence from two or more “Moderate” strength studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.

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C. Limited evidence supports that the following factors are associated with the increased risk of developing carpal tunnel syndrome (CTS):

   a. Dialysis
   b. Fibromyalgia
   c. Varicosis
   d. Distal radius fracture

Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from two or more “Low” strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## DECREASED RISK OF CTS

Moderate evidence supports that physical activity/exercise is associated with the decreased risk of developing carpal tunnel syndrome (CTS).

Strength of Recommendation: Moderate Evidence ★★★☆

*Description: Evidence from two or more “Moderate” strength studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.*

## FACTORS SHOWING NO ASSOCIATED RISK OF CTS

A. Moderate evidence supports that the use of oral contraception and female hormone replacement therapy (HRT) are not associated with increased or decreased risk of developing carpal tunnel syndrome (CTS).

Strength of Recommendation: Moderate Evidence ★★★☆

*Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.*

B. Limited evidence supports that race/ethnicity and female education level are not associated with increased or decreased risk of developing carpal tunnel syndrome (CTS).

Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from two or more "Low" strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## FACTORS SHOWING CONFLICTING RISK OF CTS

Limited evidence supports that the following factors have conflicting results regarding the development of carpal tunnel syndrome (CTS):

- Diabetes
- Age
- Gender/Sex
- Genetics
- Comorbid drug use
- Smoking
- Wrist bending
- Workplace

Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from two or more "Low" strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## IMMOBILIZATION

Strong evidence supports that the use of immobilization (brace/splint/orthosis) should improve patient reported outcomes.

Strength of Recommendation: Strong Evidence ★★★★

*Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.*

## STEROID INJECTIONS

Strong evidence supports that the use of steroid (methylprednisolone) injection should improve patient reported outcomes.

Strength of Recommendation: Strong Evidence ★★★★

*Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.*

## MAGNET THERAPY

Strong evidence supports not using magnet therapy for the treatment of carpal tunnel syndrome.

Strength of Recommendation: Strong Evidence ★★★★

*Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.*

## ORAL TREATMENTS

Moderate evidence supports no benefit of oral treatments (diuretic, gabapentin, astaxanthin capsules, NSAIDs, or pyridoxine) compared to placebo.

Strength of Recommendation: Moderate Evidence ★★★☆

*Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.*

## ORAL STEROIDS

Moderate evidence supports that oral steroids could improve patient reported outcomes as compared to placebo.

Strength of Recommendation: Moderate Evidence ★★★☆

*Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.*

## KETOPROFEN PHONOPHORESIS

Moderate evidence supports that ketoprofen phonophoresis could provide reduction in pain compared to placebo.

Strength of Recommendation: Moderate Evidence ★★★☆

*Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.*

## THERAPEUTIC ULTRASOUND

Limited evidence supports that therapeutic ultrasound might be effective compared to placebo.

Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from two or more "Low" strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## LASER THERAPY

Limited evidence supports that laser therapy might be effective compared to placebo.

Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from two or more "Low" strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## SURGICAL RELEASE LOCATION

Strong evidence supports that surgical release of the transverse carpal ligament should relieve symptoms and improve function.

Strength of Recommendation: Strong Evidence ★★★★

*Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.*

## SURGICAL RELEASE PROCEDURE

Limited evidence supports that if surgery is chosen, a practitioner might consider using endoscopic carpal tunnel release based on possible short term benefits. Strength of Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from two or more "Low" strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## SURGICAL VERSUS NONOPERATIVE

Strong evidence supports that surgical treatment of carpal tunnel syndrome should have a greater treatment benefit at 6 and 12 months as compared to splinting, NSAIDs/therapy, and a single steroid injection.

Strength of Recommendation: Strong Evidence ★★★★

*Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.*

## ADJUNCTIVE TECHNIQUES

Moderate evidence supports that there is no benefit to routine inclusion of the following adjunctive techniques: epineurotomy, neurolysis, flexor tenosynovectomy, and lengthening/reconstruction of the flexor retinaculum (transverse carpal ligament).

Strength of Recommendation: Moderate Evidence ★★★☆

*Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.*

## BILATERAL VERSUS STAGED CARPAL TUNNEL RELEASE

Limited evidence supports that simultaneous bilateral or staged endoscopic carpal tunnel release might be performed based on patient and surgeon preference. No evidence meeting the inclusion criteria was found addressing bilateral simultaneous open carpal tunnel release.

Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from two or more "Low" strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## LOCAL VERSUS IV REGIONAL ANESTHESIA

Limited evidence supports the use of local anesthesia rather than intravenous regional anesthesia (bier block) because it might offer longer pain relief after carpal tunnel release; no evidence meeting our inclusion criteria was found comparing general anesthesia to either regional or local anesthesia for carpal tunnel surgery.

Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from two or more "Low" strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## BUFFERED VERSUS PLAIN LIDOCAINE

Moderate evidence supports the use of buffered lidocaine rather than plain lidocaine for local anesthesia because it could result in less injection pain.

Strength of Recommendation: Moderate Evidence ★★★☆

*Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.*

## ASPIRIN USE

Limited evidence supports that the patient might continue the use of aspirin perioperatively; no evidence meeting our inclusion criteria addressed other anticoagulants.

Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from two or more "Low" strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## PREOPERATIVE ANTIBIOTICS

Limited evidence supports that there is no benefit for routine use of prophylactic antibiotics prior to carpal tunnel release because there is no demonstrated reduction in postoperative surgical site infection.

Strength of Recommendation: Limited Evidence ★★☆☆

*Description: Evidence from two or more "Low" strength studies with consistent findings* ***or*** *evidence from a single study for recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.*

## SUPERVISED VERSUS HOME THERAPY

Moderate evidence supports no additional benefit to routine supervised therapy over home programs in the immediate postoperative period. No evidence meeting the inclusion criteria was found comparing the potential benefit of exercise versus no exercise after surgery.

Strength of Recommendation: Moderate Evidence ★★★☆

*Description: Evidence from two or more "Moderate" strength studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.*

## POSTOPERATIVE IMMOBILIZATION

Strong evidence supports no benefit to routine postoperative immobilization after carpal tunnel release.

Strength of Recommendation: Strong Evidence ★★★★

*Description: Evidence from two or more "High" strength studies with consistent findings for recommending for or against the intervention.*

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# III.INTRODUCTION

## Overview

This clinical practice guideline is based on a systematic review of published studies with regard to the diagnosis and treatment of carpal tunnel syndrome (CTS). In addition to providing practice recommendations, this guideline also highlights limitations in the literature and areas that require future research.

This guideline is intended to be used by all qualified and appropriately trained physicians and surgeons involved in the diagnosis and treatment of CTS. It is also intended to serve as an information resource for decision makers and developers of practice guidelines and recommendations.

The following definition of carpal tunnel syndrome has been added to the introduction section: "For the purpose of this guideline, Carpal Tunnel Syndrome (CTS) is defined as follows: Carpal Tunnel Syndrome is a symptomatic compression neuropathy of the median nerve at the level of the wrist, characterized physiologically by evidence of increased pressure within the carpal tunnel and decreased function of the nerve at that level. Carpal Tunnel Syndrome can be caused by many different diseases, conditions and events. It is characterized by patients as producing numbness, tingling, hand and arm pain and muscle dysfunction. The disorder is not restricted by age, gender, ethnicity, or occupation and is associated with or caused by systemic disease and local mechanical and disease factors.

## Goals and Rationale

The purpose of this clinical practice guideline is to help improve treatment based on the current best evidence. Current evidence-based medicine (EBM) standards demand that physicians use the best available evidence in their clinical decision making. To assist them, this clinical practice guideline consists of a systematic review of the available literature regarding the diagnosis and treatment of CTS. The systematic review detailed herein was conducted between February 2013 and February 2015 and demonstrates where there is good evidence, where evidence is lacking, and what topics future research must target in order to improve the diagnosis and treatment of CTS. AAOS staff and the physician work group systematically reviewed the available literature and subsequently wrote the following recommendations based on a rigorous, standardized process.

Musculoskeletal care is provided in many different settings by many different providers. We created this guideline as an educational tool to guide qualified physicians through a series of treatment decisions in an effort to improve the quality and efficiency of care. This guideline should not be construed as including all proper methods of care or excluding methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding any specific procedure or treatment must be made in light of all circumstances presented by the patient and the needs and resources particular to the locality or institution.

## Intended Users

This guideline is intended to be used by orthopaedic surgeons and physicians managing carpal tunnel syndrome.  Typically, orthopaedic surgeons will have completed medical training, a qualified residency in orthopaedic surgery, and some may have completed additional subspecialty training. General surgeons, plastic surgeons, neurosurgeons, primary care physicians, hospital-based and outpatient adult internal medicine specialists, including neurologists, physiatrists and occupational health medicine specialists, physical therapists, occupational therapists, nurse practitioners, physician assistants, and other healthcare professionals who routinely see this type of patient in various practice settings may also benefit from this guideline.

This guideline is not intended for use as a benefits determination document.

The care of CTS is based on the assumption that decisions are predicated on the patient and / or the patient's qualified heath care advocate having physician communication with discussion of available treatments and procedures applicable to the individual patient. Once the patient and or their advocate have been informed of available therapies and have discussed these options with his/her physician, an informed decision can be made. Clinician input based on experience with conservative management and the clinician's surgical experience and skills increases the probability of identifying patients who will benefit from specific treatment options.

## Patient Population

This document addresses the diagnosis and treatment of adult patients presenting with complaints which may be attributable to CTS.

## Burden of Disease

CTS is the most common compressive neuropathy affecting the upper extremity and is an important cause of lost workplace productivity. The prevalence of CTS is estimated to be 0.7/10,000 workers. Between 1997 and 2010 CTS was the second most common cause of days lost from the workplace. Throughout this period the median time lost per case of CTS varied between 21 and 32 days.

## Etiology

CTS is caused by compression of the median nerve under the transverse carpal ligament. Although pressure on the median nerve is clearly the pathophysiologic basis for the symptoms observed clinically, the etiology of elevated pressure within the carpal canal is unknown.

## Risk Factors

Conditions which occupy volume within the carpal canal may increase the risk of symptomatic compression of the median nerve. Diseases affecting the synovium of the flexor tendons, such as rheumatoid arthritis, or rare tumors or anomalous muscles in the carpal canal are example of uncommonly encountered medical conditions associated with an increased risk of CTS. Given that the cause of increased pressure within the carpal canal is unknown in the majority of cases, there is little known about risk factors for developing CTS, although a number of associations both with medical conditions and workplace exposures have been described. For more information regarding risk factors, please see the recommendations concerning risk factors for CTS.

## Emotional and Physical Impact

The principal impact of CTS on patients relates to the sensory disturbance which may disrupt sleep and, during non-sleeping hours, impair strength and the ability to carry out fine manipulation. CTS may also be associated with pain in the wrist and digits. These symptoms may have a substantial effect on an individual's ability to accomplish activities of daily living and to perform work-related duties.

## Potential Benefits, Harms, and Contraindications

The main benefit of a guideline focused on diagnosis is the emphasis on standardized diagnostic criteria which reduce variability in the case definition for CTS. This could have an important impact on the care of CTS, by minimizing the risk of incorrect diagnosis, and also help in the design of studies seeking to identify associations with specific workplace exposures, an area of interest for workers.

## Future Research

A significant obstacle to evaluating pathways to the treatment of CTS is the absence of a widely accepted reference standard for the diagnosis. An effort to achieve consensus among the many clinical disciplines which evaluate and treat CTS is an important goal of future research in this area. If consensus of this nature can be established, then a clear and consistent case definition should allow a comparison of treatment options as well as an evaluation of the impact of workplace exposures on the development of CTS symptoms.

# IV.METHODS

The methods used to perform this systematic review were employed to minimize bias and enhance transparency in the selection, appraisal, and analysis of the available evidence. These processes are vital to the development of reliable, transparent, and accurate clinical recommendations for treating carpal tunnel syndrome.

This clinical practice guideline and the systematic review upon which it is based evaluate the effectiveness of treatments for carpal tunnel syndrome. This section describes the methods used to prepare this guideline and systematic review, including search strategies used to identify literature, criteria for selecting eligible articles, determining the strength of the evidence, data extraction, methods of statistical analysis, and the review and approval of the guideline. The AAOS approach incorporates practicing physicians (clinical experts) and methodologists who are free of potential conflicts of interest as recommended by guideline development experts.[M10]

The AAOS understands that only high-quality guidelines are credible, and we go to great lengths to ensure the integrity of our evidence analyses. The AAOS addresses bias beginning with the selection of guideline development group members. Applicants with financial conflicts of interest (COI) related to the guideline topic cannot participate if the conflict occurred within one year of the start date of the guideline's development or if an immediate family member has, or has had, a relevant financial conflict. Additionally, all guideline development group members sign an attestation form agreeing to remain free of relevant financial conflicts for two years following the publication of the guideline.

This guideline and systematic review were prepared by the AAOS Management of Carpal Tunnel Syndrome Guideline physician guideline development group (clinical experts) with the assistance of the AAOS Evidence-Based Medicine (EBM) Unit in the Department of Research and Scientific Affairs (methodologists) at the AAOS. To develop this guideline, the guideline development group held an introductory meeting on February 1, 2013 to establish the scope of the guideline and the systematic reviews. As the physician experts, the guideline development group defined the scope of the guideline by creating PICO Questions (i.e. population, intervention, comparison, and outcome) that directed the literature search. When necessary, these clinical experts also provided content help, search terms and additional clarification for the AAOS Medical Librarian. The Medical Librarian created and executed the search(s). The supporting group of methodologists (AAOS EBM Unit) reviewed all abstracts, recalled pertinent full-text articles for review and evaluated the quality of studies meeting the inclusion criteria. They also abstracted, analyzed, interpreted, and/or summarized the relevant evidence for each recommendation and prepared the initial draft for the final meeting. Upon completion of the systematic reviews, the physician guideline development group participated in a three-day recommendation meeting on May 15-17, 2015. At this meeting, the physician experts and methodologists evaluated and integrated all material to develop the final recommendations. The final recommendations and rationales were edited, written and voted on at the final meeting. The draft guideline recommendations and rationales received final review by the methodologists to ensure that these recommendations and rationales were consistent with the data. The draft was then completed and submitted for peer review on September 8th, 2015.

The resulting draft guidelines were then peer-reviewed, edited in response to that review and subsequently sent for public commentary, where after additional edits were made. Thereafter, the draft guideline was sequentially approved by the AAOS Committee on Evidence-Based Quality and Value, AAOS Council on Research and Quality, and the AAOS Board of Directors (see Appendix II for a description of the AAOS bodies involved in the approval process). All AAOS guidelines are reviewed and updated or retired every five years in accordance with the criteria of the National Guideline Clearinghouse.

Thus the process of AAOS guideline development incorporates the benefits from clinical physician expertise as well as the statistical knowledge and interpretation of non-conflicted methodologists. The process also includes an extensive review process offering the opportunity for over 200 clinical physician experts to provide input into the draft prior to publication. This process provides a sound basis for minimizing bias, enhancing transparency and ensuring the highest level of accuracy for interpretation of the evidence.

## FORMULATING PICO QUESTIONS

The guideline development group began work on this guideline by constructing a set of PICO questions. These questions specify the patient population of interest (P), the intervention of interest (I), the comparisons of interest (C), and the patient-oriented outcomes of interest (O). They function as questions for the systematic review, not as final recommendations or conclusions. Once established, these *a priori* PICO questions cannot be modified until the final guideline development group meeting.

## STUDY SELECTION CRITERIA

We developed *a priori* article inclusion criteria for our review. These criteria are our “rules of evidence” and articles that did not meet them are, for the purposes of this guideline, not evidence.

To be included in our systematic reviews (and hence, in this guideline) an article had to meet the following criteria:

- Study must be of an CTS injury or prevention thereof
- Study must be published in or after 1966 for *surgical treatment, rehabilitation, bracing, prevention and MRI*
- Study must be published in or after 1966 for *x rays* and *non-operative treatment*
- Study must be published in or after 1966 for all others non specified
- Study should have 10 or more patients per group
- For surgical treatment a minimum of 3 months follow up duration.
- Antibiotic prophylaxis, anticoagulations, mode of anesthesia: all follow-ups
- For *non-operative treatment* a minimum of 1 month.

### Standard Criteria for all CPGs

Article must be a full article report of a clinical study.
Retrospective non-comparative case series, medical records review, meeting abstracts, historical articles, editorials, letters, and commentaries are ***excluded***.
Confounded studies (i.e. studies that give patients the treatment of interest AND another treatment) are ***excluded***.

Case series studies that have non-consecutive enrollment of patients are ***excluded***.
Controlled trials in which patients were not stochastically assigned to groups AND in which there was either a difference in patient characteristics or outcomes at baseline AND where the authors did not statistically adjust for these differences when analyzing the results are ***excluded***.
All studies of "Very Weak" strength of evidence are ***excluded***.
All studies evaluated as Level V will be ***excluded***.
Composite measures or outcomes are ***excluded*** even if they are patient-oriented.
Study must appear in a peer-reviewed publication
For any included study that uses "paper-and-pencil" outcome measures (e.g., SF-36), only those outcome measures that have been validated will be included
For any given follow-up time point in any included study, there must be ≥ 50% patient follow-up (if the follow-up is >50% but <80%, the study quality will be downgraded by one Level)
Study must be of humans
Study must be published in English
Study results must be quantitatively presented
Study must not be an in vitro study
Study must not be a biomechanical study
Study must not have been performed on cadavers

We will only evaluate surrogate outcomes when no patient oriented outcomes are available.

### BEST EVIDENCE SYNTHESIS

We included only the best available evidence for any given outcome addressing a recommendation. Accordingly, we first included the highest quality evidence for any given outcome if it was available. In the absence of two or more occurrences of an outcome at this quality, we considered outcomes of the next lowest quality until at least two or more occurrences of an outcome had been acquired. For example, if there were two 'moderate' quality occurrences of an outcome that addressed a recommendation, we did not include 'low' quality occurrences of this outcome. A summary of the evidence that met the inclusion criteria, but was not best available evidence was created and can be viewed by recommendation in Appendix XII.

## MINIMALLY CLINICALLY IMPORTANT IMPROVEMENT

Wherever possible, we consider the effects of treatments in terms of the minimally clinically important difference (MCID) in addition to whether their effects are statistically significant. The MCID is the smallest clinical change that is important to patients, and recognizes the fact that there are some treatment-induced statistically significant improvements that are too small to matter to patients. However, there were no occurrences of validated MCID outcomes in the studies included in this clinical practice guideline.

When MCID values from the specific guideline patient population are not available, we use the following measures listed in order of priority:

1) MCID/MID
2) PASS or Impact
3) Another validated measure
4) Statistical Significance

# LITERATURE SEARCHES

We begin the systematic review with a comprehensive search of the literature. Articles we consider were published prior to February 27, 2015 in four electronic databases; PubMed, EMBASE, CINAHL, and The Cochrane Central Register of Controlled Trials. The medical librarian conducts the search using key terms determined from the guideline development group's preliminary recommendations.

We supplement the electronic search with a manual search of the bibliographies of all retrieved publications, recent systematic reviews, and other review articles for potentially relevant citations. Recalled articles are evaluated for possible inclusion based on the study selection criteria and are summarized for the guideline development group who assist with reconciling possible errors and omissions.

The study attrition diagram in Appendix IV provides a detailed description of the numbers of identified abstracts and recalled and selected studies that were evaluated in the systematic review of this guideline. The search strategies used to identify the abstracts are contained in Appendix V.

# METHODS FOR EVALUATING EVIDENCE

As noted earlier, we judge quality based on *a priori* PICO questions and use an automated numerical scoring process to arrive at final ratings. Extensive measures are taken to determine quality ratings so that they are free of bias.

We evaluate the quality of evidence separately for each study using modified versions of the GRADE and QUADAS instruments. Depending on the type of study (i.e. diagnostic, prognostic, randomized control trial, or observational) the study design is evaluated using a list of standardized questions (see below for the domains evaluated for each type of study design).

## *DIAGNOSTIC STUDY QUALITY APPRAISAL QUESTIONS*

The following questions are used to evaluate the study quality of diagnostic study designs.

1. Was the patient spectrum representative of the patients who will receive the test in practice?
2. Were the selection criteria clearly described?
3. Was the execution of the index and reference tests described in sufficient detail to permit its replication?
4. Is the reference standard likely to correctly classify the target condition?
5. Are the index test(s) results interpreted by an examiner without the knowledge of the reference tests results (or vice versa)?
6. Other Bias?

### Diagnostic Study Design Quality Key

| **High Quality Study** | **<1 Flaw** |
|---|---|
| Moderate Quality Study | ≥1 and <2 Flaws |
| Low Quality Study | ≥2 and <3 Flaws |
| Very Low Quality Study | ≥3 Flaws |

## *PROGNOSTIC STUDY QUALITY APPRAISAL QUESTIONS*

The following questions are used to evaluate the study quality of prognostic study designs.

1. Was the spectrum of patients studied for this prognostic variable representative of the patient spectrum seen in actual clinical practice?
2. Was loss to follow up unrelated to key characteristics?
3. Was the prognostic factor of interest adequately measured in the study to limit potential bias?
4. Was the outcome of interest adequately measured in study participants to sufficiently limit bias?
5. Were all important confounders adequately measured in study participants to sufficiently limit potential bias?
6. Was the statistical analysis appropriate for the design of the study, limiting potential for presentation of invalid results?

### Prognostic Study Design Quality Key

| **High Quality Study** | **<1 Flaw** |
|---|---|
| Moderate Quality Study | ≥1 and <2 Flaws |
| Low Quality Study | ≥2 and <3 Flaws |
| Very Low Quality Study | ≥3 Flaws |

## *RANDOMIZED STUDY QUALITY APPRAISAL QUESTIONS*

The following domains are evaluated to determine the study quality of randomized study designs.

1. Random Sequence Generation
2. Allocation Concealment
3. Blinding of Participants and Personnel
4. Incomplete Outcome Data
5. Selective Reporting
6. Other Bias

Upgrading Randomized Study Quality Questions

1. Is there a large magnitude of effect?
2. Influence of All Plausible Residual Confounding
3. Dose-Response Gradient

**Randomized Study Design Quality Key**

| **High Quality Study** | **<2 Flaw** |
|---|---|
| Moderate Quality Study | ≥2 and <4 Flaws |
| Low Quality Study | ≥4 and <6 Flaws |
| Very Low Quality Study | ≥6 Flaws |

***OBSERVATIONAL STUDY DESIGN QUALITY APPRAISAL QUESTIONS***

The following questions are used to evaluate the study quality of observational study designs. Note that all observation studies begin the appraisal process at "low quality" due to design flaws inherent in observational studies.

1. Is this observational study a prospective case series?
2. Does the strategy for recruiting participants into the study differ across groups?
3. Did the study fail to balance the allocation between the groups or match groups (e.g., through stratification, matching, propensity scores)?
4. Were important confounding variables not taken into account in the design and/or analysis (e.g., through matching, stratification, interaction terms, multivariate analysis, or other statistical adjustment such as instrumental variables)?
5. Was the length of follow-up different across study groups?
6. Other Bias?

Upgrading Observational Study Quality Questions
1. Is there a large magnitude of effect?
2. Influence of All Plausible Residual Confounding
3. Dose-Response Gradient

**Observational Study Design Quality Key**

| **High Quality Study** | **<2 Flaw** |
|---|---|
| Moderate Quality Study | ≥2 and <4 Flaws |
| Low Quality Study | ≥4 and <6 Flaws |
| Very Low Quality Study | ≥6 Flaws |

## DEFINING THE STRENGTH OF THE RECOMMENDATIONS

Judging the strength of evidence is only a stepping stone towards arriving at the strength of a guideline recommendation. The strength of recommendation also takes into account the quality, quantity, and the trade-off between the benefits and harms of a treatment, the magnitude of a treatment's effect, and whether there is data on critical outcomes.

Strength of recommendation expresses the degree of confidence one can have in a recommendation. As such, the strength expresses how possible it is that a recommendation will be overturned by future evidence. It is very difficult for future evidence to overturn a recommendation that is based on many high quality randomized controlled trials that show a large effect. It is much more likely that future evidence will overturn recommendations derived from a few small case series. Consequently, recommendations based on the former kind of evidence are given a high strength of recommendation and recommendations based on the latter kind of evidence are given a low strength.

To develop the strength of a recommendation, AAOS staff first assigned a preliminary strength for each recommendation that took only the final strength of evidence (including quality and applicability) and the quantity of evidence (see Table 1).

**Table 1. Strength of Recommendation Descriptions**

| Strength | Overall Strength of Evidence | Description of Evidence Quality | Strength Visual |
|---|---|---|---|
| **Strong** | Strong | Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention. | ★★★★ |
| **Moderate** | Moderate | Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention. | ★★★☆ |
| **Limited** | Low Strength Evidence or Conflicting Evidence | Evidence from two or more "Low" quality studies with consistent findings **or** evidence from a single "Moderate" quality study recommending for against the intervention or diagnostic or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention. | ★★☆☆ |
| **Consensus** | No Evidence | There is no supporting evidence. In the absence of reliable evidence, the guideline development group is making a recommendation based on their clinical opinion. Consensus statements are published in a separate, complimentary document. | ★☆☆☆ |

## WORDING OF THE FINAL RECOMMENDATIONS

To prevent bias in the way recommendations are worded, the AAOS uses specific predetermined language stems that are governed by the evidence strengths. Each recommendation was written using language that accounts for the final strength of the recommendation. This language, and the corresponding strength, is shown in Table 2.

**Table 2. AAOS Guideline Language Stems**

| Guideline Language | Strength of Recommendation |
|---|---|
| Strong evidence supports that the practitioner should/should not do X, because… | Strong |
| Moderate evidence supports that the practitioner could/could not do X, because… | Moderate |
| Limited evidence supports that the practitioner might/might not do X, because… | Limited |
| In the absence of reliable evidence, it is the ***opinion*** of this guideline development group that…* | Consensus* |

**Consensus based recommendations are made according to specific criteria. These criteria can be found in Appendix VII.*

## APPLYING THE RECOMMENDATIONS TO CLINICAL PRACTICE

To increase the practicality and applicability of the guideline recommendations in this document, the information listed in Table 3 provides assistance in interpreting the correlation between the strength of a recommendation and patient counseling time, use of decision aids, and the impact of future research

**Table 3. Clinical Applicability: Interpreting the Strength of a Recommendation**

| Strength of Recommendation | Patient Counseling (Time) | Decision Aids | Impact of Future Research |
|---|---|---|---|
| Strong | Least | Least Important, unless the evidence supports no difference between two alternative interventions | Not likely to change |
| Moderate | Less | Less Important | Less likely to change |
| Limited | More | Important | Change possible/anticipated |
| Consensus | Most | Most Important | Impact unknown |

## VOTING ON THE RECOMMENDATIONS

The recommendations and their strength were voted on by the guideline development group members during the final meeting. If disagreement between the guideline development group occurred, there was further discussion to see whether the disagreement(s) could be resolved. Recommendations were approved and adopted in instances where a simple majority (60%) of the guideline development group voted to approve.

## STATISTICAL METHODS

### *ANALYSIS OF DIAGNOSTIC DATA*

Likelihood ratios, sensitivity, specificity and 95% confidence intervals were calculated to determine the accuracy of diagnostic modalities based on two by two diagnostic contingency tables extracted from the included studies. When summary values of sensitivity, specificity, or other diagnostic performance measures were reported, estimates of the diagnostic contingency table were used to calculate likelihood ratios.

Likelihood ratios (LR) indicate the magnitude of the change in probability of disease due to a given test result. For example, a positive likelihood ratio of 10 indicates that a positive test result is 10 times more common in patients with disease than in patients without disease. Likelihood ratios are interpreted according to previously published values, as seen in Table 4 below.

**Table 4. Interpreting Likelihood Ratios**

| Positive Likelihood Ratio | Negative Likelihood Ratio | Interpretation |
|---|---|---|
| >10 | <0.1 | Large and conclusive change in probability |
| 5-10 | 0.1-0.2 | Moderate change in probability |
| 2-5 | 0.2-0.5 | Small (but sometimes important change in probability) |
| 1-2 | 0.5-1 | Small (and rarely important) change in probability |

### *ANALYSIS OF INTERVENTION/PREVENTION DATA*

When possible, we recalculate the results reported in individual studies and compile them to answer the recommendations. The results of all statistical analysis conducted by the AAOS Clinical Practice Guidelines Unit are conducted using SAS 9.4. SAS was used to determine the magnitude, direction, and/or 95% confidence intervals of the treatment effect. For data reported as means (and associated measures of dispersion) the mean difference between groups and the 95% confidence interval was calculated and a two-tailed t-test of independent groups was used to determine statistical significance. When published studies report measures of dispersion other than the standard deviation the value was estimated to facilitate calculation of the treatment effect. In studies that report standard errors or confidence intervals the standard deviation was back-calculated. In some circumstances statistical testing was conducted by the authors and measures of dispersion were not reported. In the absence of measures of dispersion, the results of the statistical analyses conducted by the authors (i.e. the p-value) are considered as evidence. For proportions, we report the proportion of patients that experienced an outcome along with the percentage of patients that experienced an outcome. The variance of the arcsine difference was used to determine statistical significance.[M7] P-values < 0.05 were considered statistically significant.

When the data was available, we performed meta-analyses using the random effects method of DerSimonian and Laird.[M8] A minimum of three studies was required for an outcome to be considered by meta-analysis. Heterogeneity was assessed with the I-squared statistic. Meta-analyses with I-squared values less than 50% were considered as evidence. Those with I-squared larger than 50% were not considered as evidence for this guideline. All meta-analyses were performed using SAS 9.4. The arcsine difference was used in meta-analysis of proportions. In order to overcome the difficulty of interpreting the magnitude of the arcsine difference, a summary odds ratio is calculated based on random effects meta-analysis of proportions and the number needed to treat (or harm) is calculated. The standardized mean difference was used for meta-analysis of means and magnitude was interpreted using Cohen's definitions of small, medium, and large effect.

## PEER REVIEW

Following the final meeting, the guideline draft undergoes peer review for additional input from external content experts. Written comments are provided on the structured review form (see Appendix VII). All peer reviewers are required to disclose their conflicts of interest.
To guide who participates, the guideline development group identifies specialty societies at the introductory meeting. O*rganizations*, not *individuals*, are specified.

The specialty societies are solicited for nominations of individual peer reviewers approximately six weeks before the final meeting. The peer review period is announced as it approaches and others interested are able to volunteer to review the draft. The chair of the AAOS committee on Evidence Based Quality and Value reviews the draft of the guideline prior to dissemination.

Some specialty societies (both orthopaedic and non-orthopaedic) ask their evidence-based practice (EBP) committee to provide review of the guideline. The organization is responsible for coordinating the distribution of our materials and consolidating their comments onto one form. The chair of the external EBP committees provides disclosure of their conflicts of interest (COI) and manages the potential conflicts of their members.

Again, the AAOS asks for comments to be assembled into a single response form by the specialty society and for the individual submitting the review to provide disclosure of potentially conflicting interests. The peer review stage gives external stakeholders an opportunity to provide evidence-based direction for modifications that they believe have been overlooked. Since the draft is subject to revisions until its approval by the AAOS Board of Directors as the final step in the guideline development process, confidentiality of all working drafts is essential.

The manager of the evidence-based medicine unit drafts the initial responses to comments that address methodology. These responses are then reviewed by the guideline development group chair and vice-chair, who respond to questions concerning clinical practice and techniques. The director of the Department of Research and Scientific Affairs provides input as well. All comments received and the initial drafts of the responses are also reviewed by all members of the guideline development group. All changes to a recommendation as a result of peer review are based on the evidence and undergoes majority vote by the guideline development group members via teleconference. Final revisions are summarized in a detailed report that is made part of the guideline document throughout the remainder of the review and approval processes.

The AAOS believes in the importance of demonstrating responsiveness to input received during the peer review process and welcomes the critiques of external specialty societies. Following final approval of the guideline, all individual responses are posted on our website http://www.aaos.org/guidelines with a point-by-point reply to each non-editorial comment. Reviewers who wish to remain anonymous notify the AAOS to have their names de-identified; their comments, our responses, and their COI disclosures are still posted.

Review of the Management of Carpal tunnel syndrome guideline was requested of 18 organizations. Seven returned comments on the structured review form (see Appendix IX).

## PUBLIC COMMENTARY

After modifying the draft in response to peer review, the guideline was subjected to a thirty day period of “Public Commentary.” Commentators consist of members of the AAOS Board of Directors (BOD), members of the Council on Research and Quality (CORQ), members of the Board of Councilors (BOC), and members of the Board of Specialty Societies (BOS). The guideline is automatically forwarded to the AAOS BOD and CORQ so that they may review it and provide comment prior to being asked to approve the document. Members of the BOC and BOS are solicited for interest. If they request to see the document, it is forwarded to them for comment. Based on these bodies, over 200 commentators have the opportunity to provide input into this guideline. Three members returned public comments.

## THE AAOS GUIDELINE APPROVAL PROCESS

This final guideline draft must be approved by the AAOS Committee on Evidence Based Quality and Value Committee, the AAOS Council on Research and Quality, and the AAOS Board of Directors. These decision-making bodies are described in Appendix II and are not designated to modify the contents. Their charge is to approve or reject its publication by majority vote.

## REVISION PLANS

This guideline represents a cross-sectional view of current treatment and may become outdated as new evidence becomes available. This guideline will be revised in accordance with new evidence, changing practice, rapidly emerging treatment options, and new technology. This guideline will be updated or withdrawn in five years in accordance with the standards of the National Guideline Clearinghouse.

## GUIDELINE DISSEMINATION PLANS

The primary purpose of the present document is to provide interested readers with full documentation about not only our recommendations, but also about how we arrived at those recommendations.

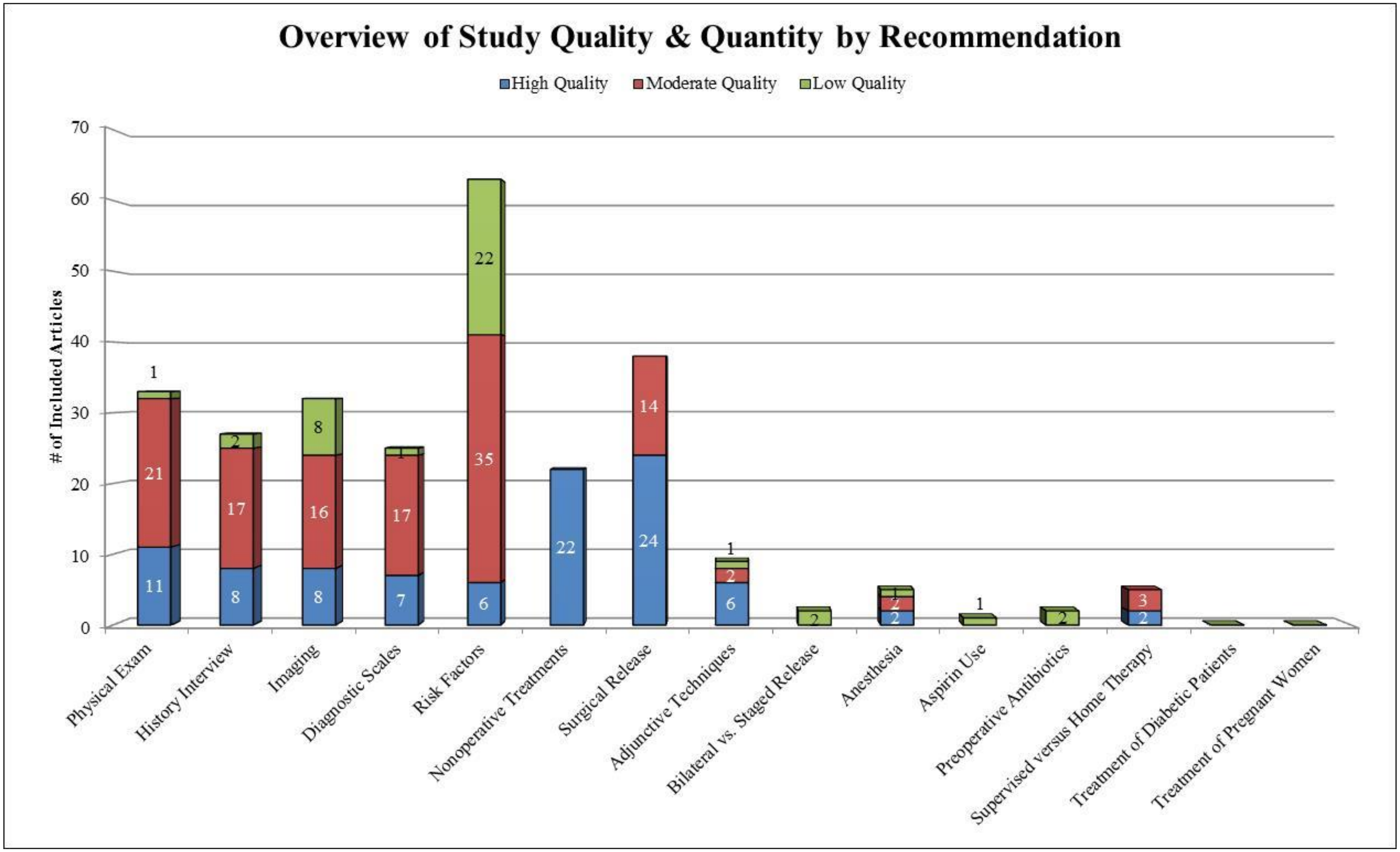
To view all AAOS published guideline recommendations in a user-friendly app, please visit www.orthoguidelines.org.

Shorter versions of the guideline are available in other venues. Publication of most guidelines is announced by an Academy press release, articles authored by the guideline development group and published in the Journal of the American Academy of Orthopaedic Surgeons, and articles published in AAOS *Now*. Most guidelines are also distributed at the AAOS Annual Meeting in various venues such as on Academy Row and at Committee Scientific Exhibits.

Selected guidelines are disseminated by webinar, an Online Module for the Orthopaedic Knowledge Online website, Radio Media Tours, Media Briefings, and by distributing them at relevant Continuing Medical Education (CME) courses and at the AAOS Resource Center.

Other dissemination efforts outside of the AAOS will include submitting the guideline to the National Guideline Clearinghouse and distributing the guideline at other medical specialty societies' meetings.

# V. Overview of Articles by Recommendation*



**Note, some articles were applicable to multiple recommendations*

# VI. FULL GUIDELINE RECOMMENDATIONS

## PHYSICAL EXAM GUIDELINE RECOMMENDATIONS

### A. OBSERVATION

Strong evidence supports Thenar atrophy is strongly associated with ruling-in carpal tunnel syndrome, but poorly associated with ruling-out carpal tunnel syndrome.

**Strength of Recommendation: Strong Evidence** ★★★★

Description: Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention.

There were two high quality (Claes, 2013; Naranjo, 2007) and two moderate quality studies (Gomes, 2006; Makanji, 2014) with strong evidence that the presence of thenar atrophy can rule in the diagnosis of CTS. Pooling the results into a meta-analysis demonstrated a strong association with electrodiagnostic studies (EDS) that used the criteria for the diagnosis of CTS established by the American Association of Electrodiagnostic Medicine (AANEM). The individual studies, as well as the meta-analysis, showed that the absence of thenar atrophy did not rule out the diagnosis of CTS. The meta-analysis did not include two moderate quality studies (De Krom, 1990 or Gerr, 1998) because of variations in the electrodiagnostic test methods and also because of the availability of higher quality evidence examining the utility of thenar atrophy. The study by Claes was somewhat limited by its exclusion of the patients with severe thenar atrophy. The studies also did not clearly differentiate loss of thenar muscle bulk on a neurogenic basis versus disuse atrophy, for example in cases of trapeziometacarpal joint osteoarthritis.

### B. PHYSICAL SIGNS

Strong evidence supports not using the Phalen Test, Tinel Sign, Flick Sign, or Upper limb neurodynamic/nerve tension test (ULNT) criterion A/B as independent physical examination maneuvers to diagnose carpal tunnel syndrome, because alone, each has a poor or weak association with ruling-in or ruling-out carpal tunnel syndrome.

**Strength of Recommendation: Strong Evidence** ★★★★

Description: Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention.

**Rationale**

Evidence from five high quality studies (Gok, 2008; Naranjo, 2007; Vanti, 2011; Vanti, 2012; Wainner, 2005) and one moderate quality study (Tan, 2012) supports not using the Phalen Test, Tinel Sign, Flick Sign, or ULNT criterion A/B as independent physical examination maneuvers to rule in or rule out the diagnosis of carpal tunnel syndrome. Each of these studies showed poor agreement with electrodiagnostic tests as the reference standard. The EDS criteria in some instances used the AANEM criteria and in others general EDS methods. A meta-analysis of the performance of the Tinel sign and Phalen test also demonstrated poor agreement to this reference standard.

---

## C. MANEUVERS

Moderate evidence supports not using the following as independent physical examination maneuvers to diagnose carpal tunnel syndrome, because alone, each has a poor or weak association with ruling-in or ruling-out carpal tunnel syndrome:

- Carpal Compression test
- Reverse Phalen Test
- Thenar Weakness or Thumb Abduction Weakness or Abductor Pollicis Brevis Manual Muscle Testing
- 2-point discrimination
- Semmes-Weinstein Monofilament Test
- CTS-Relief Maneuver (CTS-RM)
- Pin Prick Sensory Deficit; thumb or index or middle finger
- ULNT Criterion C
- Tethered median nerve stress test
- Vibration perception – tuning fork
- Scratch collapse test
- Luthy sign
- Pinwheel

**Strength of Recommendation: Moderate Evidence** ★★★☆

Description: Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.

**Rationale**

Several moderate and high quality studies provided a moderate level of evidence to suggest that the various tests listed above were not found to have been used as individual tests to rule in or rule out the diagnosis of CTS. CTS-RM had a moderate association to the reference standard when ruling-in CTS according to one high quality study (Gok, 2008) however the generalizability of these results is unclear because the study sample only contained female subjects. Meta-analysis could not be performed on any of these studies due to inconsistent reporting or lack of sufficient evidence. The reference standard for comparison was the use of either electrodiagnostic studies (EDS) following AANEM criteria or other general EDS methods. There is conflicting evidence of whether or not combining tests helps to rule in or rule out the diagnosis of CTS, as the test combinations were not validated or weighted to ensure reliability, accuracy, and/or clinical relevance; any valid scales are evaluated in the diagnostic scales recommendation.

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### Risks and Harms of Implementing the Physical Exam and History Interview Recommendations

There are no known harms associated with implementing these recommendations.

### Future Research

Future studies should define diagnostic reference standard. The development of standardized diagnostic scales and stand-alone maneuvers or tests should be evaluated against a reference standard. Studies should include appropriate blinding as well as timing between tests to allow for unbiased and accurate assessments.

# STUDY QUALITY TABLE OF PHYSICAL EXAM AND HISTORY INTERVIEW RECOMMENDATIONS

## Table 5. Diagnostic Quality Evaluations

| Study | Representative Population | Clear Selection Criteria | Detailed Enough to Replicate | Reference Standard Identifies Target Condition | Blinding | Other Bias? | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|
| Bilkis,S., 2012 | ● | ◑ | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Bland,J.D., 2000 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Boland,R.A., 2009 | ● | ● | ● | ◑ | ◑ | ◑ | Include | Moderate Quality |
| Claes,F., 2013 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Dale,A.M., 2011 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| De Krom,M.C., 1990 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| De,Smet L., 1995 | ● | ● | ● | ◑ | ○ | ● | Include | Moderate Quality |
| El,Miedany Y., 2008 | ● | ◑ | ● | ◑ | ● | ● | Include | Moderate Quality |
| Gerr,F., 1998 | ● | ● | ● | ◑ | ◑ | ◑ | Include | Moderate Quality |
| Gok,H., 2008 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Gomes,I., 2006 | ● | ● | ● | ◑ | ◑ | ◑ | Include | Moderate Quality |
| Hansen,P.A., 2004 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Heller,L., 1986 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Karl,A.I., 2001 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Katz,J.N., 1990 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Katz,J.N., 1991 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Kaul,M.P., 2000 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Kaul,M.P., 2001 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Khosrawi,S., 2012 | ● | ● | ○ | ◑ | ◑ | ● | Include | Low Quality |
| Kuhlman,K.A., 1997 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| MacDermid,J.C., 1997 | ● | ◑ | ● | ◑ | ● | ● | Include | Moderate Quality |
| Makanji,H.S., 2014 | ● | ◑ | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Naranjo,A., 2007 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Ntani,G., 2013 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Padua,L., 1999 | ● | ● | ● | ◑ | ◑ | ◑ | Include | Moderate Quality |
| Pagel,K.J., 2002 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Raudino,F., 2000 | ● | ◑ | ● | ◑ | ◑ | ● | Include | Moderate Quality |

| Study | Representative Population | Clear Selection Criteria | Detailed Enough to Replicate | Reference Standard Identifies Target Condition | Blinding | Other Bias? | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|
| Tan,S.V., 2012 | ● | ● | ● | ◑ | ● | ○ | Include | Moderate Quality |
| Vanti,C., 2011 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Vanti,C., 2012 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Wainner,R.S., 2005 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Weber,R.A., 2000 | ● | ◑ | ● | ◑ | ● | ● | Include | Moderate Quality |
| Witt,J.C., 2004 | ● | ● | ● | ◑ | ○ | ● | Include | Moderate Quality |

# RESULTS

## *SUMMARY OF DATA FINDINGS*

### *TABLE 6: SUMMARY OF FINDINGS- INDEX TEST VERSUS AANEM REFERENCED EDS*

| | LR + | LR - | |
|---|---|---|---|
| ● | >10 | <0.1 | In **"STRONG"** agreement with the reference standard |
| ◕ | >5 but <10 | >0.1 but <0.2 | In **"MODERATE"** agreement with the reference standard |
| ◔ | >2 and <5 | >0.2 but <0.5 | In **"WEAK"** agreement with the reference standard |
| ○ | <2 | >0.5 | In **"POOR"** agreement with the reference standard |

| | | **High Quality** | | | | | | | **Moderate Quality** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Index Test** | **Rule In/Out** | **Claes,F., 2013** | **Gok,H., 2008** | **Naranjo,A., 2007** | **Tan,S.V., 2012** | **Vanti,C., 2011** | **Vanti,C., 2012** | **Wainner,R.S., 2005** | ***Bland,J.D., 2000** | **Boland,R.A., 2009** | ***De Krom,M.C., 1990** | **El,Miedany Y., 2008** | ***Gerr,F., 1998** | **Gomes,I., 2006** | ***Hansen,P.A., 2004** | **Makanji,H.S., 2014** | **Padua,L., 1999** | **Raudino,F., 2000** | **Witt,J.C., 2004** | **Meta-Analysis** |
| **Carpal Compression Test (CCT)** | RULE IN | | | | | | | ○ | | | | ○ | | | | | | | | NA |
| | RULE OUT | | | | | | | ○ | | | | ○ | | | | | | | | NA |
| **Flick Sign** | RULE IN | | ◔ | | | | | ○ | ○ | | ○ | | | | ○ | | | | | NA |
| | RULE OUT | | ◔ | | | | | ◔ | ○ | | ○ | | | | ○ | | | | | NA |
| **Phalen Test** | RULE IN | | | ○ | ○ | | | ○ | | ◔ | | ○ | | ◔ | | ○ | ○ | ◔ | ○ | ○ |
| | RULE OUT | | | ○ | ○ | | | ○ | | ◔ | | ○ | | ○ | | ○ | ○ | ○ | ○ | ○ |
| **Reverse Phalen Test** | RULE IN | | | | | | | | | | | ○ | | ◔ | | | | | | NA |
| | RULE OUT | | | | | | | | | | | ○ | | ○ | | | | | | NA |
| **Thenar Weakness** | RULE IN | ◔ | | | | | | | | | | | | ○ | | | | ◔ | | NA |
| | RULE OUT | ○ | | | | | | | | | | | | ○ | | | | ○ | | NA |
| **Thumb Abduction Weakness** | RULE IN | | | | | | | | | | | | | | | ○ | | | | NA |
| | RULE OUT | | | | | | | | | | | | | | | ○ | | | | NA |
| **Thenar Atrophy** | RULE IN | ◕ | | ● | | | | | | | ◔ | | ○ | ● | | ◔ | | | | ● |
| | RULE OUT | ○ | | ○ | | | | | | | ○ | | ○ | ○ | | ○ | | | | ○ |
| **Tinel Sign** | RULE IN | | | ○ | ◔ | | | ○ | | | | ○ | | ◔ | | ○ | | ◔ | ○ | ○ |
| | RULE OUT | | | ○ | ○ | | | ○ | | | | ○ | | ○ | | ○ | | ○ | ○ | ○ |
| **ULNT1; criterion A** | RULE IN | | | | | ○ | ○ | ○ | | | | | | | | | | | | NA |
| | RULE OUT | | | | | ○ | ○ | ○ | | | | | | | | | | | | NA |
| **ULNT1; criterion B** | RULE IN | | | | | | ○ | ○ | | | | | | | | | | | | NA |
| | RULE OUT | | | | | | ○ | ○ | | | | | | | | | | | | NA |
| *Table only displays index tests with more than one article of supporting evidence* | | | | | | | | | | | | | | | | | | | | |
| **EDS method used in the study does not directly reference AAEM criteria and cannot be included in meta-analysis* | | | | | | | | | | | | | | | | | | | | |

*TABLE 7: SUMMARY OF FINDINGS- INDEX TEST VERSUS GENERAL EDS METHODS*

| | LR + | LR - | |
|---|---|---|---|
| ● | ≥10 | ≤0.1 | In **"STRONG"** agreement with the reference standard |
| ◕ | ≥5 but <10 | >0.1 but ≤0.2 | In **"MODERATE"** agreement with the reference standard |
| ◔ | >2 and <5 | >0.2 but <0.5 | In **"WEAK"** agreement with the reference standard |
| ○ | ≤2 | ≥0.5 | In **"POOR"** agreement with the reference standard |

| | | **High Quality** | | | **Moderate Quality** | | | | | | | | | | | | | | | | | | **Low Quality** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Index Test** | **Rule In/Out** | **Katz,J.N., 1990 (B)** | **Ntani,G., 2013** | **Pagel,K.J., 2002** | **Bilkis,S., 2012** | **Dale,A.M., 2011 (1)** | **Dale,A.M., 2011 (2)** | **Dale,A.M., 2011 (3)** | **Dale,A.M., 2011 (4)** | **Dale,A.M., 2011 (5)** | **Dale,A.M., 2011 (6)** | **De Krom,M.C., 1990** | **De,Smet L., 1995** | **Gerr,F., 1998** | **Hansen,P.A., 2004** | **Heller,L., 1986** | **Katz,J.N., 1991** | **Kaul,M.P., 2001** | **Kuhlman,K.A., 1997** | **MacDermid,J.C., 1997 (1)** | **MacDermid,J.C., 1997 (2)** | **Khosrawi,S., 2012** | **Meta-Analysis** |
| **2 Point Discrimination** | RULE IN | ○ | | | | | | | | | | | | ○ | | | ○ | | | | | | NA |
| | RULE OUT | ○ | | | | | | | | | | | | ○ | | | ○ | | | | | | NA |
| **Carpal Compression Test (CCT)** | RULE IN | | | | | | | | | | | ○ | | | | | | ○ | ○ | | | | NA |
| | RULE OUT | | | | | | | | | | | ○ | | | | | | ○ | ○ | | | | NA |
| **Phalen Test (PT)** | RULE IN | ○ | ○ | | ● | ○ | ○ | ○ | ◔ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ◔ | ◕ | ◕ | | ○ |
| | RULE OUT | ○ | ○ | | ◔ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ◔ | ○ | ○ | ○ | ○ | | ○ | ◕ | ◕ | | ○ |
| **Tinel Sign (TS)** | RULE IN | ○ | ○ | | | ◔ | ○ | ○ | ◔ | ○ | ○ | ○ | | ○ | ◔ | ◔ | ○ | | ○ | ◕ | ◕ | | ○ |
| | RULE OUT | ○ | ○ | | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | | ○ | ◔ | ○ | | ○ |
| **Phalen Test and Tinel Sign** | RULE IN | ○ | | | | ◔ | ○ | ○ | ◔ | ○ | ○ | | | | | ◕ | | | | | | ◔ | ○ |
| | RULE OUT | ○ | | | | ○ | ○ | ○ | ○ | ○ | ○ | | | | | ○ | | | | | | ○ | ○ |
| **Phalen Test or Tinel Sign** | RULE IN | ○ | | | | | | | | | | | | | ○ | ○ | | | | | | | NA |
| | RULE OUT | ◔ | | | | | | | | | | | | | ○ | ◔ | | | | | | | NA |
| **Semmes-Weinstein Monofilament Test (SWMF)** | RULE IN | | | ○ | | ◔ | ○ | ○ | ◔ | ○ | ○ | | | | | | | | | ◔ | ○ | | NA |
| | RULE OUT | | | ◕ | | ○ | ○ | ○ | ◔ | ○ | ○ | | | | | | | | | ◔ | ◔ | | NA |
| **Thenar Weakness** | RULE IN | | ○ | | | | | | | | | | | ○ | | | | | ○ | | | | NA |
| | RULE OUT | | ○ | | | | | | | | | | | ○ | | | | | ○ | | | | NA |

*Table only displays index tests with more than one article of supporting evidence*

*Authors with parenthetical numbers indicate a change in method of EDS, alternate limbs, or alternate examiner*

*Authors with parenthetical letters indicate a unique study with the same author and year as another study listed in the guideline*

## *DETAILED DATA FINDINGS*

### *TABLE 8: HIGH QUALITY STUDIES- PICO 1 (PHYSICAL TESTS VERSUS REFERENCE STANDARD)*

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Claes,F., 2013 | High Quality | CTS Positive (2 Point Discrimination) | clinically diagnosed CTS suspects | at least 2 of 4 abnormal EDS parameters | Subjects | index pos; 2point; SWMF; both (Nerve Conduction Studies (NCS); AANEM referenced) | 99 | index neg; 2point; SWMF; both (Nerve Conduction Studies (NCS); AANEM referenced) | 57 | 0.82\|0.14 | 0.62\|0.31 | 0.90\|1.22 | POOR | POOR |
| Claes,F., 2013 | High Quality | CTS Positive (2 Point Discrimination and Semmes-Weinstein Monofilament Test (SWMF) 1) | clinically diagnosed CTS suspects | at least 2 of 4 abnormal EDS parameters | Subjects | index pos; 2point; SWMF; both (Nerve Conduction Studies (NCS); AANEM referenced) | 119 | index neg; 2point; SWMF; both (Nerve Conduction Studies (NCS); AANEM referenced) | 37 | 0.82\|0.11 | 0.75\|0.15 | 0.88\|1.65 | POOR | POOR |
| Claes,F., 2013 | High Quality | CTS Positive (Semmes-Weinstein Monofilament Test (SWMF) 1) | clinically diagnosed CTS suspects | at least 2 of 4 abnormal EDS parameters | Subjects | index pos; 2point; SWMF; both (Nerve Conduction Studies (NCS); AANEM referenced) | 65 | index neg; 2point; SWMF; both (Nerve Conduction Studies (NCS); AANEM referenced) | 91 | 0.83\|0.16 | 0.42\|0.58 | 0.98\|1.01 | POOR | POOR |
| Claes,F., 2013 | High Quality | CTS Positive (Thenar Atrophy) | clinically diagnosed CTS suspects | at least 2 of 4 abnormal EDS parameters | Subjects | index pos; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 36 | index neg; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 120 | 0.97\|0.21 | 0.27\|0.96 | 7.00\|0.76 | MODERATE | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Claes,F., 2013 | High Quality | CTS Positive (Thenar Weakness) | clinically diagnosed CTS suspects | at least 2 of 4 abnormal EDS parameters | Subjects | index pos; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 46 | index neg; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 110 | 0.96\|0.22 | 0.34\|0.92 | 4.40\|0.72 | WEAK | POOR |
| Gok,H., 2008 | High Quality | CTS Positive (CTS-RM: Relief maneuver) | all female subjects with CTS symptoms | | Subjects | index pos; flick sign; relief maneuver (Nerve Conduction Studies (NCS); AANEM referenced) | 51 | index neg; flick sign; relief maneuver (Nerve Conduction Studies (NCS); AANEM referenced) | 36 | 0.92\|0.69 | 0.81\|0.86 | 5.88\|0.22 | MODERATE | WEAK |
| Gok,H., 2008 | High Quality | CTS Positive (CTS-RM: Relief maneuver and Flick Sign) | all female subjects with CTS symptoms | | Subjects | index pos; flick sign; relief maneuver (Nerve Conduction Studies (NCS); AANEM referenced) | 40 | index neg; flick sign; relief maneuver (Nerve Conduction Studies (NCS); AANEM referenced) | 47 | 0.95\|0.57 | 0.66\|0.93 | 9.50\|0.37 | MODERATE | WEAK |
| Gok,H., 2008 | High Quality | CTS Positive (Flick Sign) | all female subjects with CTS symptoms | | Subjects | index pos; flick sign; relief maneuver (Nerve Conduction Studies (NCS); AANEM referenced) | 46 | index neg; flick sign; relief maneuver (Nerve Conduction Studies (NCS); AANEM referenced) | 41 | 0.87\|0.56 | 0.69\|0.79 | 3.33\|0.39 | WEAK | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (2 Point Discrimination) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 27 | index neg; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 83 | 0.52\|0.64 | 0.32\|0.80 | 1.62\|0.85 | POOR | POOR |
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Phalen Test) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 68 | index neg; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 42 | 0.49\|0.74 | 0.75\|0.47 | 1.41\|0.53 | POOR | POOR |
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Phalen Test and Katz Hand Diagram; classic or probable) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 33 | index neg; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 77 | 0.67\|0.71 | 0.50\|0.83 | 3.00\|0.60 | WEAK | POOR |
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Phalen Test and Tinel Sign) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 42 | index neg; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 68 | 0.71\|0.47 | 0.45\|0.73 | 1.67\|0.75 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Phalen Test or Katz Hand Diagram; classic or probable) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 77 | index neg; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 33 | 0.47\|0.76 | 0.82\|0.38 | 1.32\|0.48 | POOR | WEAK |
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Phalen Test or Tinel Sign) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 78 | index neg; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 32 | 0.50\|0.84 | 0.89\|0.41 | 1.50\|0.28 | POOR | WEAK |
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Tinel Sign) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 48 | index neg; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 62 | 0.54\|0.71 | 0.59\|0.67 | 1.77\|0.61 | POOR | POOR |
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Tinel Sign and Katz Hand Diagram; classic or probable) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 25 | index neg; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 85 | 0.68\|0.68 | 0.39\|0.88 | 3.19\|0.70 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Tinel Sign or Katz Hand Diagram; classic or probable) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 69 | index neg; PT; TS; 2 point; combinations; combinations with katz (Nerve Conduction Studies (NCS)) | 41 | 0.52\|0.80 | 0.82\|0.50 | 1.64\|0.36 | POOR | WEAK |
| Kaul,M.P., 2000 | High Quality | CTS Positive (Tethered Median Stress Test (TMST)) | CTS suspected veterans | multiple parameters used within NCS | Subjects | index pos; TMST (Nerve Conduction Studies (NCS); AANEM referenced) | 47 | index neg; TMST (Nerve Conduction Studies (NCS); AANEM referenced) | 55 | 0.62\|0.47 | 0.50\|0.59 | 1.22\|0.85 | POOR | POOR |
| Naranjo,A., 2007 | High Quality | CTS Positive (Phalen Test) | 68 patients with suspected CTS | determined NCS and US cutoffs | Extremities | index pos; PT, TS, PT/TS (Nerve Conduction Studies (NCS); AANEM referenced) | 78 | index neg; PT, TS, PT/TS (Nerve Conduction Studies (NCS); AANEM referenced) | 27 | 0.78\|0.30 | 0.76\|0.32 | 1.12\|0.74 | POOR | POOR |
| Naranjo,A., 2007 | High Quality | CTS Positive (Phalen Test and Tinel Sign) | 68 patients with suspected CTS | determined NCS and US cutoffs | Extremities | index pos; PT, TS, PT/TS (Nerve Conduction Studies (NCS); AANEM referenced) | 81 | index neg; PT, TS, PT/TS (Nerve Conduction Studies (NCS); AANEM referenced) | 24 | 0.83\|0.46 | 0.84\|0.44 | 1.50\|0.37 | POOR | WEAK |
| Naranjo,A., 2007 | High Quality | CTS Positive (Thenar Atrophy) | 68 patients with suspected CTS | determined NCS and US cutoffs | Extremities | index pos; thenar atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 4 | index neg; thenar atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 101 | 1.00\|0.25 | 0.05\|1.00 | 10.00\|0.95 | STRONG | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Naranjo,A., 2007 | High Quality | CTS Positive (Tinel Sign) | 68 patients with suspected CTS | determined NCS and US cutoffs | Extremities | index pos; PT, TS, PT/TS (Nerve Conduction Studies (NCS); AANEM referenced) | 74 | index neg; PT, TS, PT/TS (Nerve Conduction Studies (NCS); AANEM referenced) | 31 | 0.80\|0.32 | 0.74\|0.40 | 1.23\|0.66 | POOR | POOR |
| Ntani,G., 2013 | High Quality | CTS Positive (Phalen Test) | responders from all suspected CTS out-patients | SNC abnormality | Extremities | index pos; TS; PT (Nerve Conduction Studies (NCS); Sensory Nerve Conduction (SNC)) | 865 | index neg; TS; PT (Nerve Conduction Studies (NCS); Sensory Nerve Conduction (SNC)) | 696 | 0.89\|0.18 | 0.57\|0.56 | 1.32\|0.76 | POOR | POOR |
| Ntani,G., 2013 | High Quality | CTS Positive (Thenar Weakness) | responders from all suspected CTS out-patients | SNC abnormality | Extremities | index pos; thenar weakness; pain (Nerve Conduction Studies (NCS); Sensory Nerve Conduction (SNC)) | 162 | index neg; thenar weakness; pain (Nerve Conduction Studies (NCS); Sensory Nerve Conduction (SNC)) | 1403 | 0.81\|0.13 | 0.10\|0.86 | 0.70\|1.05 | POOR | POOR |
| Ntani,G., 2013 | High Quality | CTS Positive (Tinel Sign) | responders from all suspected CTS out-patients | SNC abnormality | Extremities | index pos; TS; PT (Nerve Conduction Studies (NCS); Sensory Nerve Conduction (SNC)) | 451 | index neg; TS; PT (Nerve Conduction Studies (NCS); Sensory Nerve Conduction (SNC)) | 1110 | 0.88\|0.15 | 0.29\|0.74 | 1.14\|0.95 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pagel,K.J., 2002 | High Quality | CTS Positive (Semmes-Weinstein Monofilament Test (SWMF) 1) | symptoms of suspected CTS | two cutoff values for each SWMF method; NCS by palm diff median to ulnar latency | Subjects | index pos; SWMF 1, 2 (Nerve Conduction Studies (NCS)) | 104 | index neg; SWMF 1, 2 (Nerve Conduction Studies (NCS)) | 9 | 0.57\|0.89 | 0.98\|0.15 | 1.16\|0.11 | POOR | MODERATE |
| Pagel,K.J., 2002 | High Quality | CTS Positive (Semmes-Weinstein Monofilament Test (SWMF) 2) | symptoms of suspected CTS | two cutoff values for each SWMF method; NCS by palm diff median to ulnar latency | Subjects | index pos; SWMF 1, 2 (Nerve Conduction Studies (NCS)) | 15 | index neg; SWMF 1, 2 (Nerve Conduction Studies (NCS)) | 98 | 0.53\|0.47 | 0.13\|0.87 | 1.01\|1.00 | POOR | POOR |
| Tan,S.V., 2012 | Moderate Quality | CTS Positive (Phalen Test) | limbs of 100 CTS suspects | at least 2 abnormal EDS parameters | Extremities | index pos; PT; TS (Nerve Conduction Studies (NCS); AANEM referenced) | 65 | index neg; PT; TS (Nerve Conduction Studies (NCS); AANEM referenced) | 135 | 0.65\|0.58 | 0.42\|0.77 | 1.86\|0.75 | POOR | POOR |
| Tan,S.V., 2012 | Moderate Quality | CTS Positive (Tinel Sign) | limbs of 100 CTS suspects | at least 2 abnormal EDS parameters | Extremities | index pos; PT; TS (Nerve Conduction Studies (NCS); AANEM referenced) | 39 | index neg; PT; TS (Nerve Conduction Studies (NCS); AANEM referenced) | 161 | 0.72\|0.56 | 0.28\|0.89 | 2.60\|0.80 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vanti,C., 2011 | High Quality | CTS Positive (ULNT1; criterion A) | 47 clinical CTS suspects; 3 did not complete tests | symptoms and reduced scv-wp | Subjects | index pos; ULNT1, A, A/B/C (Nerve Conduction Studies (NCS); AANEM referenced) | 19 | index neg; ULNT1, A, A/B/C (Nerve Conduction Studies (NCS); AANEM referenced) | 25 | 0.68\|0.56 | 0.54\|0.70 | 1.81\|0.65 | POOR | POOR |
| Vanti,C., 2011 | High Quality | CTS Positive (ULNT1; criterion A, B, and C) | 47 clinical CTS suspects; 3 did not complete tests | symptoms and reduced scv-wp | Subjects | index pos; ULNT1, A, A/B/C (Nerve Conduction Studies (NCS); AANEM referenced) | 39 | index neg; ULNT1, A, A/B/C (Nerve Conduction Studies (NCS); AANEM referenced) | 5 | 0.56\|0.60 | 0.92\|0.15 | 1.08\|0.56 | POOR | POOR |
| Vanti,C., 2012 | High Quality | CTS Positive (ULNT1; criterion A) | limbs of 47 patients | | Extremities | index pos; ULNT1, A, B, C (Nerve Conduction Studies (NCS); AANEM referenced) | 24 | index neg; ULNT1, A, B, C (Nerve Conduction Studies (NCS); AANEM referenced) | 60 | 0.58\|0.65 | 0.40\|0.80 | 1.96\|0.75 | POOR | POOR |
| Vanti,C., 2012 | High Quality | CTS Positive (ULNT1; criterion B) | limbs of 47 patients | | Extremities | index pos; ULNT1, A, B, C (Nerve Conduction Studies (NCS); AANEM referenced) | 18 | index neg; ULNT1, A, B, C (Nerve Conduction Studies (NCS); AANEM referenced) | 62 | 0.56\|0.60 | 0.29\|0.82 | 1.61\|0.87 | POOR | POOR |
| Vanti,C., 2012 | High Quality | CTS Positive (ULNT1; criterion C) | limbs of 47 patients | | Extremities | index pos; ULNT1, A, B, C (Nerve Conduction Studies (NCS); AANEM referenced) | 5 | index neg; ULNT1, A, B, C (Nerve Conduction Studies (NCS); AANEM referenced) | 75 | 0.40\|0.56 | 0.06\|0.93 | 0.86\|1.01 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wainner,R.S., 2005 | High Quality | CTS Positive (Abductor Pollicis Brevis Manual Muscle Testing) | CTS and cervical radiculopathy suspects | | Subjects | index pos; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 11 | index neg; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 71 | 0.45\|0.68 | 0.18\|0.89 | 1.61\|0.92 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Carpal Compression Test (CCT)) | CTS and cervical radiculopathy suspects | | Subjects | index pos; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 56 | index neg; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 26 | 0.32\|0.62 | 0.64\|0.30 | 0.91\|1.21 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Flick Sign) | CTS and cervical radiculopathy suspects | | Subjects | index pos; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 46 | index neg; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 36 | 0.50\|0.86 | 0.82\|0.57 | 1.93\|0.31 | POOR | WEAK |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Phalen Test) | CTS and cervical radiculopathy suspects | | Subjects | index pos; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 54 | index neg; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 28 | 0.41\|0.79 | 0.79\|0.41 | 1.33\|0.53 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wainner,R.S., 2005 | High Quality | CTS Positive (Sensory Deficit; pin prick; index finger) | CTS and cervical radiculopathy suspects | | Subjects | index pos; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 33 | index neg; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 49 | 0.45\|0.73 | 0.54\|0.67 | 1.61\|0.70 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Sensory Deficit; pin prick; middle finger) | CTS and cervical radiculopathy suspects | | Subjects | index pos; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 26 | index neg; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 56 | 0.46\|0.71 | 0.43\|0.74 | 1.65\|0.77 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Sensory Deficit; pin prick; thumb) | CTS and cervical radiculopathy suspects | | Subjects | index pos; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 34 | index neg; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 48 | 0.53\|0.79 | 0.64\|0.70 | 2.17\|0.51 | WEAK | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Tinel Sign) | CTS and cervical radiculopathy suspects | | Subjects | index pos; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 34 | index neg; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 48 | 0.32\|0.65 | 0.39\|0.57 | 0.92\|1.06 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wainner,R.S., 2005 | High Quality | CTS Positive (Tinel Sign 2) | CTS and cervical radiculopathy suspects | | Subjects | index pos; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 31 | index neg; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 51 | 0.42\|0.71 | 0.46\|0.67 | 1.39\|0.80 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (ULNT1; criterion A) | CTS and cervical radiculopathy suspects | | Subjects | index pos; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 68 | index neg; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 14 | 0.31\|0.50 | 0.75\|0.13 | 0.86\|1.93 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (ULNT1; criterion B) | CTS and cervical radiculopathy suspects | | Subjects | index pos; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 56 | index neg; ULNT1, A, B; TS, TS 2; CCT; PT; Flick (Nerve Conduction Studies (NCS); AANEM referenced) | 26 | 0.32\|0.62 | 0.64\|0.30 | 0.91\|1.21 | POOR | POOR |

## *TABLE 9: MODERATE QUALITY STUDIES- PICO 1 (PHYSICAL TESTS VERSUS REFERENCE STANDARD)*

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bilkis,S., 2012 | Moderate Quality | CTS Positive (Modified Phalen Test) | 37 patients with comorbidities excluded | determined mixed nerve NCS cutoffs | Extremities | index pos; PT; MPT (Nerve Conduction Studies (NCS)) | 39 | index neg; PT; MPT (Nerve Conduction Studies (NCS)) | 27 | 1.00\|0.74 | 0.85\|1.00 | 10.00\|0.15 | STRONG | MODERATE |
| Bilkis,S., 2012 | Moderate Quality | CTS Positive (Phalen Test) | 37 patients with comorbidities excluded | determined mixed nerve NCS cutoffs | Extremities | index pos; PT; MPT (Nerve Conduction Studies (NCS)) | 23 | index neg; PT; MPT (Nerve Conduction Studies (NCS)) | 43 | 1.00\|0.47 | 0.50\|1.00 | 10.00\|0.50 | STRONG | WEAK |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Flick Sign) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Flick (Nerve Conduction Studies (NCS)) | 4093 | index neg; Flick (Nerve Conduction Studies (NCS)) | 4130 | 0.64\|0.50 | 0.56\|0.59 | 1.37\|0.74 | POOR | POOR |
| Boland,R.A., 2009 | Moderate Quality | CTS Positive (Modified Carpal Compression Test (MCCT)) | 43 hands of CTS suspects | referenced median and mixed nerve cutoffs | Extremities | index pos; PT; MCCT; PT or MCCT with no thenar sensory deficit (Nerve Conduction Studies (NCS); AANEM referenced) | 10 | index neg; PT; MCCT; PT or MCCT with no thenar sensory deficit (Nerve Conduction Studies (NCS); AANEM referenced) | 76 | 1.00\|0.16 | 0.14\|1.00 | 10.00\|0.86 | STRONG | POOR |
| Boland,R.A., 2009 | Moderate Quality | CTS Positive (Modified Carpal Compression Test (MCCT) and no thenar sensory deficit) | 43 hands of CTS suspects | referenced median and mixed nerve cutoffs | Extremities | index pos; PT; MCCT; PT or MCCT with no thenar sensory deficit (Nerve Conduction Studies (NCS); AANEM referenced) | 9 | index neg; PT; MCCT; PT or MCCT with no thenar sensory deficit (Nerve Conduction Studies (NCS); AANEM referenced) | 77 | 1.00\|0.16 | 0.12\|1.00 | 10.00\|0.88 | STRONG | POOR |
| Boland,R.A., 2009 | Moderate Quality | CTS Positive (Phalen Test) | 43 hands of CTS suspects | referenced median and mixed nerve cutoffs | Extremities | index pos; PT; MCCT; PT or MCCT with no thenar sensory deficit (Nerve Conduction Studies (NCS); AANEM referenced) | 50 | index neg; PT; MCCT; PT or MCCT with no thenar sensory deficit (Nerve Conduction Studies (NCS); AANEM referenced) | 36 | 0.94\|0.25 | 0.64\|0.75 | 2.54\|0.49 | WEAK | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boland,R.A., 2009 | Moderate Quality | CTS Positive (Phalen Test and no thenar sensory deficit) | 43 hands of CTS suspects | referenced median and mixed nerve cutoffs | Extremities | index pos; PT; MCCT; PT or MCCT with no thenar sensory deficit (Nerve Conduction Studies (NCS); AANEM referenced) | 44 | index neg; PT; MCCT; PT or MCCT with no thenar sensory deficit (Nerve Conduction Studies (NCS); AANEM referenced) | 42 | 0.93\|0.21 | 0.55\|0.75 | 2.22\|0.59 | WEAK | POOR |
| Dale,A.M., 2011 (1) | Moderate Quality | CTS Positive (At least Phalen Test, Tinel Sign, or Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 423 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 685 | 0.02\|0.99 | 0.64\|0.62 | 1.68\|0.59 | POOR | POOR |
| Dale,A.M., 2011 (1) | Moderate Quality | CTS Positive (Phalen Test) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 102 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1006 | 0.02\|0.99 | 0.18\|0.91 | 1.99\|0.90 | POOR | POOR |
| Dale,A.M., 2011 (1) | Moderate Quality | CTS Positive (Phalen Test and Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 32 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1076 | 0.06\|0.99 | 0.18\|0.97 | 6.65\|0.84 | MODERATE | POOR |
| Dale,A.M., 2011 (1) | Moderate Quality | CTS Positive (Phalen Test and Tinel Sign) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 25 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1083 | 0.04\|0.99 | 0.09\|0.98 | 4.16\|0.93 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dale,A.M., 2011 (1) | Moderate Quality | CTS Positive (Phalen Test, Tinel Sign, and Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 8 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1100 | 0.13\|0.99 | 0.09\|0.99 | 14.25\|0.91 | STRONG | POOR |
| Dale,A.M., 2011 (1) | Moderate Quality | CTS Positive (Semmes-Weinstein Monofilament Test (SWMF) 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 291 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 817 | 0.02\|0.99 | 0.55\|0.74 | 2.10\|0.61 | WEAK | POOR |
| Dale,A.M., 2011 (1) | Moderate Quality | CTS Positive (Tinel Sign) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 120 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 988 | 0.03\|0.99 | 0.27\|0.89 | 2.56\|0.81 | WEAK | POOR |
| Dale,A.M., 2011 (1) | Moderate Quality | CTS Positive (Tinel Sign and Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 39 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1069 | 0.05\|0.99 | 0.18\|0.97 | 5.39\|0.85 | MODERATE | POOR |
| Dale,A.M., 2011 (2) | Moderate Quality | CTS Positive (At least Phalen Test, Tinel Sign, or Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 421 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 687 | 0.30\|0.80 | 0.49\|0.65 | 1.40\|0.79 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dale,A.M., 2011 (2) | Moderate Quality | CTS Positive (Phalen Test) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 101 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 1007 | 0.30\|0.77 | 0.11\|0.92 | 1.36\|0.97 | POOR | POOR |
| Dale,A.M., 2011 (2) | Moderate Quality | CTS Positive (Phalen Test and Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 31 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 1077 | 0.39\|0.77 | 0.05\|0.98 | 2.03\|0.98 | WEAK | POOR |
| Dale,A.M., 2011 (2) | Moderate Quality | CTS Positive (Phalen Test and Tinel Sign) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 25 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 1083 | 0.24\|0.76 | 0.02\|0.98 | 1.01\|1.00 | POOR | POOR |
| Dale,A.M., 2011 (2) | Moderate Quality | CTS Positive (Phalen Test, Tinel Sign, and Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 7 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 1101 | 0.14\|0.76 | 0.00\|0.99 | 0.54\|1.00 | POOR | POOR |
| Dale,A.M., 2011 (2) | Moderate Quality | CTS Positive (Semmes-Weinstein Monofilament Test (SWMF) 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 290 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 818 | 0.32\|0.79 | 0.36\|0.77 | 1.54\|0.84 | POOR | POOR |
| Dale,A.M., 2011 (2) | Moderate Quality | CTS Positive (Tinel Sign) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 120 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 988 | 0.29\|0.77 | 0.13\|0.90 | 1.32\|0.96 | POOR | POOR |
| Dale,A.M., 2011 (2) | Moderate Quality | CTS Positive (Tinel Sign and Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 39 | index neg; LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 1069 | 0.36\|0.77 | 0.05\|0.97 | 1.80\|0.98 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dale,A.M., 2011 (3) | Moderate Quality | CTS Positive (At least Phalen Test, Tinel Sign, or Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 443 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 665 | 0.37\|0.79 | 0.54\|0.65 | 1.57\|0.70 | POOR | POOR |
| Dale,A.M., 2011 (3) | Moderate Quality | CTS Positive (Phalen Test) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 104 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 1004 | 0.36\|0.73 | 0.12\|0.92 | 1.45\|0.96 | POOR | POOR |
| Dale,A.M., 2011 (3) | Moderate Quality | CTS Positive (Phalen Test and Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 51 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 1057 | 0.49\|0.73 | 0.08\|0.97 | 2.52\|0.95 | WEAK | POOR |
| Dale,A.M., 2011 (3) | Moderate Quality | CTS Positive (Phalen Test and Tinel Sign) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 35 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 1073 | 0.37\|0.73 | 0.04\|0.97 | 1.55\|0.98 | POOR | POOR |
| Dale,A.M., 2011 (3) | Moderate Quality | CTS Positive (Phalen Test, Tinel Sign, and Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 20 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 1088 | 0.35\|0.73 | 0.02\|0.98 | 1.41\|0.99 | POOR | POOR |
| Dale,A.M., 2011 (3) | Moderate Quality | CTS Positive (Semmes-Weinstein Monofilament Test (SWMF) 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 340 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 768 | 0.41\|0.78 | 0.45\|0.75 | 1.79\|0.73 | POOR | POOR |
| Dale,A.M., 2011 (3) | Moderate Quality | CTS Positive (Tinel Sign) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 127 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 981 | 0.40\|0.74 | 0.17\|0.91 | 1.76\|0.92 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dale,A.M., 2011 (3) | Moderate Quality | CTS Positive (Tinel Sign and Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 59 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS)) | 1049 | 0.49\|0.74 | 0.09\|0.96 | 2.53\|0.94 | WEAK | POOR |
| Dale,A.M., 2011 (4) | Moderate Quality | CTS Positive (At least Phalen Test, Tinel Sign, or Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 445 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 663 | 0.04\|0.99 | 0.67\|0.60 | 1.68\|0.55 | POOR | POOR |
| Dale,A.M., 2011 (4) | Moderate Quality | CTS Positive (Phalen Test) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 105 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1003 | 0.07\|0.98 | 0.29\|0.91 | 3.23\|0.78 | WEAK | POOR |
| Dale,A.M., 2011 (4) | Moderate Quality | CTS Positive (Phalen Test and Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 51 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1057 | 0.14\|0.98 | 0.29\|0.96 | 7.19\|0.74 | MODERATE | POOR |
| Dale,A.M., 2011 (4) | Moderate Quality | CTS Positive (Phalen Test and Tinel Sign) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 36 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1072 | 0.06\|0.98 | 0.08\|0.97 | 2.66\|0.95 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dale,A.M., 2011 (4) | Moderate Quality | CTS Positive (Phalen Test, Tinel Sign, and Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 19 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1089 | 0.11\|0.98 | 0.08\|0.98 | 5.31\|0.93 | MODERATE | POOR |
| Dale,A.M., 2011 (4) | Moderate Quality | CTS Positive (Semmes-Weinstein Monofilament Test (SWMF) 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 342 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 766 | 0.05\|0.99 | 0.67\|0.70 | 2.22\|0.48 | WEAK | WEAK |
| Dale,A.M., 2011 (4) | Moderate Quality | CTS Positive (Tinel Sign) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 127 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 981 | 0.05\|0.98 | 0.25\|0.89 | 2.24\|0.84 | WEAK | POOR |
| Dale,A.M., 2011 (4) | Moderate Quality | CTS Positive (Tinel Sign and Semmes-Weinstein Monofilament Test 1) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 60 | index neg; RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1048 | 0.10\|0.98 | 0.25\|0.95 | 5.02\|0.79 | MODERATE | POOR |
| Dale,A.M., 2011 (5) | Moderate Quality | CTS Positive (At least Phalen Test, Tinel Sign, or Semmes-Weinstein Monofilament Test 1) | 76 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 44 | index neg; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 32 | 0.16\|0.88 | 0.64\|0.43 | 1.12\|0.84 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dale,A.M., 2011 (5) | Moderate Quality | CTS Positive (Phalen Test) | 76 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 20 | index neg; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 56 | 0.10\|0.84 | 0.18\|0.72 | 0.66\|1.13 | POOR | POOR |
| Dale,A.M., 2011 (5) | Moderate Quality | CTS Positive (Phalen Test and Semmes-Weinstein Monofilament Test 1) | 76 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 8 | index neg; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 68 | 0.25\|0.87 | 0.18\|0.91 | 1.97\|0.90 | POOR | POOR |
| Dale,A.M., 2011 (5) | Moderate Quality | CTS Positive (Phalen Test and Tinel Sign) | 76 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 6 | index neg; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 70 | 0.17\|0.86 | 0.09\|0.92 | 1.18\|0.98 | POOR | POOR |
| Dale,A.M., 2011 (5) | Moderate Quality | CTS Positive (Phalen Test, Tinel Sign, and Semmes-Weinstein Monofilament Test 1) | 76 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 2 | index neg; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 74 | 0.50\|0.86 | 0.09\|0.98 | 5.91\|0.92 | MODERATE | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dale,A.M., 2011 (5) | Moderate Quality | CTS Positive (Semmes-Weinstein Monofilament Test (SWMF) 1) | 76 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 30 | index neg; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 46 | 0.20\|0.89 | 0.55\|0.63 | 1.48\|0.72 | POOR | POOR |
| Dale,A.M., 2011 (5) | Moderate Quality | CTS Positive (Tinel Sign) | 76 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 14 | index neg; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 62 | 0.21\|0.87 | 0.27\|0.83 | 1.61\|0.88 | POOR | POOR |
| Dale,A.M., 2011 (5) | Moderate Quality | CTS Positive (Tinel Sign and Semmes-Weinstein Monofilament Test 1) | 76 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 8 | index neg; SYMPT: LEFT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 68 | 0.25\|0.87 | 0.18\|0.91 | 1.97\|0.90 | POOR | POOR |
| Dale,A.M., 2011 (6) | Moderate Quality | CTS Positive (At least Phalen Test, Tinel Sign, or Semmes-Weinstein Monofilament Test 1) | 113 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 73 | index neg; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 40 | 0.19\|0.83 | 0.67\|0.36 | 1.04\|0.93 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dale,A.M., 2011 (6) | Moderate Quality | CTS Positive (Phalen Test) | 113 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 28 | index neg; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 85 | 0.21\|0.82 | 0.29\|0.76 | 1.19\|0.94 | POOR | POOR |
| Dale,A.M., 2011 (6) | Moderate Quality | CTS Positive (Phalen Test and Semmes-Weinstein Monofilament Test 1) | 113 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 19 | index neg; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 94 | 0.32\|0.84 | 0.29\|0.86 | 2.02\|0.83 | WEAK | POOR |
| Dale,A.M., 2011 (6) | Moderate Quality | CTS Positive (Phalen Test and Tinel Sign) | 113 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 9 | index neg; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 104 | 0.22\|0.82 | 0.10\|0.92 | 1.25\|0.98 | POOR | POOR |
| Dale,A.M., 2011 (6) | Moderate Quality | CTS Positive (Phalen Test, Tinel Sign, and Semmes-Weinstein Monofilament Test 1) | 113 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 5 | index neg; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 108 | 0.40\|0.82 | 0.10\|0.97 | 2.92\|0.94 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dale,A.M., 2011 (6) | Moderate Quality | CTS Positive (Semmes-Weinstein Monofilament Test (SWMF) 1) | 113 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 59 | index neg; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 54 | 0.24\|0.87 | 0.67\|0.51 | 1.36\|0.65 | POOR | POOR |
| Dale,A.M., 2011 (6) | Moderate Quality | CTS Positive (Tinel Sign) | 113 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 26 | index neg; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 87 | 0.19\|0.82 | 0.24\|0.77 | 1.04\|0.99 | POOR | POOR |
| Dale,A.M., 2011 (6) | Moderate Quality | CTS Positive (Tinel Sign and Semmes-Weinstein Monofilament Test 1) | 113 clinically suspected symptomatic hands | sensory, motor, and MUDS cutoffs | Extremities | index pos; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 17 | index neg; SYMPT: RIGHT HAND; PT; TS; SWMF1; combinations (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 96 | 0.29\|0.83 | 0.24\|0.87 | 1.83\|0.88 | POOR | POOR |
| De Krom,M.C., 1990 | Moderate Quality | CTS Positive (Abductor Pollicis Brevis Paresis) | random selection of general pop with 50 that admitted to persistent CTS symptoms | DML and DSL with referenced normal values | Extremities | index pos; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 27 | index neg; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 66 | 0.63\|0.59 | 0.39\|0.80 | 1.89\|0.77 | POOR | POOR |
| De Krom,M.C., 1990 | Moderate Quality | CTS Positive (Carpal Compression Test (CCT)) | random selection of general pop with 50 that admitted to persistent CTS symptoms | DML and DSL with referenced normal values | Extremities | index pos; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 5 | index neg; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 88 | 0.40\|0.52 | 0.05\|0.94 | 0.74\|1.02 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| De Krom,M.C., 1990 | Moderate Quality | CTS Positive (Flick Sign) | random selection of general pop with 50 that admitted to persistent CTS symptoms | DML and DSL with referenced normal values | Extremities | index pos; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 41 | index neg; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 52 | 0.54\|0.58 | 0.50\|0.61 | 1.29\|0.82 | POOR | POOR |
| De Krom,M.C., 1990 | Moderate Quality | CTS Positive (Hypalgesia; pinwheel) | random selection of general pop with 50 that admitted to persistent CTS symptoms | DML and DSL with referenced normal values | Extremities | index pos; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 37 | index neg; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 56 | 0.46\|0.52 | 0.39\|0.59 | 0.95\|1.04 | POOR | POOR |
| De Krom,M.C., 1990 | Moderate Quality | CTS Positive (Hyperpathia; pinwheel) | random selection of general pop with 50 that admitted to persistent CTS symptoms | DML and DSL with referenced normal values | Extremities | index pos; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 16 | index neg; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 77 | 0.69\|0.57 | 0.25\|0.90 | 2.45\|0.84 | WEAK | POOR |
| De Krom,M.C., 1990 | Moderate Quality | CTS Positive (Luthy Sign) | random selection of general pop with 50 that admitted to persistent CTS symptoms | DML and DSL with referenced normal values | Extremities | index pos; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 32 | index neg; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 61 | 0.59\|0.59 | 0.43\|0.73 | 1.63\|0.77 | POOR | POOR |
| De Krom,M.C., 1990 | Moderate Quality | CTS Positive (Opponens Pollicis Paresis) | random selection of general pop with 50 that admitted to persistent CTS symptoms | DML and DSL with referenced normal values | Extremities | index pos; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 12 | index neg; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 81 | 0.42\|0.52 | 0.11\|0.86 | 0.80\|1.03 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| De Krom,M.C., 1990 | Moderate Quality | CTS Positive (Phalen Test) | random selection of general pop with 50 that admitted to persistent CTS symptoms | DML and DSL with referenced normal values | Extremities | index pos; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 43 | index neg; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 48 | 0.49\|0.52 | 0.48\|0.53 | 1.02\|0.98 | POOR | POOR |
| De Krom,M.C., 1990 | Moderate Quality | CTS Positive (Reverse Phalen Test) | random selection of general pop with 50 that admitted to persistent CTS symptoms | DML and DSL with referenced normal values | Extremities | index pos; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 40 | index neg; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 53 | 0.45\|0.51 | 0.41\|0.55 | 0.91\|1.07 | POOR | POOR |
| De Krom,M.C., 1990 | Moderate Quality | CTS Positive (Thenar Atrophy) | random selection of general pop with 50 that admitted to persistent CTS symptoms | DML and DSL with referenced normal values | Extremities | index pos; thenar atrophy (Nerve Conduction Studies (NCS)) | 10 | index neg; thenar atrophy (Nerve Conduction Studies (NCS)) | 83 | 0.70\|0.55 | 0.16\|0.94 | 2.60\|0.90 | WEAK | POOR |
| De Krom,M.C., 1990 | Moderate Quality | CTS Positive (Tinel Sign) | random selection of general pop with 50 that admitted to persistent CTS symptoms | DML and DSL with referenced normal values | Extremities | index pos; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 31 | index neg; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 62 | 0.35\|0.47 | 0.25\|0.59 | 0.61\|1.27 | POOR | POOR |
| De Krom,M.C., 1990 | Moderate Quality | CTS Positive (Tourniquet Test) | random selection of general pop with 50 that admitted to persistent CTS symptoms | DML and DSL with referenced normal values | Extremities | index pos; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 70 | index neg; Flick; PT; TS; RPT; CCT; Luthy; Hypagalsia; Hyperpathia; Thenar; OP; APB; tourniquet (Nerve Conduction Studies (NCS)) | 21 | 0.44\|0.38 | 0.70\|0.17 | 0.85\|1.74 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| De,Smet L., 1995 | Moderate Quality | CTS Positive (Durkan Test) | 54 confirmed CTS limbs; 12 symptomatic unconfirmed | Slowing conduction velocity and DML | Extremities | index pos; PT; Durkan (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 42 | index neg; PT; Durkan (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 24 | 0.81\|0.17 | 0.63\|0.33 | 0.94\|1.11 | POOR | POOR |
| De,Smet L., 1995 | Moderate Quality | CTS Positive (Phalen Test) | 54 confirmed CTS limbs; 12 symptomatic unconfirmed | Slowing conduction velocity and DML | Extremities | index pos; PT; Durkan (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 57 | index neg; PT; Durkan (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 9 | 0.86\|0.44 | 0.91\|0.33 | 1.36\|0.28 | POOR | WEAK |
| El,Miedany Y., 2008 | Moderate Quality | CTS Positive (Carpal Compression Test (CCT)) | clinically diagnosed CTS suspects; large tenosynovitis prevalence | comparative, sensory, or motor abnormality | Subjects | index pos; PT; TS; RPT; CCT (Nerve Conduction Studies (NCS); AANEM referenced) | 120 | index neg; PT; TS; RPT; CCT (Nerve Conduction Studies (NCS); AANEM referenced) | 112 | 0.70\|0.11 | 0.46\|0.25 | 0.61\|2.17 | POOR | POOR |
| El,Miedany Y., 2008 | Moderate Quality | CTS Positive (Phalen Test) | clinically diagnosed CTS suspects; large tenosynovitis prevalence | comparative, sensory, or motor abnormality | Subjects | index pos; PT; TS; RPT; CCT (Nerve Conduction Studies (NCS); AANEM referenced) | 127 | index neg; PT; TS; RPT; CCT (Nerve Conduction Studies (NCS); AANEM referenced) | 105 | 0.69\|0.08 | 0.47\|0.17 | 0.57\|3.16 | POOR | POOR |
| El,Miedany Y., 2008 | Moderate Quality | CTS Positive (Reverse Phalen Test) | clinically diagnosed CTS suspects; large tenosynovitis prevalence | comparative, sensory, or motor abnormality | Subjects | index pos; PT; TS; RPT; CCT (Nerve Conduction Studies (NCS); AANEM referenced) | 108 | index neg; PT; TS; RPT; CCT (Nerve Conduction Studies (NCS); AANEM referenced) | 124 | 0.71\|0.14 | 0.42\|0.35 | 0.65\|1.64 | POOR | POOR |
| El,Miedany Y., 2008 | Moderate Quality | CTS Positive (Tinel Sign) | clinically diagnosed CTS suspects; large tenosynovitis prevalence | comparative, sensory, or motor abnormality | Subjects | index pos; PT; TS; RPT; CCT (Nerve Conduction Studies (NCS); AANEM referenced) | 72 | index neg; PT; TS; RPT; CCT (Nerve Conduction Studies (NCS); AANEM referenced) | 160 | 0.76\|0.19 | 0.30\|0.65 | 0.84\|1.09 | POOR | POOR |
| Gerr,F., 1998 | Moderate Quality | CTS Positive (2 Point Discrimination) | 60 symptomatic patient hands suspected of CTS | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; PT; TS; vib perception; 2point (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 21 | index neg; PT; TS; vib perception; 2point (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 94 | 0.43\|0.49 | 0.16\|0.79 | 0.76\|1.06 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gerr,F., 1998 | Moderate Quality | CTS Positive (Phalen Test) | 60 symptomatic patient hands suspected of CTS | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; PT; TS; vib perception; 2point (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 48 | index neg; PT; TS; vib perception; 2point (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 67 | 0.52\|0.52 | 0.44\|0.60 | 1.11\|0.93 | POOR | POOR |
| Gerr,F., 1998 | Moderate Quality | CTS Positive (Thenar Atrophy) | 60 symptomatic patient hands suspected of CTS | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; thenar weakness; thenar atrophy (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 15 | index neg; thenar weakness; thenar atrophy (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 100 | 0.60\|0.52 | 0.16\|0.90 | 1.53\|0.94 | POOR | POOR |
| Gerr,F., 1998 | Moderate Quality | CTS Positive (Thenar Weakness) | 60 symptomatic patient hands suspected of CTS | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; thenar weakness; thenar atrophy (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 34 | index neg; thenar weakness; thenar atrophy (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 81 | 0.62\|0.56 | 0.37\|0.78 | 1.64\|0.81 | POOR | POOR |
| Gerr,F., 1998 | Moderate Quality | CTS Positive (Tinel Sign) | 60 symptomatic patient hands suspected of CTS | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; PT; TS; vib perception; 2point (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 19 | index neg; PT; TS; vib perception; 2point (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 96 | 0.42\|0.49 | 0.14\|0.81 | 0.74\|1.06 | POOR | POOR |
| Gerr,F., 1998 | Moderate Quality | CTS Positive (Vibration Perception; tuning fork; index finger) | 60 symptomatic patient hands suspected of CTS | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; PT; TS; vib perception; 2point (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 30 | index neg; PT; TS; vib perception; 2point (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 85 | 0.67\|0.56 | 0.35\|0.83 | 2.04\|0.78 | WEAK | POOR |
| Gomes,I., 2006 | Moderate Quality | CTS Positive (At least Phalen Test, Tinel Sign, or Reverse Phalen Test) | subset of total 3907 limbs examined from NCS referred patients | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; PT; TS; RPT; PT, RPT, or TS (Nerve Conduction Studies (NCS); AANEM referenced) | 442 | index neg; PT; TS; RPT; PT, RPT, or TS (Nerve Conduction Studies (NCS); AANEM referenced) | 485 | 0.59\|0.73 | 0.66\|0.66 | 1.94\|0.51 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Phalen Test) | subset of total 3907 limbs examined from NCS referred patients | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; PT; TS; RPT; PT, RPT, or TS (Nerve Conduction Studies (NCS); AANEM referenced) | 366 | index neg; PT; TS; RPT; PT, RPT, or TS (Nerve Conduction Studies (NCS); AANEM referenced) | 561 | 0.60\|0.70 | 0.56\|0.73 | 2.07\|0.60 | WEAK | POOR |
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Reverse Phalen Test) | subset of total 3907 limbs examined from NCS referred patients | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; PT; TS; RPT; PT, RPT, or TS (Nerve Conduction Studies (NCS); AANEM referenced) | 279 | index neg; PT; TS; RPT; PT, RPT, or TS (Nerve Conduction Studies (NCS); AANEM referenced) | 648 | 0.64\|0.67 | 0.46\|0.81 | 2.42\|0.67 | WEAK | POOR |
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Thenar Atrophy) | 2535 patients referred for NCS from 5 facilities | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 54 | index neg; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 873 | 0.91\|0.61 | 0.13\|0.99 | 13.43\|0.88 | STRONG | POOR |
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Thenar Weakness) | 2535 patients referred for NCS from 5 facilities | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 1482 | index neg; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 2425 | 0.43\|0.63 | 0.42\|0.64 | 1.17\|0.90 | POOR | POOR |
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Tinel Sign) | subset of total 3907 limbs examined from NCS referred patients | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; PT; TS; RPT; PT, RPT, or TS (Nerve Conduction Studies (NCS); AANEM referenced) | 215 | index neg; PT; TS; RPT; PT, RPT, or TS (Nerve Conduction Studies (NCS); AANEM referenced) | 712 | 0.62\|0.64 | 0.34\|0.85 | 2.27\|0.77 | WEAK | POOR |
| Hansen,P.A., 2004 | Moderate Quality | CTS Positive (Flick Sign) | referred CTS suspects | CSI digit diff result and DML cutoffs | Subjects | index pos; Flick sign; PT; TS; combinations (Nerve Conduction Studies (NCS)) | 47 | index neg; Flick sign; PT; TS; combinations (Nerve Conduction Studies (NCS)) | 95 | 0.74\|0.37 | 0.37\|0.74 | 1.44\|0.85 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hansen,P.A., 2004 | Moderate Quality | CTS Positive (Flick Sign or Phalen Test) | referred CTS suspects | CSI digit diff result and DML cutoffs | Subjects | index pos; Flick sign; PT; TS; combinations (Nerve Conduction Studies (NCS)) | 65 | index neg; Flick sign; PT; TS; combinations (Nerve Conduction Studies (NCS)) | 77 | 0.72\|0.38 | 0.49\|0.62 | 1.29\|0.82 | POOR | POOR |
| Hansen,P.A., 2004 | Moderate Quality | CTS Positive (Flick Sign or Tinel Sign) | referred CTS suspects | CSI digit diff result and DML cutoffs | Subjects | index pos; Flick sign; PT; TS; combinations (Nerve Conduction Studies (NCS)) | 59 | index neg; Flick sign; PT; TS; combinations (Nerve Conduction Studies (NCS)) | 83 | 0.75\|0.39 | 0.46\|0.68 | 1.45\|0.79 | POOR | POOR |
| Hansen,P.A., 2004 | Moderate Quality | CTS Positive (Phalen Test) | referred CTS suspects | CSI digit diff result and DML cutoffs | Subjects | index pos; Flick sign; PT; TS; combinations (Nerve Conduction Studies (NCS)) | 44 | index neg; Flick sign; PT; TS; combinations (Nerve Conduction Studies (NCS)) | 98 | 0.73\|0.36 | 0.34\|0.74 | 1.32\|0.89 | POOR | POOR |
| Hansen,P.A., 2004 | Moderate Quality | CTS Positive (Phalen Test or Tinel Sign) | referred CTS suspects | CSI digit diff result and DML cutoffs | Subjects | index pos; Flick sign; PT; TS; combinations (Nerve Conduction Studies (NCS)) | 52 | index neg; Flick sign; PT; TS; combinations (Nerve Conduction Studies (NCS)) | 90 | 0.75\|0.38 | 0.41\|0.72 | 1.48\|0.81 | POOR | POOR |
| Hansen,P.A., 2004 | Moderate Quality | CTS Positive (Tinel Sign) | referred CTS suspects | CSI digit diff result and DML cutoffs | Subjects | index pos; Flick sign; PT; TS; combinations (Nerve Conduction Studies (NCS)) | 30 | index neg; Flick sign; PT; TS; combinations (Nerve Conduction Studies (NCS)) | 112 | 0.87\|0.38 | 0.27\|0.91 | 3.22\|0.79 | WEAK | POOR |
| Heller,L., 1986 | Moderate Quality | CTS Positive (Phalen Test) | 60 referrals of CTS suspects | EMG motor latency measure | Extremities | index pos; PT, TS, PT/TS, PT or TS (Electromyography (EMG)) | 48 | index neg; PT, TS, PT/TS, PT or TS (Electromyography (EMG)) | 32 | 0.81\|0.41 | 0.67\|0.59 | 1.64\|0.55 | POOR | POOR |
| Heller,L., 1986 | Moderate Quality | CTS Positive (Phalen Test and Tinel Sign) | 60 referrals of CTS suspects | EMG motor latency measure | Extremities | index pos; PT, TS, PT/TS, PT or TS (Electromyography (EMG)) | 29 | index neg; PT, TS, PT/TS, PT or TS (Electromyography (EMG)) | 51 | 0.93\|0.39 | 0.47\|0.91 | 5.12\|0.59 | MODERATE | POOR |
| Heller,L., 1986 | Moderate Quality | CTS Positive (Phalen Test or Tinel Sign) | 60 referrals of CTS suspects | EMG motor latency measure | Extremities | index pos; PT, TS, PT/TS, PT or TS (Electromyography (EMG)) | 59 | index neg; PT, TS, PT/TS, PT or TS (Electromyography (EMG)) | 21 | 0.80\|0.48 | 0.81\|0.45 | 1.49\|0.42 | POOR | WEAK |
| Heller,L., 1986 | Moderate Quality | CTS Positive (Tinel Sign) | 60 referrals of CTS suspects | EMG motor latency measure | Extremities | index pos; PT, TS, PT/TS, PT or TS (Electromyography (EMG)) | 40 | index neg; PT, TS, PT/TS, PT or TS (Electromyography (EMG)) | 40 | 0.88\|0.43 | 0.60\|0.77 | 2.66\|0.51 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Karl,A.I., 2001 | Moderate Quality | CTS Positive (Lumbrical Provocation Test (LPT)) | 96 veterans; 90 men and 6 women with median symptoms | palm diff median to ulnar latency; D2-D5 latency; or motor diff | Subjects | index pos; LPT (Nerve Conduction Studies (NCS)) | 32 | index neg; LPT (Nerve Conduction Studies (NCS)) | 64 | 0.59\|0.50 | 0.37\|0.71 | 1.29\|0.88 | POOR | POOR |
| Katz,J.N., 1991 | Moderate Quality | CTS Positive (2 Point Discrimination) | CTS symptomatic subjects at one hospital | referenced motor and sensory latency cutoffs | Subjects | index pos; PT; TS; 2point (Nerve Conduction Studies (NCS)) | 16 | index neg; PT; TS; 2point (Nerve Conduction Studies (NCS)) | 62 | 0.44\|0.63 | 0.23\|0.81 | 1.24\|0.94 | POOR | POOR |
| Katz,J.N., 1991 | Moderate Quality | CTS Positive (Phalen Test) | CTS symptomatic subjects at one hospital | referenced motor and sensory latency cutoffs | Subjects | index pos; PT; TS; 2point (Nerve Conduction Studies (NCS)) | 53 | index neg; PT; TS; 2point (Nerve Conduction Studies (NCS)) | 25 | 0.42\|0.68 | 0.73\|0.35 | 1.14\|0.75 | POOR | POOR |
| Katz,J.N., 1991 | Moderate Quality | CTS Positive (Tinel Sign) | CTS symptomatic subjects at one hospital | referenced motor and sensory latency cutoffs | Subjects | index pos; PT; TS; 2point (Nerve Conduction Studies (NCS)) | 35 | index neg; PT; TS; 2point (Nerve Conduction Studies (NCS)) | 43 | 0.54\|0.74 | 0.63\|0.67 | 1.90\|0.55 | POOR | POOR |
| Kaul,M.P., 2001 | Moderate Quality | CTS Positive (Carpal Compression Test (CCT)) | consecutive veterans with CTS symptoms | motor, sensory, and mixed nerve latencies and digit diff | Subjects | index pos; PPT; CCT (Nerve Conduction Studies (NCS)) | 63 | index neg; PPT; CCT (Nerve Conduction Studies (NCS)) | 72 | 0.67\|0.47 | 0.53\|0.62 | 1.37\|0.77 | POOR | POOR |
| Kaul,M.P., 2001 | Moderate Quality | CTS Positive (Pressure Provocative Test (PPT)) | consecutive veterans with CTS symptoms | motor, sensory, and mixed nerve latencies and digit diff | Subjects | index pos; PPT; CCT (Nerve Conduction Studies (NCS)) | 60 | index neg; PPT; CCT (Nerve Conduction Studies (NCS)) | 74 | 0.70\|0.53 | 0.55\|0.68 | 1.73\|0.66 | POOR | POOR |
| Kuhlman,K.A., 1997 | Moderate Quality | CTS Positive (Carpal Compression Test (CCT)) | 143 clinical CTS suspects | referenced sensory and motor cutoffs | Extremities | index pos; PT; TS; Hypesthesia; APB weakness; median compression (Nerve Conduction Studies (NCS)) | 62 | index neg; PT; TS; Hypesthesia; APB weakness; median compression (Nerve Conduction Studies (NCS)) | 166 | 0.65\|0.39 | 0.28\|0.74 | 1.10\|0.97 | POOR | POOR |
| Kuhlman,K.A., 1997 | Moderate Quality | CTS Positive (Hypesthesia; pinwheel) | 143 clinical CTS suspects | referenced sensory and motor cutoffs | Extremities | index pos; PT; TS; Hypesthesia; APB weakness; median compression (Nerve Conduction Studies (NCS)) | 86 | index neg; PT; TS; Hypesthesia; APB weakness; median compression (Nerve Conduction Studies (NCS)) | 142 | 0.85\|0.51 | 0.51\|0.85 | 3.40\|0.57 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kuhlman,K.A., 1997 | Moderate Quality | CTS Positive (Phalen Test) | 143 clinical CTS suspects | referenced sensory and motor cutoffs | Extremities | index pos; PT; TS; Hypesthesia; APB weakness; median compression (Nerve Conduction Studies (NCS)) | 94 | index neg; PT; TS; Hypesthesia; APB weakness; median compression (Nerve Conduction Studies (NCS)) | 134 | 0.78\|0.49 | 0.51\|0.76 | 2.11\|0.64 | WEAK | POOR |
| Kuhlman,K.A., 1997 | Moderate Quality | CTS Positive (Thenar Weakness) | 143 clinical CTS suspects | referenced sensory and motor cutoffs | Extremities | index pos; PT; TS; Hypesthesia; APB weakness; median compression (Nerve Conduction Studies (NCS)) | 123 | index neg; PT; TS; Hypesthesia; APB weakness; median compression (Nerve Conduction Studies (NCS)) | 105 | 0.76\|0.54 | 0.66\|0.66 | 1.96\|0.51 | POOR | POOR |
| Kuhlman,K.A., 1997 | Moderate Quality | CTS Positive (Tinel Sign) | 143 clinical CTS suspects | referenced sensory and motor cutoffs | Extremities | index pos; PT; TS; Hypesthesia; APB weakness; median compression (Nerve Conduction Studies (NCS)) | 44 | index neg; PT; TS; Hypesthesia; APB weakness; median compression (Nerve Conduction Studies (NCS)) | 184 | 0.75\|0.41 | 0.23\|0.87 | 1.82\|0.88 | POOR | POOR |
| MacDermid,J.C., 1997 (1) | Moderate Quality | CTS Positive (Phalen Test (Examiner 1)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 81 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 81 | AR | 0.87\|0.90 | 8.70\|0.14 | MODERATE | MODERATE |
| MacDermid,J.C., 1997 (1) | Moderate Quality | CTS Positive (Pinch Test (Examiner 1)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 77 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 77 | AR | 0.72\|0.88 | 6.00\|0.32 | MODERATE | WEAK |
| MacDermid,J.C., 1997 (1) | Moderate Quality | CTS Positive (Reverse Phalen Test (Examiner 1)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 80 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 80 | AR | 0.65\|0.96 | 16.25\|0.36 | STRONG | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MacDermid,J.C., 1997 (1) | Moderate Quality | CTS Positive (Semmes-Weinstein Monofilament Test (SWMF) 1 (Examiner 1)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 79 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 79 | AR | 0.86\|0.60 | 2.15\|0.23 | WEAK | WEAK |
| MacDermid,J.C., 1997 (1) | Moderate Quality | CTS Positive (Tethered Median Stress Test (TMST) (Examiner 1)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 80 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 80 | AR | 0.52\|0.92 | 6.50\|0.52 | MODERATE | POOR |
| MacDermid,J.C., 1997 (1) | Moderate Quality | CTS Positive (Tinel Sign (Examiner 1)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 78 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 78 | AR | 0.59\|0.92 | 7.38\|0.45 | MODERATE | WEAK |
| MacDermid,J.C., 1997 (1) | Moderate Quality | CTS Positive (Vibration Perception; tuning fork; index finger (Examiner 1)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 73 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 73 | AR | 0.77\|0.80 | 3.85\|0.29 | WEAK | WEAK |
| MacDermid,J.C., 1997 (2) | Moderate Quality | CTS Positive (Phalen Test (Examiner 2)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 77 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 77 | AR | 0.86\|0.86 | 6.14\|0.16 | MODERATE | MODERATE |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MacDermid,J.C., 1997 (2) | Moderate Quality | CTS Positive (Pinch Test (Examiner 2)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 73 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 73 | AR | 0.70\|0.78 | 3.18\|0.38 | WEAK | WEAK |
| MacDermid,J.C., 1997 (2) | Moderate Quality | CTS Positive (Reverse Phalen Test (Examiner 2)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 76 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 76 | AR | 0.75\|0.85 | 5.00\|0.29 | MODERATE | WEAK |
| MacDermid,J.C., 1997 (2) | Moderate Quality | CTS Positive (Semmes-Weinstein Monofilament Test (SWMF) 1 (Examiner 2)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 70 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 70 | AR | 0.85\|0.32 | 1.25\|0.47 | POOR | WEAK |
| MacDermid,J.C., 1997 (2) | Moderate Quality | CTS Positive (Tethered Median Stress Test (TMST) (Examiner 2)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 76 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 76 | AR | 0.36\|0.95 | 7.20\|0.67 | MODERATE | POOR |
| MacDermid,J.C., 1997 (2) | Moderate Quality | CTS Positive (Tinel Sign (Examiner 2)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 74 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 74 | AR | 0.41\|0.94 | 6.83\|0.63 | MODERATE | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MacDermid,J.C., 1997 (2) | Moderate Quality | CTS Positive (Vibration Perception; tuning fork; index finger (Examiner 2)) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 77 | index neg; PT; Vibration; Pinch; RPT; TS; TMST; SWMF (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 77 | AR | 0.77\|0.72 | 2.75\|0.32 | WEAK | WEAK |
| Makanji,H.S., 2014 | Moderate Quality | CTS Positive (Durkan Test) | referred CTS suspects | DML and DSL with referenced normal values | Subjects | index pos; Durkan; PT; Scratch Collapse (Nerve Conduction Studies (NCS); AANEM referenced) | 69 | index neg; Durkan; PT; Scratch Collapse (Nerve Conduction Studies (NCS); AANEM referenced) | 19 | 0.72\|0.21 | 0.77\|0.17 | 0.93\|1.33 | POOR | POOR |
| Makanji,H.S., 2014 | Moderate Quality | CTS Positive (Phalen Test) | referred CTS suspects | DML and DSL with referenced normal values | Subjects | index pos; Durkan; PT; Scratch Collapse (Nerve Conduction Studies (NCS); AANEM referenced) | 59 | index neg; Durkan; PT; Scratch Collapse (Nerve Conduction Studies (NCS); AANEM referenced) | 29 | 0.75\|0.28 | 0.68\|0.35 | 1.04\|0.93 | POOR | POOR |
| Makanji,H.S., 2014 | Moderate Quality | CTS Positive (Scratch Collapse Test) | referred CTS suspects | DML and DSL with referenced normal values | Subjects | index pos; Durkan; PT; Scratch Collapse (Nerve Conduction Studies (NCS); AANEM referenced) | 31 | index neg; Durkan; PT; Scratch Collapse (Nerve Conduction Studies (NCS); AANEM referenced) | 57 | 0.71\|0.25 | 0.34\|0.61 | 0.86\|1.09 | POOR | POOR |
| Makanji,H.S., 2014 | Moderate Quality | CTS Positive (Thenar Atrophy) | referred CTS suspects | DML and DSL with referenced normal values | Subjects | index pos; Gender/Sex F, M; tobacco use (yes); thenar atrophy; thumb abduction weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 13 | index neg; Gender/Sex F, M; tobacco use (no); thenar atrophy; thumb abduction weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 75 | 0.92\|0.29 | 0.18\|0.96 | 4.25\|0.85 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Makanji,H.S., 2014 | Moderate Quality | CTS Positive (Thumb Abduction Weakness) | referred CTS suspects | DML and DSL with referenced normal values | Subjects | index pos; Gender/Sex F, M; tobacco use (yes); thenar atrophy; thumb abduction weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 30 | index neg; Gender/Sex F, M; tobacco use (no); thenar atrophy; thumb abduction weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 58 | 0.80\|0.29 | 0.37\|0.74 | 1.42\|0.85 | POOR | POOR |
| Makanji,H.S., 2014 | Moderate Quality | CTS Positive (Tinel Sign) | referred CTS suspects | DML and DSL with referenced normal values | Subjects | index pos; Durkan; PT; Scratch Collapse (Nerve Conduction Studies (NCS); AANEM referenced) | 27 | index neg; Durkan; PT; Scratch Collapse (Nerve Conduction Studies (NCS); AANEM referenced) | 36 | 0.74\|0.25 | 0.43\|0.56 | 0.97\|1.02 | POOR | POOR |
| Padua,L., 1999 | Moderate Quality | CTS Positive (Phalen Test) | clinically suspected idiopathic CTS patients | clinical and NCS from AANEM considered; min of clinical diagnosis and various severities of NCS testing results | Extremities | index pos; PT (Nerve Conduction Studies (NCS) and clinical diagnosis; AANEM referenced) | 752 | index neg; PT (Nerve Conduction Studies (NCS) and clinical diagnosis; AANEM referenced) | 371 | 0.96\|0.08 | 0.68\|0.49 | 1.33\|0.66 | POOR | POOR |
| Raudino,F., 2000 | Moderate Quality | CTS Positive (Hypoaesthesia; pin prick) | symptomatic and asymptomatic limbs of 83 suspected CTS patients that were NCS confirmed | sensory and motor as compared to control group | Extremities | index pos; PT; TS; stress test; hypoaesthesia (Nerve Conduction Studies (NCS); AANEM referenced) | 45 | index neg; PT; TS; stress test; hypoaesthesia (Nerve Conduction Studies (NCS); AANEM referenced) | 121 | 1.00\|0.21 | 0.32\|1.00 | 10.00\|0.68 | STRONG | POOR |
| Raudino,F., 2000 | Moderate Quality | CTS Positive (Phalen Test) | symptomatic and asymptomatic limbs of 83 suspected CTS patients that were NCS confirmed | sensory and motor as compared to control group | Extremities | index pos; PT; TS; stress test; hypoaesthesia (Nerve Conduction Studies (NCS); AANEM referenced) | 85 | index neg; PT; TS; stress test; hypoaesthesia (Nerve Conduction Studies (NCS); AANEM referenced) | 81 | 0.93\|0.25 | 0.56\|0.77 | 2.45\|0.57 | WEAK | POOR |

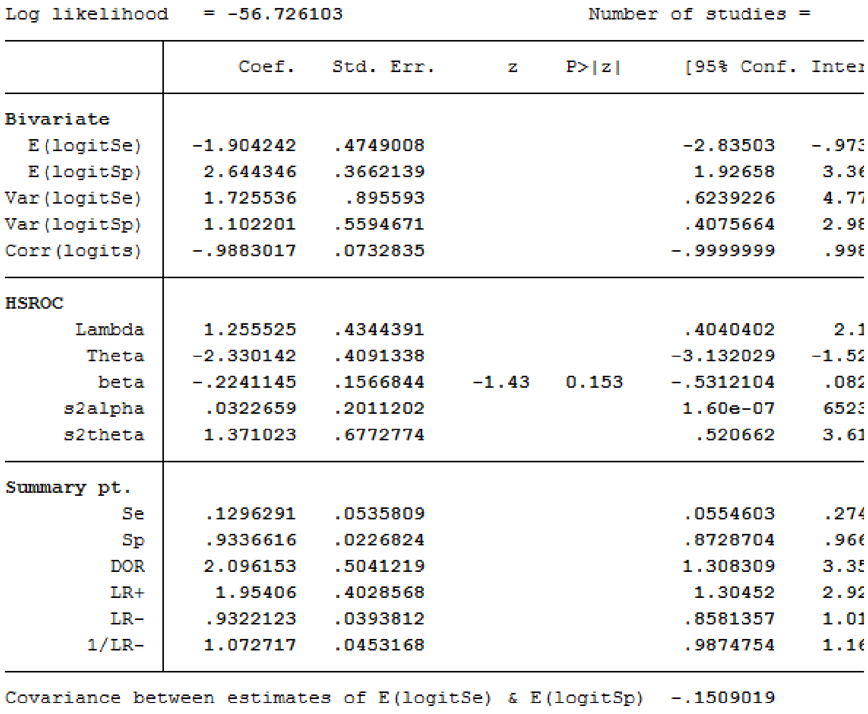
| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raudino,F., 2000 | Moderate Quality | CTS Positive (Stress Test; hyperextended wrist) | symptomatic and asymptomatic limbs of 83 suspected CTS patients that were NCS confirmed | sensory and motor as compared to control group | Extremities | index pos; PT; TS; stress test; hypoaesthesia (Nerve Conduction Studies (NCS); AANEM referenced) | 72 | index neg; PT; TS; stress test; hypoaesthesia (Nerve Conduction Studies (NCS); AANEM referenced) | 94 | 0.96\|0.24 | 0.49\|0.88 | 4.27\|0.57 | WEAK | POOR |
| Raudino,F., 2000 | Moderate Quality | CTS Positive (Thenar Weakness) | symptomatic and asymptomatic limbs of 83 suspected CTS patients that were NCS confirmed | sensory and motor as compared to control group | Extremities | index pos; thenar weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 18 | index neg; thenar weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 148 | 0.94\|0.17 | 0.12\|0.96 | 3.16\|0.91 | WEAK | POOR |
| Raudino,F., 2000 | Moderate Quality | CTS Positive (Tinel Sign) | symptomatic and asymptomatic limbs of 83 suspected CTS patients that were NCS confirmed | sensory and motor as compared to control group | Extremities | index pos; PT; TS; stress test; hypoaesthesia (Nerve Conduction Studies (NCS); AANEM referenced) | 63 | index neg; PT; TS; stress test; hypoaesthesia (Nerve Conduction Studies (NCS); AANEM referenced) | 103 | 0.94\|0.21 | 0.42\|0.85 | 2.74\|0.68 | WEAK | POOR |
| Weber,R.A., 2000 | Moderate Quality | CTS Positive (Pressure Specified Sensory Device (PSSD)) | 53 patients with suspected CTS from one hosp | history and physical signs and symptoms | Extremities | index pos; PSSD (Clinical Diagnosis) | 67 | index neg; PSSD (Clinical Diagnosis) | 39 | 0.73\|0.87 | 0.91\|0.65 | 2.62\|0.14 | WEAK | MODERATE |
| Witt,J.C., 2004 | Moderate Quality | CTS Positive (Phalen Test) | referred CTS suspects | various NCS parameters as needed | Subjects | index pos; PT; TS (Nerve Conduction Studies (NCS); AANEM referenced) | 46 | index neg; PT; TS (Nerve Conduction Studies (NCS); AANEM referenced) | 38 | 0.24\|0.66 | 0.46\|0.42 | 0.79\|1.30 | POOR | POOR |
| Witt,J.C., 2004 | Moderate Quality | CTS Positive (Tinel Sign) | referred CTS suspects | various NCS parameters as needed | Subjects | index pos; PT; TS (Nerve Conduction Studies (NCS); AANEM referenced) | 32 | index neg; PT; TS (Nerve Conduction Studies (NCS); AANEM referenced) | 52 | 0.19\|0.65 | 0.25\|0.57 | 0.58\|1.32 | POOR | POOR |

*TABLE 10: LOW QUALITY STUDIES- PICO 1 (PHYSICAL TESTS VERSUS REFERENCE STANDARD)*

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Khosrawi,S., 2012 | Low Quality | CTS Positive (Phalen Test and Tinel Sign) | ALL PREGNANT WOMEN | median to ulnar cutoffs referenced | Subjects | index pos; PT/TS (Nerve Conduction Studies (NCS)) | 29 | index neg; PT/TS (Nerve Conduction Studies (NCS)) | 71 | 0.34\|0.87 | 0.53\|0.77 | 2.24\|0.62 | WEAK | POOR |

# META-ANALYSES

## *FIGURE 1: GENERAL EDS VERSUS PHALEN TEST AND TINEL SIGN*



```
Log likelihood   = -56.726103                    Number of studies =

             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Inter
-------------+--------------------------------------------------------------
Bivariate    |
  E(logitSe) |  -1.904242   .4749008                      -2.83503   -.973
  E(logitSp) |   2.644346   .3662139                       1.92658    3.36
Var(logitSe) |   1.725536    .895593                      .6239226    4.77
Var(logitSp) |   1.102201   .5594671                      .4075664    2.98
Corr(logits) |  -.9883017   .0732835                     -.9999999    .998
-------------+--------------------------------------------------------------
HSROC        |
      Lambda |   1.255525   .4344391                      .4040402     2.1
       Theta |  -2.330142   .4091338                     -3.132029   -1.52
        beta |  -.2241145   .1566844    -1.43   0.153    -.5312104    .082
     s2alpha |   .0322659   .2011202                      1.60e-07    6523
     s2theta |   1.371023   .6772774                       .520662    3.61
-------------+--------------------------------------------------------------
Summary pt.  |
          Se |   .1296291   .0535809                      .0554603    .274
          Sp |   .9336616   .0226824                      .8728704    .966
         DOR |   2.096153   .5041219                      1.308309    3.35
         LR+ |    1.95406   .4028568                       1.30452    2.92
         LR- |   .9322123   .0393812                      .8581357    1.01
       1/LR- |   1.072717   .0453168                      .9874754    1.16
--------------------------------------------------------------------------
Covariance between estimates of E(logitSe) & E(logitSp)  -.1509019
```

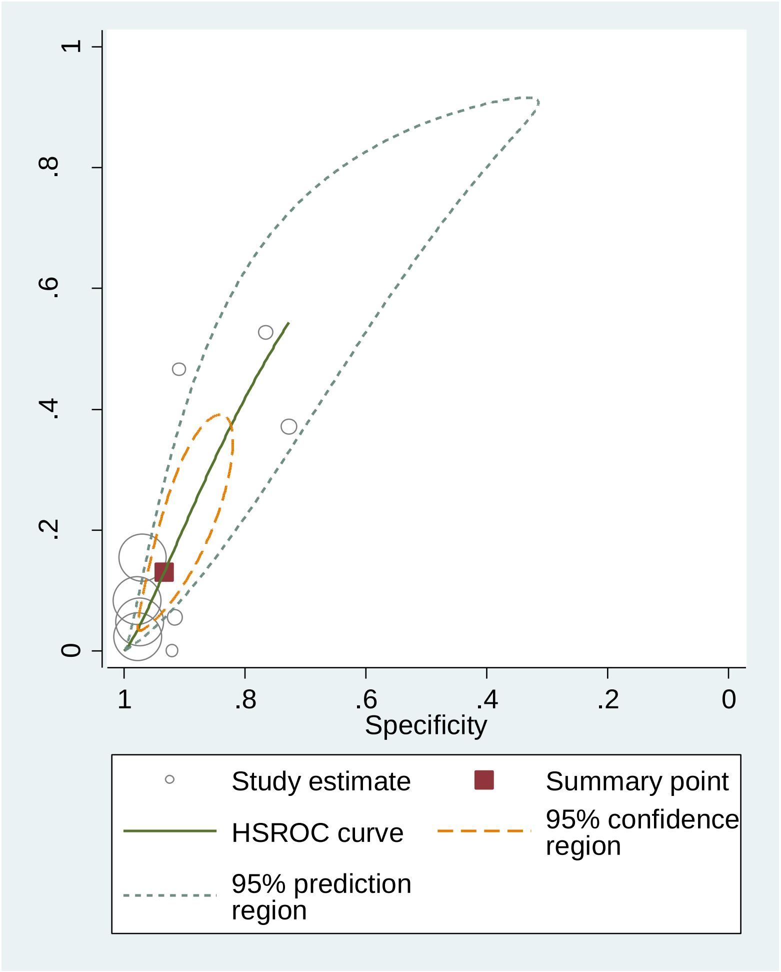
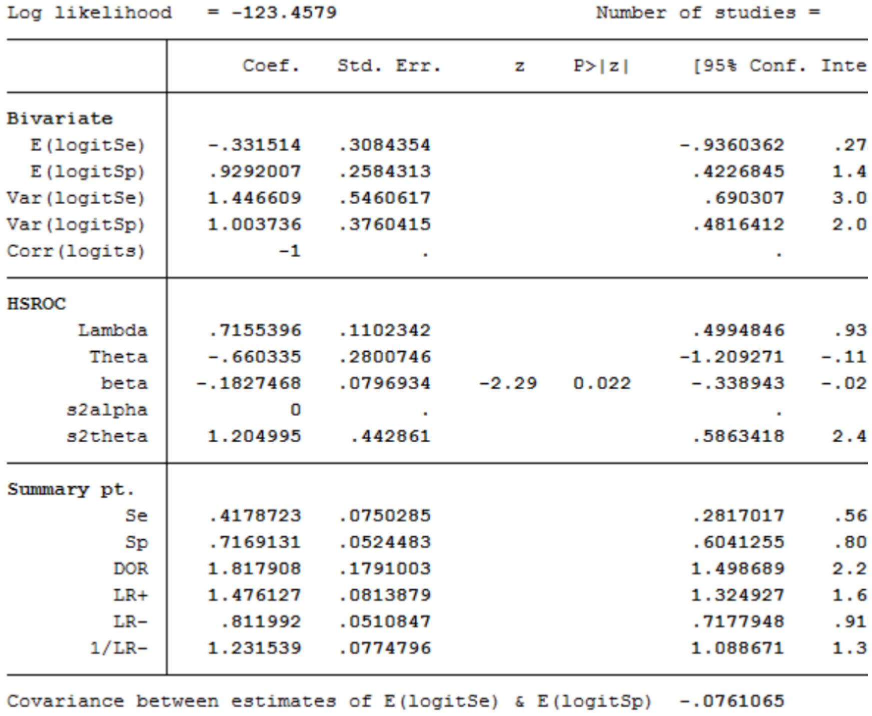


*FIGURE 2: GENERAL EDS VERSUS PHALEN TEST*



```
Log likelihood   = -123.4579                    Number of studies =
-------------------------------------------------------------------------
              |     Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
--------------+----------------------------------------------------------
Bivariate     |
  E(logitSe)  |  -.331514   .3084354                     -.9360362    .27
  E(logitSp)  |  .9292007   .2584313                      .4226845    1.4
Var(logitSe)  |  1.446609   .5460617                       .690307    3.0
Var(logitSp)  |  1.003736   .3760415                      .4816412    2.0
Corr(logits)  |        -1          .                             .
--------------+----------------------------------------------------------
HSROC         |
      Lambda  |  .7155396   .1102342                      .4994846    .93
       Theta  |  -.660335   .2800746                     -1.209271   -.11
        beta  | -.1827468   .0796934    -2.29   0.022     -.338943   -.02
     s2alpha  |         0          .                             .
     s2theta  |  1.204995    .442861                      .5863418    2.4
--------------+----------------------------------------------------------
Summary pt.   |
          Se  |  .4178723   .0750285                      .2817017    .56
          Sp  |  .7169131   .0524483                      .6041255    .80
         DOR  |  1.817908   .1791003                      1.498689    2.2
         LR+  |  1.476127   .0813879                      1.324927    1.6
         LR-  |   .811992   .0510847                      .7177948    .91
       1/LR-  |  1.231539   .0774796                      1.088671    1.3
-------------------------------------------------------------------------
Covariance between estimates of E(logitSe) & E(logitSp)  -.0761065
```

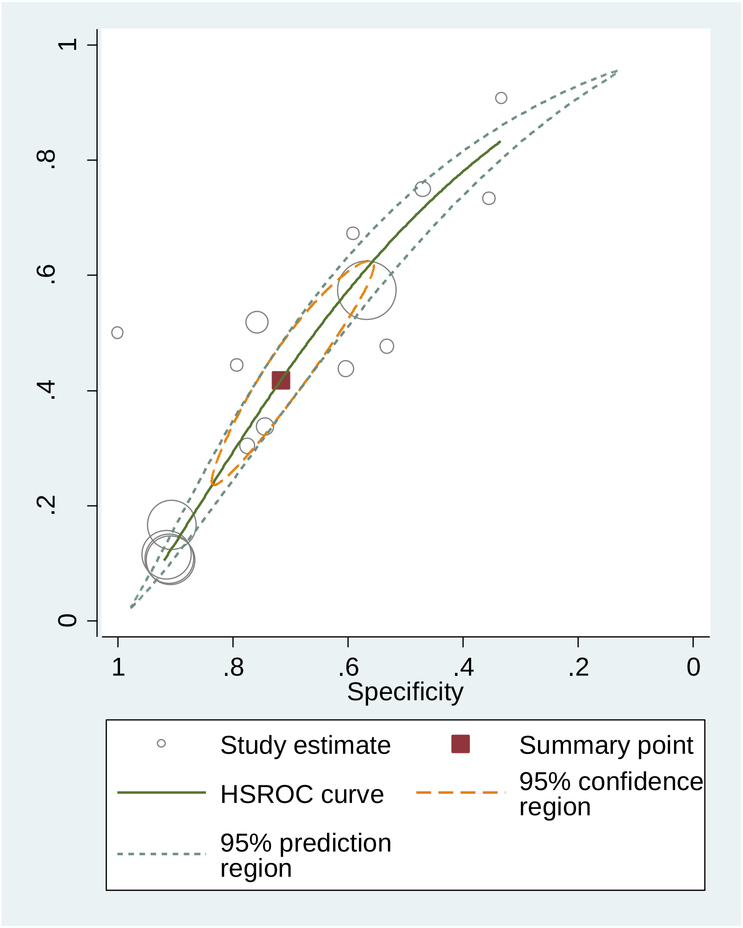
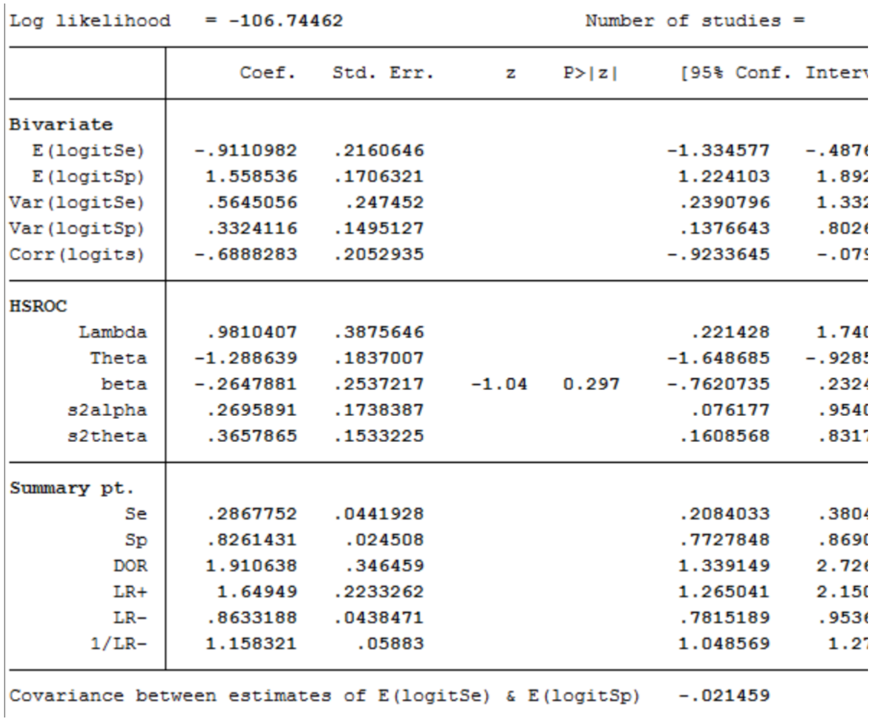


*FIGURE 3: GENERAL EDS VERSUS TINEL SIGN*



```
Log likelihood   = -106.74462                    Number of studies =
--------------------------------------------------------------------------
               |    Coef.   Std. Err.      z    P>|z|     [95% Conf. Inter
---------------+----------------------------------------------------------
Bivariate      |
  E(logitSe)   | -.9110982   .2160646                     -1.334577   -.487
  E(logitSp)   |  1.558536   .1706321                      1.224103    1.89
Var(logitSe)   |  .5645056    .247452                      .2390796    1.33
Var(logitSp)   |  .3324116   .1495127                      .1376643    .802
Corr(logits)   | -.6888283   .2052935                     -.9233645    -.07
---------------+----------------------------------------------------------
HSROC          |
      Lambda   |  .9810407   .3875646                       .221428    1.74
       Theta   | -1.288639   .1837007                     -1.648685   -.928
        beta   | -.2647881   .2537217    -1.04   0.297    -.7620735    .232
     s2alpha   |  .2695891   .1738387                       .076177    .954
     s2theta   |  .3657865   .1533225                      .1608568    .831
---------------+----------------------------------------------------------
Summary pt.    |
          Se   |  .2867752   .0441928                      .2084033    .380
          Sp   |  .8261431    .024508                      .7727848    .869
         DOR   |  1.910638    .346459                      1.339149    2.72
         LR+   |   1.64949   .2233262                      1.265041    2.15
         LR-   |  .8633188   .0438471                      .7815189    .953
      1/LR-    |  1.158321     .05883                      1.048569     1.2
--------------------------------------------------------------------------
Covariance between estimates of E(logitSe) & E(logitSp)   -.021459
```

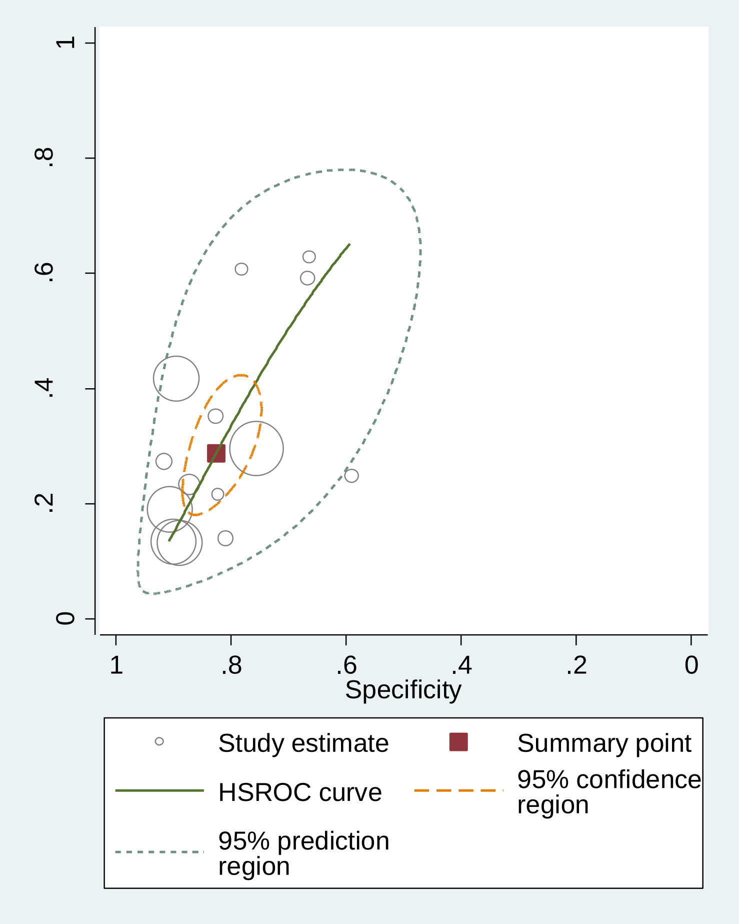
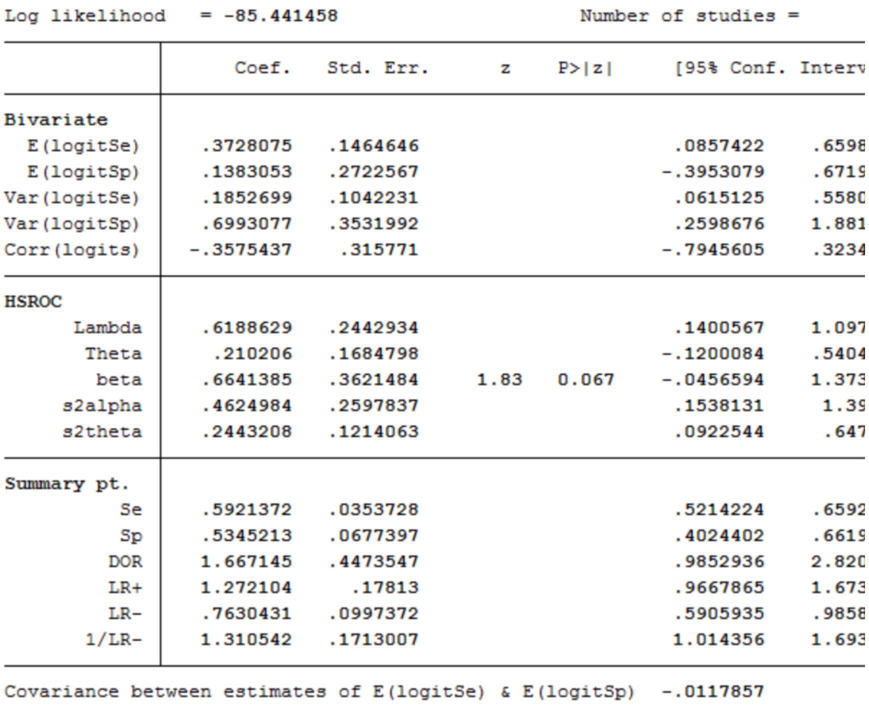


*FIGURE 4: EDS AANEM VERSUS PHALEN TEST*



```
Log likelihood    = -85.441458                    Number of studies =

             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interv
-------------+-----------------------------------------------------------------
Bivariate    |
  E(logitSe) |   .3728075   .1464646                      .0857422    .6598
  E(logitSp) |   .1383053   .2722567                     -.3953079    .6719
 Var(logitSe)|   .1852699   .1042231                      .0615125    .5580
 Var(logitSp)|   .6993077   .3531992                      .2598676    1.881
 Corr(logits)|  -.3575437    .315771                     -.7945605    .3234
-------------+-----------------------------------------------------------------
HSROC        |
      Lambda |   .6188629   .2442934                      .1400567    1.097
       Theta |    .210206   .1684798                     -.1200084    .5404
        beta |   .6641385   .3621484     1.83   0.067    -.0456594    1.373
     s2alpha |   .4624984   .2597837                      .1538131     1.39
     s2theta |   .2443208   .1214063                      .0922544     .647
-------------+-----------------------------------------------------------------
Summary pt.  |
          Se |   .5921372   .0353728                      .5214224    .6592
          Sp |   .5345213   .0677397                      .4024402    .6619
         DOR |   1.667145   .4473547                      .9852936    2.820
         LR+ |   1.272104     .17813                      .9667865    1.673
         LR- |   .7630431   .0997372                      .5905935    .9858
       1/LR- |   1.310542   .1713007                      1.014356    1.693
-------------------------------------------------------------------------------
Covariance between estimates of E(logitSe) & E(logitSp)   -.0117857
```

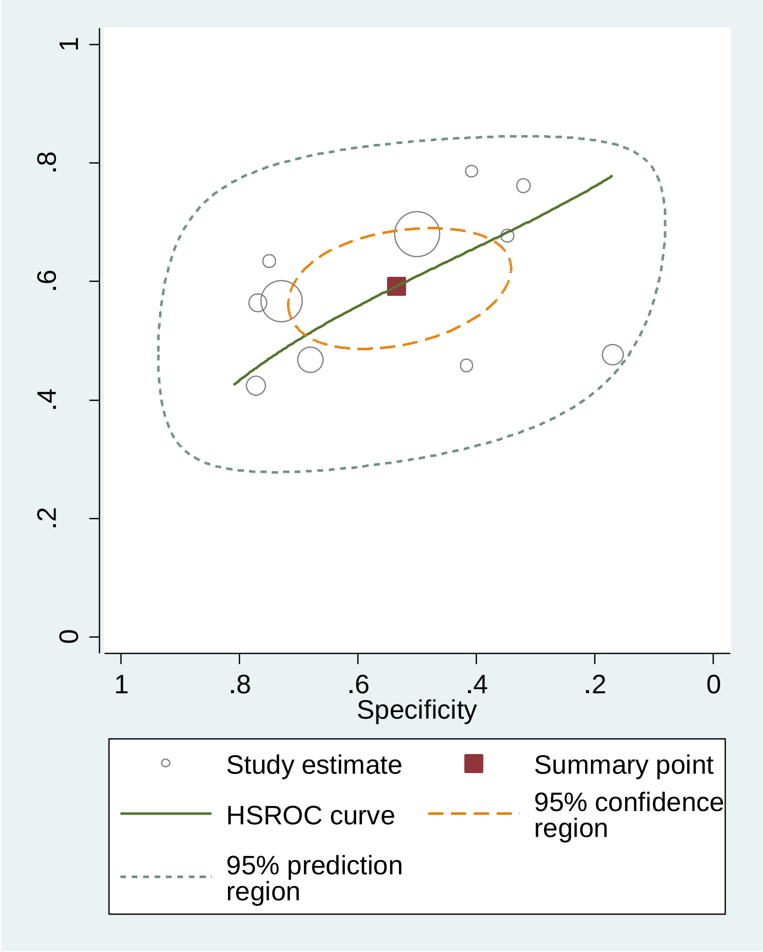
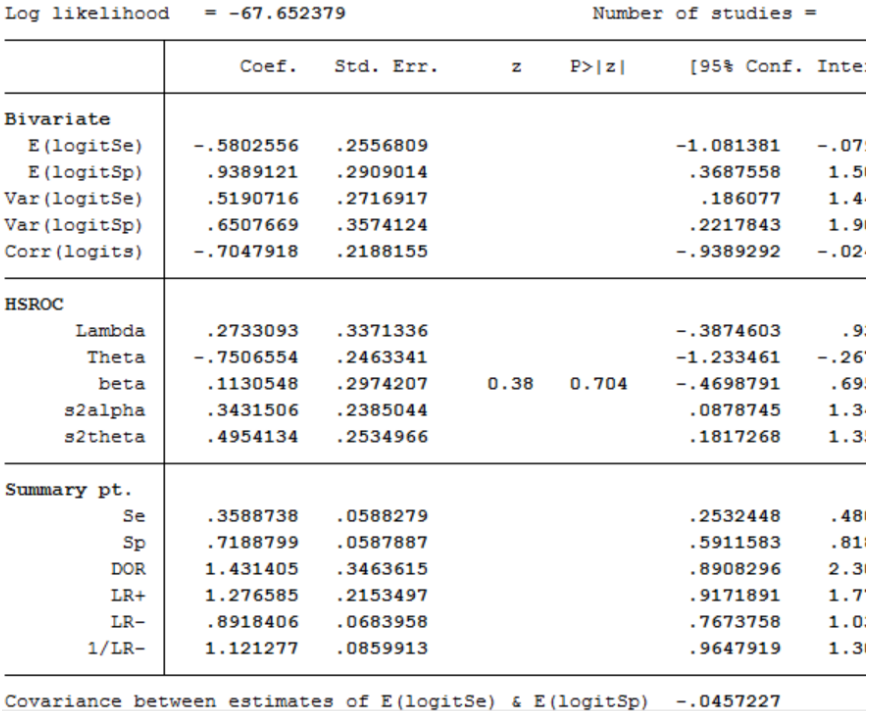


*FIGURE 5: EDS AANEM VERSUS TINEL SIGN*



```
Log likelihood    = -67.652379                    Number of studies =
------------------------------------------------------------------------
                |     Coef.   Std. Err.      z    P>|z|     [95% Conf. Inte
----------------+-------------------------------------------------------
Bivariate       |
  E(logitSe)    | -.5802556   .2556809                     -1.081381   -.07
  E(logitSp)    |  .9389121   .2909014                      .3687558    1.5
Var(logitSe)    |  .5190716   .2716917                       .186077    1.4
Var(logitSp)    |  .6507669   .3574124                      .2217843    1.9
Corr(logits)    | -.7047918   .2188155                     -.9389292   -.02
----------------+-------------------------------------------------------
HSROC           |
         Lambda |  .2733093   .3371336                     -.3874603     .9
          Theta | -.7506554   .2463341                     -1.233461   -.26
           beta |  .1130548   .2974207     0.38   0.704   -.4698791    .69
        s2alpha |  .3431506   .2385044                      .0878745    1.3
        s2theta |  .4954134   .2534966                      .1817268    1.3
----------------+-------------------------------------------------------
Summary pt.     |
             Se |  .3588738   .0588279                      .2532448    .48
             Sp |  .7188799   .0587887                      .5911583    .81
            DOR |  1.431405   .3463615                      .8908296    2.3
            LR+ |  1.276585   .2153497                      .9171891    1.7
            LR- |  .8918406   .0683958                      .7673758    1.0
          1/LR- |  1.121277   .0859913                      .9647919    1.3
------------------------------------------------------------------------
Covariance between estimates of E(logitSe) & E(logitSp)  -.0457227
```

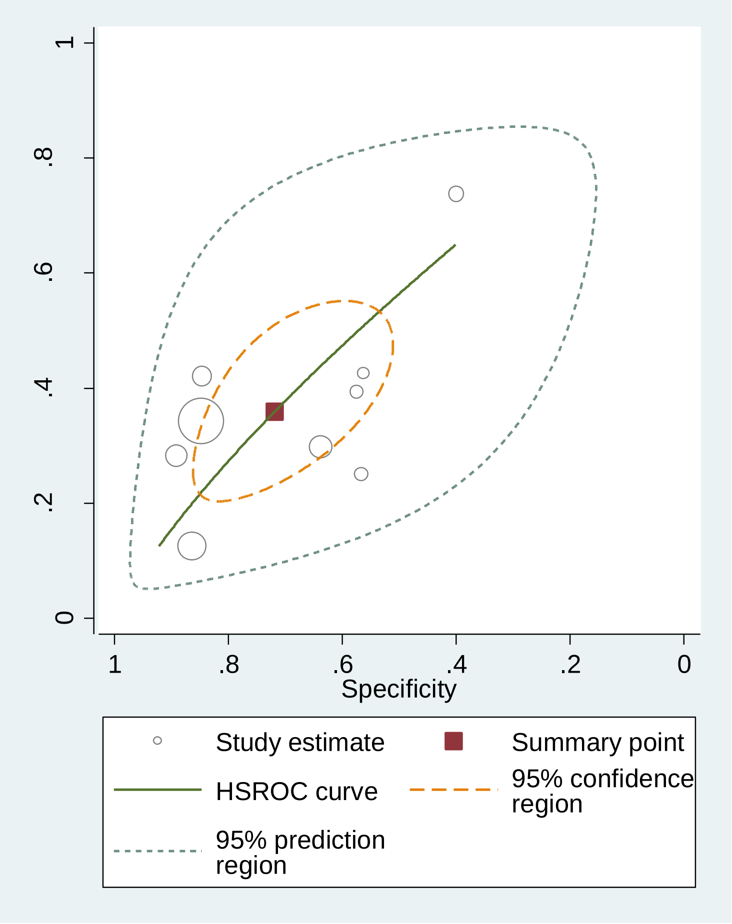
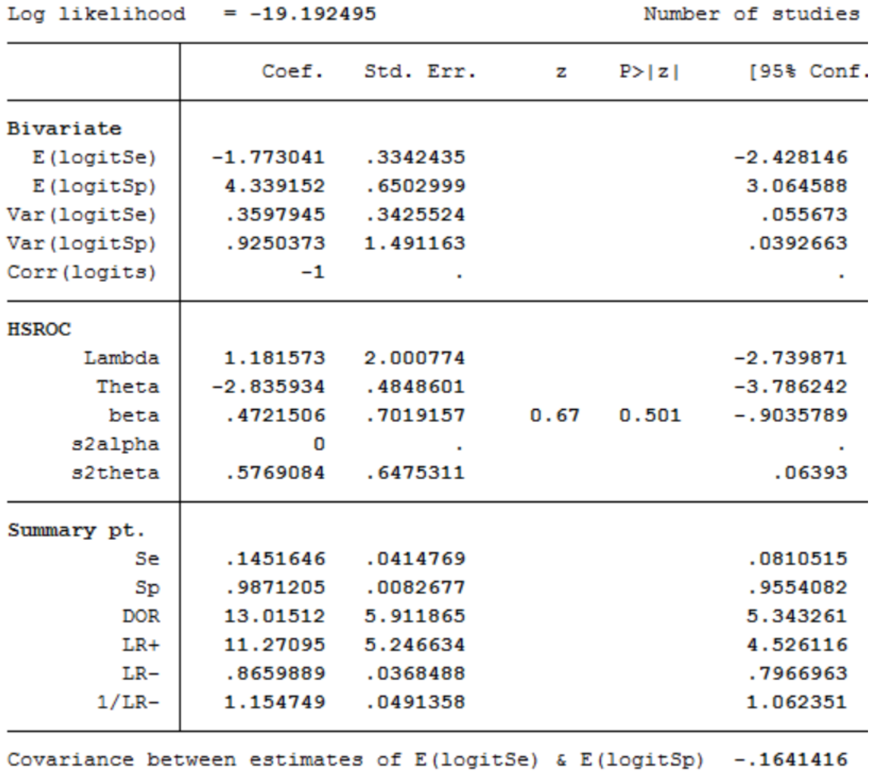
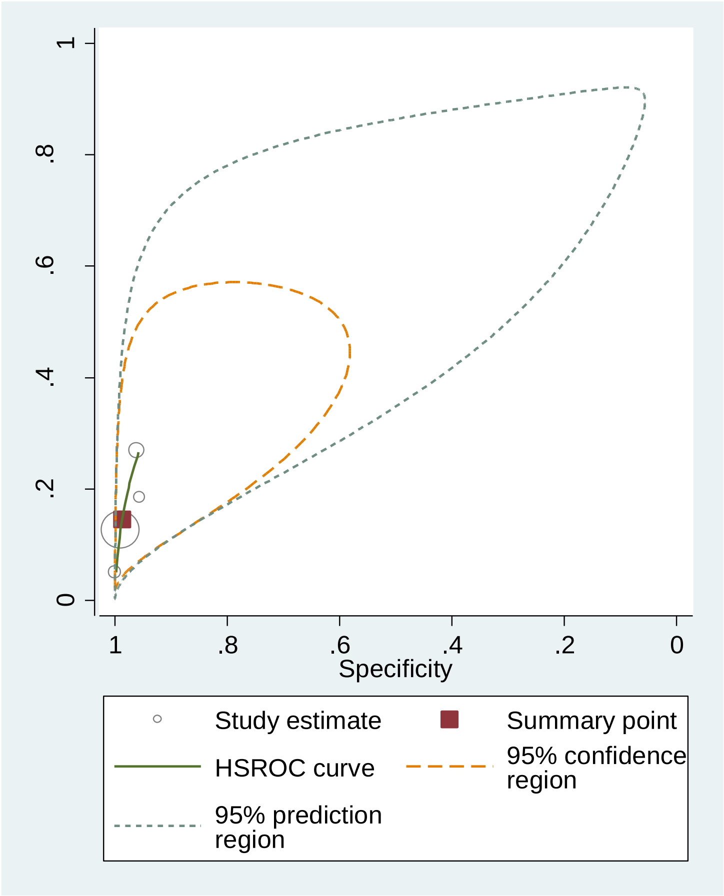


*FIGURE 6: EDS AANEM VERSUS THENAR ATROPHY*



```
Log likelihood    = -19.192495                        Number of studies
------------------------------------------------------------------------
               |     Coef.   Std. Err.      z     P>|z|      [95% Conf.
---------------+--------------------------------------------------------
Bivariate      |
  E(logitSe)   | -1.773041   .3342435                      -2.428146
  E(logitSp)   |  4.339152   .6502999                       3.064588
Var(logitSe)   |  .3597945   .3425524                        .055673
Var(logitSp)   |  .9250373   1.491163                       .0392663
Corr(logits)   |        -1          .                              .
---------------+--------------------------------------------------------
HSROC          |
        Lambda |  1.181573   2.000774                      -2.739871
         Theta | -2.835934   .4848601                      -3.786242
          beta |  .4721506   .7019157     0.67    0.501    -.9035789
       s2alpha |         0          .                              .
       s2theta |  .5769084   .6475311                         .06393
---------------+--------------------------------------------------------
Summary pt.    |
            Se |  .1451646   .0414769                       .0810515
            Sp |  .9871205   .0082677                       .9554082
           DOR |  13.01512   5.911865                       5.343261
           LR+ |  11.27095   5.246634                       4.526116
           LR- |  .8659889   .0368488                       .7966963
        1/LR- |  1.154749   .0491358                       1.062351
------------------------------------------------------------------------
Covariance between estimates of E(logitSe) & E(logitSp)    -.1641416
```



# HISTORY INTERVIEW GUIDELINE RECOMMENDATIONS

## A. HISTORY INTERVIEW TOPICS

Moderate evidence supports not using the following as independent history interview topics to diagnose carpal tunnel syndrome, because alone, each has a poor or weak association with ruling-in or ruling-out carpal tunnel syndrome:

- Sex/gender
- Ethnicity
- Bilateral symptoms
- Diabetes mellitus
- Worsening symptoms at night
- Duration of symptoms
- Patient localization of symptoms
- Hand dominance
- Symptomatic limb
- Age
- BMI

**Strength of Recommendation: Moderate Evidence** ★★★☆

Description: Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.

### Rationale

Two high quality studies (Claes, 2013; Katz, 1990) and several moderate quality studies investigated the relationship between history interview topics and CTS as compared to a reference standard which was the use of either EDS following AANEM criteria or general EDS methods. When examined individually, each of the factors listed above had a poor or weak association with EDS based on the likelihood ratio. Sex/gender data pooled in a meta-analysis, also showed a poor association with electrodiagnostic testing.

### Risks and Harms of Implementing this Recommendation

There are no known harms associated with implementing these recommendations.

### Future Research

Future studies should evaluate and use standardized language for describing symptoms and their severity. Standardized scales and stand-alone history interview topics should be evaluated against a reference standard.

## B. PATIENT REPORTED NUMBNESS AND PAIN

Limited evidence supports that patients who do not report frequent numbness or pain might not have carpal tunnel syndrome.

### Strength of Recommendation: Limited Evidence ★★☆☆

Description: Evidence from one or more "Low" quality studies with consistent findings **or** evidence from a single "Moderate" quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

### Rationale

One moderate quality study (MacDermid, 1997) found a strong or moderate association between CTS and patient reporting of frequent numbness or frequent pain.

### Risks and Harms of Implementing this Recommendation

There are no known harms associated with implementing these recommendations.

### Future Research

Future studies should evaluate and use standardized language for describing symptoms and their severity. Standardized scales and stand-alone history interview topics should be evaluated against a reference standard.

## STUDY QUALITY TABLE OF HISTORY INTERVIEW GUIDELINE RECOMMENDATIONS

### Table 11. Diagnostic Quality Evaluations

| Study | Representative Population | Clear Selection Criteria | Detailed Enough to Replicate | Reference Standard Identifies Target Condition | Blinding | Other Bias? | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|
| Becker,J., 2002 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Bland,J.D., 2000 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Claes,F., 2013 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Coggon,D., 2013 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Dale,A.M., 2011 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| De Krom,M.C., 1990 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| El,Miedany Y., 2008 | ● | ◑ | ● | ◑ | ● | ● | Include | Moderate Quality |
| Franzblau,A., 1994 | ● | ◑ | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Gerr,F., 1998 | ● | ● | ● | ◑ | ◑ | ◑ | Include | Moderate Quality |
| Glowacki,K.A., 1996 | ● | ● | ● | ○ | ◑ | ◑ | Include | Low Quality |
| Gomes,I., 2006 | ● | ● | ● | ◑ | ◑ | ◑ | Include | Moderate Quality |
| Katz,J.N., 1990 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Katz,J.N., 1991 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Khosrawi,S., 2012 | ● | ● | ○ | ◑ | ◑ | ● | Include | Low Quality |
| Lo,J.K., 2002 | ● | ● | ● | ◑ | ○ | ◑ | Include | Low Quality |
| MacDermid,J.C., 1997 | ● | ◑ | ● | ◑ | ● | ● | Include | Moderate Quality |
| Makanji,H.S., 2014 | ● | ◑ | ● | ◑ | ◑ | ● | Include | Moderate Quality |

| Study | Representative Population | Clear Selection Criteria | Detailed Enough to Replicate | Reference Standard Identifies Target Condition | Blinding | Other Bias? | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|
| Naranjo,A., 2007 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Ntani,G., 2013 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Raudino,F., 2000 | ● | ◑ | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Tan,S.V., 2012 | ● | ● | ● | ◑ | ● | ○ | Include | Moderate Quality |
| Taylor-Gjevre,R.M., 2010 | ● | ◑ | ● | ◑ | ● | ● | Include | Moderate Quality |
| Wainner,R.S., 2005 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Witt,J.C., 2004 | ● | ● | ● | ◑ | ○ | ● | Include | Moderate Quality |
| Yagci,I., 2010 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Ziswiler,H.R., 2005 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |

# RESULTS

## *SUMMARY OF DATA FINDINGS*

*TABLE 12: SUMMARY OF FINDINGS- INDEX TEST VERSUS AANEM REFERENCED EDS*

| | **LR +** | **LR -** | |
|---|---|---|---|
| ● | ≥10 | ≤0.1 | In "**STRONG**" agreement with the reference standard |
| ◕ | ≥5 but <10 | >0.1 but ≤0.2 | In "**MODERATE**" agreement with the reference standard |
| ◔ | >2 and <5 | >0.2 but <0.5 | In "**WEAK**" agreement with the reference standard |
| ○ | ≤2 | ≥0.5 | In "**POOR**" agreement with the reference standard |

| | | **High Quality** | **Moderate Quality** | | | |
|---|---|---|---|---|---|---|
| **Index Test** | **Rule In/Out** | **Claes,F., 2013** | **Gomes,I., 2006** | **Makanji,H.S., 2014** | **Yagci,I., 2010** | **Meta-Analysis** |
| **Gender/Sex Female** | RULE IN | ○ | ○ | ○ | ◔ | ○ |
| | RULE OUT | ○ | ◔ | ○ | ○ | ○ |
| **Gender/Sex Male** | RULE IN | ◕ | ○ | ○ | ○ | ○ |
| | RULE OUT | ○ | ○ | ○ | ○ | ○ |

*Table only displays index tests with more than one article of supporting evidence*

*TABLE 13: SUMMARY OF FINDINGS- INDEX TEST VERSUS GENERAL EDS METHODS*

| | LR + | LR - | |
|---|---|---|---|
| ● | ≥10 | ≤0.1 | In **"STRONG"** agreement with the reference standard |
| ◕ | ≥5 but <10 | >0.1 but ≤0.2 | In **"MODERATE"** agreement with the reference standard |
| ◔ | >2 and <5 | >0.2 but <0.5 | In **"WEAK"** agreement with the reference standard |
| ○ | ≤2 | ≥0.5 | In **"POOR"** agreement with the reference standard |

| | | **High Quality** | **Moderate Quality** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Index Test** | **Rule In/Out** | **Katz,J.N., 1990 (B)** | **Becker,J., 2002** | **Bland,J.D., 2000** | **Coggon,D., 2013** | **Dale,A.M., 2011 (1)** | **Dale,A.M., 2011 (2)** | **MacDermid,J.C., 1997** | **Taylor-Gjevre,R.M., 2010** | **Meta-Analysis** |
| **Bilateral Symptoms** | RULE IN | ○ | | | | | | | ○ | NA |
| | RULE OUT | ○ | | | | | | | ○ | NA |
| **Diabetes Mellitus** | RULE IN | | ○ | | ○ | | | | | NA |
| | RULE OUT | | ○ | | ○ | | | | | NA |
| **Gender/Sex Female** | RULE IN | | ○ | ○ | ○ | | | | ○ | NA |
| | RULE OUT | | ◔ | ○ | ○ | | | | ○ | NA |
| **Gender/Sex Male** | RULE IN | | ○ | ○ | ○ | | | | ○ | NA |
| | RULE OUT | | ○ | ○ | ○ | | | | ○ | NA |
| **Hand Left** | RULE IN | | | | | ○ | ○ | | ○ | NA |
| | RULE OUT | | | | | ○ | ○ | | ○ | NA |
| **Hand Right** | RULE IN | | | ○ | | ○ | ○ | | ○ | NA |
| | RULE OUT | | | ○ | | ○ | ○ | | ○ | NA |
| **Worsening symptoms at night** | RULE IN | | | ○ | | | | ◔ | | NA |
| | RULE OUT | | | ○ | | | | ◔ | | NA |

*Table only displays index tests with more than one article of supporting evidence*

*Authors with parenthetical numbers indicate a change in EDS method/threshold, alternate limbs, or alternate examiner*

*Authors with parenthetical letters indicate a unique study with the same author and year as another study listed in the guideline*

## *DETAILED DATA FINDINGS*

### *TABLE 14: HIGH QUALITY STUDIES- PICO 2 (HISTORY INTERVIEW TOPICS VERSUS REFERENCE STANDARD)*

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Claes,F., 2013 | High Quality | CTS Positive (Gender/Sex Female) | clinically diagnosed CTS suspects | at least 2 of 4 abnormal EDS parameters | Subjects | index pos; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 121 | index neg; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 35 | 0.79\|0.03 | 0.74\|0.04 | 0.77\|6.80 | POOR | POOR |
| Claes,F., 2013 | High Quality | CTS Positive (Gender/Sex Male) | clinically diagnosed CTS suspects | at least 2 of 4 abnormal EDS parameters | Subjects | index pos; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 35 | index neg; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 121 | 0.97\|0.21 | 0.26\|0.96 | 6.80\|0.77 | MODERATE | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Claes,F., 2013 | High Quality | CTS Positive (Opponens Pollicis Weakness) | clinically diagnosed CTS suspects | at least 2 of 4 abnormal EDS parameters | Subjects | index pos; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 10 | index neg; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 146 | 0.90\|0.17 | 0.07\|0.96 | 1.80\|0.97 | POOR | POOR |
| Claes,F., 2013 | High Quality | CTS Positive (Wrist Left) | clinically diagnosed CTS suspects | at least 2 of 4 abnormal EDS parameters | Subjects | index pos; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 71 | index neg; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 85 | 0.82\|0.15 | 0.45\|0.50 | 0.89\|1.11 | POOR | POOR |
| Claes,F., 2013 | High Quality | CTS Positive (Wrist Right) | clinically diagnosed CTS suspects | at least 2 of 4 abnormal EDS parameters | Subjects | index pos; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 85 | index neg; Gender/Sex F, M; Hand R, L; thenar atrophy; weakness; OP weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 71 | 0.85\|0.18 | 0.55\|0.50 | 1.11\|0.89 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Age; 40+) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; neurologist assessment; age 40+; nocturnal symptoms; bilateral symptoms (Nerve Conduction Studies (NCS)) | 73 | index neg; neurologist assessment; age 40+; nocturnal symptoms; bilateral symptoms (Nerve Conduction Studies (NCS)) | 37 | 0.48\|0.76 | 0.80\|0.42 | 1.38\|0.48 | POOR | WEAK |
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Bilateral Symptoms) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; neurologist assessment; age 40+; nocturnal symptoms; bilateral symptoms (Nerve Conduction Studies (NCS)) | 55 | index neg; neurologist assessment; age 40+; nocturnal symptoms; bilateral symptoms (Nerve Conduction Studies (NCS)) | 55 | 0.49\|0.69 | 0.61\|0.58 | 1.45\|0.67 | POOR | POOR |
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Neurologist Assessment; probable or possible) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; neurologist assessment; age 40+; nocturnal symptoms; bilateral symptoms (Nerve Conduction Studies (NCS)) | 55 | index neg; neurologist assessment; age 40+; nocturnal symptoms; bilateral symptoms (Nerve Conduction Studies (NCS)) | 55 | 0.67\|0.87 | 0.84\|0.73 | 3.08\|0.22 | WEAK | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Nocturnal Symptoms) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; neurologist assessment; age 40+; nocturnal symptoms; bilateral symptoms (Nerve Conduction Studies (NCS)) | 81 | index neg; neurologist assessment; age 40+; nocturnal symptoms; bilateral symptoms (Nerve Conduction Studies (NCS)) | 29 | 0.42\|0.66 | 0.77\|0.29 | 1.09\|0.79 | POOR | POOR |
| Ntani,G., 2013 | High Quality | CTS Positive (Pain; hand) | responders from all suspected CTS out-patients | SNC abnormality | Extremities | index pos; thenar weakness; pain (Nerve Conduction Studies (NCS); Sensory Nerve Conduction (SNC)) | 893 | index neg; thenar weakness; pain (Nerve Conduction Studies (NCS); Sensory Nerve Conduction (SNC)) | 913 | 0.91\|0.20 | 0.53\|0.69 | 1.69\|0.69 | POOR | POOR |
| Tan,S.V., 2012 | Moderate Quality | CTS Positive (Clinical symptoms) | limbs of 100 CTS suspects | at least 2 abnormal EDS parameters | Extremities | index pos; clinical symptoms (Nerve Conduction Studies (NCS); AANEM referenced) | 160 | index neg; clinical symptoms (Nerve Conduction Studies (NCS); AANEM referenced) | 40 | 0.55\|0.73 | 0.89\|0.29 | 1.25\|0.39 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wainner,R.S., 2005 | High Quality | CTS Positive (Age; 45+) | CTS and cervical radiculopathy suspects | | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 40 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 42 | 0.45\|0.76 | 0.64\|0.59 | 1.58\|0.60 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Behavior of symptoms is constant) | CTS and cervical radiculopathy suspects | | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 70 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 12 | 0.31\|0.50 | 0.79\|0.11 | 0.88\|1.93 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Behavior of symptoms is intermittent, variable) | CTS and cervical radiculopathy suspects | | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 12 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 70 | 0.50\|0.69 | 0.21\|0.89 | 1.93\|0.88 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wainner,R.S., 2005 | High Quality | CTS Positive (Do symptoms wake you up at night) | CTS and cervical radiculopathy suspects | | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 57 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 25 | 0.35\|0.68 | 0.71\|0.31 | 1.04\|0.91 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Does grasping or hand use tasks worsen symptoms) | CTS and cervical radiculopathy suspects | | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 56 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 26 | 0.39\|0.77 | 0.79\|0.37 | 1.25\|0.58 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Entire affected limb or hand feels numb) | CTS and cervical radiculopathy suspects | | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 22 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 60 | 0.50\|0.72 | 0.39\|0.80 | 1.93\|0.76 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wainner,R.S., 2005 | High Quality | CTS Positive (Hand feels fat or swollen) | CTS and cervical radiculopathy suspects |  | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 31 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 51 | 0.35\|0.67 | 0.39\|0.63 | 1.06\|0.96 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Loss of feeling is the most bothersome symptom) | CTS and cervical radiculopathy suspects |  | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 76 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 6 | 0.36\|0.83 | 0.96\|0.09 | 1.06\|0.39 | POOR | WEAK |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Pain, Numbness, Tingling are most bothersome symptoms) | CTS and cervical radiculopathy suspects |  | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 6 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 76 | 0.17\|0.64 | 0.04\|0.91 | 0.39\|1.06 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wainner,R.S., 2005 | High Quality | CTS Positive (Symptoms are most bothersome in the hand, finger) | CTS and cervical radiculopathy suspects | | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 40 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 42 | 0.45\|0.76 | 0.64\|0.59 | 1.58\|0.60 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Symptoms are most bothersome in the neck, shoulder/blade, arm) | CTS and cervical radiculopathy suspects | | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 42 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 40 | 0.24\|0.55 | 0.36\|0.41 | 0.60\|1.58 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Trouble fumbling or dropping objects) | CTS and cervical radiculopathy suspects | | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 43 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 39 | 0.47\|0.79 | 0.71\|0.57 | 1.68\|0.50 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ziswiler,H.R., 2005 | High Quality | CTS Positive (Hand Left) | 71 CTS suspects referred to outpatient clinic in Switzerland | motor and sensory latency cutoff values | Extremities | index pos; Hand RIGHT, Hand LEFT (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 49 | index neg; Hand RIGHT, Hand LEFT (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 52 | 0.76\|0.21 | 0.47\|0.48 | 0.91\|1.10 | POOR | POOR |
| Ziswiler,H.R., 2005 | High Quality | CTS Positive (Hand Right) | 71 CTS suspects referred to outpatient clinic in Switzerland | motor and sensory latency cutoff values | Extremities | index pos; Hand RIGHT, Hand LEFT (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 52 | index neg; Hand RIGHT, Hand LEFT (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 49 | 0.79\|0.24 | 0.53\|0.52 | 1.10\|0.91 | POOR | POOR |

*TABLE 15: MODERATE QUALITY STUDIES- PICO 2 (HISTORY INTERVIEW TOPICS VERSUS REFERENCE STANDARD)*

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Becker,J., 2002 | Moderate Quality | CTS Positive (Age; 41-60) | CTS symptomatic subjects referred for NCS and EMG from 5 Brazil facilities | sensory, motor, and mixed nerve cutoffs | Subjects | index pos; Gender/Sex F, M; BMI; Age; Diabetes (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 944 | index neg; Gender/Sex F, M; BMI; Age; Diabetes (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 828 | 0.52\|0.64 | 0.62\|0.54 | 1.34\|0.70 | POOR | POOR |
| Becker,J., 2002 | Moderate Quality | CTS Positive (BMI; >30) | CTS symptomatic subjects referred for NCS and EMG from 5 Brazil facilities | sensory, motor, and mixed nerve cutoffs | Subjects | index pos; Gender/Sex F, M; BMI; Age; Diabetes (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 322 | index neg; Gender/Sex F, M; BMI; Age; Diabetes (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 1450 | 0.66\|0.60 | 0.27\|0.89 | 2.39\|0.82 | WEAK | POOR |
| Becker,J., 2002 | Moderate Quality | CTS Positive (Diabetes Mellitus) | CTS symptomatic subjects referred for NCS and EMG from 5 Brazil facilities | sensory, motor, and mixed nerve cutoffs | Subjects | index pos; Gender/Sex F, M; BMI; Age; Diabetes (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 61 | index neg; Gender/Sex F, M; BMI; Age; Diabetes (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 1711 | 0.59\|0.56 | 0.05\|0.97 | 1.79\|0.98 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Becker,J., 2002 | Moderate Quality | CTS Positive (Gender/Sex Female) | CTS symptomatic subjects referred for NCS and EMG from 5 Brazil facilities | sensory, motor, and mixed nerve cutoffs | Subjects | index pos; Gender/Sex F, M; BMI; Age; Diabetes (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 1354 | index neg; Gender/Sex F, M; BMI; Age; Diabetes (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 418 | 0.51\|0.78 | 0.88\|0.33 | 1.32\|0.36 | POOR | WEAK |
| Becker,J., 2002 | Moderate Quality | CTS Positive (Gender/Sex Male) | CTS symptomatic subjects referred for NCS and EMG from 5 Brazil facilities | sensory, motor, and mixed nerve cutoffs | Subjects | index pos; Gender/Sex F, M; BMI; Age; Diabetes (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 418 | index neg; Gender/Sex F, M; BMI; Age; Diabetes (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 1354 | 0.22\|0.49 | 0.12\|0.67 | 0.36\|1.32 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Does a splint relieve symptoms) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 822 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 984 | 0.68\|0.47 | 0.52\|0.64 | 1.43\|0.76 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Duration of Symptoms 0-3 months) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 665 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 7558 | 0.51\|0.42 | 0.07\|0.91 | 0.79\|1.02 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Duration of Symptoms 12+ months) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 3611 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 4612 | 0.60\|0.45 | 0.46\|0.59 | 1.13\|0.91 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Duration of Symptoms 3-6 months) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 2001 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 6222 | 0.54\|0.42 | 0.23\|0.74 | 0.90\|1.04 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Duration of Symptoms 6-12 months) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 1946 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 6277 | 0.56\|0.43 | 0.23\|0.76 | 0.97\|1.01 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Gender/Sex Female) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 5392 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 2376 | 0.56\|0.43 | 0.69\|0.31 | 1.00\|1.00 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Gender/Sex Male) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 2376 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 5392 | 0.57\|0.44 | 0.31\|0.69 | 1.00\|1.00 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Hand Left or Ambidextrous) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 786 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 7437 | 0.54\|0.43 | 0.09\|0.90 | 0.90\|1.01 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Hand Right) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 7437 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 786 | 0.57\|0.46 | 0.91\|0.10 | 1.01\|0.90 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Symptoms equal in both hands) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 1612 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 6611 | 0.54\|0.42 | 0.18\|0.79 | 0.87\|1.03 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Symptoms worse in Left Hand) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 2573 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 5650 | 0.52\|0.41 | 0.29\|0.65 | 0.83\|1.09 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Symptoms worse in Right Hand) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 4038 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 4185 | 0.61\|0.47 | 0.53\|0.56 | 1.20\|0.85 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Worse symptoms in all fingers excluding the thumb) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 715 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 7508 | 0.46\|0.42 | 0.07\|0.89 | 0.64\|1.04 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Worse symptoms in all fingers including the thumb) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 2594 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 5629 | 0.54\|0.42 | 0.30\|0.66 | 0.89\|1.06 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Worse symptoms in middle and ring) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 709 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 7514 | 0.65\|0.44 | 0.10\|0.93 | 1.39\|0.97 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Worse symptoms in ring and pinky) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 327 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 7896 | 0.20\|0.41 | 0.01\|0.93 | 0.19\|1.07 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Worse symptoms in thumb, index, and middle) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 3088 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 5135 | 0.68\|0.50 | 0.45\|0.72 | 1.64\|0.76 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Worsening symptoms at night) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 5717 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 2506 | 0.63\|0.57 | 0.77\|0.40 | 1.28\|0.58 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Worsening symptoms during hand work) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 6267 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 1956 | 0.57\|0.44 | 0.77\|0.24 | 1.01\|0.97 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Worsening symptoms first thing in the morning) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 5465 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 2758 | 0.62\|0.52 | 0.72\|0.41 | 1.21\|0.70 | POOR | POOR |
| Bland,J.D., 2000 | Moderate Quality | CTS Positive (Worsening symptoms while driving) | 7768 East Kent referrals to NCS lab for suspected CTS | sensory and motor latency cutoffs | Extremities | index pos; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 3024 | index neg; Gender/Sex F, M; Hand R, L/A; symptoms; history; fingers; duration; Gender/Sex (Nerve Conduction Studies (NCS)) | 5199 | 0.58\|0.44 | 0.38\|0.64 | 1.06\|0.97 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (&lt;6 months since free of numbness, tingling, or pain in the hands for 4+ weeks) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 325 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 520 | 0.50\|0.43 | 0.35\|0.58 | 0.84\|1.12 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (&lt;7 days in the past 4 weeks when numbness, tingling, or pain in the hands disturbed sleep) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 166 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 659 | 0.54\|0.47 | 0.20\|0.80 | 1.01\|1.00 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (&lt;7 days in the past 4 weeks with numbness, tingling, or pain in the hands) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 49 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 733 | 0.43\|0.45 | 0.05\|0.92 | 0.63\|1.03 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (0 days in the past 4 weeks when numbness, tingling, or pain in the hands disturbed sleep) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 157 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 668 | 0.35\|0.42 | 0.13\|0.74 | 0.47\|1.19 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (0 somatic symptoms at least moderately distressing in the past week) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 223 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 661 | 0.58\|0.48 | 0.27\|0.77 | 1.20\|0.94 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (1 somatic symptom at least moderately distressing in the past week) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 233 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 651 | 0.53\|0.46 | 0.26\|0.73 | 0.96\|1.01 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (1+ years since free of numbness, tingling, or pain in the hands for 4+ weeks) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 450 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 395 | 0.56\|0.49 | 0.56\|0.50 | 1.11\|0.89 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (14-28 days in the past 4 weeks when numbness, tingling, or pain in the hands disturbed sleep) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 341 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 484 | 0.62\|0.53 | 0.48\|0.67 | 1.46\|0.77 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (14-28 days in the past 4 weeks with numbness, tingling, or pain in the hands) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 631 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 151 | 0.56\|0.54 | 0.83\|0.23 | 1.08\|0.73 | POOR | POOR |

| **Reference Title** | **Quality** | **Outcome (Index Test)** | **Patient Characteristics** | **Threshold Notes** | **Outcomes Reported By** | **Group1 (Reference Standard)** | **Group1 N** | **Group2 (Reference Standard)** | **Group2 N** | **PPV\|NPV** | **Sens\|Spec** | **LR+\|LR-** | **Rule In Test** | **Rule Out Test** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (2+ somatic symptoms at least moderately distressing in the past week) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 428 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 456 | 0.52\|0.45 | 0.47\|0.50 | 0.93\|1.07 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (6+ months to &lt;1 year since free of numbness, tingling, or pain in the hands for 4+ weeks) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 70 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 775 | 0.59\|0.46 | 0.09\|0.93 | 1.21\|0.98 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (7-13 days in the past 4 weeks when numbness, tingling, or pain in the hands disturbed sleep) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 161 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 664 | 0.52\|0.46 | 0.19\|0.80 | 0.93\|1.02 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (7-13 days in the past 4 weeks with numbness, tingling, or pain in the hands) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 102 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 680 | 0.48\|0.45 | 0.12\|0.85 | 0.78\|1.04 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Age; 20-29) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 55 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 829 | 0.44\|0.46 | 0.05\|0.92 | 0.67\|1.03 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Age; 30-39) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 172 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 712 | 0.53\|0.46 | 0.19\|0.80 | 0.97\|1.01 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Age; 40-49) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 281 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 603 | 0.56\|0.47 | 0.33\|0.70 | 1.09\|0.96 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Age; 50-59) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 281 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 603 | 0.53\|0.46 | 0.32\|0.68 | 0.99\|1.01 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Age; 60+) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 95 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 789 | 0.56\|0.47 | 0.11\|0.90 | 1.09\|0.99 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Being very clumsy due to hand symptoms in the past 4 weeks) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 106 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 778 | 0.51\|0.46 | 0.11\|0.87 | 0.89\|1.02 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (BMI; &lt;25) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; symptoms (Nerve Conduction Studies (NCS)) | 272 | index neg; symptoms (Nerve Conduction Studies (NCS)) | 590 | 0.43\|0.41 | 0.25\|0.61 | 0.66\|1.22 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (BMI; 25+ but &lt;30) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; symptoms (Nerve Conduction Studies (NCS)) | 313 | index neg; symptoms (Nerve Conduction Studies (NCS)) | 549 | 0.52\|0.45 | 0.35\|0.62 | 0.92\|1.05 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (BMI; 30+) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; symptoms (Nerve Conduction Studies (NCS)) | 277 | index neg; symptoms (Nerve Conduction Studies (NCS)) | 585 | 0.66\|0.52 | 0.40\|0.77 | 1.70\|0.79 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Current smoker) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 184 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 693 | 0.45\|0.44 | 0.18\|0.75 | 0.71\|1.10 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Diabetes Mellitus) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 55 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 829 | 0.67\|0.47 | 0.08\|0.96 | 1.77\|0.96 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Difficulty fastening buttons or zips due to hand symptoms in the past 4 weeks) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 111 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 773 | 0.51\|0.46 | 0.12\|0.87 | 0.91\|1.01 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Difficulty turning taps, using kitchen gadgets, sewing, or doing repairs due to hand symptoms in the past 4 weeks) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 196 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 688 | 0.54\|0.46 | 0.22\|0.78 | 1.01\|1.00 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Ethnicity; Other) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 26 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 858 | 0.73\|0.47 | 0.04\|0.98 | 2.34\|0.98 | WEAK | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Ethnicity; South Asian) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 32 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 852 | 0.75\|0.47 | 0.05\|0.98 | 2.58\|0.97 | WEAK | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Ethnicity; White) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 826 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 58 | 0.52\|0.26 | 0.91\|0.04 | 0.94\|2.47 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Ex-smoker) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 233 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 644 | 0.58\|0.48 | 0.29\|0.76 | 1.21\|0.93 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Gender/Sex Female) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 594 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 290 | 0.54\|0.47 | 0.68\|0.33 | 1.01\|0.98 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Gender/Sex Male) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 290 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 594 | 0.53\|0.46 | 0.32\|0.67 | 0.98\|1.01 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Having minor accidents (e.g. dropping things) due to hand symptoms in the past 4 weeks) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 120 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 764 | 0.45\|0.45 | 0.11\|0.84 | 0.70\|1.06 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Job dissatisfaction) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 121 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 763 | 0.49\|0.45 | 0.12\|0.85 | 0.82\|1.03 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Lifting/carrying weights 5+ kg in one hand in a working day) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 355 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 529 | 0.55\|0.47 | 0.41\|0.61 | 1.05\|0.97 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Little choice in how or what work is done or in timetable and breaks) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 212 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 672 | 0.55\|0.47 | 0.24\|0.77 | 1.04\|0.99 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Little support from supervisor or colleagues) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 156 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 728 | 0.50\|0.45 | 0.16\|0.81 | 0.86\|1.03 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Mental Health; Good) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 324 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 556 | 0.52\|0.46 | 0.36\|0.62 | 0.95\|1.03 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Mental Health; Intermediate) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 297 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 583 | 0.52\|0.45 | 0.33\|0.65 | 0.94\|1.03 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Mental Health; Poor) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 256 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 624 | 0.58\|0.48 | 0.31\|0.73 | 1.18\|0.94 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Never smoked) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 460 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 417 | 0.55\|0.47 | 0.53\|0.49 | 1.04\|0.96 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Other Arthritis) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 184 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 700 | 0.50\|0.45 | 0.19\|0.78 | 0.86\|1.04 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Other repeated movements of wrist/fingers for >4 hours per working day) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 449 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 435 | 0.55\|0.47 | 0.52\|0.50 | 1.04\|0.96 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Pain in the elbow in the past 4 weeks) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; symptoms (Nerve Conduction Studies (NCS)) | 351 | index neg; symptoms (Nerve Conduction Studies (NCS)) | 533 | 0.53\|0.46 | 0.39\|0.59 | 0.96\|1.03 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Pain in the neck in the past 4 weeks) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; symptoms (Nerve Conduction Studies (NCS)) | 439 | index neg; symptoms (Nerve Conduction Studies (NCS)) | 445 | 0.50\|0.43 | 0.47\|0.47 | 0.87\|1.15 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Pain in the shoulder in the past 4 weeks) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; symptoms (Nerve Conduction Studies (NCS)) | 431 | index neg; symptoms (Nerve Conduction Studies (NCS)) | 453 | 0.50\|0.42 | 0.45\|0.47 | 0.85\|1.17 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Repeated bending/straightening of elbow for >1 hour per working day) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 547 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 337 | 0.54\|0.46 | 0.62\|0.38 | 0.99\|1.01 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Rheumatoid Arthritis) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 42 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 842 | 0.55\|0.46 | 0.05\|0.95 | 1.04\|1.00 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Targets, bonuses, or deadlines provided by work) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 454 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 430 | 0.54\|0.47 | 0.52\|0.49 | 1.03\|0.97 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Trouble writing or typing due to hand symptoms in the past 4 weeks) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; demographics and symptoms (Nerve Conduction Studies (NCS)) | 132 | index neg; demographics and symptoms (Nerve Conduction Studies (NCS)) | 752 | 0.53\|0.46 | 0.15\|0.85 | 0.97\|1.00 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Use of keyboard or mouse for >4 hours per working day) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 265 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 619 | 0.45\|0.43 | 0.25\|0.65 | 0.71\|1.16 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Work for >1 hour per working day with tools that made the hands/arms vibrate) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 129 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 755 | 0.60\|0.47 | 0.16\|0.87 | 1.28\|0.96 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Work with hand above shoulder height for >1 hour per working day) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 144 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 740 | 0.60\|0.47 | 0.18\|0.86 | 1.28\|0.95 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Work with neck bent forward for >2 hours per working day) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 369 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 515 | 0.52\|0.45 | 0.41\|0.57 | 0.94\|1.04 | POOR | POOR |
| Coggon,D., 2013 | Moderate Quality | CTS Positive (Work with neck twisted for >.05 hours per working day) | CTS suspected adults from one hosp referred to neurophysiology | sensory nerve conduction in index and between index and pinky >8ms | Subjects | index pos; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 226 | index neg; occupational and non-occupational factors (Nerve Conduction Studies (NCS)) | 658 | 0.55\|0.47 | 0.26\|0.75 | 1.07\|0.98 | POOR | POOR |
| Dale,A.M., 2011 (1) | Moderate Quality | CTS Positive (Hand Left) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; Hand RIGHT, Hand LEFT (Nerve Conduction Studies (NCS)) | 1108 | index neg; Hand RIGHT, Hand LEFT (Nerve Conduction Studies (NCS)) | 1108 | 0.24\|0.72 | 0.46\|0.49 | 0.90\|1.10 | POOR | POOR |
| Dale,A.M., 2011 (1) | Moderate Quality | CTS Positive (Hand Right) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; Hand RIGHT, Hand LEFT (Nerve Conduction Studies (NCS)) | 1108 | index neg; Hand RIGHT, Hand LEFT (Nerve Conduction Studies (NCS)) | 1108 | 0.28\|0.76 | 0.54\|0.51 | 1.10\|0.90 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dale,A.M., 2011 (2) | Moderate Quality | CTS Positive (Hand Left) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; Hand RIGHT, Hand LEFT (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1108 | index neg; Hand RIGHT, Hand LEFT (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1108 | 0.01\|0.98 | 0.31\|0.50 | 0.62\|1.38 | POOR | POOR |
| Dale,A.M., 2011 (2) | Moderate Quality | CTS Positive (Hand Right) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; Hand RIGHT, Hand LEFT (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1108 | index neg; Hand RIGHT, Hand LEFT (Nerve Conduction Studies (NCS) and Katz Hand Diagram; classic or probable) | 1108 | 0.02\|0.99 | 0.69\|0.50 | 1.38\|0.62 | POOR | POOR |
| El,Miedany Y., 2008 | Moderate Quality | CTS Positive (Tenosynovitis) | clinically diagnosed CTS suspects; large tenosynovitis prevalence | tenosynovitis diagnosed with US; CTS by NCS abnormalities in sensory, motor, or comparative | Subjects | index pos; tenosynovitis (Nerve Conduction Studies (NCS); AANEM referenced) | 119 | index neg; tenosynovitis (Nerve Conduction Studies (NCS); AANEM referenced) | 113 | 0.68\|0.09 | 0.44\|0.21 | 0.56\|2.69 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Franzblau,A., 1994 (1) | Moderate Quality | CTS Positive (Distal extremity symptoms and nocturnal symptoms) | 408 at risk workers from various facilities | median to ulnar sensory peak latency of >.8ms or >.5ms | Extremities | index pos; Handed dom, non-dom; distal and nocturnal sympt (Nerve Conduction Studies (NCS); >.5ms) | 106 | index neg; Handed dom, non-dom; distal and nocturnal sympt (Nerve Conduction Studies (NCS); >.5ms) | 703 | 0.35\|0.85 | 0.26\|0.90 | 2.52\|0.82 | WEAK | POOR |
| Franzblau,A., 1994 (1) | Moderate Quality | CTS Positive (Dominant Hand) | 408 at risk workers from various facilities | median to ulnar sensory peak latency of >.8ms or >.5ms | Extremities | index pos; Handed dom, non-dom; distal and nocturnal sympt (Nerve Conduction Studies (NCS); >.5ms) | 408 | index neg; Handed dom, non-dom; distal and nocturnal sympt (Nerve Conduction Studies (NCS); >.5ms) | 408 | 0.20\|0.85 | 0.56\|0.51 | 1.15\|0.86 | POOR | POOR |
| Franzblau,A., 1994 (1) | Moderate Quality | CTS Positive (Non-Dominant Hand) | 408 at risk workers from various facilities | median to ulnar sensory peak latency of >.8ms or >.5ms | Extremities | index pos; Handed dom, non-dom; distal and nocturnal sympt (Nerve Conduction Studies (NCS); >.5ms) | 408 | index neg; Handed dom, non-dom; distal and nocturnal sympt (Nerve Conduction Studies (NCS); >.5ms) | 408 | 0.15\|0.80 | 0.44\|0.49 | 0.86\|1.15 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Franzblau,A., 1994 (2) | Moderate Quality | CTS Positive (Distal extremity symptoms and nocturnal symptoms) | 408 at risk workers from various facilities | median to ulnar sensory peak latency of >.8ms or >.5ms | Extremities | index pos; Handed dom, non-dom; distal and nocturnal sympt (Nerve Conduction Studies (NCS); >.8ms) | 74 | index neg; Handed dom, non-dom; distal and nocturnal sympt (Nerve Conduction Studies (NCS); >.8ms) | 735 | 0.32\|0.89 | 0.23\|0.93 | 3.18\|0.83 | WEAK | POOR |
| Franzblau,A., 1994 (2) | Moderate Quality | CTS Positive (Dominant Hand) | 408 at risk workers from various facilities | median to ulnar sensory peak latency of >.8ms or >.5ms | Extremities | index pos; Handed dom, non-dom; distal and nocturnal sympt (Nerve Conduction Studies (NCS); >.8ms) | 408 | index neg; Handed dom, non-dom; distal and nocturnal sympt (Nerve Conduction Studies (NCS); >.8ms) | 408 | 0.10\|0.92 | 0.56\|0.51 | 1.13\|0.87 | POOR | POOR |
| Franzblau,A., 1994 (2) | Moderate Quality | CTS Positive (Non-Dominant Hand) | 408 at risk workers from various facilities | median to ulnar sensory peak latency of >.8ms or >.5ms | Extremities | index pos; Handed dom, non-dom; distal and nocturnal sympt (Nerve Conduction Studies (NCS); >.8ms) | 408 | index neg; Handed dom, non-dom; distal and nocturnal sympt (Nerve Conduction Studies (NCS); >.8ms) | 408 | 0.08\|0.90 | 0.44\|0.49 | 0.87\|1.13 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Age; 40-60) | 2535 patients referred for NCS from 5 facilities | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 2130 | index neg; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 1777 | 0.45\|0.68 | 0.62\|0.51 | 1.26\|0.74 | POOR | POOR |
| Gomes,I., 2006 | Moderate Quality | CTS Positive (BMI; 30+) | 2535 patients referred for NCS from 5 facilities | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 762 | index neg; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 3145 | 0.60\|0.66 | 0.30\|0.87 | 2.31\|0.81 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Gender/Sex Female) | 2535 patients referred for NCS from 5 facilities | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 2948 | index neg; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 959 | 0.44\|0.77 | 0.85\|0.31 | 1.23\|0.48 | POOR | WEAK |
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Gender/Sex Male) | 2535 patients referred for NCS from 5 facilities | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 959 | index neg; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 2948 | 0.23\|0.56 | 0.15\|0.69 | 0.48\|1.23 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Pain; upper limb) | 2535 patients referred for NCS from 5 facilities | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 3092 | index neg; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 815 | 0.42\|0.71 | 0.85\|0.24 | 1.12\|0.63 | POOR | POOR |
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Paresthesia; upper limb) | 2535 patients referred for NCS from 5 facilities | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 3006 | index neg; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 901 | 0.45\|0.81 | 0.89\|0.31 | 1.28\|0.37 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Sensory Symptoms; hand) | 2535 patients referred for NCS from 5 facilities | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 3161 | index neg; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 746 | 0.44\|0.83 | 0.92\|0.26 | 1.24\|0.32 | POOR | WEAK |
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Worsening symptoms at night) | 2535 patients referred for NCS from 5 facilities | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 1926 | index neg; Gender/Sex F, M; BMI30+; Age40-60; Paresthesia; Pain; Sensory sympt; weak; night; atrophy (Nerve Conduction Studies (NCS); AANEM referenced) | 1981 | 0.52\|0.74 | 0.66\|0.61 | 1.69\|0.56 | POOR | POOR |
| Katz,J.N., 1991 | Moderate Quality | CTS Positive (Occupation; exposed to pinching, grasping, wrist flexion, or vibration) | CTS symptomatic subjects at one hospital | referenced motor and sensory latency cutoffs | Subjects | index pos; Occupation (Nerve Conduction Studies (NCS)) | 54 | index neg; Occupation (Nerve Conduction Studies (NCS)) | 24 | 0.46\|0.79 | 0.83\|0.40 | 1.38\|0.42 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Employment; Disability) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 17 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 331 | 0.35\|0.51 | 0.04\|0.94 | 0.58\|1.03 | POOR | POOR |
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Employment; Employed) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 220 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 128 | 0.45\|0.45 | 0.58\|0.32 | 0.85\|1.32 | POOR | POOR |
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Employment; Homemaker) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 35 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 313 | 0.40\|0.50 | 0.08\|0.88 | 0.71\|1.04 | POOR | POOR |
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Employment; Retired) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 56 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 292 | 0.77\|0.57 | 0.25\|0.93 | 3.50\|0.80 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Employment; Student) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 7 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 341 | 0.14\|0.51 | 0.01\|0.97 | 0.18\|1.03 | POOR | POOR |
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Employment; Unemployed) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 3 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 345 | 0.33\|0.51 | 0.01\|0.99 | 0.53\|1.01 | POOR | POOR |
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Employment; Unknown) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 10 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 338 | 0.60\|0.52 | 0.04\|0.98 | 1.59\|0.99 | POOR | POOR |
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Referral; Family Physician) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 50 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 298 | 0.56\|0.53 | 0.17\|0.88 | 1.35\|0.95 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Referral; Hand Clinic) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 69 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 279 | 0.45\|0.51 | 0.18\|0.79 | 0.86\|1.04 | POOR | POOR |
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Referral; Neurology) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 4 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 344 | 0.00\|0.51 | 0.00\|0.98 | 0.00\|1.02 | POOR | POOR |
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Referral; Other) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 10 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 338 | 0.20\|0.51 | 0.01\|0.96 | 0.26\|1.03 | POOR | POOR |
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Referral; Physiatry) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 5 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 343 | 0.40\|0.51 | 0.01\|0.98 | 0.71\|1.01 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Referral; Rheumatology) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 10 | index neg; employment; referral source (Nerve Conduction Studies (NCS); AANEM referenced) | 338 | 0.60\|0.52 | 0.04\|0.98 | 1.59\|0.99 | POOR | POOR |
| MacDermid, J.C., 1997 | Moderate Quality | CTS Positive (Hand Symptoms Only) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; numb; pain; night sympt; hand only (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 42 | index neg; numb; pain; night sympt; hand only (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 42 | 0.36\|0.50 | 0.42\|0.44 | 0.74\|1.33 | POOR | POOR |
| MacDermid, J.C., 1997 | Moderate Quality | CTS Positive (Numbness; frequent) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; numb; pain; night sympt; hand only (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 48 | index neg; numb; pain; night sympt; hand only (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 36 | 0.75\|1.00 | 1.00\|0.75 | 4.00\|0.00 | WEAK | STRONG |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MacDermid, J.C., 1997 | Moderate Quality | CTS Positive (Pain; frequent) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; numb; pain; night sympt; hand only (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 71 | index neg; numb; pain; night sympt; hand only (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 13 | 0.49\|0.92 | 0.97\|0.25 | 1.30\|0.11 | POOR | MODERATE |
| MacDermid, J.C., 1997 | Moderate Quality | CTS Positive (Worsening symptoms at night) | referred to clinic for CTS symptoms | various nerves and compression measurements | Extremities | index pos; numb; pain; night sympt; hand only (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 39 | index neg; numb; pain; night sympt; hand only (Nerve Conduction Studies (NCS), Electromyography (EMG), and Clinical Diagnosis) | 45 | 0.69\|0.80 | 0.75\|0.75 | 3.00\|0.33 | WEAK | WEAK |
| Makanji,H.S., 2014 | Moderate Quality | CTS Positive (Gender/Sex Female) | referred CTS suspects | DML and DSL with referenced normal values | Subjects | index pos; Gender/Sex F, M; tobacco use (yes); thenar atrophy; thumb abduction weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 55 | index neg; Gender/Sex F, M; tobacco use (no); thenar atrophy; thumb abduction weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 33 | 0.69\|0.18 | 0.58\|0.26 | 0.79\|1.59 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Makanji,H.S., 2014 | Moderate Quality | CTS Positive (Gender/Sex Male) | referred CTS suspects | DML and DSL with referenced normal values | Subjects | index pos; Gender/Sex F, M; tobacco use (yes); thenar atrophy; thumb abduction weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 33 | index neg; Gender/Sex F, M; tobacco use (no); thenar atrophy; thumb abduction weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 55 | 0.82\|0.31 | 0.42\|0.74 | 1.59\|0.79 | POOR | POOR |
| Makanji,H.S., 2014 | Moderate Quality | CTS Positive (Tobacco Use) | referred CTS suspects | DML and DSL with referenced normal values | Subjects | index pos; Gender/Sex F, M; tobacco use (yes); thenar atrophy; thumb abduction weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 5 | index neg; Gender/Sex F, M; tobacco use (no); thenar atrophy; thumb abduction weakness (Nerve Conduction Studies (NCS); AANEM referenced) | 83 | 0.80\|0.27 | 0.06\|0.96 | 1.42\|0.98 | POOR | POOR |
| Pastare,D., 2009 | Moderate Quality | CTS Positive (Clinical Diagnosis; 2 or more symptoms) | 66 CTS suspected patients referred to Neuro lab in Singapore hosp | sensory, motor, and LINT cutoffs | Extremities | index pos; clinical diagnosis, 2+ sympt (Nerve Conduction Studies (NCS); AANEM referenced) | 66 | index neg; clinical diagnosis, 2+ sympt (Nerve Conduction Studies (NCS); AANEM referenced) | 31 | 0.82\|0.45 | 0.76\|0.54 | 1.65\|0.44 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Taylor-Gjevre,R.M., 2010 | Moderate Quality | CTS Positive (Bilateral Symptoms) | clinically diagnosed CTS suspects referred for NCS | motor, mixed, sensory nerve latency cutoffs referenced | Subjects | index pos; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 139 | index neg; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 72 | 0.57\|0.42 | 0.65\|0.33 | 0.98\|1.04 | POOR | POOR |
| Taylor-Gjevre,R.M., 2010 | Moderate Quality | CTS Positive (Dominant Hand; Left) | clinically diagnosed CTS suspects referred for NCS | motor, mixed, sensory nerve latency cutoffs referenced | Subjects | index pos; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 20 | index neg; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 191 | 0.60\|0.43 | 0.10\|0.91 | 1.12\|0.99 | POOR | POOR |
| Taylor-Gjevre,R.M., 2010 | Moderate Quality | CTS Positive (Dominant Hand; Right) | clinically diagnosed CTS suspects referred for NCS | motor, mixed, sensory nerve latency cutoffs referenced | Subjects | index pos; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 191 | index neg; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 20 | 0.57\|0.40 | 0.90\|0.09 | 0.99\|1.12 | POOR | POOR |
| Taylor-Gjevre,R.M., 2010 | Moderate Quality | CTS Positive (Gender/Sex Female) | clinically diagnosed CTS suspects referred for NCS | motor, mixed, sensory nerve latency cutoffs referenced | Subjects | index pos; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 156 | index neg; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 55 | 0.56\|0.40 | 0.73\|0.24 | 0.96\|1.12 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Taylor-Gjevre,R.M., 2010 | Moderate Quality | CTS Positive (Gender/Sex Male) | clinically diagnosed CTS suspects referred for NCS | motor, mixed, sensory nerve latency cutoffs referenced | Subjects | index pos; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 55 | index neg; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 156 | 0.60\|0.44 | 0.27\|0.76 | 1.12\|0.96 | POOR | POOR |
| Taylor-Gjevre,R.M., 2010 | Moderate Quality | CTS Positive (Hand Left) | clinically diagnosed CTS suspects referred for NCS | motor, mixed, sensory nerve latency cutoffs referenced | Subjects | index pos; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 29 | index neg; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 182 | 0.69\|0.45 | 0.17\|0.90 | 1.65\|0.93 | POOR | POOR |
| Taylor-Gjevre,R.M., 2010 | Moderate Quality | CTS Positive (Hand Right) | clinically diagnosed CTS suspects referred for NCS | motor, mixed, sensory nerve latency cutoffs referenced | Subjects | index pos; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 43 | index neg; Gender/Sex; bilateral; dominance; hand (Nerve Conduction Studies (NCS)) | 168 | 0.51\|0.41 | 0.18\|0.77 | 0.78\|1.07 | POOR | POOR |
| Taylor-Gjevre,R.M., 2010 | Moderate Quality | CTS Positive (Non-Symptomatic Hand) | clinically diagnosed CTS suspects referred for NCS | motor, mixed, sensory nerve latency cutoffs referenced | Extremities | index pos; symptomatic hands (Nerve Conduction Studies (NCS)) | 72 | index neg; symptomatic hands (Nerve Conduction Studies (NCS)) | 350 | 0.38\|0.51 | 0.14\|0.80 | 0.67\|1.08 | POOR | POOR |
| Taylor-Gjevre,R.M., 2010 | Moderate Quality | CTS Positive (Symptomatic Hand) | clinically diagnosed CTS suspects referred for NCS | motor, mixed, sensory nerve latency cutoffs referenced | Extremities | index pos; symptomatic hands (Nerve Conduction Studies (NCS)) | 350 | index neg; symptomatic hands (Nerve Conduction Studies (NCS)) | 72 | 0.49\|0.63 | 0.86\|0.20 | 1.08\|0.67 | POOR | POOR |

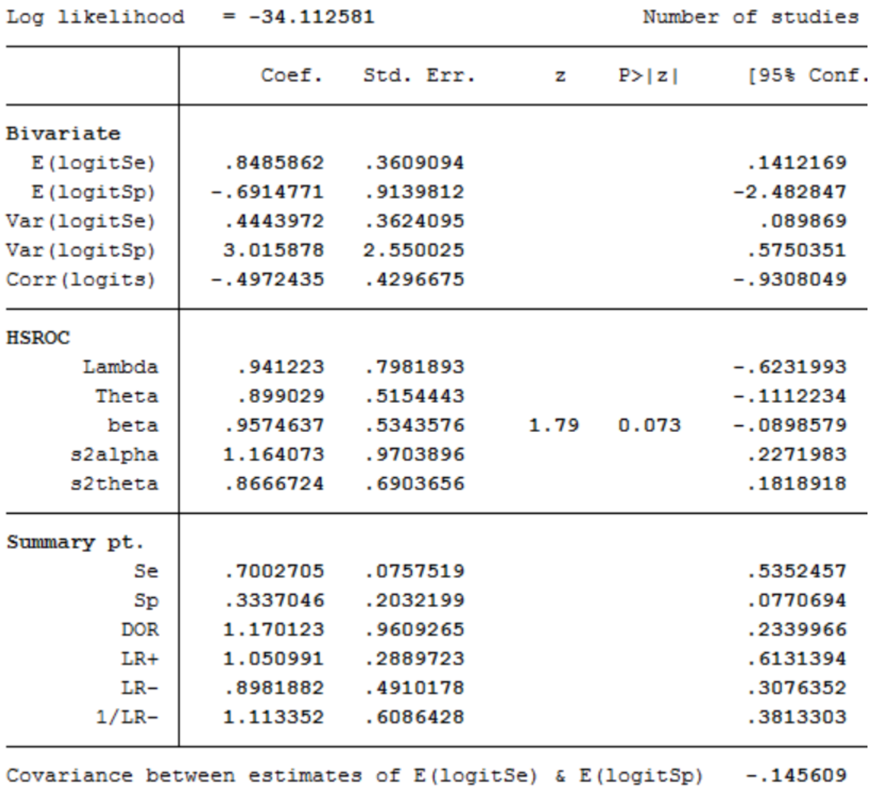
| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Witt,J.C., 2004 | Moderate Quality | CTS Positive (Clinical diagnosis) | referred CTS suspects | various NCS parameters as needed | Subjects | index pos; clinical diagnosis (Nerve Conduction Studies (NCS); AANEM referenced) | 65 | index neg; clinical diagnosis (Nerve Conduction Studies (NCS); AANEM referenced) | 19 | 0.22\|0.47 | 0.58\|0.15 | 0.69\|2.78 | POOR | POOR |
| Yagci,I., 2010 | Moderate Quality | CTS Positive (Gender/Sex Female) | DPN PATIENT POPULATION referred to EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; Gender/Sex F, M (Nerve Conduction Studies (NCS); AANEM referenced) | 14 | index neg; Gender/Sex F, M (Nerve Conduction Studies (NCS); AANEM referenced) | 33 | 0.79\|0.67 | 0.50\|0.88 | 4.17\|0.57 | WEAK | POOR |
| Yagci,I., 2010 | Moderate Quality | CTS Positive (Gender/Sex Male) | DPN PATIENT POPULATION referred to EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; Gender/Sex F, M (Nerve Conduction Studies (NCS); AANEM referenced) | 33 | index neg; Gender/Sex F, M (Nerve Conduction Studies (NCS); AANEM referenced) | 14 | 0.33\|0.21 | 0.50\|0.12 | 0.57\|4.17 | POOR | POOR |

*TABLE 16: LOW QUALITY STUDIES- PICO 2 (HISTORY INTERVIEW TOPICS VERSUS REFERENCE STANDARD)*

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Glowacki,K. A., 1996 | Low Quality | CTS Positive (Workers' Compensation) | 167 clinically diagnosed CTS surgical patients | motor and sensory latency cutoff values | Extremities | index pos; workers comp (Surgical Relief of Symptoms; resolved or improved) | 136 | index neg; non-workers comp (Surgical Relief of Symptoms; resolved or improved) | 91 | 0.90\|0.03 | 0.58\|0.19 | 0.72\|2.22 | POOR | POOR |
| Khosrawi,S., 2012 | Low Quality | CTS Positive (Clinical Symptoms) | ALL PREGNANT WOMEN | median to ulnar cutoffs referenced | Subjects | index pos; clinical symptoms (Nerve Conduction Studies (NCS)) | 40 | index neg; clinical symptoms (Nerve Conduction Studies (NCS)) | 60 | 0.28\|0.87 | 0.58\|0.64 | 1.62\|0.66 | POOR | POOR |

## META-ANALYSES

### *FIGURE 7: EDS AANEM VERSUS FEMALE GENDER/SEX*



```
Log likelihood   = -34.112581                       Number of studies

                 |      Coef.   Std. Err.      z    P>|z|     [95% Conf.
-----------------+------------------------------------------------------
Bivariate        |
  E(logitSe)     |   .8485862   .3609094                      .1412169
  E(logitSp)     |  -.6914771   .9139812                     -2.482847
Var(logitSe)     |   .4443972   .3624095                       .089869
Var(logitSp)     |   3.015878   2.550025                      .5750351
Corr(logits)     |  -.4972435   .4296675                     -.9308049
-----------------+------------------------------------------------------
HSROC            |
          Lambda |    .941223   .7981893                     -.6231993
           Theta |    .899029   .5154443                     -.1112234
            beta |   .9574637   .5343576     1.79   0.073     -.0898579
         s2alpha |   1.164073   .9703896                      .2271983
         s2theta |   .8666724   .6903656                      .1818918
-----------------+------------------------------------------------------
Summary pt.      |
              Se |   .7002705   .0757519                      .5352457
              Sp |   .3337046   .2032199                      .0770694
             DOR |   1.170123   .9609265                      .2339966
             LR+ |   1.050991   .2889723                      .6131394
             LR- |   .8981882   .4910178                      .3076352
           1/LR- |   1.113352   .6086428                      .3813303
-----------------+------------------------------------------------------
Covariance between estimates of E(logitSe) & E(logitSp)       -.145609
```

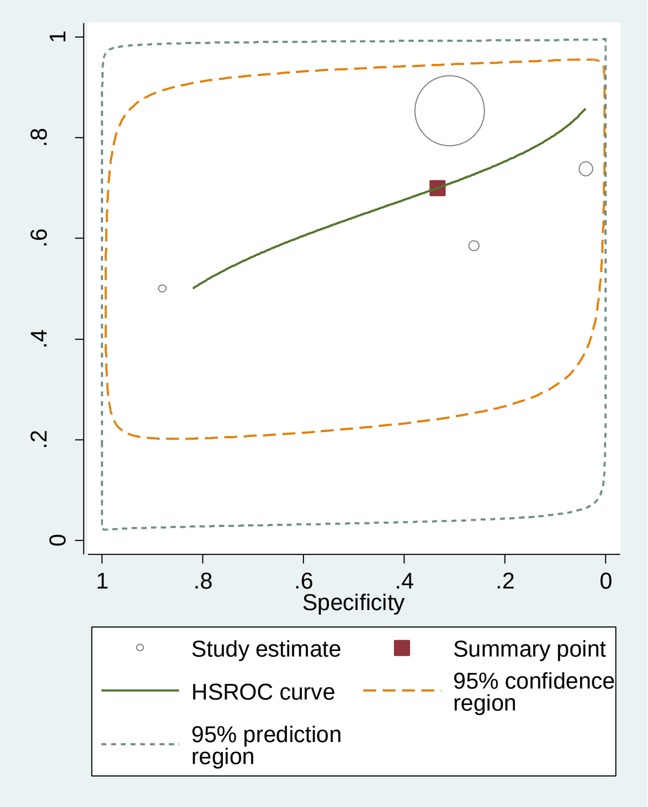
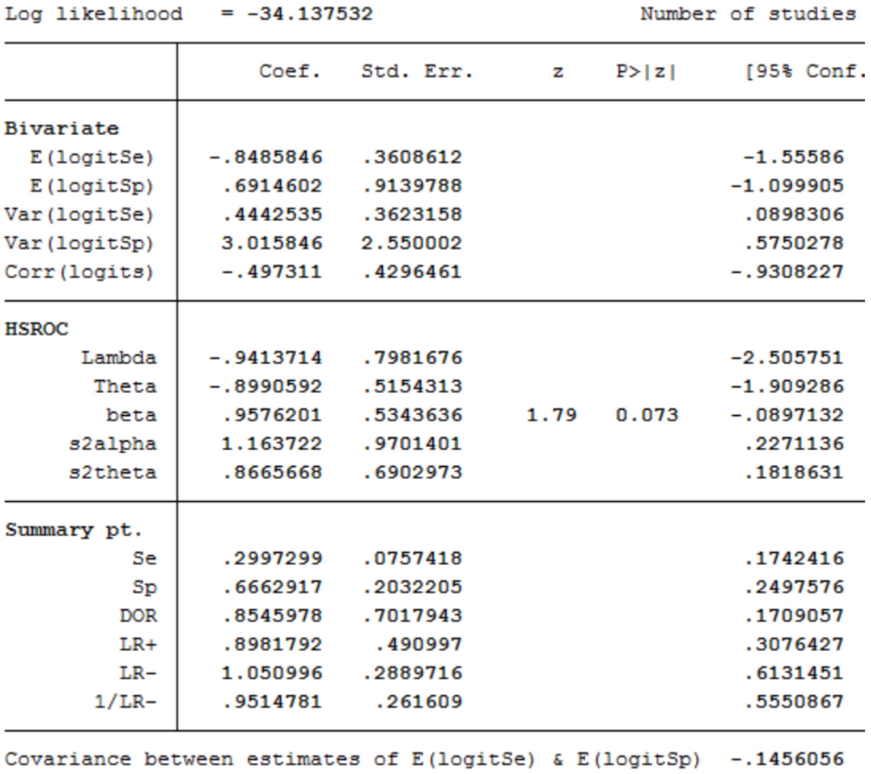
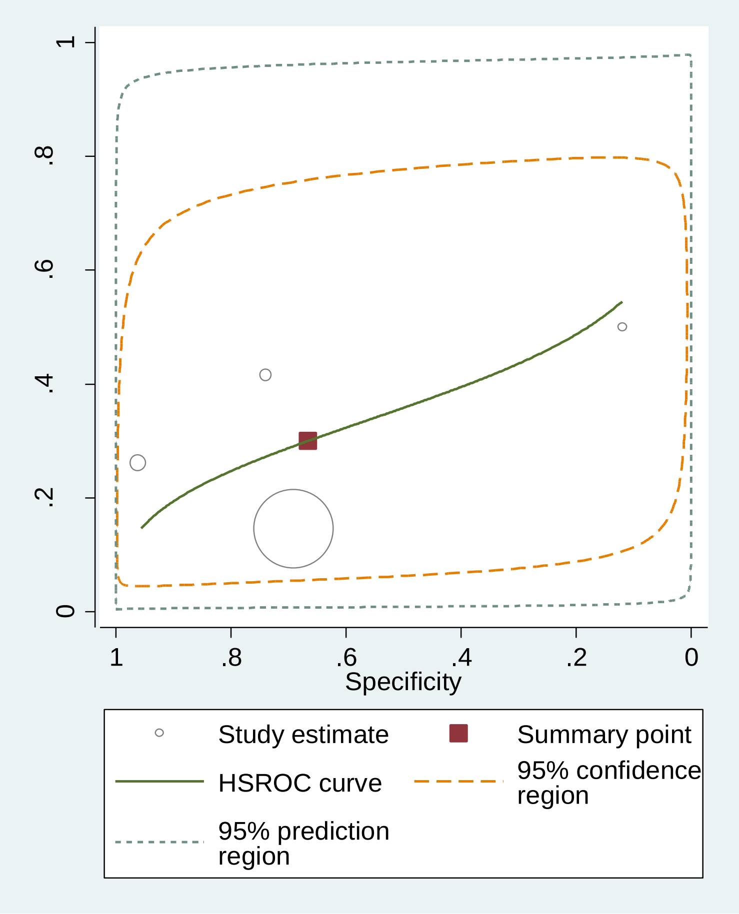


*FIGURE 8: EDS AANEM VERSUS MALE GENDER/SEX*



```
Log likelihood    = -34.137532                    Number of studies

             |      Coef.    Std. Err.        z    P>|z|      [95% Conf.
-------------+----------------------------------------------------------
Bivariate    |
   E(logitSe)|  -.8485846    .3608612                        -1.55586
   E(logitSp)|   .6914602    .9139788                       -1.099905
 Var(logitSe)|   .4442535    .3623158                        .0898306
 Var(logitSp)|   3.015846    2.550002                        .5750278
 Corr(logits)|   -.497311    .4296461                       -.9308227
-------------+----------------------------------------------------------
HSROC        |
       Lambda|  -.9413714    .7981676                       -2.505751
        Theta|  -.8990592    .5154313                       -1.909286
         beta|   .9576201    .5343636     1.79    0.073     -.0897132
      s2alpha|   1.163722    .9701401                        .2271136
      s2theta|   .8665668    .6902973                        .1818631
-------------+----------------------------------------------------------
Summary pt.  |
           Se|   .2997299    .0757418                        .1742416
           Sp|   .6662917    .2032205                        .2497576
          DOR|   .8545978    .7017943                        .1709057
          LR+|   .8981792     .490997                        .3076427
          LR-|   1.050996    .2889716                        .6131451
        1/LR-|   .9514781     .261609                        .5550867
------------------------------------------------------------------------
Covariance between estimates of E(logitSe) & E(logitSp)   -.1456056
```



## IMAGING GUIDELINE RECOMMENDATIONS

### A. HAND-HELD NERVE CONDUCTION STUDY (NCS)

Limited evidence supports that a hand-held nerve conduction study (NCS) device might be used for the diagnosis of carpal tunnel syndrome.

**Strength of Recommendation: Limited Evidence** ★★☆☆

Description: Evidence from one or more "Low" quality studies with consistent findings **or** evidence from a single "Moderate" quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

#### Rationale

There was one moderate quality study (Tan, 2012) evaluating the use of a hand-held NCS device for the diagnosis of CTS. This study showed that a handheld NCS device can rule in or rule out the diagnosis of CTS, in patients with typical symptoms of CTS, using EDS following AANEM criteria as the reference standard. The hand-held NCS device closely parallels the severity of disease compared with the neurological assessment as well.

#### Risks and Harms of Implementing this Recommendation

The user should be aware of the limitations and specific utility of these devices. They should not be used in patients that have symptoms or signs that might suggest an alternative diagnosis or in patients who have weakness or atrophy. Use of the hand-held NCS device in those with alternative diagnosis to CTS or motor deficit may result in missed or delayed diagnosis.

#### Future Research

More high quality studies are needed to confirm the utility of this method in comparisoned to electrodiagnostic studies.

### B. MRI

Moderate evidence supports not routinely using MRI for the diagnosis of carpal tunnel syndrome.

**Strength of Recommendation: Moderate Evidence** ★★★☆

Description: Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.

#### Rationale

There was one high quality study (Jarvik, 2002) evaluating MRI for the diagnosis of CTS. Findings on MRI had a weak or poor association as a rule out test for CTS as compared to a classic or probable hand pain diagram and nerve conduction study. Only severe fascicular swelling, severe flexor tenosynovitis, or severe increased muscle signal had a strong association with CTS, suggesting that MRI would be insensitive in identifying the diagnosis of CTS in the majority of patients in whom these findings would be unlikely to be present.

### Risks and Harms of Implementing this Recommendation

There are no known harms associated with implementing these recommendations.

### Future Research

In order for imaging modalities to be effective in diagnosis of CTS consensus on the optimal location for the measurements and threshold values for parameters such as cross-sectional area are required.

## C. DIAGNOSTIC ULTRASOUND

Limited evidence supports not routinely using ultrasound for the diagnosis of carpal tunnel syndrome.

### Strength of Recommendation: Limited Evidence ★★☆☆

Description: Evidence from one or more “Low” quality studies with consistent findings **or** evidence from a single “Moderate” quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

### Rationale

There were five high quality (Naranjo, 2007; Moran, 2009; Ziswiler, 2005; Wong, 2004; Claes, 2013) and seven moderate quality studies (Abdel Ghaffar, 2012; Dejaco, 2013; Fowler, 2014; Hashemi, 2009; Moghtaderi, 2012; Nakamichi, 2002; Pastare, 2009) evaluating ultrasound for the diagnosis of CTS compared with EDS as the reference standard. These studies showed conflicting results regarding the utility of ultrasound (US) as either a rule in or rule out test in the diagnosis of CTS. In general, there was variation between the studies for the cut-off value for making the diagnosis or for exclusion of CTS. The ideal location for measuring the cross-sectional area (CSA) of the median nerve for indicating the diagnosis of CTS also varied between studies. There is a general agreement that a CSA greater than 12-13 mm is strongly correlated with EDS. As a rule out study for CTS, there is a strong correlation with CSA below 8 mm. One moderate quality (Abdel Ghaffar, 2012) and one low quality study (Mallouhi, 2006) suggest that a US measurement of nerve hypervascularity may have a strong association as a rule out study for CTS.

### Risks and Harms of Implementing this Recommendation

There are no known harms associated with implementing these recommendations.

### Future Research

In order for imaging modalities to be effective in diagnosis of CTS consensus on the optimal location for the measurements and threshold values for parameters such as cross-sectional area are required. Further high quality studies are needed to determine the utility of hypervascularity of the median nerve by ultrasound in the diagnosis of CTS.

## STUDY QUALITY TABLE OF IMAGING MODALITIES

### *TABLE 17. DIAGNOSTIC QUALITY EVALUATIONS*

| Study | Representative Population | Clear Selection Criteria | Detailed Enough to Replicate | Reference Standard Identifies Target Condition | Blinding | Other Bias? | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|
| Abdel Ghaffar,M.K., 2012 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Beckenbaugh,R.D., 1995 | ● | ◑ | ● | ◑ | ◑ | ◑ | Include | Low Quality |
| Claes,F., 2013 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Dejaco,C., 2013 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Deniz,F.E., 2012 | ● | ◑ | ● | ○ | ● | ◑ | Include | Low Quality |
| Fowler,J.R., 2014 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Franzblau,A., 1994 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Glowacki,K.A., 1996 | ● | ● | ● | ○ | ◑ | ◑ | Include | Low Quality |
| Hashemi,A.-H., 2009 | ● | ● | ○ | ◑ | ● | ● | Include | Moderate Quality |
| Jarvik,J.G., 2002 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Kang,E.K., 2008 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Kaul,M.P., 2002 | ● | ● | ● | ◑ | ○ | ◑ | Include | Low Quality |
| Lo,J.K., 2002 | ● | ● | ● | ◑ | ○ | ◑ | Include | Low Quality |
| Mallouhi,A., 2006 | ● | ● | ◑ | ◑ | ● | ○ | Include | Low Quality |
| Missere,M., 1999 | ● | ◑ | ● | ◑ | ◑ | ◑ | Include | Low Quality |
| Moghtaderi,A., 2012 | ● | ◑ | ● | ◑ | ● | ● | Include | Moderate Quality |

| Study | Representative Population | Clear Selection Criteria | Detailed Enough to Replicate | Reference Standard Identifies Target Condition | Blinding | Other Bias? | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|
| Moran,L., 2009 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Nakamichi,K., 2002 | ● | ◑ | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Naranjo,A., 2007 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Pastare,D., 2009 | ● | ● | ● | ◑ | ○ | ● | Include | Moderate Quality |
| Sheean,G.L., 1995 | ● | ◑ | ● | ◑ | ◑ | ◑ | Include | Low Quality |
| Smith,T., 1998 | ● | ● | ● | ◑ | ○ | ◑ | Include | Low Quality |
| Stalberg,E., 2000 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Swen,W.A., 2001 | ● | ● | ● | ○ | ● | ● | Include | Moderate Quality |
| Szopinski,K., 2011 | ● | ◑ | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Tan,S.V., 2012 | ● | ● | ● | ◑ | ● | ○ | Include | Moderate Quality |
| Weber,R.A., 2000 | ● | ◑ | ● | ◑ | ● | ● | Include | Moderate Quality |
| Werner,R.A., 1994 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Werner,R.A., 1995 | ● | ◑ | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Wong,S.M., 2004 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Yazdchi,M., 2012 | ● | ◑ | ● | ◑ | ● | ◑ | Include | Moderate Quality |

| Study | Representative Population | Clear Selection Criteria | Detailed Enough to Replicate | Reference Standard Identifies Target Condition | Blinding | Other Bias? | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|
| Ziswiler,H.R., 2005 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |

# RESULTS

## *SUMMARY OF DATA FINDINGS*

*TABLE 18: SUMMARY OF FINDINGS- INDEX TEST VERSUS AANEM REFERENCED EDS*

| | LR + | LR - | |
|---|---|---|---|
| ● | ≥10 | ≤0.1 | In **"STRONG"** agreement with the reference standard |
| ◕ | ≥5 but <10 | >0.1 but ≤0.2 | In **"MODERATE"** agreement with the reference standard |
| ◔ | >2 and <5 | >0.2 but <0.5 | In **"WEAK"** agreement with the reference standard |
| ○ | ≤2 | ≥0.5 | In **"POOR"** agreement with the reference standard |

| | | High Quality | | | | Moderate Quality | | |
|---|---|---|---|---|---|---|---|---|
| **Index Test** | **Rule In/Out** | **Naranjo,A., 2007 (1)** | **Tan,S.V., 2012 (1)** | **Tan,S.V., 2012 (2)** | **Wong,S.M., 2004 (1)** | **Fowler,J.R., 2014** | **Pastare,D., 2009** | **Meta-Analysis** |
| **Hand held NCS** | RULE IN | | ◕ | ◕ | | | | NA |
| | RULE OUT | | ◕ | ◕ | | | | NA |
| **Ultrasound; CSA inlet; >9mm sq** | RULE IN | ○ | | | | | ◕ | NA |
| | RULE OUT | ◕ | | | | | ◔ | NA |
| **Ultrasound; CSA proximal inlet; >10mm sq** | RULE IN | | | | ◔ | ◕ | | NA |
| | RULE OUT | | | | ◔ | ◕ | | NA |

*Table only displays index tests with more than one article of supporting evidence*

*Authors with parenthetical numbers indicate a change in EDS method/threshold, alternate limbs, or alternate examiner*

*TABLE 19: SUMMARY OF FINDINGS- INDEX TEST VERSUS GENERAL EDS METHODS*

| | **LR +** | **LR -** | |
|---|---|---|---|
| ● | ≥10 | ≤0.1 | In **"STRONG"** agreement with the reference standard |
| ◕ | ≥5 but <10 | >0.1 but ≤0.2 | In **"MODERATE"** agreement with the reference standard |
| ◔ | >2 and <5 | >0.2 but <0.5 | In "**WEAK"** agreement with the reference standard |
| ○ | ≤2 | ≥0.5 | In **"POOR"** agreement with the reference standard |

| | | **Moderate Quality** | **Low Quality** | |
|---|---|---|---|---|
| **Index Test** | **Rule In/Out** | **Abdel Ghaffar,M.K., 2012** | **Mallouhi,A., 2006** | **Meta-Analysis** |
| **Ultrasound; nerve edema** | RULE IN | ◔ | ◔ | NA |
| | RULE OUT | ◔ | ◔ | NA |
| **Ultrasound; nerve hypervascularization** | RULE IN | ◔ | ◔ | NA |
| | RULE OUT | ● | ● | NA |
| *Table only displays index tests with more than one article of supporting evidence* | | | | |

## *DETAILED DATA FINDINGS*

### *TABLE 20: HIGH QUALITY STUDIES- PICO 3 (IMAGING MODALITIES VERSUS REFERENCE STANDARD)*

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Claes,F., 2013 | High Quality | CTS Positive (Ultrasound; CSA inlet) | clinically diagnosed CTS suspects | at least 2 of 4 abnormal EDS parameters | Subjects | index pos; CSA (Nerve Conduction Studies (NCS); AANEM referenced) | 89 | index neg; CSA (Nerve Conduction Studies (NCS); AANEM referenced) | 67 | 0.97\|0.34 | 0.66\|0.88 | 5.73\|0.38 | MODERATE | WEAK |
| Franzblau,A., 1994 (1) | High Quality | CTS Positive (Current Perception Threshold (CPT)) | manufacturing workers in Michigan with complaints of CTS | confirmed median mononeuropathy by NCS only | Subjects | index pos; CPT (Nerve Conduction Studies (NCS); >.5ms) | 34 | index neg; CPT (Nerve Conduction Studies (NCS); >.5ms) | 48 | 0.26\|0.88 | 0.60\|0.63 | 1.61\|0.64 | POOR | POOR |
| Franzblau,A., 1994 (2) | High Quality | CTS Positive (Current Perception Threshold (CPT)) | manufacturing workers in Michigan with complaints of CTS | median to ulnar sensory peak latency of >.5ms | Subjects | index pos; CPT (Nerve Conduction Studies (NCS); >.5ms and Clinical Symptoms) | 35 | index neg; CPT (Nerve Conduction Studies (NCS); >.5ms and Clinical Symptoms) | 48 | 0.11\|0.96 | 0.67\|0.60 | 1.66\|0.56 | POOR | POOR |
| Jarvik,J.G., 2002 | High Quality | CTS Positive (Any MRI abnormality) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.92\|0.28 | 1.28\|0.29 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jarvik,J.G., 2002 | High Quality | CTS Positive (Any severe MRI abnormality) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.58\|0.72 | 2.07\|0.58 | WEAK | POOR |
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Bowing of flexor retinaculum) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.45\|0.76 | 1.88\|0.72 | POOR | POOR |
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Deep palmar bursitis) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.77\|0.00 | 0.77\|0.60 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Fascicular swelling) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.74\|0.44 | 1.32\|0.59 | POOR | POOR |
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Fat in the carpal tunnel) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.43\|0.16 | 0.51\|3.56 | POOR | POOR |
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Flattening of median nerve) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.59\|0.33 | 0.88\|1.24 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Flexor tenosynovitis) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.60\|0.54 | 1.30\|0.74 | POOR | POOR |
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Increased median nerve signal) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.88\|0.39 | 1.44\|0.31 | POOR | WEAK |
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Increased muscle signal) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.10\|0.96 | 2.50\|0.94 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Severe bowing of flexor retinaculum) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.03\|0.98 | 1.50\|0.99 | POOR | POOR |
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Severe deep palmar bursitis) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.09\|0.88 | 0.75\|1.03 | POOR | POOR |
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Severe fascicular swelling) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.11\|1.00 | 10.00\|0.89 | STRONG | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Severe flattening of median nerve) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.08\|0.89 | 0.73\|1.03 | POOR | POOR |
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Severe flexor tenosynovitis) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.00\|1.00 | 10.00\|1.00 | STRONG | POOR |
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Severe level of fat in the carpal tunnel) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.02\|0.92 | 0.25\|1.07 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Severely increased median nerve signal) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.30\|0.85 | 2.00\|0.82 | WEAK | POOR |
| Jarvik,J.G., 2002 | High Quality | CTS Positive (MRI; Severely increased muscle signal) | CTS suspects from 5 sites in Seattle | median to ulnar sensory peak and mixed nerve latency | Subjects | index pos; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | index neg; MRI parameters (Nerve Conduction Studies (NCS); AANEM referenced and Katz Hand Diagram; classic or probable) | . | AR | 0.01\|1.00 | 10.00\|0.99 | STRONG | POOR |
| Moran,L., 2009 | High Quality | CTS Positive (Ultrasound; CSA inlet; Automatic Tracing; >11mm sq) | 46 CTS suspected manual workers (catering and cleaning) referred to ortho dept | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; CSA via 2 formulas and cutoffs (Nerve Conduction Studies (NCS); AANEM referenced) | 55 | index neg; CSA via 2 formulas and cutoffs (Nerve Conduction Studies (NCS); AANEM referenced) | 15 | 0.78\|0.53 | 0.86\|0.40 | 1.43\|0.35 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moran,L., 2009 | High Quality | CTS Positive (Ultrasound; CSA inlet; Automatic Tracing; >13mm sq) | 46 CTS suspected manual workers (catering and cleaning) referred to ortho dept | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; CSA via 2 formulas and cutoffs (Nerve Conduction Studies (NCS); AANEM referenced) | 32 | index neg; CSA via 2 formulas and cutoffs (Nerve Conduction Studies (NCS); AANEM referenced) | 38 | 0.94\|0.47 | 0.60\|0.90 | 6.00\|0.44 | MODERATE | WEAK |
| Moran,L., 2009 | High Quality | CTS Positive (Ultrasound; CSA inlet; Elipse Formula; >12.3mm sq) | 46 CTS suspected manual workers (catering and cleaning) referred to ortho dept | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; CSA via 2 formulas and cutoffs (Nerve Conduction Studies (NCS); AANEM referenced) | 32 | index neg; CSA via 2 formulas and cutoffs (Nerve Conduction Studies (NCS); AANEM referenced) | 38 | 0.97\|0.50 | 0.62\|0.95 | 12.40\|0.40 | STRONG | WEAK |
| Moran,L., 2009 | High Quality | CTS Positive (Ultrasound; CSA inlet; Elipse Formula; >9.8mm sq) | 46 CTS suspected manual workers (catering and cleaning) referred to ortho dept | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; CSA via 2 formulas and cutoffs (Nerve Conduction Studies (NCS); AANEM referenced) | 57 | index neg; CSA via 2 formulas and cutoffs (Nerve Conduction Studies (NCS); AANEM referenced) | 13 | 0.81\|0.69 | 0.92\|0.45 | 1.67\|0.18 | POOR | MODERATE |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; bowing of flexor retinaculum) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 75 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 30 | 0.84\|0.43 | 0.79\|0.52 | 1.64\|0.41 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; compression in longitudinal view) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 17 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 88 | 0.76\|0.24 | 0.16\|0.84 | 1.02\|1.00 | POOR | POOR |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >10mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 75 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 30 | 0.84\|0.43 | 0.79\|0.52 | 1.64\|0.41 | POOR | WEAK |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >11mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 58 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 47 | 0.88\|0.38 | 0.64\|0.72 | 2.28\|0.50 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >12mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 47 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 58 | 0.94\|0.38 | 0.55\|0.88 | 4.58\|0.51 | WEAK | POOR |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >13mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 33 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 72 | 1.00\|0.35 | 0.41\|1.00 | 10.00\|0.59 | STRONG | POOR |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >14mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 22 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 83 | 1.00\|0.30 | 0.28\|1.00 | 10.00\|0.73 | STRONG | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >15mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 22 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 83 | 1.00\|0.30 | 0.28\|1.00 | 10.00\|0.73 | STRONG | POOR |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >16mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 11 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 94 | 1.00\|0.27 | 0.14\|1.00 | 10.00\|0.86 | STRONG | POOR |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >8mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 99 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 6 | 0.80\|0.83 | 0.99\|0.20 | 1.23\|0.06 | POOR | STRONG |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >9.7mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 82 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 23 | 0.84\|0.52 | 0.86\|0.48 | 1.66\|0.29 | POOR | WEAK |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >9.7mm sq and BCTQ >3) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | AR | 0.86\|0.40 | 1.44\|0.34 | POOR | WEAK |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >9.7mm sq and bowing of flexor retinaculum) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | AR | 0.94\|0.40 | 1.56\|0.16 | POOR | MODERATE |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >9.7mm sq and compression in longitudinal view) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | AR | 1.00\|0.25 | 1.33\|0.00 | POOR | STRONG |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >9.7mm sq and Phalen Test) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | AR | 0.84\|0.38 | 1.34\|0.43 | POOR | WEAK |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >9.7mm sq and symptom duration >24 months) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | AR | 0.93\|0.43 | 1.62\|0.18 | POOR | MODERATE |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >9.7mm sq and Tinel Sign) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | AR | 0.86\|0.40 | 1.43\|0.36 | POOR | WEAK |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >9.7mm sq, neg Tinel Sign, and neg Phalen Test) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | AR | 1.00\|0.67 | 2.99\|0.00 | WEAK | STRONG |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >9.7mm sq, pos Tinel Sign, and pos Phalen Test) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | . | AR | 0.87\|0.36 | 1.35\|0.38 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA inlet; >9mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 93 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 12 | 0.83\|0.75 | 0.96\|0.36 | 1.50\|0.10 | POOR | MODERATE |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA max; >11.5mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 65 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 40 | 0.89\|0.45 | 0.73\|0.72 | 2.59\|0.38 | WEAK | WEAK |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA outlet; >11.5mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 56 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 49 | 0.91\|0.41 | 0.64\|0.80 | 3.19\|0.45 | WEAK | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; CSA proximal inlet; >10.1mm sq) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 70 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 35 | 0.86\|0.43 | 0.75\|0.60 | 1.88\|0.42 | POOR | WEAK |
| Naranjo,A., 2007 | High Quality | CTS Positive (Ultrasound; flattening index) | 68 patients with suspected CTS | ROC curve determined cutoffs | Extremities | index pos; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 65 | index neg; US locations; nerve swelling combinations to physical tests (Nerve Conduction Studies (NCS); AANEM referenced) | 40 | 0.80\|0.30 | 0.65\|0.48 | 1.25\|0.73 | POOR | POOR |
| Tan,S.V., 2012 (1) | Moderate Quality | CTS Positive (Hand held NCS (Examiner 1)) | limbs of 100 CTS suspects | at least 2 abnormal EDS parameters | Extremities | index pos; hand held NCS (Nerve Conduction Studies (NCS); AANEM referenced) | . | index neg; hand held NCS (Nerve Conduction Studies (NCS); AANEM referenced) | . | AR | 0.85\|0.90 | 8.50\|0.17 | MODERATE | MODERATE |
| Tan,S.V., 2012 (2) | Moderate Quality | CTS Positive (Hand held NCS (Examiner 2)) | limbs of 100 CTS suspects | at least 2 abnormal EDS parameters | Extremities | index pos; hand held NCS (Nerve Conduction Studies (NCS); AANEM referenced) | . | index neg; hand held NCS (Nerve Conduction Studies (NCS); AANEM referenced) | . | AR | 0.84\|0.89 | 7.64\|0.18 | MODERATE | MODERATE |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wong,S.M., 2004 | High Quality | CTS Positive (Ultrasound; CSA proximal inlet; >10mm sq) | 120 CTS suspects referred to one hospital | sensory and motor latency cutoffs | Extremities | index pos; US CSA >.9 (Nerve Conduction Studies (NCS); AANEM referenced) | 121 | index neg;US CSA >.9 (Nerve Conduction Studies (NCS); AANEM referenced) | 72 | 0.92\|0.68 | 0.83\|0.83 | 4.89\|0.21 | WEAK | WEAK |
| Wong,S.M., 2004 | High Quality | CTS Positive (Ultrasound; CSA proximal inlet; >9mm sq) | 120 CTS suspects referred to one hospital | sensory and motor latency cutoffs | Extremities | index pos; US CSA >.9 (Nerve Conduction Studies (NCS); AANEM referenced) | 150 | index neg;US CSA >.9 (Nerve Conduction Studies (NCS); AANEM referenced) | 43 | 0.83\|0.77 | 0.93\|0.56 | 2.10\|0.13 | WEAK | MODERATE |
| Ziswiler,H.R., 2005 | High Quality | CTS Positive (Ultrasound; CSA max; >10mm sq) | 71 CTS suspects referred to outpatient clinic in Switzerland | motor and sensory latency cutoff values | Extremities | index pos; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 67 | index neg; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 34 | 0.94\|0.59 | 0.82\|0.83 | 4.91\|0.22 | WEAK | WEAK |
| Ziswiler,H.R., 2005 | High Quality | CTS Positive (Ultrasound; CSA max; >11mm sq) | 71 CTS suspects referred to outpatient clinic in Switzerland | motor and sensory latency cutoff values | Extremities | index pos; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 43 | index neg; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 58 | 0.98\|0.38 | 0.54\|0.96 | 12.38\|0.48 | STRONG | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ziswiler,H.R., 2005 | High Quality | CTS Positive (Ultrasound; CSA max; >12mm sq) | 71 CTS suspects referred to outpatient clinic in Switzerland | motor and sensory latency cutoff values | Extremities | index pos; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 34 | index neg; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 67 | 1.00\|0.34 | 0.44\|1.00 | 10.00\|0.56 | STRONG | POOR |
| Ziswiler,H.R., 2005 | High Quality | CTS Positive (Ultrasound; CSA max; >13mm sq) | 71 CTS suspects referred to outpatient clinic in Switzerland | motor and sensory latency cutoff values | Extremities | index pos; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 24 | index neg; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 77 | 1.00\|0.30 | 0.31\|1.00 | 10.00\|0.69 | STRONG | POOR |
| Ziswiler,H.R., 2005 | High Quality | CTS Positive (Ultrasound; CSA max; >14mm sq) | 71 CTS suspects referred to outpatient clinic in Switzerland | motor and sensory latency cutoff values | Extremities | index pos; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 20 | index neg; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 81 | 1.00\|0.28 | 0.26\|1.00 | 10.00\|0.74 | STRONG | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ziswiler,H.R., 2005 | High Quality | CTS Positive (Ultrasound; CSA max; >6mm sq) | 71 CTS suspects referred to outpatient clinic in Switzerland | motor and sensory latency cutoff values | Extremities | index pos; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 96 | index neg; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 5 | 0.80\|0.80 | 0.99\|0.17 | 1.20\|0.07 | POOR | STRONG |
| Ziswiler,H.R., 2005 | High Quality | CTS Positive (Ultrasound; CSA max; >7mm sq) | 71 CTS suspects referred to outpatient clinic in Switzerland | motor and sensory latency cutoff values | Extremities | index pos; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 93 | index neg; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 8 | 0.82\|0.75 | 0.97\|0.26 | 1.32\|0.10 | POOR | STRONG |
| Ziswiler,H.R., 2005 | High Quality | CTS Positive (Ultrasound; CSA max; >8mm sq) | 71 CTS suspects referred to outpatient clinic in Switzerland | motor and sensory latency cutoff values | Extremities | index pos; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 80 | index neg; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 21 | 0.88\|0.62 | 0.90\|0.57 | 2.06\|0.18 | WEAK | MODERATE |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ziswiler,H.R., 2005 | High Quality | CTS Positive (Ultrasound; CSA max; >9mm sq) | 71 CTS suspects referred to outpatient clinic in Switzerland | motor and sensory latency cutoff values | Extremities | index pos; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 74 | index neg; CSA max; various cutoff levels (Nerve Conduction Studies (NCS); AANEM referenced and Rated Signs and Symptoms) | 27 | 0.91\|0.59 | 0.86\|0.70 | 2.82\|0.20 | WEAK | WEAK |

## *TABLE 21: MODERATE QUALITY STUDIES- PICO 3 (IMAGING MODALITIES VERSUS REFERENCE STANDARD)*

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Abdel Ghaffar,M.K., 2012 | Moderate Quality | CTS Positive (Ultrasound; bowing of flexor retinaculum) | 41 suspected CTS patients from one hosp | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; US factors (Nerve Conduction Studies (NCS)) | 40 | index neg; US factors (Nerve Conduction Studies (NCS)) | 13 | 0.95\|0.23 | 0.79\|0.60 | 1.98\|0.35 | POOR | WEAK |
| Abdel Ghaffar,M.K., 2012 | Moderate Quality | CTS Positive (Ultrasound; CSA inlet; >11mm sq) | 41 suspected CTS patients from one hosp | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; US factors (Nerve Conduction Studies (NCS)) | 48 | index neg; US factors (Nerve Conduction Studies (NCS)) | 5 | 0.94\|0.40 | 0.94\|0.40 | 1.56\|0.16 | POOR | MODERATE |
| Abdel Ghaffar,M.K., 2012 | Moderate Quality | CTS Positive (Ultrasound; nerve edema) | 41 suspected CTS patients from one hosp | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; US factors (Nerve Conduction Studies (NCS)) | 42 | index neg; US factors (Nerve Conduction Studies (NCS)) | 11 | 0.95\|0.27 | 0.83\|0.60 | 2.08\|0.28 | WEAK | WEAK |
| Abdel Ghaffar,M.K., 2012 | Moderate Quality | CTS Positive (Ultrasound; nerve hypervascularization) | 41 suspected CTS patients from one hosp | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; US factors (Nerve Conduction Studies (NCS)) | 49 | index neg; US factors (Nerve Conduction Studies (NCS)) | 4 | 0.96\|0.75 | 0.98\|0.60 | 2.45\|0.03 | WEAK | STRONG |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA difference between CsL and CsP; >2.5mm sq) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.94\|0.55 | 2.09\|0.12 | WEAK | MODERATE |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA difference between CsL and CsP; >6.5mm sq) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.42\|0.93 | 5.89\|0.63 | MODERATE | POOR |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA difference between CsR and CsP; >1.5mm sq) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.96\|0.32 | 1.41\|0.11 | POOR | MODERATE |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA difference between CsR and CsP; >5.5mm sq) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.52\|0.93 | 7.30\|0.52 | MODERATE | POOR |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA difference between CsS and CsP; >.5mm sq) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.93\|0.17 | 1.11\|0.44 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA difference between CsS and CsP; >5.5mm sq) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.36\|0.95 | 7.74\|0.67 | MODERATE | POOR |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA Inlet (CsS); >12.8mm sq) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.36\|0.92 | 4.33\|0.70 | WEAK | POOR |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA Inlet (CsS); >8.8mm sq) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.90\|0.45 | 1.63\|0.22 | POOR | WEAK |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA max (CsL); >13.8mm sq) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.38\|0.92 | 4.66\|0.67 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA max (CsL); >9.8mm sq) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.92\|0.60 | 2.30\|0.14 | WEAK | MODERATE |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA proximal inlet (CsR); >13.8mm sq) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.32\|0.92 | 3.88\|0.74 | WEAK | POOR |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA proximal inlet (CsR); >9.8mm sq) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.91\|0.61 | 2.34\|0.15 | WEAK | MODERATE |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA ratio between CsL and CSA proximal pronator quadrus (CsP); >1.3) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.91\|0.51 | 1.84\|0.18 | POOR | MODERATE |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA ratio between CsL and CSA proximal pronator quadrus (CsP); >1.81) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.51\|0.92 | 6.21\|0.53 | MODERATE | POOR |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA ratio between CsR and CsP; >1.25) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.91\|0.45 | 1.64\|0.20 | POOR | WEAK |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA ratio between CsR and CsP; >1.68) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.56\|0.92 | 6.88\|0.47 | MODERATE | WEAK |
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA ratio between CsS and CsP; >1.07) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.91\|0.21 | 1.15\|0.43 | POOR | WEAK |

| **Reference Title** | **Quality** | **Outcome (Index Test)** | **Patient Characteristics** | **Threshold Notes** | **Outcomes Reported By** | **Group1 (Reference Standard)** | **Group 1 N** | **Group2 (Reference Standard)** | **Group 2 N** | **PPV\|NPV** | **Sens\|Spec** | **LR+\|LR-** | **Rule In Test** | **Rule Out Test** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dejaco,C., 2013 | Moderate Quality | CTS Positive (Ultrasound; CSA ratio between CsS and CsP; >1.66) | 135 patients with suspected CTS; asymptomatic hands included | ranked as CTS by neurologist based on NCS and clinical assessment | Extremities | index pos; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | index neg; US CSA levels (Clinical Diagnosis and Nerve Conduction Studies (NCS); >90% neurologist confidence) | . | AR | 0.46\|0.92 | 5.66\|0.58 | MODERATE | POOR |
| Fowler,J.R., 2014 | Moderate Quality | CTS Positive (Ultrasound; CSA proximal inlet; >10mm sq) | referred for EDS | DML 4.2ms+ or DSL 3.2ms+ | Subjects | index pos; US CSA (Nerve Conduction Studies (NCS); AANEM referenced) | 52 | index neg; US CSA (Nerve Conduction Studies (NCS); AANEM referenced) | 33 | 0.90\|0.76 | 0.85\|0.83 | 5.13\|0.17 | MODERATE | MODERATE |
| Hashemi,A.-H., 2009 | Moderate Quality | CTS Positive (Ultrasound; CSA max; >10mm sq) | 50 CTS suspects referred to the hospital | NCV of median nerve in carpal tunnel and ring finger | Extremities | index pos; US (Nerve Conduction Studies (NCS)) | 60 | index neg; US (Nerve Conduction Studies (NCS)) | 40 | 0.80\|0.88 | 0.91\|0.74 | 3.55\|0.13 | WEAK | MODERATE |
| Kang,E.K., 2008 | Moderate Quality | CTS Positive (Current Perception Threshold (CPT)) | all women; 31 patients referred for NCS | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; CPT (Nerve Conduction Studies (NCS); AANEM referenced) | 34 | index neg; CPT (Nerve Conduction Studies (NCS); AANEM referenced) | 26 | 0.59\|0.65 | 0.69\|0.55 | 1.53\|0.57 | POOR | POOR |
| Lo,J.K., 2002 | Moderate Quality | CTS Positive (Electromyography (EMG); APB deinnervation potentials) | charts of all patients suspected of CTS referred to outpatient EDS lab | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; EMG (Nerve Conduction Studies (NCS); AANEM referenced) | 48 | index neg; EMG (Nerve Conduction Studies (NCS); AANEM referenced) | 300 | 0.92\|0.58 | 0.26\|0.98 | 11.65\|0.76 | STRONG | POOR |
| Moghtaderi, A., 2012 | Moderate Quality | CTS Positive (Ultrasound; CSA distal outlet; >13.5mm sq) | CTS moderate or severe patients from one clinic vs upper limb pain controls | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; CSA prox and distal (Nerve Conduction Studies (NCS); AANEM referenced) | 16 | index neg; CSA prox and distal (Nerve Conduction Studies (NCS); AANEM referenced) | 63 | 0.81\|0.63 | 0.36\|0.93 | 5.18\|0.69 | MODERATE | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moghtaderi, A., 2012 | Moderate Quality | CTS Positive (Ultrasound; CSA proximal inlet; >11.5mm sq) | CTS moderate or severe patients from one clinic vs upper limb pain controls | motor, mixed, sensory nerve cutoffs referenced | Subjects | index pos; CSA prox and distal (Nerve Conduction Studies (NCS); AANEM referenced) | 34 | index neg; CSA prox and distal (Nerve Conduction Studies (NCS); AANEM referenced) | 45 | 0.88\|0.87 | 0.83\|0.91 | 8.96\|0.18 | MODERATE | MODERATE |
| Nakamichi,K., 2002 | Moderate Quality | CTS Positive (Ultrasound; CSA inlet) | 275 clinically diagnosed CTS patients | sensory and motor latency cutoffs | Extremities | index pos; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 47 | index neg; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 367 | 0.85\|0.29 | 0.13\|0.94 | 2.15\|0.92 | WEAK | POOR |
| Nakamichi,K., 2002 | Moderate Quality | CTS Positive (Ultrasound; CSA mid) | 275 clinically diagnosed CTS patients | sensory and motor latency cutoffs | Extremities | index pos; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 20 | index neg; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 394 | 0.45\|0.26 | 0.03\|0.90 | 0.31\|1.07 | POOR | POOR |
| Nakamichi,K., 2002 | Moderate Quality | CTS Positive (Ultrasound; CSA mid and CSA inlet) | 275 clinically diagnosed CTS patients | sensory and motor latency cutoffs | Extremities | index pos; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 14 | index neg; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 400 | 0.86\|0.28 | 0.04\|0.98 | 2.25\|0.98 | WEAK | POOR |
| Nakamichi,K., 2002 | Moderate Quality | CTS Positive (Ultrasound; CSA outlet) | 275 clinically diagnosed CTS patients | sensory and motor latency cutoffs | Extremities | index pos; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 59 | index neg; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 355 | 0.66\|0.26 | 0.13\|0.82 | 0.73\|1.06 | POOR | POOR |
| Nakamichi,K., 2002 | Moderate Quality | CTS Positive (Ultrasound; CSA outlet and CSA inlet) | 275 clinically diagnosed CTS patients | sensory and motor latency cutoffs | Extremities | index pos; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 29 | index neg; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 385 | 0.90\|0.29 | 0.09\|0.97 | 3.25\|0.94 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nakamichi,K., 2002 | Moderate Quality | CTS Positive (Ultrasound; CSA outlet and CSA mid) | 275 clinically diagnosed CTS patients | sensory and motor latency cutoffs | Extremities | index pos; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 60 | index neg; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 354 | 0.75\|0.28 | 0.15\|0.87 | 1.13\|0.98 | POOR | POOR |
| Nakamichi,K., 2002 | Moderate Quality | CTS Positive (Ultrasound; CSA outlet, CSA mid, and CSA inlet) | 275 clinically diagnosed CTS patients | sensory and motor latency cutoffs | Extremities | index pos; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 87 | index neg; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 327 | 0.92\|0.32 | 0.27\|0.94 | 4.29\|0.78 | WEAK | POOR |
| Nakamichi,K., 2002 | Moderate Quality | CTS Positive (Ultrasound; no CSA abnormality at distal, mid, or proximal) | 275 clinically diagnosed CTS patients | sensory and motor latency cutoffs | Extremities | index pos; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 98 | index neg; US CSA locations (Nerve Conduction Studies (NCS); AANEM referenced) | 316 | 0.51\|0.21 | 0.17\|0.58 | 0.39\|1.45 | POOR | POOR |
| Pastare,D., 2009 | Moderate Quality | CTS Positive (Ultrasound; CSA inlet; >9mm sq) | 66 CTS suspected patients referred to Neuro lab in Singapore hosp | sensory, motor, and LINT cutoffs | Extremities | index pos; CSA proximal (Nerve Conduction Studies (NCS); AANEM referenced) | 50 | index neg; CSA proximal (Nerve Conduction Studies (NCS); AANEM referenced) | 47 | 0.96\|0.51 | 0.68\|0.92 | 8.79\|0.35 | MODERATE | WEAK |
| Stalberg,E., 2000 | Moderate Quality | CTS Positive (Automatic Carpal Tunnel Tester) | Only 178 hands readable on CT tester; 136 patients with presumptive CTS diagnosis | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; CT tester (Nerve Conduction Studies (NCS); AANEM referenced) | 49 | index neg; CT tester (Nerve Conduction Studies (NCS); AANEM referenced) | 129 | 0.90\|0.97 | 0.92\|0.96 | 23.83\|0.09 | STRONG | STRONG |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Swen,W.A., 2001 | Moderate Quality | CTS Positive (Distal Sensory Latency (DSL) difference from Ulnar; digit 4) | 63 symptomatic patients visiting neuro clinic | Surgical relief on VAS scale; motor, mixed, sensory nerve cutoffs referenced for NCS | Subjects | index pos; NCS; DSL; CSA (Surgical Relief of Symptoms; 90+ percent improvement on VAS scale after 3 months) | 58 | index neg; NCS; DSL; CSA (Surgical Relief of Symptoms; 90+ percent improvement on VAS scale after 3 months) | 5 | 0.78\|0.60 | 0.96\|0.19 | 1.18\|0.23 | POOR | WEAK |
| Swen,W.A., 2001 | Moderate Quality | CTS Positive (Nerve Conduction Studies (NCS); AANEM referenced) | 63 symptomatic patients visiting neuro clinic | Surgical relief on VAS scale; motor, mixed, sensory nerve cutoffs referenced for NCS | Subjects | index pos; NCS; DSL; CSA (Surgical Relief of Symptoms; 90+ percent improvement on VAS scale after 3 months) | 59 | index neg; NCS; DSL; CSA (Surgical Relief of Symptoms; 90+ percent improvement on VAS scale after 3 months) | 4 | 0.78\|0.75 | 0.98\|0.19 | 1.20\|0.11 | POOR | MODERATE |
| Swen,W.A., 2001 | Moderate Quality | CTS Positive (Ultrasound; CSA inlet; Elipse Formula; >10mm sq) | 63 symptomatic patients visiting neuro clinic | Surgical relief on VAS scale; motor, mixed, sensory nerve cutoffs referenced for NCS | Subjects | index pos; NCS; DSL; CSA (Surgical Relief of Symptoms; 90+ percent improvement on VAS scale after 3 months) | 39 | index neg; NCS; DSL; CSA (Surgical Relief of Symptoms; 90+ percent improvement on VAS scale after 3 months) | 24 | 0.85\|0.42 | 0.70\|0.63 | 1.87\|0.48 | POOR | WEAK |
| Szopinski,K., 2011 | Moderate Quality | CTS Positive (Ultrasound; cross sectional shape; non-triangular) | 76 patients with clinical diagnosis of CTS | motor and sensory latency and velocity cutoff values | Extremities | index pos; CS shape triangular, non triangular (Nerve Conduction Studies (NCS); AANEM referenced) | 124 | index neg; CS shape triangular, non triangular (Nerve Conduction Studies (NCS); AANEM referenced) | 15 | 0.85\|0.13 | 0.89\|0.10 | 0.98\|1.16 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Szopinski,K., 2011 | Moderate Quality | CTS Positive (Ultrasound; cross sectional shape; triangular) | 76 patients with clinical diagnosis of CTS | motor and sensory latency and velocity cutoff values | Extremities | index pos; CS shape triangular, non triangular (Nerve Conduction Studies (NCS); AANEM referenced) | 15 | index neg; CS shape triangular, non triangular (Nerve Conduction Studies (NCS); AANEM referenced) | 124 | 0.87\|0.15 | 0.11\|0.90 | 1.16\|0.98 | POOR | POOR |
| Weber,R.A., 2000 | Moderate Quality | CTS Positive (Nerve Conduction Studies (NCS); AANEM referenced) | 53 patients with suspected CTS from one hosp | history and physical signs and symptoms | Extremities | index pos; NCS (Clinical Diagnosis) | 67 | index neg; NCS (Clinical Diagnosis) | 39 | 0.64\|0.72 | 0.80\|0.54 | 1.73\|0.38 | POOR | WEAK |
| Werner,R.A., 1994 | Moderate Quality | CTS Positive (Vibratory Threshold) | 130 line workers at a company with complaints of symptoms; 1 was unable to get NCS due to cast | median to ulnar sensory peak latency of >.5ms | Subjects | index pos; VT (Nerve Conduction Studies (NCS)) | 8 | index neg; VT (Nerve Conduction Studies (NCS)) | 121 | 0.13\|0.79 | 0.04\|0.93 | 0.57\|1.03 | POOR | POOR |
| Werner,R.A., 1995 | Moderate Quality | CTS Positive (Vibratory Threshold; Jetzer Index) | patients recruited from 2 manufacturing plants; current symptoms not required | median to ulnar sensory peak latency of >.5ms | Subjects | index pos; VT Jetzer (Nerve Conduction Studies (NCS)) | 80 | index neg; VT Jetzer (Nerve Conduction Studies (NCS)) | 87 | 0.31\|0.82 | 0.61\|0.56 | 1.40\|0.69 | POOR | POOR |
| Yazdchi,M., 2012 | Moderate Quality | CTS Positive (Ultrasound; CSA inlet; >12.5mm sq) | 90 CTS suspected patients | motor and sensory latency responses | Extremities | index pos; US variations (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 121 | index neg; US variations (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 59 | 0.92\|0.25 | 0.72\|0.60 | 1.79\|0.47 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yazdchi,M., 2012 | Moderate Quality | CTS Positive (Ultrasound; CSA outlet; >11.5mm sq) | 90 CTS suspected patients | motor and sensory latency responses | Extremities | index pos; US variations (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 129 | index neg; US variations (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 51 | 0.91\|0.27 | 0.76\|0.56 | 1.73\|0.43 | POOR | WEAK |
| Yazdchi,M., 2012 | Moderate Quality | CTS Positive (Ultrasound; CSA proximal inlet; >11.5mm sq) | 90 CTS suspected patients | motor and sensory latency responses | Extremities | index pos; US variations (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 129 | index neg; US variations (Nerve Conduction Studies (NCS) and Electromyography (EMG)) | 51 | 0.91\|0.27 | 0.76\|0.56 | 1.73\|0.43 | POOR | WEAK |

## *TABLE 22: LOW QUALITY STUDIES- PICO 3 (IMAGING MODALITIES VERSUS REFERENCE STANDARD)*

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Beckenbaugh,R. D., 1995 | Low Quality | CTS Positive (Hand Held Electroneurometer; motor latency >2.8ms) | 45 CTS suspected patients | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; hand held EMG; ML cutoffs (Electromyography (EMG)) | 63 | index neg; hand held EMG; ML cutoffs (Electromyography (EMG)) | 1 | 0.89\|1.00 | 1.00\|0.13 | 1.14\|0.00 | POOR | STRONG |
| Beckenbaugh,R. D., 1995 | Low Quality | CTS Positive (Hand Held Electroneurometer; motor latency >3.2ms) | 45 CTS suspected patients | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; hand held EMG; ML cutoffs (Electromyography (EMG)) | 59 | index neg; hand held EMG; ML cutoffs (Electromyography (EMG)) | 5 | 0.93\|0.80 | 0.98\|0.50 | 1.96\|0.04 | POOR | STRONG |
| Beckenbaugh,R. D., 1995 | Low Quality | CTS Positive (Hand Held Electroneurometer; motor latency >3.7ms) | 45 CTS suspected patients | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; hand held EMG; ML cutoffs (Electromyography (EMG)) | 55 | index neg; hand held EMG; ML cutoffs (Electromyography (EMG)) | 9 | 0.96\|0.67 | 0.95\|0.75 | 3.79\|0.07 | WEAK | STRONG |
| Beckenbaugh,R. D., 1995 | Low Quality | CTS Positive (Hand Held Electroneurometer; motor latency >3.9ms) | 45 CTS suspected patients | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; hand held EMG; ML cutoffs (Electromyography (EMG)) | 49 | index neg; hand held EMG; ML cutoffs (Electromyography (EMG)) | 15 | 0.98\|0.47 | 0.86\|0.88 | 6.86\|0.16 | MODERATE | MODERATE |
| Beckenbaugh,R. D., 1995 | Low Quality | CTS Positive (Hand Held Electroneurometer; motor latency >4.3ms) | 45 CTS suspected patients | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; hand held EMG; ML cutoffs (Electromyography (EMG)) | 39 | index neg; hand held EMG; ML cutoffs (Electromyography (EMG)) | 25 | 0.97\|0.28 | 0.68\|0.88 | 5.43\|0.37 | MODERATE | WEAK |
| Beckenbaugh,R. D., 1995 | Low Quality | CTS Positive (Hand Held Electroneurometer; motor latency >4.7ms) | 45 CTS suspected patients | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; hand held EMG; ML cutoffs (Electromyography (EMG)) | 29 | index neg; hand held EMG; ML cutoffs (Electromyography (EMG)) | 35 | 1.00\|0.23 | 0.52\|1.00 | 10.00\|0.48 | STRONG | WEAK |
| Deniz,F.E., 2012 | Low Quality | CTS Positive (CT; Distal Area) | patients referred to Neuro services for suspected CTS |  | Subjects | index pos; MRI; CT; EMG (Clinical Diagnosis) | 39 | index neg; MRI; CT; EMG (Clinical Diagnosis) | 39 | AR | 0.68\|0.87 | 5.08\|0.37 | MODERATE | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Deniz,F.E., 2012 | Low Quality | CTS Positive (CT; Distal Density) | patients referred to Neuro services for suspected CTS | | Subjects | index pos; MRI; CT; EMG (Clinical Diagnosis) | 39 | index neg; MRI; CT; EMG (Clinical Diagnosis) | 39 | AR | 0.71\|0.75 | 2.82\|0.39 | WEAK | WEAK |
| Deniz,F.E., 2012 | Low Quality | CTS Positive (CT; Proximal Area) | patients referred to Neuro services for suspected CTS | | Subjects | index pos; MRI; CT; EMG (Clinical Diagnosis) | 39 | index neg; MRI; CT; EMG (Clinical Diagnosis) | 39 | AR | 0.97\|0.47 | 1.82\|0.06 | POOR | STRONG |
| Deniz,F.E., 2012 | Low Quality | CTS Positive (CT; Proximal Density) | patients referred to Neuro services for suspected CTS | | Subjects | index pos; MRI; CT; EMG (Clinical Diagnosis) | 39 | index neg; MRI; CT; EMG (Clinical Diagnosis) | 39 | AR | 0.68\|0.80 | 3.38\|0.41 | WEAK | WEAK |
| Deniz,F.E., 2012 | Low Quality | CTS Positive (Electromyography (EMG)) | patients referred to Neuro services for suspected CTS | | Subjects | index pos; MRI; CT; EMG (Clinical Diagnosis) | 69 | index neg; MRI; CT; EMG (Clinical Diagnosis) | 69 | AR | 0.91\|0.81 | 4.84\|0.11 | WEAK | MODERATE |
| Deniz,F.E., 2012 | Low Quality | CTS Positive (MRI; Distal Area) | patients referred to Neuro services for suspected CTS | | Subjects | index pos; MRI; CT; EMG (Clinical Diagnosis) | 50 | index neg; MRI; CT; EMG (Clinical Diagnosis) | 50 | AR | 0.65\|0.80 | 3.25\|0.44 | WEAK | WEAK |
| Deniz,F.E., 2012 | Low Quality | CTS Positive (MRI; Distal Intensity) | patients referred to Neuro services for suspected CTS | | Subjects | index pos; MRI; CT; EMG (Clinical Diagnosis) | 50 | index neg; MRI; CT; EMG (Clinical Diagnosis) | 50 | AR | 0.88\|0.40 | 1.46\|0.31 | POOR | WEAK |
| Deniz,F.E., 2012 | Low Quality | CTS Positive (MRI; Proximal Area) | patients referred to Neuro services for suspected CTS | | Subjects | index pos; MRI; CT; EMG (Clinical Diagnosis) | 50 | index neg; MRI; CT; EMG (Clinical Diagnosis) | 50 | AR | 0.43\|1.00 | 10.00\|0.58 | STRONG | POOR |
| Deniz,F.E., 2012 | Low Quality | CTS Positive (MRI; Proximal Intensity) | patients referred to Neuro services for suspected CTS | | Subjects | index pos; MRI; CT; EMG (Clinical Diagnosis) | 50 | index neg; MRI; CT; EMG (Clinical Diagnosis) | 50 | AR | 0.88\|0.60 | 2.19\|0.21 | WEAK | WEAK |
| Glowacki,K.A., 1996 | Low Quality | CTS Positive (Electrodiagnostic Studies; NCS/EMG; AANEM referenced) | 93 clinically diagnosed CTS surgical patients undergoing EDS | motor and sensory latency and velocity cutoff values | Extremities | index pos; EDS; emg/ncs (Surgical Relief of Symptoms; resolved or improved) | 99 | index neg; EDS; emg/ncs (Surgical Relief of Symptoms; resolved or improved) | 27 | 0.93\|0.07 | 0.79\|0.22 | 1.01\|0.96 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kaul,M.P., 2002 | Low Quality | CTS Positive (2L-INT) | obtainable responses from 158 subjects | palm diff rates referenced | Subjects | index pos; 2L-INT (Nerve Conduction Studies (NCS); palm-diff) | 78 | index neg; 2L-INT (Nerve Conduction Studies (NCS); palm-diff) | 51 | 0.92\|0.88 | 0.92\|0.88 | 7.85\|0.09 | MODERATE | STRONG |
| Mallouhi,A., 2006 | Low Quality | CTS Positive (Ultrasound; nerve edema) | clinically suspected CTS suspects from database | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; US edema; US hypervascular (Nerve Conduction Studies (NCS)) | 149 | index neg; US edema; US hypervascular (Nerve Conduction Studies (NCS)) | 57 | 0.92\|0.39 | 0.80\|0.65 | 2.26\|0.31 | WEAK | WEAK |
| Mallouhi,A., 2006 | Low Quality | CTS Positive (Ultrasound; nerve hypervascularization) | clinically suspected CTS suspects from database | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; US edema; US hypervascular (Nerve Conduction Studies (NCS)) | 174 | index neg; US edema; US hypervascular (Nerve Conduction Studies (NCS)) | 32 | 0.94\|0.75 | 0.95\|0.71 | 3.24\|0.07 | WEAK | STRONG |
| Missere,M., 1999 | Low Quality | CTS Positive (Ultrasound; M Index) | 45 workers recruited for potential job risk of CTS | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; US M index (M space decrease) (Electromyography (EMG)) | 61 | index neg; US M index (M space increase) (Electromyography (EMG)) | 29 | 0.36\|0.86 | 0.85\|0.39 | 1.39\|0.39 | POOR | WEAK |
| Sheean,G.L., 1995 | Low Quality | CTS Positive (2L-INT; DML) | virtually consecutive suspected CTS patients | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; 2L-INT-DML (Nerve Conduction Studies (NCS); AANEM referenced) | 49 | index neg; 2L-INT-DML (Nerve Conduction Studies (NCS); AANEM referenced) | 17 | 0.98\|0.94 | 0.98\|0.94 | 16.65\|0.02 | STRONG | STRONG |
| Smith,T., 1998 | Low Quality | CTS Positive (Electromyography (EMG); Sensory Nerve Conduction (SNC); Needle; AANEM referenced) | CTS suspected patients referred to neuro dept | SCN cutoffs | Subjects | index pos; EMG SNC (Nerve Conduction Studies (NCS); Sensory Nerve Conduction (SNC); Surface; AANEM referenced) | 44 | index neg; EMG SNC (Nerve Conduction Studies (NCS); Sensory Nerve Conduction (SNC); Surface; AANEM referenced) | 38 | 0.84\|0.92 | 0.93\|0.83 | 5.55\|0.09 | MODERATE | STRONG |

## DIAGNOSTIC SCALES

Moderate evidence supports that diagnostic questionnaires and/or electrodiagnostic studies could be used to aid the diagnosis of carpal tunnel syndrome.

**Strength of Recommendation: Moderate Evidence** ★★★☆

Description: Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.

### Rationale

The evaluation of diagnostic tools, either scales based on clinically acquired information from the history and physical examination, or electrodiagnostic tests, requires a clear consensus on a reference standard against which the performance of these diagnostic tests can be compared. This type of consensus still does not exist with respect to carpal tunnel syndrome. It is recognized that electrodiagnostic testing has long been considered to represent a reference standard but this assumption is untenable because these tests clearly have false positive and negative results. Beyond this there simply is no consensus supporting any single diagnostic tool as a reference standard. Where clinical diagnostic scales are taken as the reference standard, electrodiagnostic tests may demonstrate poor sensitivity and specificity. The same is true of clinical diagnostic scales when electrodiagnostic tests are taken as the reference standard. Agreement between electrodiagnostic tests and clinical diagnostic tests, regardless of which is taken as the reference standard, is also complicated by the binary nature of the comparison. Electrodiagnostic data is, by and large, continuous in nature and so establishing a hard cutoff point to compare to clinical diagnostic scales seems potentially arbitrary. At least one of the clinical diagnostic scales, the CTS-6, attempts to address this by defining the diagnosis in probabilistic terms as a continuous variable. Given this set of circumstances the Workgroup sought to evaluate the role of clinical diagnostic tests and electrodiagnostic testing in the evaluation of CTS in the context in which they are used, in other words, in clinical settings where a patient presents with complaints that might be attributable to this condition.

There were two clinical diagnostic tests studied in high quality investigations, the Katz Hand Diagram and the CTS-6. The Boston Carpal Tunnel Scale, a status instrument most frequently used to measure outcomes of treatment for CTS was also evaluated in two high quality studies.

In comparison to electrodiagnostic testing Katz et al demonstrated high sensitivity (0.96) and good negative predictive value (0.91) for the "classic", "probable" or "possible" designations however, positive predictive value and specificity were low. This indicates that, using electrodiagnostic testing as a reference standard, the Katz Hand Diagram used in this way had more value as a "rule out test". Sensitivity decreased and specificity increased if comparison to electrodiagnostic tests was made only using "classic" or "probable" results. Sensitivity decreased further and specificity was commensurately increased when only "classic" results were compared to electrodiagnostic testing. Defined using only "classic" or "classic" or "probable" results the Katz Hand Diagram was considered weak or poor as either a "rule in" or "rule out" test. Vanti made similar observations using AANEM electrodiagnostic definitions for CTS in demonstrating that the "classic" or "probable" results functioned as a strong "rule out" test.

Graham took a different approach to evaluating the respective roles of electrodiagnostic testing and the CTS-6, an instrument that expresses the probability of CTS. The pre-test probability of CTS was established using the CTS-6 and then the post-test probability after electrodiagnostic testing was estimated using likelihood ratios established with two electrodiagnostic standards for CTS, one lax (with higher sensitivity and lower specificity) and one stringent (with lower sensitivity and higher specificity). This study showed that the changes in probability after electrodiagnostic testing, using either electrodiagnostic definition, were small and probably below a clinically relevant standard. This suggests that the most appropriate setting for electrodiagnostic testing is where there is uncertainty about the clinical diagnosis.

There were two high quality studies evaluating the Boston Carpal Tunnel Syndrome Questionnaire (Wainner, Naranjo). Both of these studies used electrodiagnostic tests as the reference standard. The results were consistent in both studies in showing that this instrument functioned as either a weak or poor "rule in" or "rule out" test. This may have been due to the fact that the scale was actually developed as a status instrument rather than as a diagnostic scale.

### Risks and Harms of Implementing this Recommendation

While diagnostic scales/questionnaires can be used for the clinical assessment of CTS, they may be unable to exclude other etiologies that could mimic CTS (such as cervical radiculopathy), or identify other disorders (such as polyneuropathy) that may affect the decision making process regarding therapy. Where indicated, appropriate clinical evaluation for alternative diagnoses should be carried out. Electrodiagnostic testing may be of most value when the clinical diagnosis is unclear or when atypical features exist.

### Future Research

Establishing consensus on a reference standard for the diagnosis for CTS is the most important research goal in this area.

## *QUALITY TABLE OF DIAGNOSTIC SCALES*

**Table 23. Diagnostic Quality Evaluations**

| Study | Representative Population | Clear Selection Criteria | Detailed Enough to Replicate | Reference Standard Identifies Target Condition | Blinding | Other Bias? | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2003 | ● | ● | ● | ○ | ● | ● | Include | Moderate Quality |
| Bland,J.D., 2014 | ● | ● | ● | ◑ | ○ | ◑ | Include | Low Quality |
| Bonauto,D.K., 2008 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Calfee,R.P., 2012 | ● | ◑ | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Cartwright,M.S., 2013 | ● | ◑ | ● | ◑ | ● | ● | Include | Moderate Quality |
| Dale,A.M., 2011 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Dhong,E.S., 2000 | ● | ◑ | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Fowler,J.R., 2014 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Franzblau,A., 1994 | ● | ◑ | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Gomes,I., 2006 | ● | ● | ● | ◑ | ◑ | ◑ | Include | Moderate Quality |
| Graham,B., 2008 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Hems,T.E., 2009 | ● | ● | ● | ◑ | ◑ | ◑ | Include | Moderate Quality |
| Katz,J.N., 1990 (A) | ● | ● | ○ | ◑ | ● | ● | Include | Moderate Quality |
| Katz,J.N., 1990 (B) | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Katz,J.N., 1990 (C) | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Katz,J.N., 1991 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Kuhlman,K.A., 1997 | ● | ● | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Lo,J.K., 2009 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Makanji,H.S., 2014 | ● | ◑ | ● | ◑ | ◑ | ● | Include | Moderate Quality |
| Naranjo,A., 2007 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Padua,L., 1999 | ● | ● | ● | ◑ | ◑ | ◑ | Include | Moderate Quality |
| Stevens,J.C., 1997 | ● | ◑ | ● | ◑ | ● | ◑ | Include | Moderate Quality |
| Vanti,C., 2012 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Wainner,R.S., 2005 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Westerman,D., 2012 | ● | ● | ● | ◑ | ● | ● | Include | High Quality |
| Yagci,I., 2010 | ● | ● | ● | ◑ | ● | ◑ | Include | Moderate Quality |

## RESULTS

### *SUMMARY OF DATA FINDINGS*

*TABLE 24: SUMMARY OF FINDINGS- INDEX TEST VERSUS AANEM REFERENCED EDS*

| | LR + | LR - | |
|---|---|---|---|
| ● | ≥10 | ≤0.1 | In **"STRONG"** agreement with the reference standard |
| ◕ | ≥5 but <10 | >0.1 but ≤0.2 | In **"MODERATE"** agreement with the reference standard |
| ◔ | >2 and <5 | >0.2 but <0.5 | In "**WEAK**" agreement with the reference standard |
| ○ | ≤2 | ≥0.5 | In **"POOR"** agreement with the reference standard |

| | | High Quality | | Moderate Quality | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Index Test** | **Rule In/Out** | **Vanti,C., 2012** | **Wainner,R.S., 2005** | **Bonauto,D.K., 2008** | **Fowler,J.R., 2014** | **Gomes,I., 2006** | **Makanji,H.S., 2014** | **Yagci,I., 2010** | **Meta-Analysis** |
| ****CTS-6; Stringent; 80+%** | RULE IN | | | | ◔ | | ○ | | NA |
| | RULE OUT | | | | ◕ | | ○ | | NA |
| **Katz Hand Diagram; classic or probable** | RULE IN | ○ | ○ | ○ | | ○ | | ● | ○ |
| | RULE OUT | ● | ○ | ○ | | ◔ | | ◕ | ○ |
| **Katz Hand Diagram; classic** | RULE IN | | | ◔ | | | | ● | NA |
| | RULE OUT | | | ○ | | | | ◔ | NA |

*Table only displays index tests with more than one article of supporting evidence*

***As displayed in the full data sheet, Graham,B., 2008 presents a high quality article with varying methodology to evaluate the utility of CTS-6 as compared to EDS AAEM as well*

## *TABLE 25: SUMMARY OF FINDINGS- INDEX TEST VERSUS GENERAL EDS METHODS*

| | **LR +** | **LR -** | |
|---|---|---|---|
| ● | ≥10 | ≤0.1 | In **"STRONG"** agreement with the reference standard |
| ◕ | ≥5 but <10 | >0.1 but ≤0.2 | In **"MODERATE"** agreement with the reference standard |
| ◔ | >2 and <5 | >0.2 but <0.5 | In **"WEAK"** agreement with the reference standard |
| ○ | ≤2 | ≥0.5 | In **"POOR"** agreement with the reference standard |

| | | **High Quality** | | **Moderate Quality** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Index Test** | **Rule In/Out** | **Katz,J.N., 1990 (B)** | **Katz,J.N., 1990 (C)** | **Calfee,R.P., 2012 (1)** | **Calfee,R.P., 2012 (2)** | **Calfee,R.P., 2012 (3)** | **Cartwright,M.S., 2013 (1)** | **Cartwright,M.S., 2013 (2)** | **Cartwright,M.S., 2013 (3)** | **Dale,A.M., 2011** | **Katz,J.N., 1990 (A)** | **Katz,J.N., 1991** | **Meta-Analysis** |
| **Katz Hand Diagram; classic** | RULE IN | | ◔ | | | | | | | | ● | | NA |
| | RULE OUT | | ○ | | | | | | | | ○ | | NA |
| **Katz Hand Diagram; classic or probable** | RULE IN | ◔ | ◔ | ○ | ○ | ○ | ◔ | ◔ | ◔ | ○ | ◕ | ○ | ○ |
| | RULE OUT | ○ | ◔ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ◔ | ◔ | ○ |
| **Katz Hand Diagram; classic, probable, or possible** | RULE IN | | ○ | | | | | | | | ○ | | NA |
| | RULE OUT | | ◕ | | | | | | | | ● | | NA |

*Table only displays index tests with more than one article of supporting evidence*

*Authors with parenthetical numbers indicate a change in EDS method/threshold, alternate limbs, or alternate examiner*

*Authors with parenthetical letters indicate a unique study with the same author and year as another study listed in the guideline*

## DETAILED DATA FINDINGS

### *TABLE 26: HIGH QUALITY STUDIES: PICO 4 (DIAGNOSTIC SCALES VERSUS REFERENCE STANDARD)*

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes reported by: | Group1 (Reference Standard) | Group 1 N | Group2 (Reference Standard) | Group 2 N | Coefficient of Average Change in Probability (Pre-Post Test) | SD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Graham,B., 2008 | High Quality | CTS Positive (CTS-6; Stringent; 80+%) | patients referred to EDS lab in a tertiary care center | Stringent Sensory Latency 2.27+ms | Subjects | index pos; CTS 6 stringent (Nerve Conduction Studies (NCS); AAEM referenced) | 104 | index neg; CTS 6 stringent (Nerve Conduction Studies (NCS); AAEM referenced) | 39 | -0.02 | 0.1 |
| Graham,B., 2008 | High Quality | CTS Positive (CTS-6; Very Stringent; 90+%) | patients referred to EDS lab in a tertiary care center | Stringent Sensory Latency 2.27+ms | Subjects | index pos; CTS 6 very stringent (Nerve Conduction Studies (NCS); AAEM referenced) | 84 | index neg; CTS 6 very stringent (Nerve Conduction Studies (NCS); AAEM referenced) | 59 | -0.02 | 0.1 |
| Graham,B., 2008 | High Quality | CTS Positive (CTS-6; Stringent; 80+%) | patients referred to EDS lab in a tertiary care center | Lax Sensory Latency >2ms | Subjects | index pos; CTS 6 stringent (Nerve Conduction Studies (NCS); AAEM referenced) | 104 | index neg; CTS 6 stringent (Nerve Conduction Studies (NCS); AAEM referenced) | 39 | -0.06 | 0.2 |
| Graham,B., 2008 | High Quality | CTS Positive (CTS-6; Very Stringent; 90+%) | patients referred to EDS lab in a tertiary care center | Lax Sensory Latency >2ms | Subjects | index pos; CTS 6 very stringent (Nerve Conduction Studies (NCS); AAEM referenced) | 84 | index neg; CTS 6 very stringent (Nerve Conduction Studies (NCS); AAEM referenced) | 59 | -0.01 | 0.1 |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Katz,J.N., 1990 (B) | High Quality | CTS Positive (Katz Hand Diagram; classic or probable) | discomfort patients suspected of CTS | referenced sensory and motor cutoffs | Subjects | index pos; katz (Nerve Conduction Studies (NCS)) | 46 | index neg; katz (Nerve Conduction Studies (NCS)) | 64 | 0.59\|0.73 | 0.61\|0.71 | 2.13\|0.54 | WEAK | POOR |
| Katz,J.N., 1990 (C) | High Quality | CTS Positive (Katz Hand Diagram; classic) | 110 suspected CTS patients referred to one hosp | motor latency, sensory latency, and sensory velocity cutoffs | Extremities | index pos; katz levels (Nerve Conduction Studies (NCS)) | 30 | index neg; katz levels (Nerve Conduction Studies (NCS)) | 115 | 0.60\|0.70 | 0.34\|0.87 | 2.60\|0.76 | WEAK | POOR |
| Katz,J.N., 1990 (C) | High Quality | CTS Positive (Katz Hand Diagram; classic or probable) | 110 suspected CTS patients referred to one hosp | motor latency, sensory latency, and sensory velocity cutoffs | Extremities | index pos; katz levels (Nerve Conduction Studies (NCS)) | 59 | index neg; katz levels (Nerve Conduction Studies (NCS)) | 86 | 0.58\|0.78 | 0.64\|0.73 | 2.36\|0.49 | WEAK | WEAK |
| Katz,J.N., 1990 (C) | High Quality | CTS Positive (Katz Hand Diagram; classic, probable, or possible) | 110 suspected CTS patients referred to one hosp | motor latency, sensory latency, and sensory velocity cutoffs | Extremities | index pos; katz levels (Nerve Conduction Studies (NCS)) | 122 | index neg; katz levels (Nerve Conduction Studies (NCS)) | 23 | 0.42\|0.91 | 0.96\|0.23 | 1.25\|0.17 | POOR | MODERATE |
| Lo,J.K., 2009 | High Quality | CTS Positive (Clinical point-score system; >10) | all CTS suspects chosen from a group of 348 as the patients with highest risk factors for CTS | sensory, motor, or combination of abnormalities | Subjects | index pos; clinical point-score system; >10 = CTS (Nerve Conduction Studies (NCS); AANEM referenced) | 164 | index neg; clinical point-score system; >10 = CTS (Nerve Conduction Studies (NCS); AANEM referenced) | 114 | 0.32\|0.16 | 0.36\|0.14 | 0.41\|4.62 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Naranjo,A., 2007 | High Quality | CTS Positive (Boston Carpal Tunnel Questionnaire (BCTQ); Functional severity scale) | 68 patients with suspected CTS | BCTQ cutoff at >3 | Extremities | index pos; BCTQ FSS, SSS (Nerve Conduction Studies (NCS); AANEM referenced) | 37 | index neg; BCTQ FSS, SSS (Nerve Conduction Studies (NCS); AANEM referenced) | 68 | 0.76\|0.24 | 0.35\|0.64 | 0.97\|1.02 | POOR | POOR |
| Naranjo,A., 2007 | High Quality | CTS Positive (Boston Carpal Tunnel Questionnaire (BCTQ); Symptom severity scale) | 68 patients with suspected CTS | BCTQ cutoff at >3 | Extremities | index pos; BCTQ FSS, SSS (Nerve Conduction Studies (NCS); AANEM referenced) | 49 | index neg; BCTQ FSS, SSS (Nerve Conduction Studies (NCS); AANEM referenced) | 56 | 0.80\|0.27 | 0.49\|0.60 | 1.22\|0.85 | POOR | POOR |
| Vanti,C., 2012 | High Quality | CTS Positive (Katz Hand Diagram; classic or probable) | limbs of 47 patients | | Extremities | index pos; katz (Nerve Conduction Studies (NCS); AANEM referenced) | 62 | index neg; katz (Nerve Conduction Studies (NCS); AANEM referenced) | 22 | 0.56\|1.00 | 1.00\|0.45 | 1.81\|0.00 | POOR | STRONG |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Boston Carpal Tunnel Questionnaire (BCTQ); Functional severity scale; >2.5) | CTS and cervical radiculopathy suspects | | Subjects | index pos; BCTQ FSS, SSS; katz; wrist ratio (Nerve Conduction Studies (NCS); AANEM referenced) | 20 | index neg; BCTQ FSS, SSS; katz; wrist ratio (Nerve Conduction Studies (NCS); AANEM referenced) | 62 | 0.50\|0.71 | 0.36\|0.81 | 1.93\|0.79 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wainner,R.S., 2005 | High Quality | CTS Positive (Boston Carpal Tunnel Questionnaire (BCTQ); Symptom severity scale; >1.9) | CTS and cervical radiculopathy suspects |  | Subjects | index pos; BCTQ FSS, SSS; katz; wrist ratio (Nerve Conduction Studies (NCS); AANEM referenced) | 60 | index neg; BCTQ FSS, SSS; katz; wrist ratio (Nerve Conduction Studies (NCS); AANEM referenced) | 22 | 0.42\|0.86 | 0.89\|0.35 | 1.38\|0.30 | POOR | WEAK |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Katz Hand Diagram; classic or probable) | CTS and cervical radiculopathy suspects |  | Subjects | index pos; BCTQ FSS, SSS; katz; wrist ratio (Nerve Conduction Studies (NCS); AANEM referenced) | 68 | index neg; BCTQ FSS, SSS; katz; wrist ratio (Nerve Conduction Studies (NCS); AANEM referenced) | 14 | 0.31\|0.50 | 0.75\|0.13 | 0.86\|1.93 | POOR | POOR |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Wrist Ratio Index; >.67) | CTS and cervical radiculopathy suspects |  | Subjects | index pos; BCTQ FSS, SSS; katz; wrist ratio (Nerve Conduction Studies (NCS); AANEM referenced) | 66 | index neg; BCTQ FSS, SSS; katz; wrist ratio (Nerve Conduction Studies (NCS); AANEM referenced) | 16 | 0.39\|0.88 | 0.93\|0.26 | 1.25\|0.28 | POOR | WEAK |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Clinical Prediction Rule; 2 or more pos tests) | CTS and cervical radiculopathy suspects |  | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 70 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 8 | 0.36\|0.88 | 0.96\|0.13 | 1.11\|0.29 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wainner,R.S., 2005 | High Quality | CTS Positive (Clinical Prediction Rule; 3 or more pos tests) | CTS and cervical radiculopathy suspects | | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 49 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 29 | 0.51\|0.97 | 0.96\|0.54 | 2.08\|0.07 | WEAK | STRONG |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Clinical Prediction Rule; 4 or more pos tests) | CTS and cervical radiculopathy suspects | | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 29 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 49 | 0.69\|0.88 | 0.77\|0.83 | 4.44\|0.28 | WEAK | WEAK |
| Wainner,R.S., 2005 | High Quality | CTS Positive (Clinical Prediction Rule; all 5 pos tests; sympt improve by shaking, WR >.67, SSS >1.9, thumb deficit, age >45) | CTS and cervical radiculopathy suspects | | Subjects | index pos; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 6 | index neg; history questions; age; clinical combinations (Nerve Conduction Studies (NCS); AANEM referenced) | 72 | 0.83\|0.71 | 0.19\|0.98 | 10.00\|0.82 | STRONG | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Westerman,D., 2012 | High Quality | CTS Positive (Clinical Prediction; History and Physical; CTS vs Uncertain or No CTS) | CTS suspected referrals; 3 did not receive reference standard evaluation | 2 of 3 abnormalities among sensory, motor and mixed nerve evals | Subjects | index pos; clinical prediction (ranked by case history and physical exam) (Nerve Conduction Studies (NCS); AANEM referenced) | 84 | index neg; clinical prediction (ranked by case history and physical exam) (Nerve Conduction Studies (NCS); AANEM referenced) | 35 | 0.94\|0.57 | 0.84\|0.80 | 4.20\|0.20 | WEAK | MODERATE |

## *TABLE 27: MODERATE QUALITY STUDIES: PICO 4 (DIAGNOSTIC SCALES VERSUS REFERENCE STANDARD)*

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2003 | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | 254 symptomatic responders to a mass survey mailing completed the hand diagram | physical tests, signs, and history | Subjects | index pos; katz (Clinical Diagnosis) | 188 | index neg; katz (Clinical Diagnosis) | 66 | 0.44\|0.86 | 0.90\|0.35 | 1.39\|0.28 | POOR | WEAK |
| Bonauto,D. K., 2008 | Moderate Quality | CTS Positive (Katz Hand Diagram; classic) | workers from various sites with current hand symptoms | motor and sensory latency cutoff values | Subjects | index pos; katz levels (Nerve Conduction Studies (NCS); AANEM referenced) | 24 | index neg; katz levels (Nerve Conduction Studies (NCS); AANEM referenced) | 229 | 0.63\|0.59 | 0.14\|0.94 | 2.24\|0.92 | WEAK | POOR |
| Bonauto,D. K., 2008 | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | workers from various sites with current hand symptoms | motor and sensory latency cutoff values | Subjects | index pos; katz levels (Nerve Conduction Studies (NCS); AANEM referenced) | 56 | index neg; katz levels (Nerve Conduction Studies (NCS); AANEM referenced) | 197 | 0.48\|0.59 | 0.25\|0.80 | 1.25\|0.94 | POOR | POOR |
| Bonauto,D. K., 2008 | Moderate Quality | CTS Positive (Katz Hand Diagram; classic, probable, or possible) | workers from various sites with current hand symptoms | motor and sensory latency cutoff values | Subjects | index pos; katz levels (Nerve Conduction Studies (NCS); AANEM referenced) | 127 | index neg; katz levels (Nerve Conduction Studies (NCS); AANEM referenced) | 126 | 0.52\|0.67 | 0.61\|0.58 | 1.45\|0.67 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calfee,R.P., 2012 (1) | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | CTS suspects with hand symptoms from a group of workers | | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Motor Latency (DML)) | 57 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Motor Latency (DML)) | 162 | 0.30\|0.79 | 0.33\|0.76 | 1.40\|0.88 | POOR | POOR |
| Calfee,R.P., 2012 (1) | Moderate Quality | CTS Positive (Median Nerve Digit Score (MNDS); 2 digits) | CTS suspects with hand symptoms from a group of workers | | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Motor Latency (DML)) | 78 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Motor Latency (DML)) | 141 | 0.36\|0.84 | 0.55\|0.70 | 1.84\|0.64 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calfee,R.P., 2012 (1) | Moderate Quality | CTS Positive (Median Nerve Digit Score (MNDS); Index finger) | CTS suspects with hand symptoms from a group of workers | | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Motor Latency (DML)) | 84 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Motor Latency (DML)) | 135 | 0.33\|0.83 | 0.55\|0.67 | 1.65\|0.68 | POOR | POOR |
| Calfee,R.P., 2012 (1) | Moderate Quality | CTS Positive (Median Nerve Digit Score (MNDS); Long finger) | CTS suspects with hand symptoms from a group of workers | | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Motor Latency (DML)) | 93 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Motor Latency (DML)) | 126 | 0.37\|0.87 | 0.67\|0.65 | 1.90\|0.51 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calfee,R.P., 2012 (1) | Moderate Quality | CTS Positive (Median Nerve Digit Score (MNDS); Thumb) | CTS suspects with hand symptoms from a group of workers |  | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Motor Latency (DML)) | 57 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Motor Latency (DML)) | 162 | 0.32\|0.80 | 0.35\|0.77 | 1.52\|0.84 | POOR | POOR |
| Calfee,R.P., 2012 (2) | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | CTS suspects with hand symptoms from a group of workers |  | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Sensory Latency (DSL)) | 57 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Sensory Latency (DSL)) | 159 | 0.54\|0.69 | 0.38\|0.81 | 1.99\|0.76 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calfee,R.P., 2012 (2) | Moderate Quality | CTS Positive (Median Nerve Digit Score (MNDS); 2 digits) | CTS suspects with hand symptoms from a group of workers | | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Sensory Latency (DSL)) | 76 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Sensory Latency (DSL)) | 140 | 0.58\|0.74 | 0.54\|0.76 | 2.29\|0.60 | WEAK | POOR |
| Calfee,R.P., 2012 (2) | Moderate Quality | CTS Positive (Median Nerve Digit Score (MNDS); Index finger) | CTS suspects with hand symptoms from a group of workers | | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Sensory Latency (DSL)) | 80 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Sensory Latency (DSL)) | 136 | 0.55\|0.73 | 0.54\|0.73 | 2.04\|0.62 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calfee,R.P., 2012 (2) | Moderate Quality | CTS Positive (Median Nerve Digit Score (MNDS); Long finger) | CTS suspects with hand symptoms from a group of workers | | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Sensory Latency (DSL)) | 91 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Sensory Latency (DSL)) | 126 | 0.59\|0.79 | 0.67\|0.73 | 2.45\|0.46 | WEAK | WEAK |
| Calfee,R.P., 2012 (2) | Moderate Quality | CTS Positive (Median Nerve Digit Score (MNDS); Thumb) | CTS suspects with hand symptoms from a group of workers | | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Sensory Latency (DSL)) | 53 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Distal Sensory Latency (DSL)) | 163 | 0.47\|0.66 | 0.31\|0.79 | 1.49\|0.87 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calfee,R.P., 2012 (3) | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | CTS suspects with hand symptoms from a group of workers | | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Median-Ulnar Sensory Difference (MUD)) | 57 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Median-Ulnar Sensory Difference (MUD)) | 156 | 0.51\|0.72 | 0.40\|0.80 | 1.99\|0.75 | POOR | POOR |
| Calfee,R.P., 2012 (3) | Moderate Quality | CTS Positive (Median Nerve Digit Score (MNDS); 2 digits) | CTS suspects with hand symptoms from a group of workers | | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Median-Ulnar Sensory Difference (MUD)) | 77 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Median-Ulnar Sensory Difference (MUD)) | 136 | 0.55\|0.77 | 0.58\|0.75 | 2.30\|0.57 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calfee,R.P., 2012 (3) | Moderate Quality | CTS Positive (Median Nerve Digit Score (MNDS); Index finger) | CTS suspects with hand symptoms from a group of workers |  | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Median-Ulnar Sensory Difference (MUD)) | 81 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Median-Ulnar Sensory Difference (MUD)) | 132 | 0.53\|0.77 | 0.59\|0.73 | 2.17\|0.56 | WEAK | POOR |
| Calfee,R.P., 2012 (3) | Moderate Quality | CTS Positive (Median Nerve Digit Score (MNDS); Long finger) | CTS suspects with hand symptoms from a group of workers |  | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Median-Ulnar Sensory Difference (MUD)) | 91 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Median-Ulnar Sensory Difference (MUD)) | 122 | 0.54\|0.80 | 0.67\|0.70 | 2.24\|0.47 | WEAK | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calfee,R.P., 2012 (3) | Moderate Quality | CTS Positive (Median Nerve Digit Score (MNDS); Thumb) | CTS suspects with hand symptoms from a group of workers | | Subjects | index pos; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Median-Ulnar Sensory Difference (MUD)) | 53 | index neg; katz; MNDS total, long, index, thumb (Nerve Conduction Studies (NCS); Median-Ulnar Sensory Difference (MUD)) | 160 | 0.45\|0.69 | 0.33\|0.79 | 1.59\|0.85 | POOR | POOR |
| Cartwright, M.S., 2013 (1) | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | Latino manual workers community sampled from 4 counties | median to ulnar sensory peak latency of >.8ms, >.5ms, or >.6ms | Subjects | index pos; katz (Nerve Conduction Studies (NCS); >.5ms) | 34 | index neg; katz (Nerve Conduction Studies (NCS); >.5ms) | 479 | 0.50\|0.69 | 0.10\|0.95 | 2.11\|0.94 | WEAK | POOR |
| Cartwright, M.S., 2013 (2) | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | Latino manual workers community sampled from 4 counties | median to ulnar sensory peak latency of >.8ms, >.5ms, or >.6ms | Subjects | index pos; katz (Nerve Conduction Studies (NCS); >.6ms) | 34 | index neg; katz (Nerve Conduction Studies (NCS); >.6ms) | 479 | 0.47\|0.75 | 0.12\|0.95 | 2.46\|0.93 | WEAK | POOR |
| Cartwright, M.S., 2013 (3) | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | Latino manual workers community sampled from 4 counties | median to ulnar sensory peak latency of >.8ms, >.5ms, or >.6ms | Subjects | index pos; katz (Nerve Conduction Studies (NCS); >.8ms) | 34 | index neg; katz (Nerve Conduction Studies (NCS); >.8ms) | 479 | 0.38\|0.83 | 0.14\|0.95 | 2.76\|0.91 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dale,A.M., 2011 | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | 1108 recruits from 11 occupations of potential CTS risk | sensory, motor, and MUDS cutoffs | Extremities | index pos; katz (Nerve Conduction Studies (NCS)) | 62 | index neg; katz (Nerve Conduction Studies (NCS)) | 2154 | 0.56\|0.33 | 0.02\|0.96 | 0.65\|1.01 | POOR | POOR |
| Dhong,E.S., 2000 | Moderate Quality | CTS Positive (Modified Boston Carpal Tunnel Questionnaire (BCTQ); Functional severity scale) | 138 patients; 95% housewives who failed splint treatment and had clinical diagnosis | sensory latency and amplitude | Extremities | index pos; BCTQ FSS, SSS (Nerve Conduction Studies (NCS); AANEM referenced) | 222 | index neg; 0 INDEX NEG CASES; BCTQ FSS, SSS (Nerve Conduction Studies (NCS); AANEM referenced) | 0 | 0.93\|. | 1.00\|0.00 | 1.00\|0.60 | POOR | POOR |
| Dhong,E.S., 2000 | Moderate Quality | CTS Positive (Modified Boston Carpal Tunnel Questionnaire (BCTQ); Symptom severity scale) | 138 patients; 95% housewives who failed splint treatment and had clinical diagnosis | sensory latency and amplitude | Extremities | index pos; BCTQ FSS, SSS (Nerve Conduction Studies (NCS); AANEM referenced) | 222 | index neg; 0 INDEX NEG CASES; BCTQ FSS, SSS (Nerve Conduction Studies (NCS); AANEM referenced) | 0 | 0.93\|. | 1.00\|0.00 | 1.00\|0.60 | POOR | POOR |
| Fowler,J.R., 2014 | Moderate Quality | CTS Positive (CTS-6; Stringent; 80+%) | referred to EDS | 80 percent prob; score of 12+ | Subjects | index pos; CTS 6 stringent (Nerve Conduction Studies (NCS); AANEM referenced) | 55 | index neg; CTS 6 stringent (Nerve Conduction Studies (NCS); AANEM referenced) | 30 | 0.89\|0.80 | 0.89\|0.80 | 4.45\|0.14 | WEAK | MODERATE |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Franzblau,A., 1994 (1) | Moderate Quality | CTS Positive (Modified Katz Hand Diagram; classic) | 408 at risk workers from various facilities | median to ulnar sensory peak latency of >.8ms or >.5ms | Extremities | index pos; modified katz variations (Nerve Conduction Studies (NCS); >.8ms) | 59 | index neg; modified katz variations (Nerve Conduction Studies (NCS); >.8ms) | 757 | 0.27\|0.83 | 0.11\|0.94 | 1.75\|0.95 | POOR | POOR |
| Franzblau,A., 1994 (1) | Moderate Quality | CTS Positive (Modified Katz Hand Diagram; classic or probable) | 408 at risk workers from various facilities | median to ulnar sensory peak latency of >.8ms or >.5ms | Extremities | index pos; modified katz variations (Nerve Conduction Studies (NCS); >.8ms) | 91 | index neg; modified katz variations (Nerve Conduction Studies (NCS); >.8ms) | 725 | 0.21\|0.83 | 0.13\|0.89 | 1.24\|0.97 | POOR | POOR |
| Franzblau,A., 1994 (1) | Moderate Quality | CTS Positive (Modified Katz Hand Diagram; classic, probable, or possible) | 408 at risk workers from various facilities | median to ulnar sensory peak latency of >.8ms or >.5ms | Extremities | index pos; modified katz variations (Nerve Conduction Studies (NCS); >.8ms) | 159 | index neg; modified katz variations (Nerve Conduction Studies (NCS); >.8ms) | 657 | 0.16\|0.82 | 0.17\|0.80 | 0.88\|1.03 | POOR | POOR |
| Franzblau,A., 1994 (2) | Moderate Quality | CTS Positive (Modified Katz Hand Diagram; classic) | 408 at risk workers from various facilities | median to ulnar sensory peak latency of >.8ms or >.5ms | Extremities | index pos; modified Katz variations (Nerve Conduction Studies (NCS); >.5ms) | 59 | index neg; modified Katz variations (Nerve Conduction Studies (NCS); >.5ms) | 757 | 0.42\|0.84 | 0.17\|0.95 | 3.46\|0.87 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Franzblau,A., 1994 (2) | Moderate Quality | CTS Positive (Modified Katz Hand Diagram; classic or probable) | 408 at risk workers from various facilities | median to ulnar sensory peak latency of >.8ms or >.5ms | Extremities | index pos; modified Katz variations (Nerve Conduction Studies (NCS); >.5ms) | 91 | index neg; modified Katz variations (Nerve Conduction Studies (NCS); >.5ms) | 725 | 0.33\|0.84 | 0.21\|0.91 | 2.31\|0.87 | WEAK | POOR |
| Franzblau,A., 1994 (2) | Moderate Quality | CTS Positive (Modified Katz Hand Diagram; classic, probable, or possible) | 408 at risk workers from various facilities | median to ulnar sensory peak latency of >.8ms or >.5ms | Extremities | index pos; modified Katz variations (Nerve Conduction Studies (NCS); >.5ms) | 159 | index neg; modified Katz variations (Nerve Conduction Studies (NCS); >.5ms) | 657 | 0.28\|0.85 | 0.31\|0.83 | 1.86\|0.83 | POOR | POOR |
| Gomes,I., 2006 | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | 2535 patients referred for NCS from 5 facilities | sensory, motor, and mixed nerve cutoffs | Extremities | index pos; katz (Nerve Conduction Studies (NCS); AANEM referenced) | 2436 | index neg; katz (Nerve Conduction Studies (NCS); AANEM referenced) | 1471 | 0.50\|0.79 | 0.80\|0.49 | 1.55\|0.42 | POOR | WEAK |
| Hems,T.E., 2009 | Moderate Quality | CTS Positive (Bland Questionnaire; 6+) | group of patients with clinically unconfirmed CTS among a group of suspected patients | motor and sensory latency cutoffs | Subjects | index pos; Bland Questionnaire (Nerve Conduction Studies (NCS)) | 74 | index neg; Bland Questionnaire (Nerve Conduction Studies (NCS)) | 17 | 0.91\|0.65 | 0.92\|0.61 | 2.36\|0.13 | WEAK | MODERATE |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hems,T.E., 2009 | Moderate Quality | CTS Positive (Bland Questionnaire; 7+) | group of patients with clinically unconfirmed CTS among a group of suspected patients | motor and sensory latency cutoffs | Subjects | index pos; Bland Questionnaire (Nerve Conduction Studies (NCS)) | 66 | index neg; Bland Questionnaire (Nerve Conduction Studies (NCS)) | 25 | 0.91\|0.48 | 0.82\|0.67 | 2.47\|0.27 | WEAK | WEAK |
| Hems,T.E., 2009 | Moderate Quality | CTS Positive (Bland Questionnaire; 8+) | group of patients with clinically unconfirmed CTS among a group of suspected patients | motor and sensory latency cutoffs | Subjects | index pos; Bland Questionnaire (Nerve Conduction Studies (NCS)) | 57 | index neg; Bland Questionnaire (Nerve Conduction Studies (NCS)) | 34 | 0.91\|0.38 | 0.71\|0.72 | 2.56\|0.40 | WEAK | WEAK |
| Hems,T.E., 2009 | Moderate Quality | CTS Positive (Bland Questionnaire; Symptom Score Only; 6+) | group of patients with clinically unconfirmed CTS among a group of suspected patients | motor and sensory latency cutoffs | Subjects | index pos; Bland Questionnaire (Nerve Conduction Studies (NCS)) | 59 | index neg; Bland Questionnaire (Nerve Conduction Studies (NCS)) | 32 | 0.88\|0.34 | 0.71\|0.61 | 1.83\|0.47 | POOR | WEAK |
| Katz,J.N., 1990 (A) | Moderate Quality | CTS Positive (Katz Hand Diagram; classic) | 63 random patients from a group with upper extremity symptoms | no threshold for NCS evidence; one clinical confirmation (response to treatment) | Extremities | index pos; katz levels (Nerve Conduction Studies (NCS) and Clinical Diagnosis) | 32 | index neg; katz levels (Nerve Conduction Studies (NCS) and Clinical Diagnosis) | 53 | 1.00\|0.19 | 0.43\|1.00 | 10.00\|0.57 | STRONG | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Katz,J.N., 1990 (A) | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | 63 random patients from a group with upper extremity symptoms | no threshold for NCS evidence; one clinical confirmation (response to treatment) | Extremities | index pos; katz levels (Nerve Conduction Studies (NCS) and Clinical Diagnosis) | 61 | index neg; katz levels (Nerve Conduction Studies (NCS) and Clinical Diagnosis) | 24 | 0.98\|0.38 | 0.80\|0.90 | 8.00\|0.22 | MODERATE | WEAK |
| Katz,J.N., 1990 (A) | Moderate Quality | CTS Positive (Katz Hand Diagram; classic, probable, or possible) | 63 random patients from a group with upper extremity symptoms | no threshold for NCS evidence; one clinical confirmation (response to treatment) | Extremities | index pos; katz levels (Nerve Conduction Studies (NCS) and Clinical Diagnosis) | 79 | index neg; katz levels (Nerve Conduction Studies (NCS) and Clinical Diagnosis) | 6 | 0.94\|0.83 | 0.99\|0.50 | 1.97\|0.03 | POOR | STRONG |
| Katz,J.N., 1991 | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | CTS symptomatic subjects at one hospital | sensory, motor, and mixed nerve cutoffs | Subjects | index pos; katz; niosh case definition (Nerve Conduction Studies (NCS)) | 64 | index neg; katz; niosh case definition (Nerve Conduction Studies (NCS)) | 14 | 0.44\|0.86 | 0.93\|0.25 | 1.24\|0.27 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Katz,J.N., 1991 | Moderate Quality | CTS Positive (NIOSH Case Definition; symptoms, work relatedness, objective evidence) | CTS symptomatic subjects at one hospital | sensory, motor, and mixed nerve cutoffs | Subjects | index pos; katz; niosh case definition (Nerve Conduction Studies (NCS)) | 40 | index neg; katz; niosh case definition (Nerve Conduction Studies (NCS)) | 38 | 0.50\|0.74 | 0.67\|0.58 | 1.60\|0.57 | POOR | POOR |
| Kuhlman,K. A., 1997 | Moderate Quality | CTS Positive (Wrist Ratio) | 143 clinical CTS suspects | referenced sensory and motor cutoffs | Extremities | index pos; wrist ratio (Nerve Conduction Studies (NCS)) | 121 | index neg; wrist ratio (Nerve Conduction Studies (NCS)) | 107 | 0.81\|0.59 | 0.69\|0.73 | 2.58\|0.42 | WEAK | WEAK |
| Makanji,H.S., 2014 | Moderate Quality | CTS Positive (CTS-6; Lax; 50+%) | referred CTS suspects | DML and DSL with referenced normal values | | index pos; CTS 6 lax, stringent (Nerve Conduction Studies (NCS); AANEM referenced) | 77 | index neg; CTS 6 lax, stringent (Nerve Conduction Studies (NCS); AANEM referenced) | 11 | 0.74\|0.27 | 0.88\|0.13 | 1.01\|0.94 | POOR | POOR |
| Makanji,H.S., 2014 | Moderate Quality | CTS Positive (CTS-6; Stringent; 80+%) | referred CTS suspects | DML and DSL with referenced normal values | | index pos; CTS 6 lax, stringent (Nerve Conduction Studies (NCS); AANEM referenced) | 47 | index neg; CTS 6 lax, stringent (Nerve Conduction Studies (NCS); AANEM referenced) | 41 | 0.74\|0.27 | 0.54\|0.48 | 1.03\|0.97 | POOR | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Padua,L., 1999 | Moderate Quality | CTS Positive (Modified Hi-Ob Scale; Pain) | clinically suspected idiopathic CTS patients | clinical and NCS from AANEM considered; min of clinical diagnosis and various severities of NCS testing results | Extremities | index pos; Modified Hi-Ob Scale; Pain (Nerve Conduction Studies (NCS) and clinical diagnosis; AANEM referenced) | 623 | index neg; Modified Hi-Ob Scale; Pain (Nerve Conduction Studies (NCS) and clinical diagnosis; AANEM referenced) | 500 | 0.95\|0.05 | 0.55\|0.40 | 0.93\|1.11 | POOR | POOR |
| Stevens,J.C., 1997 (1) | Moderate Quality | CTS Positive (Hand Symptom Diagram (HSD) and Hand Symptom Questionnaire (HSQ); Examiner 1) | 100 CTS diagnosed patients and 50 with upper extremity problems other than CTS | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; HSD; HSQ (Nerve Conduction Studies (NCS)) | 175 | index neg; HSD; HSQ (Nerve Conduction Studies (NCS)) | 52 | 0.83\|0.73 | 0.91\|0.56 | 2.07\|0.16 | WEAK | MODERATE |
| Stevens,J.C., 1997 (1) | Moderate Quality | CTS Positive (Hand Symptom Diagram (HSD); Examiner 1) | 100 CTS diagnosed patients and 50 with upper extremity problems other than CTS | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; HSD; HSQ (Nerve Conduction Studies (NCS)) | 111 | index neg; HSD; HSQ (Nerve Conduction Studies (NCS)) | 116 | 0.86\|0.46 | 0.60\|0.78 | 2.74\|0.51 | WEAK | POOR |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stevens,J.C., 1997 (1) | Moderate Quality | CTS Positive (Hand Symptom Questionnaire (HSQ); Examiner 1) | 100 CTS diagnosed patients and 50 with upper extremity problems other than CTS | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; HSD; HSQ (Nerve Conduction Studies (NCS)) | 163 | index neg; HSD; HSQ (Nerve Conduction Studies (NCS)) | 64 | 0.83\|0.64 | 0.86\|0.60 | 2.15\|0.24 | WEAK | WEAK |
| Stevens,J.C., 1997 (2) | Moderate Quality | CTS Positive (Hand Symptom Diagram (HSD) and Hand Symptom Questionnaire (HSQ); Examiner 2) | 100 CTS diagnosed patients and 50 with upper extremity problems other than CTS | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; HSD; HSQ (Nerve Conduction Studies (NCS)) | 197 | index neg; HSD; HSQ (Nerve Conduction Studies (NCS)) | 30 | 0.76\|0.67 | 0.94\|0.29 | 1.33\|0.21 | POOR | WEAK |
| Stevens,J.C., 1997 (2) | Moderate Quality | CTS Positive (Hand Symptom Diagram (HSD); Examiner 2) | 100 CTS diagnosed patients and 50 with upper extremity problems other than CTS | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; HSD; HSQ (Nerve Conduction Studies (NCS)) | 161 | index neg; HSD; HSQ (Nerve Conduction Studies (NCS)) | 66 | 0.79\|0.52 | 0.80\|0.50 | 1.60\|0.40 | POOR | WEAK |
| Stevens,J.C., 1997 (2) | Moderate Quality | CTS Positive (Hand Symptom Questionnaire (HSQ); Examiner 2) | 100 CTS diagnosed patients and 50 with upper extremity problems other than CTS | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; HSD; HSQ (Nerve Conduction Studies (NCS)) | 168 | index neg; HSD; HSQ (Nerve Conduction Studies (NCS)) | 59 | 0.78\|0.53 | 0.82\|0.46 | 1.51\|0.39 | POOR | WEAK |

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stevens,J.C., 1997 (3) | Moderate Quality | CTS Positive (Hand Symptom Diagram (HSD) and Hand Symptom Questionnaire (HSQ); Examiner 3) | 100 CTS diagnosed patients and 50 with upper extremity problems other than CTS | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; HSD; HSQ (Nerve Conduction Studies (NCS)) | 149 | index neg; HSD; HSQ (Nerve Conduction Studies (NCS)) | 78 | 0.85\|0.58 | 0.79\|0.66 | 2.34\|0.31 | WEAK | WEAK |
| Stevens,J.C., 1997 (3) | Moderate Quality | CTS Positive (Hand Symptom Diagram (HSD); Examiner 3) | 100 CTS diagnosed patients and 50 with upper extremity problems other than CTS | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; HSD; HSQ (Nerve Conduction Studies (NCS)) | 138 | index neg; HSD; HSQ (Nerve Conduction Studies (NCS)) | 89 | 0.85\|0.53 | 0.74\|0.69 | 2.38\|0.38 | WEAK | WEAK |
| Stevens,J.C., 1997 (3) | Moderate Quality | CTS Positive (Hand Symptom Questionnaire (HSQ); Examiner 3) | 100 CTS diagnosed patients and 50 with upper extremity problems other than CTS | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; HSD; HSQ (Nerve Conduction Studies (NCS)) | 101 | index neg; HSD; HSQ (Nerve Conduction Studies (NCS)) | 126 | 0.85\|0.42 | 0.54\|0.78 | 2.45\|0.59 | WEAK | POOR |
| Yagci,I., 2010 | Moderate Quality | CTS Positive (Katz Hand Diagram; classic) | DPN PATIENT POPULATION referred to EDS lab | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; katz; clinical diagnosis via lax katz (Nerve Conduction Studies (NCS); AANEM referenced) | 22 | index neg; katz; clinical diagnosis via lax katz (Nerve Conduction Studies (NCS); AANEM referenced) | 72 | 1.00\|0.69 | 0.50\|1.00 | 10.00\|0.50 | STRONG | WEAK |

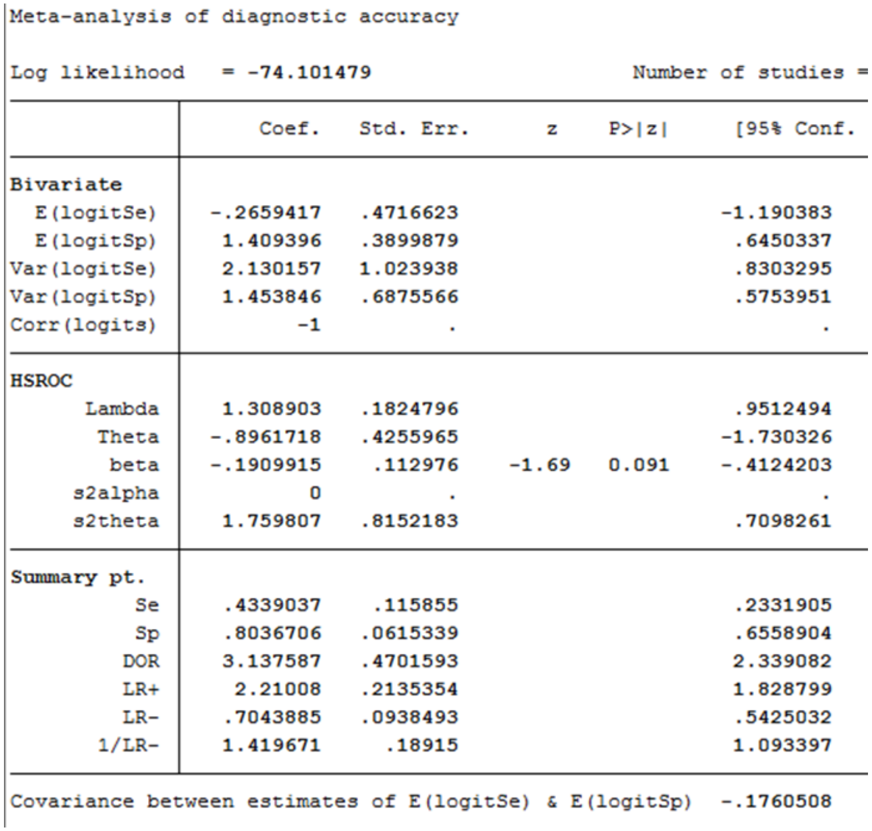
| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yagci,I., 2010 | Moderate Quality | CTS Positive (Katz Hand Diagram; classic or probable) | DPN PATIENT POPULATION referred to EDS lab | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; katz; clinical diagnosis via lax katz (Nerve Conduction Studies (NCS); AANEM referenced) | 36 | index neg; katz; clinical diagnosis via lax katz (Nerve Conduction Studies (NCS); AANEM referenced) | 58 | 1.00\|0.86 | 0.82\|1.00 | 10.00\|0.18 | STRONG | MODERATE |
| Yagci,I., 2010 | Moderate Quality | CTS Positive (Katz Hand Diagram; classic, probable, and possible) | DPN PATIENT POPULATION referred to EDS lab | motor, mixed, sensory nerve cutoffs referenced | Extremities | index pos; katz; clinical diagnosis via lax katz (Nerve Conduction Studies (NCS); AANEM referenced) | 43 | index neg; katz; clinical diagnosis via lax katz (Nerve Conduction Studies (NCS); AANEM referenced) | 51 | 1.00\|0.98 | 0.98\|1.00 | 10.00\|0.02 | STRONG | STRONG |

*TABLE 28: LOW QUALITY STUDIES- PICO 4 (DIAGNOSTIC SCALES VERSUS REFERENCE STANDARD)*

| Reference Title | Quality | Outcome (Index Test) | Patient Characteristics | Threshold Notes | Outcomes Reported By | Group1 (Reference Standard) | Group1 N | Group2 (Reference Standard) | Group2 N | PPV\|NPV | Sens\|Spec | LR+\|LR- | Rule In Test | Rule Out Test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bland,J.D., 2014 | Low Quality | CTS Positive (CTS Web Questionnaire; 40+ score) | all neurology referred patients who completed the web questionnaire | NCS graded on Canterbury severity scale | Subjects | index pos; Web Questionnaire (Nerve Conduction Studies (NCS); AANEM referenced) | 1430 | index neg; Web Questionnaire (Nerve Conduction Studies (NCS); AANEM referenced) | 1225 | 0.78\|0.68 | 0.74\|0.73 | 2.71\|0.36 | WEAK | WEAK |

## *META-ANALYSES*

*FIGURE 9: GENERAL EDS VERSUS KATZ HAND DIAGRAM (CLASSIC OR PROBABLE)*



```
Meta-analysis of diagnostic accuracy

Log likelihood   = -74.101479                   Number of studies =
-------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf.
-------------------------------------------------------------------
Bivariate    |
  E(logitSe) |  -.2659417   .4716623                     -1.190383
  E(logitSp) |   1.409396   .3899879                      .6450337
Var(logitSe) |   2.130157   1.023938                      .8303295
Var(logitSp) |   1.453846   .6875566                      .5753951
Corr(logits) |         -1          .                             .
-------------------------------------------------------------------
HSROC        |
      Lambda |   1.308903   .1824796                      .9512494
       Theta |  -.8961718   .4255965                     -1.730326
        beta |  -.1909915    .112976    -1.69   0.091    -.4124203
     s2alpha |          0          .                             .
     s2theta |   1.759807   .8152183                      .7098261
-------------------------------------------------------------------
Summary pt.  |
          Se |   .4339037    .115855                      .2331905
          Sp |   .8036706   .0615339                      .6558904
         DOR |   3.137587   .4701593                      2.339082
         LR+ |    2.21008   .2135354                      1.828799
         LR- |   .7043885   .0938493                      .5425032
       1/LR- |   1.419671     .18915                      1.093397
-------------------------------------------------------------------
Covariance between estimates of E(logitSe) & E(logitSp)   -.1760508
```

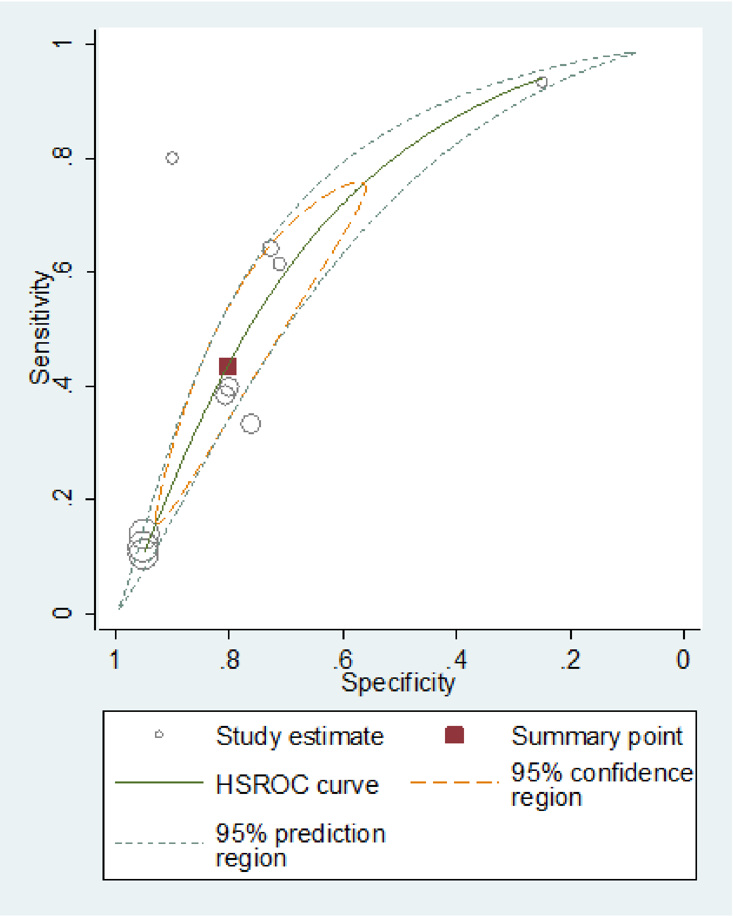
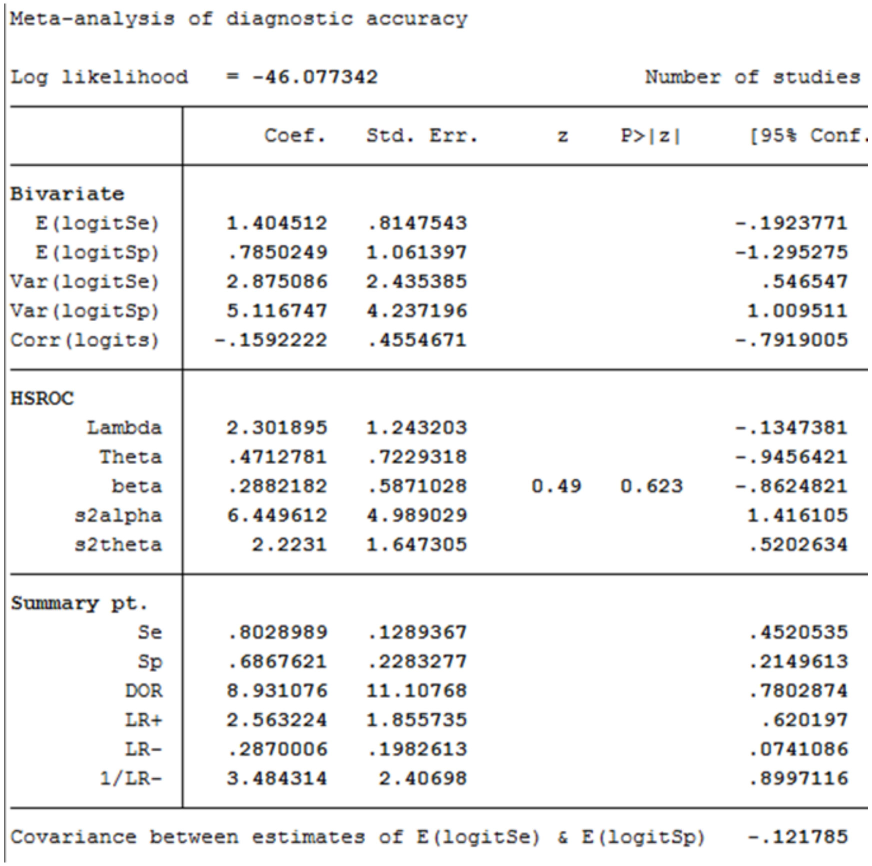
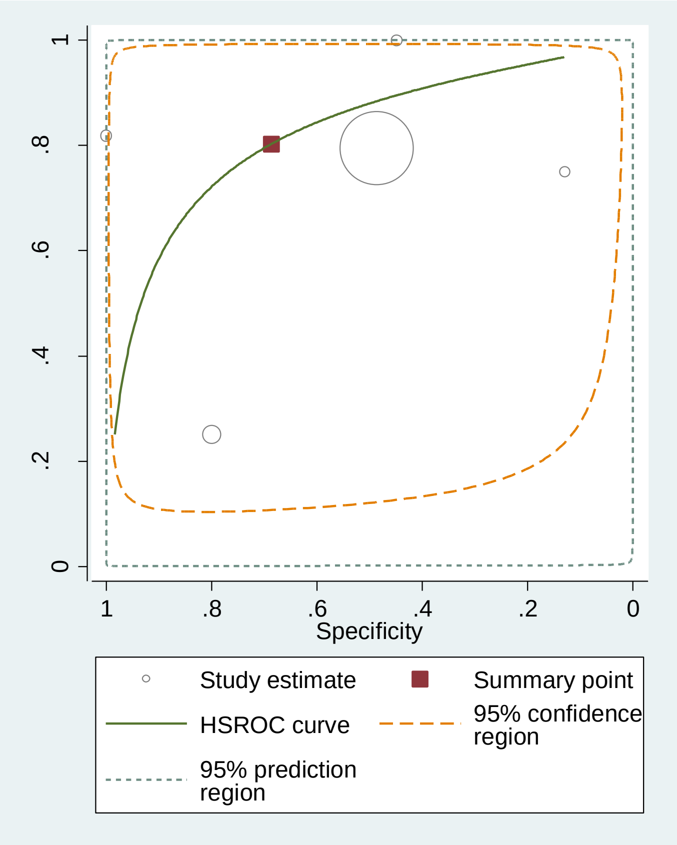


FIGURE 10: *EDS AANEM VERSUS KATZ HAND DIAGRAM (CLASSIC OR PROBABLE)*



```
Meta-analysis of diagnostic accuracy

Log likelihood   = -46.077342                         Number of studies
--------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf.
-------------+------------------------------------------------------------
Bivariate    |
  E(logitSe) |   1.404512   .8147543                      -.1923771
  E(logitSp) |   .7850249   1.061397                      -1.295275
Var(logitSe) |   2.875086   2.435385                        .546547
Var(logitSp) |   5.116747   4.237196                       1.009511
Corr(logits) |  -.1592222   .4554671                      -.7919005
-------------+------------------------------------------------------------
HSROC        |
      Lambda |   2.301895   1.243203                      -.1347381
       Theta |   .4712781   .7229318                      -.9456421
        beta |   .2882182   .5871028     0.49   0.623     -.8624821
     s2alpha |   6.449612   4.989029                       1.416105
     s2theta |     2.2231   1.647305                       .5202634
-------------+------------------------------------------------------------
Summary pt.  |
          Se |   .8028989   .1289367                       .4520535
          Sp |   .6867621   .2283277                       .2149613
         DOR |   8.931076   11.10768                       .7802874
         LR+ |   2.563224   1.855735                        .620197
         LR- |   .2870006   .1982613                       .0741086
       1/LR- |   3.484314    2.40698                       .8997116
--------------------------------------------------------------------------
Covariance between estimates of E(logitSe) & E(logitSp)    -.121785
```



## RISK FACTOR GUIDELINE RECOMMENDATIONS

### INCREASED RISK OF CTS

A. Strong evidence supports that BMI and high hand/wrist repetition rate are associated with the increased risk of developing carpal tunnel syndrome (CTS).

**Strength of Recommendation: Strong Evidence** ★★★★

Description: Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention.

B. Moderate evidence supports that the following factors are associated with the increased risk of developing carpal tunnel syndrome (CTS):

- Peri-menopausal
- Wrist Ratio/Index
- Rheumatoid Arthritis
- Psychosocial factors
- Distal upper extremity tendinopathies
- Gardening
- ACGIH Hand Activity Level at or above threshold
- Assembly line work
- Computer work
- Vibration
- Tendonitis
- Workplace forceful grip/exertion

**Strength of Recommendation: Moderate Evidence** ★★★☆

Description: Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.

C. Limited evidence supports that the following factors are associated with the increased risk of developing carpal tunnel syndrome (CTS):

- Dialysis
- Fibromyalgia
- Varicosis
- Distal radius fracture

**Strength of Recommendation: Limited Evidence** ★★☆☆

Description: Evidence from one or more “Low” quality studies with consistent findings **or** evidence from a single “Moderate” quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

## Rationale

BMI evaluated as a continuous variable was shown to be associated with development of CTS in four high quality (Armstrong, 2008; Bonfiglioli, 2013; Evanoff, 2014; Garg, 2012) and three moderate quality studies (Burt, 2011; Hlebs, 2014; Nordstrom, 1997). Only one moderate quality study (Goodson, 2014) found an insignificant result for the relationship between BMI and CTS. When evaluated as a categorical variable, five moderate quality studies (Becker, 2002; Burt, 2011; Burt, 2013; Coggon, 2013; Geoghegan, 2004) found a correlation between increasing BMI and development of CTS, while one high quality study (Hakim, 2002) and two moderate quality (Mondelli, 2006; Violante, 2007) studies found no significance.

High hand/wrist repetition rate at work was significantly associated to an increased risk of CTS by two high quality (Armstrong, 2008; Evanoff, 2014) and four moderate quality studies (Chiang, 1990; Coggon, 2013; Goodson, 2014; Silverstein, 1987). In all studies, the hand/wrist repetition involved moderate to high hand forces. One of the high quality studies (Armstrong, 2008) showed an insignificant association in two of the categories of repetition, but still showed a significant increase between the high and low quartile categories.

Peri-menopausal status was shown in one high quality study (Hakim, 2002) to be associated with an increased risk of CTS development, but no association was found between CTS and post-menopausal status.

Wrist ratio/index (ratio of wrist depth to width >0.7mm) was significantly associated with an increased risk of CTS in one high (Armstrong, 2008) and six moderate quality studies (Boz, 2004; Gordon, 1988; Hlebs, 2014; Moghtaderi, 2005; Sabry, 2009; Shariff-Mollayousefi, 2008).

Rheumatoid arthritis was associated with an increased risk of CTS in one high quality (Garg, 2012) and one moderate quality study (Burt, 2011). One moderate quality study (Geoghegan, 2004) showed an association between osteoarthritis and CTS.

Mood (“felt down, blue or depressed always/never, compared to seldom”) was associated with increased risk of CTS in one high quality study (Garg, 2012). One moderate quality study (Coggon, 2013) showed an association with increased risk based on self-rated mental health.

Hand, wrist or elbow tendinopathies (musculoskeletal conditions) were associated with increased risk of CTS in one high quality (Garg, 2012) and two moderate quality studies (Aktas, 2008; Nordstrom, 1997).

Gardening was associated with an increased risk of developing CTS in one high quality study (Garg, 2012).

The American Conference of Governmental Industrial Hygienists (ACGIH) hand activity level (HAL) is a standardized method for evaluating jobs that involves expert observation, direct measurement or video analysis to assess both pinch/grip force and hand/wrist repetition rate. There was one high quality (Bonfiglioli, 2013) and three moderate quality (Burt, 2011; Burt, 2013; Violante, 2007) studies, showing significant associations to increased risk of CTS when the ACGIH HAL was at or above the threshold limit. In addition, there was one high quality study (Garg, 2012) that showed an association with CTS by hazard ratio but this finding was limited by a wide confidence interval that included a value of 1.0 (HR: 2.01, CI: 0.8-5.0).

Assembly line work was associated with increased risk for the development of CTS in one high quality (Armstrong, 2008) and two low quality studies (Bonfiglioli, 2006; Lecler, 1998).

Computer work was significantly associated with increased risk of CTS by three moderate quality studies (Ali, 2006; Coggon, 2013; Eleftheriou, 2012). One study found an increased association with an average of greater than eight hours of computer use per day and more than four years of computer work (Ali, 2006). Another study found an association between an increased risk of CTS and working on a keyboard or mouse for more than four hours per day (Coggon, 2013). The third study found an association with a very high number of keystrokes typed per year and a higher risk of CTS (Eletheriou, 2012). There was one moderate quality study (Ali, 2006) evaluating internet use for leisure, which also found a significant result for increasing risk of CTS.

The use of vibrating hand-held tools was associated with an increased risk of CTS in one high quality (Armstrong, 2008) and three moderate quality studies (Coggon, 2013; Dale, 2014; Nordstrom, 1997).

Tendonitis in the shoulder, hand, finger, or wrist was shown to increase risk of CTS by one high quality (Armstrong, 2008) and one low quality study (Werner, 2005).

Workplace forceful grip/exertion was found to be significantly associated with increased risk of CTS by one high quality (Armstrong, 2008) and four moderate quality studies (Burt, 2011; Burt, 2013; Dale, 2014; Evanoff, 2012).

Comorbidities including dialysis, fibromyalgia, and varicosis each had one moderate quality study (Shin, 2008; Fahmi, 2013; De Krom, 1990) showing that each has a significantly increased risk of CTS.

Wrist fracture showed an increased risk of CTS in two moderate quality studies (Geoghegan, 2004; Dyer, 2008). One moderate quality study (Morgenstern, 1991) showed an insignificant relationship, but that study included only female participants and therefore the findings may not be generalizable.

### Risks and Harms of Implementing this Recommendation

There are no known harms associated with implementing these recommendations.

### Future Research

Studies should be conducted to identify objective methods for assessing workplace physical factors in order to improve the precision of risk estimation and improve confidence in thresholds of injury. Workplace intervention studies should be conducted to confirm that modifications in work activities may improve symptoms and functional deficits in workers with CTS. Studies of risk should include proper control for confounding as in a logistic regression analysis with appropriate population sizes and associated odds ratios.

## DECREASED RISK OF CTS

Moderate evidence supports that physical activity/exercise is associated with a decreased risk of developing carpal tunnel syndrome (CTS).

**Strength of Recommendation: Moderate Evidence** ★★★☆

Description: Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention

### Rationale

Vigorous exercise was associated with reduced risk of CTS in one moderate quality study (Goodson, 2014). In the same study, increased risk of CTS was associated with wrist straining exercise (e.g., weight lifting, mountain biking, racquet sports), but that risk was reduced if there was also vigorous exercise. Another moderate quality study (Eleftheriou, 2012) found an association between regular physical activity (e.g., basketball, football, tennis, jogging, and swimming) and reduced risk of CTS.

### Risks and Harms of Implementing this Recommendation

There are no known harms associated with implementing these recommendations.

### Future Research

The moderate quality studies finding that found a reduction in risk for CTS with vigorous exercise are intriguing. There should be additional research to confirm these findings and identify the specific types and amount of exercise that may be effective. There should be studies to investigate apportionment of risk between personal and workplace factors.

## FACTORS SHOWING NO ASSOCIATED RISK OF CTS

### A. Moderate evidence supports that the use of oral contraception and female hormone replacement therapy (HRT) are not associated with increased or decreased risk of developing carpal tunnel syndrome (CTS).

**Strength of Recommendation: Moderate Evidence** ★★★☆

Description: Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.

### B. Limited evidence supports that race/ethnicity and female education level are not associated with increased or decreased risk of developing carpal tunnel syndrome (CTS).

**Strength of Recommendation: Limited Evidence** ★★☆☆

Description: Evidence from one or more “Low” quality studies with consistent findings **or** evidence from a single “Moderate” quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

### Rationale

Oral contraception use among females was shown to have no significant relationship to the development of CTS in three moderate quality studies (Geoghehan, 2004; Mondelli, 2006; Morgenstern, 1991). Oral HRT use among females was shown to have no significant relationship to the development of CTS in one high quality and one moderate quality study (Hakim, 2002; Geoghehan, 2004). Education level among females showed no significant relationship to the development of CTS in one moderate quality (Bonfiglioli, 2007) and two low quality studies (Kaplan, 2008; Wright, 2014). Race/ethnicity showed no significant relationship to the development of CTS in one moderate quality study (Nathan, 2002).

## Risks and Harms of Implementing this Recommendation

There are no known harms associated with implementing these recommendations.

## Future Research

The moderate quality studies finding that found a reduction in risk for CTS with vigorous exercise are intriguing. There should be additional research to confirm these findings and identify the specific types and amount of exercise that may be effective. There should be studies to investigate apportionment of risk between personal and workplace factors. Studies should be conducted to identify objective methods for assessing workplace physical factors in order to improve the precision of risk estimation and improve confidence in thresholds of injury. Workplace intervention studies should be conducted to confirm that modifications in work activities may improve symptoms and functional deficits in workers with CTS. More research into the relationship between diabetes and CTS should be done, as the conflicting results indicate a possible association between these conditions. Studies of risk should include proper control for confounding as in a logistic regression analysis with appropriate population sizes and associated odds ratios.

## FACTORS SHOWING CONFLICTING RISK OF CTS

Limited evidence supports that the following factors have conflicting results regarding the development of carpal tunnel syndrome (CTS):

- Diabetes
- Age
- Gender/Sex
- Genetics
- Comorbid drug use
- Smoking
- Wrist bending
- Workplace

### Strength of Recommendation: Limited Evidence ★★☆☆

Description: Evidence from one or more “Low” quality studies with consistent findings **or** evidence from a single “Moderate” quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

### Rationale

Diabetes showed a conflicting relationship to CTS development. One high quality study (Armstrong, 2008) did not demonstrate a significant association with CTS. The odds ratio was elevated but there was a wide confidence interval that included a value of 1.0 (OR 2.45, CI: 0.92-6.53). Three moderate quality studies (Becker, 2002; Geoghegan, 2004; Plastino, 2011) found significant associations between diabetes and an increased risk of CTS and one (Coggon, 2013) did not find an association.

Age showed a conflicting relationship to CTS development. Two high quality studies (Armstrong, 2008; Bonfiglioli, 2013) showed increased risk in older workers on a continuous scale. Two other high quality studies (Evanoff, 2014; Garg, 2012) measuring age on a continuous scale showed insignificant results but with slightly increased risk ratios and narrow confidence limits. Two moderate quality studies (Morgenstern, 1991; Shin, 2008) also found a significantly increased risk of CTS when measuring age continuously and one moderate quality study (Silverstein, 1987) found an insignificant relationship. When measured categorically, one high quality study (Hakim, 2002) showed an increasing association at age >46 and one moderate quality study (Violante, 2007) found an increasing association among all categories. Two moderate quality studies (Eleftheriou, 2012; Mondelli, 2006) did not find a significant association between categories of age and CTS development.

Female gender/sex was associated with increased risk of CTS in one high quality (Bonfiglioli, 2013) and three moderate quality studies (Burt, 2011; Eleftheriou, 2012; Violante, 2007), while two high quality (Armstrong, 2008; Evanoff, 2014) and two moderate quality studies (Shin, 2008; Silverstein, 1987) showed no significant association.

Family history/genetics was associated with increased risk of CTS in one high quality (Hakim, 2002) and two moderate quality studies (Bonfiglioli, 2007; Burt 2011), while two moderate quality studies (Nordstrom, 1997; Violante, 2007) showed no significant correlation. The studies used varying diagnostic methods, and two of the studies evaluated female populations, which may have contributed to the conflicting results.

Comorbid drug use showed a conflicting relationship to CTS development. One high quality study (Hakim, 2002) found no association with thyroxine replacement. One moderate quality study (Geoghegan, 2004) reported an increasing risk of CTS with insulin, sulphonyl, or thyroxine. Two moderate quality studies reported no association to CTS when using diuretics (Morgenstern, 1991) or metformin (Geoghegan, 2004).

Smoking had a conflicting relationship to CTS development. Two moderate quality studies (Eleftheriou, 2012; Violante, 2007) found an association of increasing risk, one moderate quality study (Coggon, 2013) found an inverse association, and one moderate quality study (Geoghegan, 2004) found no association.

Wrist bending had a conflicting relationship to CTS development. One high (Armstrong, 2008) and one moderate quality study (De Krom, 1990) showed an increased risk while two moderate quality studies (Dale, 2014; Evanoff, 2012) displayed an insignificant association. One moderate quality study (Nordstrom, 1997) showed an insignificant result with a short duration of wrist bending and an increased risk of CTS with more frequent wrist bending.

Many recent high and moderate quality studies were identified and provide new insights into workplace factors associated with CTS. However, the studies did not consider the relative contributions of personal and work-related factors on CTS, so it is difficult to calculate risk attributable to different risk factors from the data. Some occupational factors and workplace exposures were evaluated by single studies with weak designs or relatively weak exposure assessment methods. The findings from those studies, therefore, did not contribute to the conclusions. Workplace categories include: clerical/office work, industrial, construction, farming, hospital, professional, technical, managerial, sales, skilled trades (agriculture, fabrication, machining, transporter techs, electricians, plumbers, construction), and other jobs.

### Risks and Harms of Implementing this Recommendation

There are no known risks or harms.

### Future Research

There should be studies to investigate apportionment of risk between personal and workplace factors. Studies should be conducted to identify objective methods for assessing workplace physical factors in order to improve the precision of risk estimation and improve confidence in thresholds of injury. Workplace intervention studies should be conducted to confirm that modifications in work activities may improve symptoms and functional deficits in workers with CTS. More research into the relationship between diabetes and CTS should be done, as the conflicting results indicate a possible association between these conditions. Studies of risk should include proper control for confounding as in a logistic regression analysis with appropriate population sizes and associated odds ratios.

## *STUDY QUALITY TABLES FOR RISK FACTOR RECOMMENDATIONS*

### *QUALITY TABLE FOR ASSOCIATED RISK FACTORS FOR CTS*

### Table 29. Prognostic Quality Evaluations

| Study | Representative Population | Reason for Follow Up Loss | Prognostic Factor Measured | Outcome Measurement | Confounders | Appropriate Statistical Analysis | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|
| Akbar,M., 2014 | ◑ | ● | ● | ○ | ○ | ● | Include | Low Quality |
| Aktas,I., 2008 | ◑ | ◑ | ● | ● | ○ | ● | Include | Moderate Quality |
| Ali,K.M., 2006 | ● | ● | ◑ | ● | ◑ | ◑ | Include | Moderate Quality |
| Armstrong,T., 2008 | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Bayrak,I.K., 2008 | ◑ | ● | ◑ | ● | ○ | ● | Include | Low Quality |
| Becker,J., 2002 | ◑ | ● | ◑ | ● | ● | ◑ | Include | Moderate Quality |
| Bland,J.D., 2005 | ● | ● | ● | ○ | ○ | ◑ | Include | Low Quality |
| Bonfiglioli,R., 2006 | ◑ | ◑ | ● | ● | ○ | ● | Include | Low Quality |
| Bonfiglioli,R., 2007 | ● | ◑ | ● | ● | ○ | ◑ | Include | Moderate Quality |
| Bonfiglioli,R., 2013 | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Boz,C., 2004 | ◑ | ● | ● | ● | ◑ | ◑ | Include | Moderate Quality |
| Burt,S., 2011 | ● | ◑ | ◑ | ● | ◑ | ● | Include | Moderate Quality |
| Burt,S., 2013 | ● | ◑ | ● | ● | ● | ○ | Include | Moderate Quality |
| Cartwright,M.S., 2012 | ● | ● | ● | ● | ◑ | ◑ | Include | Moderate Quality |
| Cartwright,M.S., 2014 | ● | ◑ | ● | ● | ◑ | ◑ | Include | Moderate Quality |
| Chiang,H.C., 1990 | ● | ● | ● | ● | ○ | ◑ | Include | Moderate Quality |

| Study | Representative Population | Reason for Follow Up Loss | Prognostic Factor Measured | Outcome Measurement | Confounders | Appropriate Statistical Analysis | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|
| Coggon,D., 2013 | ● | ● | ◑ | ● | ◑ | ◑ | Include | Moderate Quality |
| Dale,A.M., 2014 | ● | ● | ● | ● | ● | ○ | Include | Moderate Quality |
| de Krom,M.C., 1990 | ◑ | ● | ● | ● | ◑ | ◑ | Include | Moderate Quality |
| Dyer,G., 2008 | ◑ | ◑ | ◑ | ● | ○ | ◑ | Include | Low Quality |
| Eleftheriou,A., 2012 | ● | ● | ○ | ● | ● | ◑ | Include | Moderate Quality |
| Estirado de,Cabo E., 2003 | ◑ | ◑ | ● | ○ | ● | ◑ | Include | Low Quality |
| Evanoff,B., 2012 | ● | ◑ | ● | ● | ○ | ◑ | Include | Moderate Quality |
| Evanoff,B., 2014 | ● | ● | ● | ● | ● | ◑ | Include | High Quality |
| Fahmi,D.S., 2013 | ◑ | ● | ● | ● | ○ | ● | Include | Moderate Quality |
| Forst,L., 2006 | ● | ● | ● | ○ | ◑ | ○ | Include | Low Quality |
| Garg,A., 2012 | ◑ | ◑ | ● | ● | ● | ● | Include | High Quality |
| Gell,N., 2005 | ● | ◑ | ● | ● | ◑ | ○ | Include | Low Quality |
| Geoghegan,J.M., 2004 | ◑ | ● | ● | ● | ◑ | ◑ | Include | Moderate Quality |
| Goodson,J.T., 2014 | ◑ | ● | ● | ● | ● | ● | Include | High Quality |
| Gordon,C., 1988 | ● | ● | ◑ | ● | ◑ | ◑ | Include | Moderate Quality |
| Hakim,A.J., 2002 | ◑ | ● | ● | ● | ● | ◑ | Include | High Quality |
| Hlebs,S., 2014 | ◑ | ● | ● | ○ | ● | ● | Include | Moderate Quality |
| Jenkins,P.J., 2013 | ● | ● | ● | ● | ○ | ○ | Include | Low Quality |
| Kaplan,Y., 2008 | ● | ● | ● | ○ | ○ | ◑ | Include | Low Quality |

| Study | Representative Population | Reason for Follow Up Loss | Prognostic Factor Measured | Outcome Measurement | Confounders | Appropriate Statistical Analysis | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|
| Keese,G.R., 2006 | ◑ | ● | ● | ○ | ◑ | ◑ | Include | Low Quality |
| Kopec,J., 2011 | ● | ● | ◑ | ● | ○ | ○ | Include | Low Quality |
| Leclerc,A., 1998 | ◑ | ● | ● | ○ | ◑ | ◑ | Include | Low Quality |
| Lo,J.K., 2002 | ● | ● | ◑ | ● | ● | ◑ | Include | Moderate Quality |
| Matias,A.C., 1998 | ◑ | ● | ● | ● | ◑ | ● | Include | Moderate Quality |
| Moghtaderi,A., 2005 | ◑ | ● | ● | ● | ◑ | ● | Include | Moderate Quality |
| Mondelli,M., 2006 | ● | ● | ● | ● | ◑ | ◑ | Include | Moderate Quality |
| Morgenstern,H., 1991 | ● | ● | ● | ○ | ● | ● | Include | Moderate Quality |
| Nathan,P.A., 2002 | ● | ◑ | ◑ | ● | ◑ | ● | Include | Moderate Quality |
| Nathan,P.A., 2005 | ● | ◑ | ◑ | ● | ● | ◑ | Include | Moderate Quality |
| Nordstrom,D.L., 1997 | ● | ● | ● | ○ | ◑ | ● | Include | Moderate Quality |
| Petit,A., 2015 | ● | ◑ | ● | ● | ● | ○ | Include | Moderate Quality |
| Plastino,M., 2011 | ◑ | ● | ● | ● | ◑ | ◑ | Include | Moderate Quality |
| Roquelaure,Y., 2001 | ● | ◑ | ◑ | ● | ● | ○ | Include | Low Quality |
| Roquelaure,Y., 2008 | ● | ◑ | ● | ● | ○ | ● | Include | Moderate Quality |
| Sabry,M.M., 2009 | ◑ | ● | ● | ● | ○ | ● | Include | Moderate Quality |
| Sharifi-Mollayousefi,A., 2008 | ◑ | ● | ● | ● | ● | ◑ | Include | Moderate Quality |

| Study | Representative Population | Reason for Follow Up Loss | Prognostic Factor Measured | Outcome Measurement | Confounders | Appropriate Statistical Analysis | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|
| Shin,J., 2008 | ● | ● | ◑ | ● | ◑ | ◑ | Include | Moderate Quality |
| Silverstein,B.A., 1987 | ◑ | ● | ◑ | ● | ● | ● | Include | Moderate Quality |
| Tang,X., 1999 | ◑ | ● | ◑ | ● | ○ | ◑ | Include | Low Quality |
| Tsai,N.W., 2013 | ● | ● | ● | ● | ◑ | ○ | Include | Moderate Quality |
| Violante,F.S., 2007 | ● | ◑ | ● | ● | ◑ | ○ | Include | Moderate Quality |
| Vogelsang,L.M., 1994 | ● | ● | ● | ○ | ◑ | ○ | Include | Low Quality |
| Werner,R.A., 2005 | ● | ● | ● | ○ | ● | ○ | Include | Low Quality |
| Winn,F.J.,Jr., 1989 | ● | ● | ● | ● | ○ | ○ | Include | Low Quality |
| Wolf,J.M., 2009 | ● | ● | ● | ○ | ○ | ◑ | Include | Low Quality |
| Wright,C., 2014 | ● | ● | ◑ | ● | ◑ | ◑ | Include | Moderate Quality |
| Yagev,Y., 2001 | ◑ | ● | ● | ● | ○ | ○ | Include | Low Quality |

# RESULTS

## *SUMMARY OF DATA FINDINGS*

*TABLE 30: SUMMARY OF FINDINGS- FEMALE GENDER/SEX RELATED RISK FACTORS*

| **Increases Odds** ▲<br>**Decreases Odds** ▼<br>**Not Significant** ○ | **High Quality** | **Moderate Quality** | | | | **Low Quality** | |
|---|---|---|---|---|---|---|---|
| **Female Gender/Sex Related Risk Factors** | **Hakim,A.J. 2002** | **De Krom,M.C. 1990** | **Geoghegan,J.M. 2004** | **Mondelli,M. 2006** | **Morgenstern,H. 1991** | **Kaplan,Y. 2008** | **Wright, C. 2014** |
| **Normal pre-pregnancy BMI with excessive gestational weight gain** | | | | | | | ○ |
| **Obese pre-pregnancy with excessive gestational weight gain** | | | | | | | ○ |
| **Obese pre-pregnancy with normal gestational weight gain** | | | | | | | ▲ |
| **Overweight pre-pregnancy with excessive gestational weight gain** | | | | | | | ○ |
| **Contraception** | | | ○ | ○ | ○ | | |
| **HRT use** | ○ | | ○ | | | | |
| **Hysterectomy** | | | | | | | |
| Hysterectomy vs premenopausal | | ○ | | | | | |
| Hysterectomy vs menopause more than 5 years ago | | ▲ | | | | | |
| Hysterectomy after controlling for menopause | ○ | | | | | | |
| **Number of pregnancies** | | | | | | ▲ | ○ |
| **Number of prenatal care visits** | | | | | | | ○ |
| **Perimenopause** | ▲ | | | | | | |
| **Post-menopause** | ○ | | | | | | |
| **Time since menopause** | | ○ | | | | | |

## TABLE 31: SUMMARY OF FINDINGS- JOB RELATED FACTORS

**Increases Odds** ▲
**Decreases Odds** ▼
**Not Significant** ○

| **Job Related Risk Factors** | **High Quality** | | | | | **Moderate Quality** | | | | | | | | | | | | **Low Quality** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Armstrong,T. 2008** | **Bonfiglioli,R. 2013** | **Evanoff,B. 2014** | **Garg,A. 2012** | **Hakim,A.J. 2002** | **Ali,K.M. 2006** | **Burt,S. 2011** | **Burt,S. 2013** | **Chiang,H.C. 1990** | **Coggon,D. 2013** | **Dale, A.M. 2014** | **Eleftheriou,A. 2012** | **Evanoff,B. 2012** | **Nordstrom,D.L. 1997** | **Petit,A. 2015** | **Roquelaure,Y. 2008** | **Violante,F.S. 2007** | **Bonfiglioli,R. 2006** | **Jenkins,P.J. 2013** | **Leclerc,A. 1998** |
| **ACGIH Hand Activity between action limit and threshold limit value** | | ▲ | | ○ | | | ○ | | | | | | | | | | ○ | | | |
| **ACGIH Hand Activity level above threshold limit** | | | | | | | | | | | | | | | | | | | | |
| ACGIH above threshold limit value (TLV) versus at or below acceptable limit | | ▲ | | | | | | | | | | | | | | | | | | |
| ACGIH HAL above TLV vs acceptable level or below | | | | ○ | | | | | | | | | | | | | | | | |
| Biomechanical load above threshold limit value versus below action limit | | | | | | | | | | | | | | | | | ▲ | | | |
| Previous exposure to biomechanical overload | | | | | | | | | | | | | | | | | ○ | | | |
| Threhold limit ratio | | | | | | | | ▲ | | | | | | | | | | | | |
| Threshold limit value and above vs below action limit | | | | | | | ▲ | | | | | | | | | | | | | |
| **Assembly Line** | ▲ | | | | | | | | | | | | | | | | | ▲ | | ▲ |
| **Automatic work pace** | | | | | | | | | | | | | | | ○ | | | | | |
| **Chemicals** | | | | | | | | | | | | | | | | | | | | |
| Contact with solvents 0.08-0.75 hours/day vs none | | | | | | | | | | | | | | ▼ | | | | | | |
| Contact with solvents 1-11 hours/day vs none | | | | | | | | | | | | | | ○ | | | | | | |
| **Clerical** | | | | | | | | | | | | | | | | | | | | |
| Administrative/secretarial jobs vs. Associate professional/technical jobs | | | | | | | | | | | | | | | | | | | | |
| Matched all females | | | | | ○ | | | | | | | | | | | | | | ▲ | |
| Matched all males | | | | | | | | | | | | | | | | | | | ○ | |
| **Cold Exposure** | | | | | | | | | ▲ | | | | | | | | | | | |
| **Computer Work** | | | | | | ▲ | | | | ▲ | | ▲ | | | | | | | | |
| **Construction Work** | ▲ | | | | | | | | | | | | | | | | | | | |
| **Dexterity (ONET)** | | | | | | | | | | | | | | | | | | | | |
| Dexterity derived from factor analysis 4th vs 1st quartile | ▲ | | | | | | | | | | | | | | | | | | | |
| Dexterity derived from factor analysis 2nd vs 1st quartile | ○ | | | | | | | | | | | | | | | | | | | |
| Dexterity derived from factor analysis 3rd vs 1st quartile | ○ | | | | | | | | | | | | | | | | | | | |
| **Dynamic Strength (ONET)** | | | ○ | | | | | | | | | | | | | | | | | |
| **Exertion** | | | | | | | | | | | | | | | | | | | | |
| Exerts/min cat 2 versus 1 if BMI<30 | | | | | | | ○ | | | | | | | | | | | | | |
| Exerts/min cat 2 versus 1 if BMI>=30 | | | | | | | ○ | | | | | | | | | | | | | |
| Exerts/min cat 3 versus 1 if BMI<30 | | | | | | | ○ | | | | | | | | | | | | | |
| Exerts/min cat 3 versus 1 if BMI>=30 | | | | | | | ▲ | | | | | | | | | | | | | |
| Peak worker percieved exertion rating (0-10) | | | | | | | ▲ | | | | | | | | | | | | | |
| Time in forceful exertion between 20 and 60% vs <20% | | | | | | | | ▲ | | | | | | | | | | | | |
| Time in forceful exertion between greater than 60% vs <20% | | | | | | | | ▲ | | | | | | | | | | | | |
| **Farming** | | | | | | | | | | | | | | | | ○ | | | | |
| **Finger pinch grip** | ○ | | | | | | | | | | ○ | | ○ | | | | | | | |
| **Force** | | | | | | | | | | | | | | | | | | | | |
| Forceful gripping in most recent job | | | | | | | | | | | ▲ | | | | | | | | | |
| Peak force match cat 2 versus 1 | | | | | | | ○ | | | | | | | | | | | | | |
| Peak force match cat 3 versus 1 | | | | | | | ▲ | | | | | | | | | | | | | |
| Peak force, unitary increase (1-7) | | ○ | | | | | | | | | | | | | | | | | | |
| Upper extremity force derived from factor analysis 2nd quartile vs 1st quartile | ▲ | | | | | | | | | | | | | | | | | | | |
| Upper extremity force derived from factor analysis 3rd quartile vs 1st quartile | ▲ | | | | | | | | | | | | | | | | | | | |
| **Forearm Rotation** | ▲ | | | | | | | | | | ○ | | ○ | | | | | | | |
| **Grip** | ▲ | | | | | | | | | | ▲ | | ▲ | | | | | | | |
| **Hospital Work vs Clerical** | ○ | | | | | | | | | | | | | | | | | | | |
| **Industrial (blue collar, process, plant, machine, clothing, and shoe industries)** | | | | | | | | | | | | | | | | | | | | |
| Blue collar, process, plant, machine, clothing, and shoe industries | | | | | | | | | | | | | | | | ▲ | | | ▲ | ▲ |
| **Job Strain** | | | | | | | | ▲ | | | | | | | | | | | | |
| Strain index above 6.1 vs less than or equal to 6.1 | | | | ▲ | | | | | | | | | | | | | | | | |

## TABLE 32: SUMMARY OF FINDINGS- JOB RELATED FACTORS CONT'D

Increases Odds ▲
Decreases Odds ▼
Not Significant ○

| | High Quality | | Moderate Quality | | | | | | | | | | | | | | | | | | Low Quality | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Job Related Risk Factors | * ǂ Armstrong,T. 2008 | Evanoff,B. 2014 | Ali,K.M. 2006 | Bonfiglioli,R. 2007 | Cartwright,M.S. 2012 | Cartwright,M.S. 2014 | Chiang,H.C. 1990 | ǂ Coggon,D. 2013 | Dale, A.M. 2014 | de Krom,M.C. 1990 | Evanoff,B. 2012 | Goodson, J.T. 2014 | Matias,A.C. 1998 | Mondelli,M. 2006 | Morgenstern,H. 1991 | Nathan,P.A. 2005 | ǂ Nordstrom,D.L. 1997 | Petit,A. 2015 | Roquelaure,Y. 2008 | * Silverstein,B.A. 1987 | Forst,L. 2006 | Jenkins,P.J. 2013 | Kaplan,Y. 2008 | Werner,R.A. 2005 | Wolf,J.M. 2009 | * Yagev,Y. 2001 |
| **Lack of Coworker Support** | | | | | | | | ▲ | | | | | | | | | | | | | | | | ▲ | | |
| **Length of employment** | | | | | | | | | | | | | | | | | ▼ | | | | | | | | | |
| Previously worked at risk jobs | | | | ○ | | | | | | | | | | ▲ | | | | | | | | | | | | |
| **Level of Job Control** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IOSH Job control (0=least) 2.8-3.4 vs1-2.7 | | | | | | | | | | | | | | | | | ○ | | | | | | | | | |
| IOSH Job control (0=least) 3.6-3.8 vs1-2.7 | | | | | | | | | | | | | | | | | ▼ | | | | | | | | | |
| IOSH Job control (0=least) 4.6-4.8 vs1-2.7 | | | | | | | | | | | | | | | | | ▼ | | | | | | | | | |
| IOSH Job control (0=least) 4-4.4 vs1-2.7 | | | | | | | | | | | | | | | | | ○ | | | | | | | | | |
| Job includes targets, bonuses or deadlines | | | | | | | | ○ | | | | | | | | | | | | | | | | | | |
| Little job control in work done, in timetables, or breaks | | | | | | | | ▼ | | | | | | | | | | | | | | | | | | |
| **Level of Satisfaction** | | | | | | | | | | | | ▼ | | | | | | | | | | | | | | |
| **Lifting** | ▲ | | | | | | | | ▲ | | ▲ | | | | | ○ | | | | | | | | | | |
| **Managerial Jobs** | | | | | | | | | | | | | | | | | | | | | | ○ | | | | |
| **Military Rank** | | | | | | | | | | | | | | | | | | | | | | | | | ▲ | |
| **Office Work** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lower-grade white-collar workers vs unemployed | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Among men | | | | | | | | | | | | | | | | | | | ○ | | | | | | | |
| Among women | | | | | | | | | | | | | | | | | | | ▲ | | | | | | | |
| **Other Jobs** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Craftswomen/sales/managerial versus unemployed | | | | | | | | | | | | | | | | | | | ○ | | | | | | | |
| Elementary occupations versus technical/professional | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | |
| Home maker vs employed | | | | | | | | | | | | | | | | | | | | | | | ○ | | | |
| Poultry work | | | | | ▲ | ○ | | | | | | | | | | | | | | | | | | | | |
| System Administrator vs other computer jobs | | | ▲ | | | | | | | | | | | | | | | | | | | | | | | |
| **Piecework Payment** | | | | | | | | | | | | | | | | | | ▲ | | | | | | | | |
| **Pressing with the thumb** | ○ | | | | | | | | ○ | | | | | | | | | | | | | | | | | |
| **Professional Jobs** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Being a surgeon who uses the Kerrison rongeur tool versus not using the tool | | | | | | | | | | | | | | | | | | | | | ▲ | | | | | |
| Practicing professionally for greater or equal to 5 years | | | | | | | | | | | | | | | | | | | | | ▲ | | | | | |
| Professional jobs vs. Associate professional/technical jobs | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | |
| Professional Jobs vs Unemployed | | | | | | | | | | | | | | | | | | | ○ | | | | | | | |
| **Repetition** | ▲ | ▲ | | | | | ▲ | ▲ | | | | ▲ | | | | | | | | ▲ | | | | | | ▲ |
| **Sales** | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | |
| **Service Occupations** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Caring, leisure, and other service jobs vs. Associate professional/technical jobs | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | |
| Full-time cashiers vs office workers | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CTS diagnosed with symptoms | | | | ○ | | | | | | | | | | | | | | | | | | | | | | |
| CTS diagnosed with symptoms and EDS | | | | ▲ | | | | | | | | | | | | | | | | | | | | | | |
| Load and lift groceries after checking | | | | | | | | | | | | | | | ○ | | | | | | | | | | | |
| Part-time cashiers vs office worker | | | | ○ | | | | | | | | | | | | | | | | | | | | | | |
| Unload basket before checking | | | | | | | | | | | | | | | ○ | | | | | | | | | | | |
| Use of laser scanner to check items | | | | | | | | | | | | | | | ○ | | | | | | | | | | | |
| **Skilled Trades** | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | |
| **Static Strength (ONET)** | | ○ | | | | | | | | | | | | | | | | | | | | | | | | |
| **Technical Jobs versus Unemployed** | | | | | | | | | | | | | | | | | | | ▼ | | | | | | | |
| **Vibration** | ▲ | | | | | | | ▲ | ▲ | | | | | | | | ▲ | | | | | | | | | |
| **Work Length** | | | | | | | | | | | | | ▲ | ○ | ○ | | ○ | | | ○ | | | | | | |
| **Wrist Bending** | | | | | | | | | ○ | | ○ | | | | | | ○ | | | | | | | | | |
| Bending wrist frequently | ▲ | | | | | | | | | | | | | | | | ▲ | | | | | | | | | |
| 1 hour increase in extension | | | | | | | | | | ▲ | | | | | | | | | | | | | | | | |
| 1 hour increase in flexion | | | | | | | | | | ▲ | | | | | | | | | | | | | | | | |

** Significance may conflict among Repitition categories*
*ǂ Significance may conflict among Vibration categories*

## *TABLE 33: SUMMARY OF FINDINGS- COMORBID DISEASE RISK FACTORS*

**Increases Odds** ▲
**Decreases Odds** ▼
**Not Significant** ○

| | High Quality | | | | Moderate Quality | | | | | | | | | | | | | | Low Quality | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Comorbidity Risk Factors** | Armstrong,T. 2008 | Bonfiglioli,R. 2013 | Garg,A. 2012 | Hakim,A.J. 2002 | Aktas,I. 2008 | Becker,J. 2002 | Burt,S. 2011 | Coggon,D. 2013 | De Krom,M.C. 1990 | Fahmi,D.S. 2013 | Geoghegan,J.M. 2004 | Mondelli,M. 2006 | Morgenstern,H. 1991 | Nathan,P.A. 2002 | Nordstrom,D.L. 1997 | Plastino,M. 2011 | Shin,J. 2008 | Violante,F.S. 2007 | Akbar,M., 2014 | Bayrak,I.K. 2008 | Dyer,G. 2008 | Estirado de,Cabo E. 2003 | Keese,G.R. 2006 | Kopec,J. 2011 | Roquelaure,Y. 2001 | Vogelsang,L.M. 1994 | Werner,R.A. 2005 | Winn,F.J.,Jr., 1989 |
| **Any facillitating comorbidities** | | ▲ | | | | | | | | | | | | | | | | ▲ | | | | | | | | | | |
| **Arthritis** | | | ▲ | | | | ▲ | ○ | | | ▲ | | | | | | | | | | | | | | | | | |
| **Comorbidity Drug Use** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Corticosteroid | | | | | | | | | | | ○ | | | | | | | | | | | | | | | | | |
| Current thyroxine replacement therapy | | | | ○ | | | | | | | | | | | | | | | | | | | | | | | | |
| Thyroxine | | | | | | | | | | | ▲ | | | | | | | | | | | | | | | | | |
| Diuretics | | | | | | | | | | | | | ○ | | | | | | | | | | | | | | | |
| **Diabetes** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Diabetes | ○ | | | | | ▲ | | ○ | | | ▲ | | | | | ▲ | | | | | | | | | | | | |
| Insulin use | | | | | | | | | | | ▲ | | | | | | | | | | | | | | | | | |
| Metformin use | | | | | | | | | | | ○ | | | | | | | | | | | | | | | | | |
| Sulphonyl use | | | | | | | | | | | ▲ | | | | | | | | | | | | | | | | | |
| Female gender/sex and diabetes interaction effect | | | | | | ○ | | | | | | | | | | | | | | | | | | | | | | |
| **Dialysis** | | | | | | | | | | | | | | | | | ▲ | | | | | | | ▲ | | | | |
| **Endocrine Condition** | | | | | | | | | | | | | | ○ | | | | | | | | | | | | | | |
| **Fibromyalgia** | | | | | | | | | | ▲ | | | | | | | | | | | | | | | | | | |
| **Fracture** | | | | | | | | | | | ▲ | | ○ | | | | | | | | ▲ | | | | | | | |
| **General Comorbidities** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 or more predisposing disease (female floor cleaners) | | | | | | | | | | | | ○ | | | | | | | | | | | | | | | | |
| Bilateral agenesis vs none | | | | | | | | | | | | | | | | | | | | | | | ○ | | | | | |
| High blood pressure vs no | | | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | |
| Suspected Medical Risk factors related to cts | | | | | | | | | | | | | | | | | | | | | | | | | | ○ | | |
| Presence of Anti-HCV antibodies | | | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | |
| Related Medical Conditions (RMC instrument) | | | | | | | | | | | | | | | | | | | | | | | | | | ▲ | | |
| TOS patients with fibrositis vs TOS patients without Fibrositis | | | | | | | | | | | | | | | | | | | | | | ○ | | | | | | |
| TOS women who had miscarraiges versus women with TOS who did not have a miscarraige | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | | | |
| TOS women with fibrositis vs TOS women without Fibrositis | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | | | |
| TOS with concomitant neuropathy vs TOS alone | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | | | |
| TOS with concomitant scleroderma vs TOS alone | | | | | | | | | | | | | | | | | | | | | | ▼ | | | | | | |
| TOS with concomitant Thromboembolic events vs TOS alone | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | | | |
| Unilateral agenesis vs none | | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | | |
| **Mental Health** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Feeling down or blue or depressed always vs seldom | | | ▲ | | | | | | | | | | | | | | | | | | | | | | | | | |
| Feeling down or blue or depressed never vs seldom | | | ▲ | | | | | | | | | | | | | | | | | | | | | | | | | |
| Feeling down or blue or depressed often vs seldom | | | ○ | | | | | | | | | | | | | | | | | | | | | | | | | |
| Intermediate mental health vs good mental health | | | | | | | | ○ | | | | | | | | | | | | | | | | | | | | |
| Poor mental health vs good mental health | | | | | | | | ▲ | | | | | | | | | | | | | | | | | | | | |
| Psychological distress measured by General Health Questionnaire (GHQ-12) greater or equal to 90th percentile | | | | | | | | | | | | | | | | | | | | | | | | | ▲ | | | |
| **Musculoskeletal Conditions** | | | ▲ | | ▲ | | | | | | | | | | ▲ | | | | | ▲ | | | ▲ | | | ▲ | | |
| **Paraplegic** | | | | | | | | | | | | | | | | | | | ▲ | | | | | | | | | |
| **Raynaud's Syndrome** | | | | | | | | | | | | | | | | | | | | | | | | | | | | ▲ |
| **Tendonitis** | ▲ | | | | | | | | | | | | | | | | | | | | | | | | | | ▲ | |
| **Varicosis** | | | | | | | | | ▲ | | | | | | | | | | | | | | | | | | | |

## *TABLE 34: SUMMARY OF FINDINGS- DEMOGRAPHIC RISK FACTORS*

**Increases Odds** ▲
**Decreases Odds** ▼
**Not Significant** ○

| | **High Quality** | | | | | **Moderate Quality** | | | | | | | | | | | | | | | | | | **Low Quality** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Demographic Risk Factors** | Armstrong,T. 2008 | Bonfiglioli,R. 2013 | Evanoff,B. 2014 | Garg,A. 2012 | * Hakim,A.J. 2002 | Ali,K.M. 2006 | Becker,J. 2002 | Bonfiglioli,R. 2007 | ǂ Burt,S. 2011 | Burt,S. 2013 | ǂ Coggon,D. 2013 | de Krom,M.C. 1990 | Eleftheriou,A. 2012 | ǂ Geoghegan,J.M. 2004 | Goodson, J.T. 2014 | Hlebs,S. 2014 | Mondelli,M. 2006 | Morgenstern,H. 1991 | Nathan,P.A. 2002 | Nordstrom,D.L. 1997 | Shin,J. 2008 | Silverstein,B.A. 1987 | * Violante,F.S. 2007 | * Bland,J.D. 2005 | Gell,N. 2005 | Kaplan,Y. 2008 | Tang,X. 1999 | Vogelsang,L.M. 1994 | Werner,R.A. 2005 | Winn,F.J.,Jr., 1989 | Wright, C. 2014 |
| **Age continuous variable** | ▲ | ▲ | ○ | ○ | | | | | | | | | | | | | | ▲ | | | ▲ | ○ | | | | | | | | | |
| **Age by category** | | | | | ▲ | | | | | | | | ○ | | | | ○ | | | | | | ▲ | ▲ | | | | | | | ○ |
| **BMI continuous variable** | ▲ | ▲ | ▲ | ▲ | | | | | ▲ | | | | | | ○ | ▲ | | | | ▲ | | | | ▲ | | | | | | | |
| **BMI by category** | | | | | ○ | | ▲ | | ▲ | ▲ | ▲ | | | ▲ | | | ○ | | | | | | ○ | | | | | | | | |
| **Education** | | | | | | | | ○ | | | | | | | | | | | | | | | | | | ○ | | | | | ○ |
| **Gender/Sex Female** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Female Gender/Sex vs Male | ○ | ▲ | ○ | | | | | | | | | | ▲ | | | | | | | | ○ | ○ | ▲ | ○ | | | | | | | |
| Gender/Sex female vs male at the mean hand activity level (Model 2) | | | | | | | | | ○ | | | | | | | | | | | | | | | | | | | | | | |
| Gender/Sex female vs male at the mean hand activity level (Model 3) | | | | | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | | |
| **Genetics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CTS family history | | | | | | | | | | | | | | | | | | | | ○ | | | ○ | ○ | | | | | | | |
| CTS diagnosed by symptoms | | | | | | | | ○ | | | | | | | | | | | | | | | | | | | | | | | |
| CTS diagnosed by symptoms and EDS | | | | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | | | |
| Hand Activitiy Level among females | | | | | | | | | ○ | | | | | | | | | | | | | | | | | | | | | | |
| Hand Activitiy Level among males | | | | | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | | |
| Monozygotic vs dizygotic twins (genetic risk of CTS) | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Height/forearm (tall with short forearms)** | | | | | | | | | | | | | | | | | | | | | | | ▼ | | | | | | | | |
| **Hobbies** | | | | | ○ | | | | | | | | | | | | ○ | | | | | | | | | | | | | | |
| Gardening | | | | ▲ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Internet use (leisure) | | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hand-knitting/needlework | | | | | | | | | | | | | | | | | | | | | | | | | | | ○ | | | | |
| CTS diagnosed by symptoms | | | | | | | | ○ | | | | | | | | | | | | | | | | | | | | | | | |
| CTS diagnosed by symptoms and EDS | | | | | | | | ▲ | | | | | | | | | | | | | | | | | | | | | | | |
| **Housework** | | | | | ○ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Continuous duration of kneading or rolling dough per week | | | | | | | | | | | | | | | | | | | | | | | | | | | ○ | | | | |
| Kneading or rolling dough manually more than 2 hours per week | | | | | | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | |
| Continuous duration of washing clothes per week | | | | | | | | | | | | | | | | | | | | | | | | | | | ○ | | | | |
| Washing clothes manually more than 2 hours per week | | | | | | | | | | | | | | | | | | | | | | | | | | | ▲ | | | | |
| **Marital status** | | | | | | | | | | | | | | | | | | | | | | | | | | ○ | | | | | |
| **Moderate Alcohol Use** | | | | | | | | | | | | | | | | | | | | | | | ▼ | | | | | | | | |
| **Physical activities/exercise involving wrist strain** | | | | | | | | | | | | | | | ▲ | | | | | | | | | | | | | | | | |
| **Physical Activity/Exercise** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vigorous exercise | | | | | | | | | | | | | ▼ | | ▼ | | | | | | | | | | | | | | | | |
| History of physical sports activity (yes vs no) | | | | | | | | | | | | | ▼ | | | | | | | | | | | | | | | | | | |
| **Race/Ethnicity (White versus non-white)** | | | | | | | | | | | | | | | | | | | ○ | | | | | | | | | | | | ○ |
| **SF-36 scores (better scores)** | | | | | | | | | | | | | | | ▼ | | | | | | | | | | | | | | | | |
| **Slimming courses (yes vs. no)** | | | | | | | | | | | | | | | ○ | | | | | | | | | | | | | | | | |
| **Smoking** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Current smoker vs non smoker | | | | | | | | | | | | | | ○ | | | | | | | | | | ○ | | | | | | | ○ |
| Compared to healthy controls | | | | | | | | | | | ▼ | | | | | | | | | | | | | | | | | | | | |
| Compared to negative patients | | | | | | | | | | | ○ | | | | | | | | | | | | | | | | | | | | |
| Ever smoked (yes vs no) | | | | | | | | | | | | | ▲ | | | | | | | | | | ▲ | | | | | | | | |
| Ex-smoker vs non smoker | | | | | | | | | | | ○ | | | | | | | | | | | | | | | | | | | | |
| **Symptoms** | | | | | | | | | | | | | | | | | | | | | | | | | ▲ | | | ▲ | ▲ | ▲ | |
| 1 distressing symatic sympt vs none in past week | | | | | | | | | | | ○ | | | | | | | | | | | | | | | | | | | | |
| 2 distressing symatic sympts vs none in past week | | | | | | | | | | | ▲ | | | | | | | | | | | | | | | | | | | | |

** Significance may conflict among age categories*
*ǂ Significance may conflict among BMI categories*

*TABLE 35: SUMMARY OF FINDINGS- ANTHROPOMETRIC MEASURE RISK FACTORS*

**Increases Odds** ▲
**Decreases Odds** ▼
**Not Significant** ○

| | **High Quality** | **Moderate Quality** | | | | | | | | **Low Quality** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Anthropometric Risk Factors** | **Armstrong,T. 2008** | ***Boz,C. 2004** | **Gordon,C. 1988** | **Hlebs,S. 2014** | **Matias,A.C. 1998** | **Moghtaderi,A. 2005** | **Sabry,M.M. 2009** | **Sharifi-Mollayousefi,A. 2008** | **Violante,F.S. 2007** | **Kopec,J. 2011** | **Tsai,N.W. 2013** | **Werner,R.A. 2005** |
| **Arm Length** | | | | | | | | | ○ | | | |
| **Cross Sectional Area of Median Nerve** | | | | | | | | | | | ▲ | |
| **Digit Index** | | ▲ | | ○ | | | | ○ | | | | |
| **Elbow Posture Rating** | | | | | | | | | | | | ▲ |
| **Hand Length- Body Height ratio** | | ○ | | ▼ | | | | ▲ | | | | |
| **Hand Shape Index** | | | | ○ | | | | | | | | |
| **Location of AV fistula** | | | | | | | | | | ○ | | |
| **Overall antrhopometric measures** | | | | | ▲ | | | | | | | |
| **Shape Index** | | ○ | | | | | | ▲ | | | | |
| **Trunk Incline** | | | | | ▼ | | | | | | | |
| **Wrist Circumference** | | | | | | ▼ | | | ○ | | | |
| **Wrist Deviation** | | | | | ▲ | | | | | | | |
| **Wrist Extension** | | | | | ○ | | | | | | | |
| **Wrist Index** | ▲ | ▲ | | ▲ | | | | | | | | |
| **Wrist Ratio** | | | ▲ | | | ▲ | ▲ | ▲ | | | | |
| **Wrist-Palm-Ratio** | | | | | | | ▲ | | | | | |

**Significant at digit index only for matched females; insignificant for matched male population*

## *DETAILED DATA FINDINGS*

### *TABLE 36 RISK FACTOR: ACGIH HAND ACTIVITY*

| **Study** | **Quality** | **Population** | **CTS Diagnostics** | **Risk Factor** | **Confounding Adjustment** | **Stat. Type** | **Results** | **Significance** |
|---|---|---|---|---|---|---|---|---|
| Bonfiglioli,R. 2013 | High | N= 2492 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms at 3 years | ACGIH between acceptable level and threshold limit value versus at or below acceptable limit | sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | incident rate ratio from Poisson regression | 2.43 (1.77, 3.33) | having rating between acceptable and threshold levels is associated with higher risk of symptoms |
| Bonfiglioli,R. 2013 | High | N= 2492 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms at 3 years | ACGIH above threshold limit value versus at or below acceptable limit | sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | incident rate ratio from Poisson regression | 3.32 (2.34, 4.72) | having rating above threshold level is associated with higher risk of symptoms |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Bonfiglioli,R. 2013 | High | N= 2299 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms and NCS test at 3 years | ACGIH between acceptable level and threshold limit value versus at or below acceptable limit | sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | incident rate ratio from Poisson regression | 1.95 (1.21, 3.16) | having rating between acceptable and threshold levels is associated with higher risk of CTS |
| Bonfiglioli,R. 2013 | High | N= 2299 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms and NCS test at 3 years | ACGIH above threshold limit value versus at or below acceptable limit | sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | incident rate ratio from Poisson regression | 2.70 (1.48, 4.91) | having rating above threshold level is associated with higher risk of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | ACGIH HAL between AL and TLV vs acceptable level or below | Model1: ACGIH Hand Activity Level (HAL) ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 1.44 (0.55–3.76) | NS |
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | ACGIH HAL above TLV vs acceptable level or below | Model1: ACGIH Hand Activity Level (HAL) ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 2.01 (0.80–5.04) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Burt,S. 2011 | Moderate | N= 455 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | Between the action limit and the TLV vs below action limit | Model 3: peak worker perceived exertion rating (0-10), BMI, Hand Activity Level among females, Hand Activity Level among males, Gender/Sex female vs male at the mean hand activity level | logistic regression odds ratio | 2.28 (0.58-8.88) | NS |
| Burt,S. 2011 | Moderate | N= 455 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | Threshold limit value and above vs below action limit | Model 3: peak worker perceived exertion rating (0-10), BMI, Hand Activity Level among females, Hand Activity Level among males, Gender/Sex female vs male at the mean hand activity level | logistic regression odds ratio | 2.96 (1.51-5.80) | having a hand action level above the TLV increases CTS odds |
| Burt,S. 2013 | Moderate | N= 347 ; workers from hospital, school bus manufacturing plant, and engine assembly plant | electrodiagnostic test, symptoms, hand diagram at 2 years | Threshold limit ratio | model 2: threshold limit value, BMI, Job strain | hazard ratios | 1.4 (1.11, 1.78) | higher amount of time in spent threshold limit value is associated with higher risk of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of “classic/ probable” or “possible” symptoms of CTS | Biomechanical load between action limit and threshold limit value versus below action limit | sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 1.5 (0.9 –2.5) | NS |
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of “classic/ probable” or “possible” symptoms of CTS | Biomechanical load above threshold limit value versus below action limit | sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 3.0 (2.0 – 4.5) | Biomechanical loads above the threshold limit value increases odds of CTS compared to biomechanical loads under the action limit |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of "classic/ probable" or "possible" symptoms of CTS | Previous exposure to biomechanical overload | sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 1.4(.9-2.1) | NS |

*TABLE 37 RISK FACTOR: AGE*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, floor layers, sheet metal workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | Age per 10 year increase | model 2 best fitting model: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 1.58 (1.32, 1.89) | older have significantly higher odds of median neuropathy |
| Bonfiglioli,R. 2013 | High | N= 2492 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms at 3 years | Age | sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | incident rate ratio from Poisson regression | 1.03 (1.02, 1.04) | older age increases CTS symptom risk |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Bonfiglioli,R. 2013 | High | N= 2299 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms and NCS test at 3 years | Age | sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | incident rate ratio from Poisson regression | 1.06 (1.05, 1.08) | older age increases CTS risk |
| Evanoff,B. 2014 | High | 711 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | Age | adjusted for age, Gender/Sex, and BMI; past diagnosis of CTS or other upper extremity peripheral neuropathy, had a pacemaker or internal defibrillator, or were pregnant at the time of enrollment excluded | Multivariable mixed logistic regression models OR | 1.03 (1.00-1.05) | NS |
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | Age | Model1: ACGIH Hand Activity Level (HAL) ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 1.077 (.99,1.17) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | Age | Model 2: strain index ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 1.076 (0.99–1.17) | NS |
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | Age 46–50 vs Age 45 or below | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 2.01 (1.44–2.81) | age 46 to 50 has higher odds of CTS than 45 or younger |
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | Age 51–55 vs Age 45 or below | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 1.3 (0.92–1.83) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | Age 56–59 vs Age 45 or below | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 1.33 (0.92–1.92) | NS |
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | Age 60 vs 45 | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 1.28 (0.94–1.75) | NS |
| Bland,J.D. 2005 | Low | N= 4155 ; all patients referred to the neurophysiology service at hospital for suspicion of CTS | NCS confirmed CTS | In age quintile 2 vs 1st | Gender/Sex, smoking, age, BMI*age interaction | logistic regression OR | 1.52 (0.53,4.39) | NS |
| Bland,J.D. 2005 | Low | N= 4155 ; all patients referred to the neurophysiology service at hospital for suspicion of CTS | NCS confirmed CTS | In age quintile 3 vs 1st | Gender/Sex, smoking, age, BMI*age interaction | logistic regression OR | 5.29 (1.79,15.66) | older age is associated with higher odds of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Bland,J.D. 2005 | Low | N= 4155 ; all patients referred to the neurophysiology service at hospital for suspicion of CTS | NCS confirmed CTS | In age quintile 4 vs 1st | Gender/Sex, smoking, age, BMI*age interaction | logistic regression OR | 7.42 (2.34,23.5) | older age is associated with higher odds of CTS |
| Bland,J.D. 2005 | Low | N= 4155 ; all patients referred to the neurophysiology service at hospital for suspicion of CTS | NCS confirmed CTS | In age quintile 5 vs 1st | Gender/Sex, smoking, age, BMI*age interaction | logistic regression OR | 38.33(12.11,121.29) | older age is associated with higher odds of CTS |
| Wright, C. 2014 | Low | (3155 w/o CTS diagnosis and 91 with CTS diagnosis); EMR of a cohort of pregnant women receiving prenatal care at a large obstetrics unit; representative of those served by the urban academic center, with a large proportion of black patients | clinically diagnosed with ICD 9 diagnosis code for CTS | Age <30 versus older | age, race/ethnicity, education, smoking, parity, hypertension, diabetes, maternal weight category (constructed variable including information about maternal BMI and GWG), and number prenatal care visits | Logistical Regression OR | 0.99 (0.59-1.69) | NS |
| Eleftheriou,A. 2012 | Moderate | N= 441 ; 548 workers of a Governmental data entry & processing unit | personal history of CTS | Age at least 45 | Keyboard strokes, age, physical activity, smoking | logistic regression OR | 1.16 (0.53 to 2.55) | NS |
| Eleftheriou,A. 2012 | Moderate | N= 441 ; 548 workers of a Governmental data entry & processing unit | personal history of CTS or newly diagnosed CTS with CTS-7 algorithm score of 12 or more | Age at least 45 | Keyboard strokes, sex, physical activity, age | logistic regression OR | 1.48 (0.90 to 2.43) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Mondelli,M. 2006 | Moderate | N= 145 ; female hospital floor cleaners in Italy | diagnosed according to AAN criteria: population of hospital floor cleaners | Age 2nd vs 1st quartile | Age, BMI, duration of occupational exposure to current job, occupational exposure to the same job for previous employers, manual hobbies (including motorcycle use, diseases known to be associated with CTS (diabetes connective tissue diseases, hypothyroidism, and wrist/hand trauma), hospital (to adjust for center effects) | logistic regression OR | 1.32 (0.44-4.00) | NS |
| Mondelli,M. 2006 | Moderate | N= 145 ; female hospital floor cleaners in Italy | diagnosed according to AAN criteria: population of hospital floor cleaners | Age 3rd vs 1st quartile | Age, BMI, duration of occupational exposure to current job, occupational exposure to the same job for previous employers, manual hobbies (including motorcycle use, diseases known to be associated with CTS (diabetes connective tissue diseases, hypothyroidism, and wrist/hand trauma), hospital (to adjust for center effects) | logistic regression OR | 1.50 (0.45-4.96) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Mondelli,M. 2006 | Moderate | N= 145 ; female hospital floor cleaners in Italy | diagnosed according to AAN criteria: population of hospital floor cleaners | Age 4th vs 1st quartile | Age, BMI, duration of occupational exposure to current job, occupational exposure to the same job for previous employers, manual hobbies (including motorcycle use, diseases known to be associated with CTS (diabetes connective tissue diseases, hypothyroidism, and wrist/hand trauma), hospital (to adjust for center effects) | logistic regression OR | 1.69 (0.50-5.75) | NS |
| Morgenstern,H. 1991 | Moderate | N= 1058 ; grocery store checkers belonging to local California union | symptoms of CTS indicated in questionnaire | Age | matched by: all members were members of union food and commercial workers union ; covariates: age, hours per work week, years worked, age*years worked interaction, use of laser scanner to check items, unload basket before checking, load and lift grocery bags after checking, currently pregnant, contraceptive use, use of exogenous estrogen, use of diuretics, history of broken wrist | logistic regression odds ratio | 1.07(P=.002) | odds of CTS are greater in older patients |
| Shin,J. 2008 | Moderate | N= 123 ; All were hemodialysis patients | pain or pain in median nerve distribution and Tinel's sign | Age | age, sex, predialysis plasma BMG level in 1990, duration of dialysis | logistic regression OR | 1.43(1.09,1.89) | age is positively associated with CTS odds |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Silverstein,B.A. 1987 | Moderate | N= 652 ; workers form seven different industrial sites | based on phalen and tinel's signs and symptoms mentioned in interview | Age | Gender/Sex, age, years on job, work repetition, level of force involved in job, dummy variables controlling for job center effects | logistic regression OR | 1.05(0.99,1.11) | NS |
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of "classic/ probable" or "possible" symptoms of CTS | Age 31 to 35 versus 30 or younger | sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 1.1 (0.6 –2.1) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of "classic/ probable" or "possible" symptoms of CTS | Age 36 to 40 versus 30 or younger | sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 1.4 (0.8 –2.6) | NS |
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of "classic/ probable" or "possible" symptoms of CTS | Age 41 to 45 versus 30 or younger | sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 2.2 (1.2– 4.1) | 41 to 45 year olds had greater odds of CTS than people at age 30 or younger |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of “classic/ probable” or “possible” symptoms of CTS | Age 46 to 50 versus 30 or younger | sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 1.3 (0.7–2.5) | NS |
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of “classic/ probable” or “possible” symptoms of CTS | Age 50 or older versus 30 or younger | sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 1.7 (0.9 –3.3) | NS |

*TABLE 38 RISK FACTOR: ANTHROPOMETRIC MEASURES*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | Wrist index >= 7(depth/width of wrist in cm) | model 2 best fitting model: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 2.54 (1.69, 3.82) | wrist index is significantly correlated with median neuropathy |
| Kopec,J. 2011 | Low | N= 386 ; all patients were on hemodialysis | signs and symptoms verified by nerve conduction studies | location of AV fistula | location of AV fistula | none | none | NS |
| Tsai,N.W. 2013 | Low | N= 120 (80 non-DM and 40 DM patients); Patients with clinically suspicious CTS at the out-patient clinics of the Department of Neurology of Kaohsiung Chang Gung Memorial Hospital were evaluated. | clinically and electromyography-confirmed CTS | Cross sectional area of the median nerve at the wrist crease (CSA W) | Gender/Sex, BMI, body weight, CSA outlet, CSA W; clinical and electrophysiologic diagnosis of diabetic polyneuropathy, prior surgery for CTS, and those with gout, rheumatoid arthritis, or abnormal thyroid function related to peripheral neuropathy | Stepwise logistic regression OR | 1.21 (1.07-1.38) | In DM patients, increased CSA W increases odds of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Werner,R.A. 2005 | Low | N= 189 ; all were automobile assembly line workers | hand diagram symptoms, and median sensory evoked response that .5 msec longer than ipsilateral ulnar sensory response at 1 year | Elbow posture rating (1–10 scale) | Gender/Sex, wrist/hand tendonitis, diabetes, coworker support, median ulnar peak latency on dominant side, elbow posture rating | logistic regression odds ratio | 8.08(1.48–44.22) | higher elbow posture rating was associated with higher odds of CTS |
| Boz,C. 2004 | Moderate | N= 304 ; cases were selected and controls were relatives or people accompanying CTS patients | clinical and electrodiagnostic tests | wrist index | matched by: age matched females ; covariates: BMI, wrist index, shape index, digit index, hand length/body height ratio | logistic regression odds ratio | 1.157(1.099-1.219) | higher wrist index is associated with higher CTS odds |
| Boz,C. 2004 | Moderate | N= 304 ; cases were selected and controls were relatives or people accompanying CTS patients | clinical and electrodiagnostic tests | Shape index [hand width(mm)/hand length (mm) × 100] | matched by: age matched females ; covariates: BMI, wrist index, shape index, digit index, hand length/body height ratio | logistic regression odds ratio | 1.362(1.207-1.537) | higher hand shape index is correlated with higher CTS odds |
| Boz,C. 2004 | Moderate | N= 304 ; cases were selected and controls were relatives or people accompanying CTS patients | clinical and electrodiagnostic tests | digit index [third finger length (mm)/hand length (mm) × 100] | matched by: age matched females ; covariates: BMI, wrist index, shape index, digit index, hand length/body height ratio | logistic regression odds ratio | 1.375(1.164-1.624) | higher digit index shape index is correlated with higher CTS odds |
| Boz,C. 2004 | Moderate | N= 304 ; cases were selected and controls were relatives or people accompanying CTS patients | clinical and electrodiagnostic tests | Hand length/body height ratio | matched by: age matched females ; covariates: BMI, wrist index, shape index, digit index, hand length/body height ratio | logistic regression odds ratio | 1.246(0.650-2.287) | NS |
| Boz,C. 2004 | Moderate | N= 304 ; cases were selected and controls were relatives or people accompanying CTS patients | clinical and electrodiagnostic tests | wrist index | matched by: aged matched males ; covariates: BMI, wrist index, shape index, digit index, hand length/body height ratio | logistic regression odds ratio | 1.047(0.966-1.135) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Boz,C. 2004 | Moderate | N= 304 ; cases were selected and controls were relatives or people accompanying CTS patients | clinical and electrodiagnostic tests | Shape index [hand width(mm)/hand length (mm) × 100] | matched by: aged matched males ; covariates: BMI, wrist index, shape index, digit index, hand length/body height ratio | logistic regression odds ratio | 1.041(0.878-1.233) | NS |
| Boz,C. 2004 | Moderate | N= 304 ; cases were selected and controls were relatives or people accompanying CTS patients | clinical and electrodiagnostic tests | digit index [third finger length (mm)/hand length (mm) × 100] | matched by: aged matched males ; covariates: BMI, wrist index, shape index, digit index, hand length/body height ratio | logistic regression odds ratio | 1.177(0.880-1.574) | NS |
| Boz,C. 2004 | Moderate | N= 304 ; cases were selected and controls were relatives or people accompanying CTS patients | clinical and electrodiagnostic tests | Hand length/body height ratio | matched by: aged matched males ; covariates: BMI, wrist index, shape index, digit index, hand length/body height ratio | logistic regression odds ratio | 1.069(0.381-2.998) | NS |
| Gordon,C. 1988 | Moderate | N= 80 ; Midwestern car manufacturing workers | median motor and sensory latencies at 3 years | Wrist ratio | age, sex | regression p value | 0.001 | wrist ratio predicted median motor latency |
| Hlebs,S. 2014 | Moderate | convenience and random sampling of N= 100 (50 with CTS and 50 healthy controls); subjects performed various occupations, but the groups were balanced regarding Gender/Sex and age | clinically and electromyography (EMG) confirmed CTS; controls had no signs or symptoms of CTS | Mean wrist index >0.695 | diabetes mellitus, rheumatoid arthritis, thyroid disease, neuropathy, infections, thoracic outlet syndrome, neck pain or paresthesia (tingling) in upper limbs, pregnancy, past injury or surgery of the wrist or the neck, BMI, ratio of hand length to body height, mean wrist index >0.695, mean hand shape index, mean digit index | Multiple logistic regression OR | 42.89 (9.22, 199.60) | Wrist ratio is associated with increased odds of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Hlebs,S. 2014 | Moderate | convenience and random sampling of N= 100 (50 with CTS and 50 healthy controls); subjects performed various occupations, but the groups were balanced regarding Gender/Sex and age | clinically and electromyography (EMG) confirmed CTS; controls had no signs or symptoms of CTS | mean ratio of hand length to body height | diabetes mellitus, rheumatoid arthritis, thyroid disease, neuropathy, infections, thoracic outlet syndrome, neck pain or paresthesia (tingling) in upper limbs, pregnancy, past injury or surgery of the wrist or the neck, BMI, ratio of hand length to body height, mean wrist index >0.695, mean hand shape index, mean digit index | Multiple logistic regression OR | 0.18 (0.04, 0.92) | Hand length-body height ratio decreased odds of CTS |
| Hlebs,S. 2014 | Moderate | convenience and random sampling of N= 100 (50 with CTS and 50 healthy controls); subjects performed various occupations, but the groups were balanced regarding Gender/Sex and age | clinically and electromyography (EMG) confirmed CTS; controls had no signs or symptoms of CTS | Mean digit index | diabetes mellitus, rheumatoid arthritis, thyroid disease, neuropathy, infections, thoracic outlet syndrome, neck pain or paresthesia (tingling) in upper limbs, pregnancy, past injury or surgery of the wrist or the neck, BMI, ratio of hand length to body height, mean wrist index >0.695, mean hand shape index, mean digit index | Multiple logistic regression OR | 1.12 (0.64, 1.96) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Hlebs,S. 2014 | Moderate | convenience and random sampling of N= 100 (50 with CTS and 50 healthy controls); subjects performed various occupations, but the groups were balanced regarding Gender/Sex and age | clinically and electromyography (EMG) confirmed CTS; controls had no signs or symptoms of CTS | Mean hand shape index | diabetes mellitus, rheumatoid arthritis, thyroid disease, neuropathy, infections, thoracic outlet syndrome, neck pain or paresthesia (tingling) in upper limbs, pregnancy, past injury or surgery of the wrist or the neck, BMI, ratio of hand length to body height, mean wrist index >0.695, mean hand shape index, mean digit index | Multiple logistic regression OR | 1.22 (0.93, 1.61) | NS |
| Matias,A.C. 1998 | Moderate | N= 100 ; video display terminal operators at Midwestern university | "medically diagnosed" CTS | Trunk incline | work day duration | logistic regression odds ratio | .898(p=.03) | trunk incline is negatively associated with CTS |
| Matias,A.C. 1998 | Moderate | N= 100 ; video display terminal operators at Midwestern university | "medically diagnosed" CTS | Wrist extension | work day duration | logistic regression odds ratio | 1.057(p=.09) | NS |
| Matias,A.C. 1998 | Moderate | N= 100 ; video display terminal operators at Midwestern university | "medically diagnosed" CTS | Wrist deviation | work day duration | logistic regression odds ratio | 1.098(p=.009) | wrist deviation is positively associated with CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Matias,A.C. 1998 | Moderate | N= 100 ; video display terminal operators at Midwestern university | "medically diagnosed" CTS | overall anthropometric measure factor consisting of measures of wrist circumference, wrist diameter, upper arm length, forearm length, and hand length | work day duration | logistic regression odds ratio | 1.406(P=.07) | Overall anthropometric measures are associated with higher CTS odds |
| Moghtaderi,A. 2005 | Moderate | N= 237 ; cases and controls recruited from same urban area | clinical and electrodiagnostic tests | Wrist ratio | matched by: age ; covariates: sex, BMI, wrist ratio, wrist circumference | logistic regression odds ratio | 1.12(1.03, 1.21) | higher wrist ratio is positively associated with CTS |
| Moghtaderi,A. 2005 | Moderate | N= 237 ; cases and controls recruited from same urban area | clinical and electrodiagnostic tests | Wrist circumference | matched by: age ; covariates: sex, BMI, wrist ratio, wrist circumference | logistic regression odds ratio | .82(.76, .88) | higher wrist circumference is negatively associated with CTS |
| Sabry,M.M. 2009 | Moderate | N= 78 ; cases presented to neurophysiological laboratory unclear which population controls were recruited from | wrist ratio | CTS symptoms with mild nerve conduction abnormality vs health controls | none | mean difference | 0.02(0, 0.04) | wrist ratio is higher in CTS patients with mild conduction abnormality |
| Sabry,M.M. 2009 | Moderate | N= 69 ; cases presented to neurophysiological laboratory unclear which population controls were recruited from | wrist ratio | CTS symptoms with moderate nerve conduction abnormality vs health controls | none | mean difference | 0.03(0.01, 0.05) | wrist ratio is higher in CTS patients with moderate conduction abnormality |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Sabry,M.M. 2009 | Moderate | N= 68 ; cases presented to neurophysiological laboratory unclear which population controls were recruited from | wrist ratio | CTS symptoms with severe nerve conduction abnormality vs health controls | none | mean difference | 0.04(0.02, 0.06) | wrist ratio is higher in CTS patients with severe conduction abnormality |
| Sabry,M.M. 2009 | Moderate | N= 78 ; cases presented to neurophysiological laboratory unclear which population controls were recruited from | wrist palm ratio | CTS symptoms with mild nerve conduction abnormality vs health controls | none | mean difference | 0.01(0, 0.02) | wrist palm ratio is higher in CTS patients with mild conduction abnormality |
| Sabry,M.M. 2009 | Moderate | N= 69 ; cases presented to neurophysiological laboratory unclear which population controls were recruited from | wrist palm ratio | CTS symptoms with moderate nerve conduction abnormality vs health controls | none | mean difference | 0.02(0, 0.04) | wrist palm ratio is higher in CTS patients with moderate conduction abnormality |
| Sabry,M.M. 2009 | Moderate | N= 68 ; cases presented to neurophysiological laboratory unclear which population controls were recruited from | wrist palm ratio | CTS symptoms with severe nerve conduction abnormality vs health controls | none | mean difference | 0.03(0.01, 0.05) | wrist palm ratio is higher in CTS patients with severe conduction abnormality |
| Sharifi-Mollayousefi,A. 2008 | Moderate | N= 262 ; cases were from same urban area, and controls were their relatives | clinical and electrodiagnostic tests | Digit index [third finger length (mm)/hand length (mm) × 100] | matched by: age ; covariates: digit index, shape index, wrist ratio, hand length/hand height ratio, BMI | logistic regression odds ratio | 1 | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Sharifi-Mollayousefi,A. 2008 | Moderate | N= 262 ; cases were from same urban area, and controls were their relatives | clinical and electrodiagnostic tests | Shape index [hand width(mm)/hand length (mm) × 100] | matched by: age ; covariates: digit index, shape index, wrist ratio, hand length/hand height ratio, BMI | logistic regression odds ratio | 1.058 | odds of CTS increases as shape index increases |
| Sharifi-Mollayousefi,A. 2008 | Moderate | N= 262 ; cases were from same urban area, and controls were their relatives | clinical and electrodiagnostic tests | Wrist ratio[wrist depth(mm)/wrist width (mm)] | matched by: age ; covariates: digit index, shape index, wrist ratio, hand length/hand height ratio, BMI | logistic regression odds ratio | 1.351 | odds of CTS increases as wrist ratio index increases |
| Sharifi-Mollayousefi,A. 2008 | Moderate | N= 262 ; cases were from same urban area, and controls were their relatives | clinical and electrodiagnostic tests | Hand length/height ratio[hand length (cm)/height(m)] | matched by: age ; covariates: digit index, shape index, wrist ratio, hand length/hand height ratio, BMI | logistic regression odds ratio | 1.002 | odds of CTS increases as hand length/height ratio index increases |
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of “classic/ probable” or “possible” symptoms of CTS | BMI under 25 with a robust wrist versus BMI under 25 with a slim wrist | sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 1.1 (0.7–1.7) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of “classic/ probable” or “possible” symptoms of CTS | short height with long forearm length versus short height and short forearm length (tall/long=50th percentile or higher) | sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 0.7 (0.4 –1.1) | NS |

## *TABLE 39 RISK FACTOR: ANY FACILITATING COMORBIDITIES*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Bonfiglioli,R. 2013 | High | N= 2492 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms at 3 years | 1 or more predisposing disease (diabetes, amyloidosis, gout, thyroid disorders, scleroderma, rheumatoid arthritis, systemic lupus erythematosus, and digital flexor tendonitis) | gender/sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | incident rate ratio from Poisson regression | 1.60 (1.31, 1.94) | having predisposing diseases increase risk of symptoms |
| Bonfiglioli,R. 2013 | High | N= 2299 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms and NCS test at 3 years | 1 or more predisposing disease (diabetes, amyloidosis, gout, thyroid disorders, scleroderma, rheumatoid arthritis, systemic lupus erythematosus, and digital flexor tendonitis) | gender/sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | incident rate ratio from Poisson regression | 1.91 (1.26, 2.91) | predisposing conditions increase CTS risk |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of “classic/ probable” or “possible” symptoms of CTS | Presence of pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 2.3 (1.5–3.6) | presence pathologies facilitating CTS onset increases odds of CTS |

*TABLE 40 RISK FACTOR: ARTHRITIS*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | Rheumatoid Arthritis | Model1: ACGIH Hand Activity Level (HAL) ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 4.07 (1.43–11.58) | RA is a risk factor for CTS |
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | Rheumatoid Arthritis | Model 2: strain index ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 4.14 (1.48–11.59) | RA is a risk factor for CTS |
| Burt,S. 2011 | Moderate | N= 455 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | arthritis yes versus no | Model 3: peak worker perceived exertion rating (0-10), BMI, Hand Activity Level among females, Hand Activity Level among males, Gender/Sex female vs male at the mean hand activity level | logistic regression odds ratio | 2.03 (1.02-4.04) | arthritis increases CTS odds |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Coggon,D. 2013 | Moderate | N= 855; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs negatively tested patients | other arthritis present | matched by: sex, age ; covariates: ethnicity, BMI, smoking habits, diabetes, other arthritis present, number of moderately distressing somatic symptoms per week, use of keyboard 4 or more hours per day, use of vibrating tools, job includes bonuses/targets/deadlines | logistic regression OR | 0.7 (0.5-1.0) | NS |
| Geoghegan,J.M. 2004 | Moderate | N= 134 ; patients from the UK General Practice Research Database | diagnosed CTS | rheumatoid arthritis | matched by: age, sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 2.23 (1.57 – 3.17) | odds are greater in patients with RA |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Geoghegan,J.M. 2004 | Moderate | N= 1233 ; patients from the UK General Practice Research Database | diagnosed CTS | Arthritis | matched by: age, sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 1.89 (1.65–2.17) | arthritis patients have greater odds of CTS |

## *TABLE 41 RISK FACTOR: ASSEMBLY LINE*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | working on assembly line | model 1:age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, using vibrating tools, assembly line work, twisting forearm work, bending wrist work, using forceful hand grip, using fingers/thumb as pressing tool, using fingers in a pinch grip | logistic regression OR | 2.86 (1.64, 5.01) | working on assembly line is associated with higher odds of median neuropathy |
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | working on assembly line | model 2 best fitting model: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 2.57 (1.46, 4.54) | working on assembly line is associated with higher odds of median neuropathy |
| Bonfiglioli,R. 2006 | Low | N= 212 ; electric-power tool plant workers | abnormal NCS test and symptoms | assembly line workers versus non-assembly line workers | matched by: all employed at company that manufactures electric-powered tools ; covariates: assembly line vs. non-assembly line work | odds ratio | 7.22(2.858, 18.237) | odds of abnormal NCS and symptoms is higher in assembly line workers than in non-assembly line workers |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Leclerc,A. 1998 | Low | N= 816 ; assembly line workers and non-repetitive workers(cleaning, maintenance or catering jobs) | Tinel or phalen test positive or nerve condition velocity had been established before medical examination | assembly line work vs non repetitive work (cleaning, maintenance and catering) | matched by: all were of similar education level ; covariates: sex, age, psychological problems, BMI | logistic regression odds ratio | 4.54 (2.27 to 9.09) | odds of CTS are significantly higher in assembly line workers |

*TABLE 42 RISK FACTOR: AUTOMATIC WORK PACE*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Petit,A. 2015 | Moderate | French salaried workers working in manufacturing industry and services sector as skilled and unskilled blue collar workers | CTS symptoms on the day of medical exam (or for at least 4 days during the preceding 7 days) | work pace dependent on automatic rate | Gender/Sex, age, use of vibrating hand tools, exposure to cold temperature, holding objects in pinch grip, extreme wrist bending posture, pressing with palm base, force, and work organization factors | Logistical Regression OR | 1.9 (0.9-4.1) | NS |

*TABLE 43 RISK FACTOR: BMI*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | BMI per 5 point increase | model 2 best fitting model: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 1.28 (1.12, 1.49) | BMI is significantly correlated with greater odds of median neuropathy |
| Bonfiglioli,R. 2013 | High | N= 2492 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms at 3 years | BMI | sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | incident rate ratio from Poisson regression | 1.03 (1.00, 1.06) | NS |
| Bonfiglioli,R. 2013 | High | N= 2299 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms and NCS test at 3 years | BMI | sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | incident rate ratio from Poisson regression | 1.09 (1.04, 1.14) | BMI increases CTS risk |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Evanoff,B. 2014 | High | 711 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | BMI | adjusted for age, Gender/Sex, and BMI; past diagnosis of CTS or other upper extremity peripheral neuropathy, had a pacemaker or internal defibrillator, or were pregnant at the time of enrollment excluded | Multivariable mixed logistic regression models OR | 1.07(1.01-1.12) | Higher BMI significantly increases odds of CTS |
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | BMI continuous | Model1: ACGIH Hand Activity Level (HAL) ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 1.070 (1.02–1.12) | BMI is significantly associated with CTS risk |
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | BMI (continuous) | Model 2: strain index ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 1.063 1.02–1.11 0.005) | BMI is significantly associated with CTS risk |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | BMI 21.1–23.0 vs 21 | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 0.91(0.69–1.22) | NS |
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | BMI 23.1–25.0 vs 21 | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 0.89(0.65–1.23) | NS |
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | BMI 25.1–28.0 vs 21 | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 0.84(0.59–1.21) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | BMI Greater than 28.1 vs 21 | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 0.84(0.57–1.23) | NS |
| Bland,J.D. 2005 | Low | N= 4155 ; all patients referred to the neurophysiology service at hospital for suspicion of CTS | NCS confirmed CTS | BMI in age quintile 1 | Gender/Sex, smoking, age, BMI*age interaction | logistic regression OR | 1.09(1.06,1.12) | Higher BMI is a significant risk factor in the first age quintile |
| Bland,J.D. 2005 | Low | N= 4155 ; all patients referred to the neurophysiology service at hospital for suspicion of CTS | NCS confirmed CTS | BMI in age quintile 2 | Gender/Sex, smoking, age, BMI*age interaction | logistic regression OR | 1.09(1.06,1.12) | Higher BMI is a significant risk factor in the second age quintile |
| Bland,J.D. 2005 | Low | N= 4155 ; all patients referred to the neurophysiology service at hospital for suspicion of CTS | NCS confirmed CTS | BMI in age quintile 3 | Gender/Sex, smoking, age, BMI*age interaction | logistic regression OR | 1.05(1.02,1.08) | Higher BMI is a significant risk factor in the third age quintile |
| Bland,J.D. 2005 | Low | N= 4155 ; all patients referred to the neurophysiology service at hospital for suspicion of CTS | NCS confirmed CTS | BMI in age quintile 4 | Gender/Sex, smoking, age, BMI*age interaction | logistic regression OR | 1.05(1.01,1.08) | Higher BMI is a significant risk factor in the first fourth age quintile |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Bland,J.D. 2005 | Low | N= 4155 ; all patients referred to the neurophysiology service at hospital for suspicion of CTS | NCS confirmed CTS | BMI in age quintile 5 | Gender/Sex, smoking, age, BMI*age interaction | logistic regression OR | 1.01(0.98,1.04) | NS in fifth age quintile |
| Becker,J. 2002 | Moderate | N= 1772; cases and controls consisted of patients referred for nerve conduction studies and electromyography. | nerve conduction and electromyography | BMI Gender/Sex interaction effect | BMI over 30, Gender/Sex, age between 41 and 60, diabetes, BMI*Gender/Sex interaction effect, Gender/Sex*diabetes interaction effect | logistic regression odds ratio | 1.25(1.07,1.46) | although the overall effect of BMI remained significant in the model(for both Gender/Sex) the effect of BMI was significantly greater in males than in females |
| Burt,S. 2011 | Moderate | N= 448 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | BMI>=30 versus <30 if exerts/min cat¼1 | Model 1 Peak force match cat 2 versus 1, Peak force match cat 3 versus 1, Exerts/min cat 2 versus 1 if BMI<30, Exerts/min cat 3 versus 1 if BMI<30, Exerts/min cat 2 versus 1 if BMI>=30, Exerts/min cat 3 versus 1 if BMI>=30, BMI>=30 versus <30 if exerts/min cat¼1, BMI>=30 versus <30 if exerts/min cat¼2 1.60, BMI>=30 versus <30 if exerts/min cat¼3 | logistic regression odds ratio | 0.77 (0.24-2.48) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Burt,S. 2011 | Moderate | N= 448 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | BMI>=30 versus <30 if exerts/min cat¼2 1.60 | Model 1 Peak force match cat 2 versus 1, Peak force match cat 3 versus 1, Exerts/min cat 2 versus 1 if BMI<30, Exerts/min cat 3 versus 1 if BMI<30, Exerts/min cat 2 versus 1 if BMI>=30, Exerts/min cat 3 versus 1 if BMI>=30, BMI>=30 versus <30 if exerts/min cat¼1, BMI>=30 versus <30 if exerts/min cat¼2 1.60, BMI>=30 versus <30 if exerts/min cat¼3 | logistic regression odds ratio | 1.60 (0.52-5.00) | NS |
| Burt,S. 2011 | Moderate | N= 448 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | BMI>=30 versus <30 if exerts/min cat¼3 | Model 1 Peak force match cat 2 versus 1, Peak force match cat 3 versus 1, Exerts/min cat 2 versus 1 if BMI<30, Exerts/min cat 3 versus 1 if BMI<30, Exerts/min cat 2 versus 1 if BMI>=30, Exerts/min cat 3 versus 1 if BMI>=30, BMI>=30 versus <30 if exerts/min cat¼1, BMI>=30 versus <30 if exerts/min cat¼2 1.60, BMI>=30 versus <30 if exerts/min cat¼3 | logistic regression odds ratio | 2.26 (1.01-5.10) | obesity increases the odds of CTS among patients with highest category of exertions per minute (>=15/minute) |
| Burt,S. 2011 | Moderate | N= 456 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | BMI | Model 2: peak worker perceived exertion rating (0-10), BMI, Hand Activity Level among females, Hand Activity Level among males, Gender/Sex | logistic regression odds ratio | 1.07 (1.03-1.11) | BMI increases CTS odds |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Burt,S. 2013 | Moderate | N= 347 ; workers from hospital, school bus manufacturing plant, and engine assembly plant | electrodiagnostic test, symptoms, hand diagram at 2 years | BMI of at least 30 vs less than 30 | model1: time in forceful exertion, BMI>=30, threshold limit value, job strain | hazard ratios | 3.19(1.28,7.98) | having a BMI of 30 or greater is associated with higher risk of CTS |
| Coggon,D. 2013 | Moderate | N= 1230; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs healthy controls | BMI between 25 and 29.9 vs <25 | matched by: sex, age ; covariates: ethnicity, BMI, smoking, mental health, repeated movements, vibrating tools, job control, level of supervisor/colleague support | logistic regression OR | 1.6 (1.1-2.1) | odds higher in high BMI group |
| Coggon,D. 2013 | Moderate | N= 1230; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs healthy controls | BMI of 30 or above vs <25 | matched by: sex, age ; covariates: ethnicity, BMI, smoking, mental health, repeated movements, vibrating tools, job control, level of supervisor/colleague support | logistic regression OR | 2.1 (1.6-2.9) | odds higher in high BMI group |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Coggon,D. 2013 | Moderate | N= 855; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs negatively tested patients | BMI between 25 and 29.9 vs <25 | matched by: sex, age ; covariates: ethnicity, BMI, smoking habits, diabetes, other arthritis present, number of moderately distressing somatic symptoms per week, use of keyboard 4 or more hours per day, use of vibrating tools, job includes bonuses/targets/deadlines | logistic regression OR | 1.3 (0.9-1.9) | NS |
| Coggon,D. 2013 | Moderate | N= 855; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs negatively tested patients | BMI of 30 or above vs <25 | matched by: sex, age ; covariates: ethnicity, BMI, smoking habits, diabetes, other arthritis present, number of moderately distressing somatic symptoms per week, use of keyboard 4 or more hours per day, use of vibrating tools, job includes bonuses/targets/deadlines | logistic regression OR | 2.7 (1.9-3.9) | BMI is associated with greater risk of median neuropathy |
| Geoghegan,J.M. 2004 | Moderate | N= 171 ; patients from the UK General Practice Research Database | diagnosed CTS | BMI <18.5 vs BMI 18.5–25 | matched by: age, sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 0.64 (0.40–1.01) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Geoghegan,J.M. 2004 | Moderate | N= 3127 ; patients from the UK General Practice Research Database | diagnosed CTS | BMI 25.1–30 vs BMI 18.5–25 | matched by: age, sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 1.63 (1.45–1.84) | odds of CTS are greater in higher BMI group |
| Geoghegan,J.M. 2004 | Moderate | N= 1422 ; patients from the UK General Practice Research Database | diagnosed CTS | BMI 30–40 vs BMI 18.5–25 | matched by: age, sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 2.06 (1.79–2.38) | odds of CTS are greater in higher BMI group |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Geoghegan,J.M. 2004 | Moderate | N= 140 ; patients from the UK General Practice Research Database | diagnosed CTS | BMI >40 vs BMI 18.5–25 | matched by: age, sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 2.22 (1.53–3.21) | odds of CTS are greater in higher BMI group |
| Goodson, J.T. 2014 | Moderate | 87 CTS and 74 sex-matched general orthopedic patients from an outpatient orthopedic clinic in the Western US. | (1)Electrodiagnostic (EDX) testing results suggestive of abnormal slowing of the median nerve, (2) the presence of clinical symptoms of CTS, and (3) no confounding syndromes/disorders | BMI | excluded confounding conditions; sex, age, education levels, ethnicity, and EDX testing results | Logistical Regression OR | 1.09(0.99,1.19) | NS |
| Hlebs,S. 2014 | Moderate | convenience and random sampling of N= 100 (50 with CTS and 50 healthy controls); subjects performed various occupations, but the groups were balanced regarding Gender/Sex and age | clinically and electromyography (EMG) confirmed CTS; controls had no signs or symptoms of CTS | BMI | diabetes mellitus, rheumatoid arthritis, thyroid disease, neuropathy, infections, thoracic outlet syndrome, neck pain or paresthesia (tingling) in upper limbs, pregnancy, past injury or surgery of the wrist or the neck, BMI, ratio of hand length to body height, mean wrist index >0.695, mean hand shape index, mean digit index | Multiple logistic regression OR | 1.43 (1.16, 1.76) | high BMI is associated with increased odds of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Mondelli,M. 2006 | Moderate | N= 145 ; female hospital floor cleaners in Italy | diagnosed according to AAN criteria: population of hospital floor cleaners | BMI over 25 vs 25 or less | Age, BMI, duration of occupational exposure to current job, occupational exposure to the same job for previous employers, manual hobbies (including motorcycle use, diseases known to be associated with CTS (diabetes connective tissue diseases, hypothyroidism, and wrist/hand trauma), hospital (to adjust for center effects) | logistic regression OR | 1.73 (0.68-4.44) | NS |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Body mass index (kg/m2) | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 1.08 (1.03, 1.14) | higher BMI increases odds of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of "classic/ probable" or "possible" symptoms of CTS | Overweight BMI over 24.9 with a slim wrist versus BMI under 25 with a slim wrist | sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 1.5 (0.7–3.4) | NS |
| de Krom,M.C. 1990 | Moderate | N= 629; 28 cases and all controls were identified through random sample of patients in the Netherlands. An additional 128 cases were added from a single hospital in the area | clinical history and neurophysiologic testing | slimming courses yes vs no | matched by: age and sex stratified random sample ; covariates: height, weight(kg), slimming courses(yes/no), Hours/week in flexion activities, hours/week for extension activities, Varicosis (for men only), for women: years since menopause onset vs pre-menopausal, hysterectomy vs premenopausal | logistic regression odds ratio | 1.57(0.92, 2.66) | NS |

*TABLE 44 RISK FACTOR: BENDING*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | bending wrist frequently | model 1:age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, using vibrating tools, assembly line work, twisting forearm work, bending wrist work, using forceful hand grip, using fingers/thumb as pressing tool, using fingers in a pinch grip | logistic regression OR | 1.72 (1.07, 2.76) | bending wrist frequently is associated with higher odds of median neuropathy |
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | peak exposure to Wrist bending | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 0.98 (0.46, 2.10) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | Wrist bending in most recent job | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 1.48 (0.71, 3.12) | NS |
| Evanoff,B. 2012 | Moderate | N= 745 ; newly employed workers | symptoms and NCS at 3 years | hand wrist bending | age, Gender/Sex, lifting at least 1kg, forceful grip, finger/thumb pressing, using vibrating tools, pinch grip, forearm rotation, hand/wrist bending | NR | NR | NS |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Bending/twisting hand 0.25-1.75 hours/day vs none | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 2.42 (0.88, 6.62) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Bending/twisting hand 2-3 hours/day vs none hours/day vs none | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 1.27 (0.50, 3.26) | NS |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Bending/twisting hand 3.5-6 hours/day vs none | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 2.65 (1.83, 5.92) | higher in workers who bend/twist hand 3.5-6 hours/day |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Bending/twisting hand -16 hours/day vs none | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 2.11 (0.98, 4.52) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| de Krom,M.C. 1990 | Moderate | N= 629; 28 cases and all controls were identified through random sample of patients in the Netherlands. An additional 128 cases were added from a single hospital in the area | clinical history and neurophysiologic testing | increased CTS odds for 1 hour increase in flexion | matched by: age and sex stratified random sample ; covariates: height, weight(kg), slimming courses(yes/no), Hours/week in flexion activities, hours/week for extension activities, Varicosis (for men only), for women: years since menopause onset vs pre-menopausal, hysterectomy vs premenopausal | logistic regression odds ratio | 1.05(1.02, 1.08) | working longer hours in activities requiring wrist flexion is associated with higher CTS odds |
| de Krom,M.C. 1990 | Moderate | N= 629; 28 cases and all controls were identified through random sample of patients in the Netherlands. An additional 128 cases were added from a single hospital in the area | clinical history and neurophysiologic testing | increased CTS odds for 1 hour increase in extension | matched by: age and sex stratified random sample ; covariates: height, weight(kg), slimming courses(yes/no), Hours/week in flexion activities, hours/week for extension activities, Varicosis (for men only), for women: years since menopause onset vs pre-menopausal, hysterectomy vs premenopausal | logistic regression odds ratio | 1.04(1, 1.09) | working longer hours in activities requiring wrist extension is associated with higher CTS odds |

*TABLE 45 RISK FACTOR: CHEMICALS*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Contact with solvents 0.08-0.75 hours/day vs none | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 0.44 (0.21, 0.90) | odds lower in workers with .08 to .75 hours of contact with solvents |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Contact with solvents 1-11 hours/day vs none | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 0.80 (0.36, 1.79) | NS |

*TABLE 46 RISK FACTOR: CLERICAL*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | Occupation (clerical vs. non-clerical) | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 1.13(0.90–1.43) | NS |
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Administrative and secretarial occupations vs. Associate professional and technical occupations | matched by: all males ; covariates: Administrative and secretarial occupations vs. Associate professional and technical occupations | univariate odds ratios | 2.21 (1.00–4.73) | NS |
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Administrative and secretarial occupations vs. Associate professional and technical occupations | matched by: all females ; covariates: Administrative and secretarial occupations vs. Associate professional and technical occupations | univariate odds ratios | 1.76 (1.14–2.81) | odds are higher than in associate professional and technical occupations |

*TABLE 47 RISK FACTOR: COLD EXPOSURE*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Chiang,H.C. 1990 | Moderate | N= 269 ; workers at frozen food plants | neurological examinations and electrophysiological tests | work exposure to cold vs no exposure to cold | Age, sex, length of employment, exposure to cold(frozen food packers), repetitive movement (frozen and non-frozen food packers), and cold*repetitious movement interaction | logistic regression odds ratio | 1.85 (1.10, 3.13) | exposure to cold is a significant predictor of CTS |

*TABLE 48 RISK FACTOR: COMORBIDITY DRUG USE*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | Current thyroxine replacement therapy | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 1.13(0.72–1.78) | NS |
| Geoghegan,J.M. 2004 | Moderate | N= 766 ; patients from the UK General Practice Research Database | diagnosed CTS | Corticosteroid | matched by: age, sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 1.07 (0.90–1.27) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Geoghegan,J.M. 2004 | Moderate | N= 415 ; patients from the UK General Practice Research Database | diagnosed CTS | Thyroxine | matched by: age, sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 1.36 (1.08–1.70) | odds are greater in patients who use Thyroxine |
| Morgenstern,H. 1991 | Moderate | N= 1049 ; grocery store checkers belonging to local California union | symptoms of CTS indicated in questionnaire | use of diuretics | matched by: all members were members of union food and commercial workers union ; covariates: age, hours per work week, years worked, age*years worked interaction, use of laser scanner to check items, unload basket before checking, load and lift grocery bags after checking, currently pregnant, contraceptive use, use of exogenous estrogen, use of diuretics, history of broken wrist | logistic regression odds ratio | 2.66 ( 1.00, 7.04) | NS |

*TABLE 49 RISK FACTOR: COMPUTER WORK*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Ali,K.M. 2006 | Moderate | N= 648 ; computer professionals from 21 companies | Phalen's and Tinel's test | 4-8 years of computer work vs <4 years | age, Gender/Sex, smoking, alcohol use, BMI, years of computer work, hours of computer work per day, system administrator job vs other job functions, and internet use in leisure time | logistic regression odds ratio | 2.1(1.3,3.6) | Years of computer use is associated with greater CTS odds |
| Ali,K.M. 2006 | Moderate | N= 648 ; computer professionals from 21 companies | Phalen’s and Tinel's test | 8 or more years of computer work vs <4 years | age, Gender/Sex, smoking, alcohol use, BMI, years of computer work, hours of computer work per day, system administrator job vs other job functions, and internet use in leisure time | logistic regression odds ratio | 2.7(1.3,5.8) | Years of computer use is associated with greater CTS odds |
| Ali,K.M. 2006 | Moderate | N= 648 ; computer professionals from 21 companies | Phalen’s and Tinel's test | computer used 8 to 12 hours vs less than 8 hours | age, Gender/Sex, smoking, alcohol use, BMI, years of computer work, hours of computer work per day, system administrator job vs other job functions, and internet use in leisure time | logistic regression odds ratio | 3.6(1.3,10.3) | using a computer more hours per day is associated with greater CTS odds |
| Ali,K.M. 2006 | Moderate | N= 648 ; computer professionals from 21 companies | Phalen’s and Tinel's test | computer used more than 12 hours vs less than 8 hours | age, Gender/Sex, smoking, alcohol use, BMI, years of computer work, hours of computer work per day, system administrator job vs other job functions, and internet use in leisure time | logistic regression odds ratio | 4.4(1.3, 14.9) | using a computer more hours per day is associated with greater CTS odds |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Ali,K.M. 2006 | Moderate | N= 648 ; computer professionals from 21 companies | Phalen’s and Tinel's test | system administrator vs other job functions | age, Gender/Sex, smoking, alcohol use, BMI, years of computer work, hours of computer work per day, system administrator job vs other job functions, and internet use in leisure time | logistic regression odds ratio | 2.4(1.2, 4.8) | being a system administrator increases odds of CTS compared to other job functions |
| Coggon,D. 2013 | Moderate | N= 855; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs negatively tested patients | use of keyboard >4 hours per day | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking habits, diabetes, other arthritis present, number of moderately distressing somatic symptoms per week, use of keyboard 4 or more hours per day, use of vibrating tools, job includes bonuses/targets/deadlines | logistic regression OR | 0.6 (0.4-0.8) | patients testing positive were less likely to use keyboard or mouse more than 4 hours per day |
| Eleftheriou,A. 2012 | Moderate | N= 441 ; 548 workers of a Governmental data entry & processing unit | personal history of CTS | at least 240,500,000 vs <240,500,000 keyboard strokes | Keyboard strokes, age, physical activity, smoking | logistic regression OR | 2.23 (1.09 to 4.52) | higher key strokes associated with higher CTS odds |
| Eleftheriou,A. 2012 | Moderate | N= 441 ; 548 workers of a Governmental data entry & processing unit | personal history of CTS or newly diagnosed CTS with CTS-7 algorithm score of 12 or more | at least 240,500,000 vs <240,500,000 | Keyboard strokes, gender/sex, physical activity, age | logistic regression OR | 2.41 (1.36 to 4.25) | higher key strokes associated with higher CTS odds |

*TABLE 50 RISK FACTOR: CONSTRUCTION WORK*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | construction vs clerical work | model 2 best fitting model: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 7.01 (2.65, 18.54) | construction workers are at significantly higher odds of median neuropathy |

*TABLE 51 RISK FACTOR: DEXTERITY*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | dexterity derived from factor analysis (O*NET subscales: manual and finger dexterity, wrist finger speed, and time spent handling objects)2nd vs 1st quartile | Model 3 with O*NET factor variables: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 1.48 (0.80, 2.74) | NS |
| Armstrong,T. 2008 | High | N= 1071; follow worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | dexterity derived from factor analysis (O*NET subscales: manual and finger dexterity, wrist finger speed, and time spent handling objects)3rd vs 1st quartile | Model 3 with O*NET factor variables: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 1.11 (0.61, 2.00) | NS |
| Armstrong,T. 2008 | High | N= 1071; follow worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | dexterity derived from factor analysis (O*NET subscales: manual and finger dexterity, wrist finger speed, and time spent handling objects) 4th vs 1st quartile | Model 3 with O*NET factor variables: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 1.79 (1.01, 3.18) | Workers in the highest quartile are at significantly higher odds of median neuropathy than workers in the lowest quartile |

*TABLE 52 RISK FACTOR: DIABETES*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | diabetes history | model 2 best fitting model: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 2.45 (0.92, 6.53) | NS |
| Becker,J. 2002 | Moderate | N= 1772; cases and controls consisted of patients referred for nerve conduction studies and electromyography. | nerve conduction and electromyography | female Gender/Sex and diabetes interaction effect | BMI over 30, Gender/Sex, age between 41 and 60, diabetes, BMI*Gender/Sex interaction effect, Gender/Sex*diabetes interaction effect | logistic regression odds ratio | 1.15(0.84,1.57) | no significant interaction between diabetes and Gender/Sex |
| Becker,J. 2002 | Moderate | N= 1772; cases and controls consisted of patients referred for nerve conduction studies and electromyography. | nerve conduction and electromyography | Diabetes | BMI over 30, Gender/Sex, age between 41 and 60, diabetes, BMI*Gender/Sex interaction effect, Gender/Sex*diabetes interaction effect | logistic regression odds ratio | 1.49(1.09,2.04) | Diabetes increases odds of CTS |
| Coggon,D. 2013 | Moderate | N= 855; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs negatively tested patients | diabetes vs no diabetes | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking habits, diabetes, other arthritis present, number of moderately distressing somatic symptoms per week, use of keyboard 4 or more hours per day, use of vibrating tools, job includes bonuses/targets/deadlines | logistic regression OR | 1.6 (0.9-3.1) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Geoghegan,J.M. 2004 | Moderate | N= 494 ; patients from the UK General Practice Research Database | diagnosed CTS | Diabetes | matched by: age, gender/sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 1.51 (1.24–1.84) | odds are greater in diabetic patients |
| Geoghegan,J.M. 2004 | Moderate | N= 137 ; patients from the UK General Practice Research Database | diagnosed CTS | Insulin use | matched by: age, gender/sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 1.52 (1.06–2.18) | odds are greater in patients who use insulin |
| Geoghegan,J.M. 2004 | Moderate | N= 149 ; patients from the UK General Practice Research Database | diagnosed CTS | Metformin use | matched by: age, gender/sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 1.2 (0.84–1.72) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Geoghegan,J.M. 2004 | Moderate | N= 197 ; patients from the UK General Practice Research Database | diagnosed CTS | Sulphonyl use | matched by: age, gender/sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 1.45 (1.07–1.97) | odds are greater in patients who use sulphonyl |
| Plastino,M. 2011 | Moderate | N= 245 ; CTS patients from a single hospital, and controls from patients friends or non-blood relatives | confirmed by electrodiagnostic exam | abnormal glucose metabolism abnormalities by 2h_OGTT | weight circumference, BMI, age | p value | 0.001 | odds are higher in patients with glucose metabolism abnormalities |

*TABLE 53 RISK FACTOR: DIALYSIS*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Kopec,J. 2011 | Low | N= 386 ; all patients were on hemodialysis | signs and symptoms verified by nerve conduction studies | number of years on hemodialysis | hemodialysis | p value from chi squared test | <.00001 | CTS patients have been on hemodialysis significantly longer than non-CTS hemodialysis patients |
| Shin,J. 2008 | Moderate | N= 123 ; All were hemodialysis patients | pain or pain in median nerve distribution and Tinel's sign | duration of dialysis | age, gender/sex, predialysis plasma BMG level in 1990, duration of dialysis | logistic regression OR | 1.06(1.01,1.11) | Duration of Dialysis is associated with increased CTS odds |
| Shin,J. 2008 | Moderate | N= 123 ; All were hemodialysis patients | pain or pain in median nerve distribution and Tinel's sign | predialysis plasma BMG level in 1990 | age, gender/sex, predialysis plasma BMG level in 1990, duration of dialysis | logistic regression OR | 1.65(1.13,2.41) | higher BMG levels were associated with higher CTS odds |

*TABLE 54 RISK FACTOR: DYNAMIC STRENGTH*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Evanoff,B. 2014 | High | 711 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | Dynamic strength importance in current job | adjusted for age, Gender/Sex, and BMI; past diagnosis of CTS or other upper extremity peripheral neuropathy, had a pacemaker or internal defibrillator, or were pregnant at the time of enrollment excluded | Multivariable mixed logistic regression models OR | 2.14(.56-8.22) | NS |

*TABLE 55 RISK FACTOR: EDUCATION*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Kaplan,Y. 2008 | Low | N= 221 ; all were postmenopausal women | NCS | education | matched by: age matched females ; covariates: education level | p-value | >.05 | NS |
| Wright, C. 2014 | Low | (3155 w/o CTS diagnosis and 91 with CTS diagnosis); EMR of a cohort of pregnant women receiving prenatal care at a large obstetrics unit; representative of those served by the urban academic center, with a large proportion of black patients | clinically diagnosed with ICD 9 diagnosis code for CTS | Maternal Education (finished high school) versus some high school | age, race/ethnicity, education, smoking, parity, hypertension, diabetes, maternal weight category (constructed variable including information about maternal BMI and GWG), and number prenatal care visits | Logistical Regression OR | 1.58 (0.4-9.94) | NS |
| Wright, C. 2014 | Low | (3155 w/o CTS diagnosis and 91 with CTS diagnosis); EMR of a cohort of pregnant women receiving prenatal care at a large obstetrics unit; representative of those served by the urban academic center, with a large proportion of black patients | clinically diagnosed with ICD 9 diagnosis code for CTS | Maternal Education (college or above) versus some high school | age, race/ethnicity, education, smoking, parity, hypertension, diabetes, maternal weight category (constructed variable including information about maternal BMI and GWG), and number prenatal care visits | Logistical Regression OR | 10.4 (1-148) | NS |
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS symptoms | Education >8 years | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 1.48(0.77–2.86) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS diagnosis with clinical and electrodiagnostic examinations | Education >8 years | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 2.15(0.75–6.17) | NS |

*TABLE 56 RISK FACTOR: ENDOCRINE*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Nathan,P.A. 2002 | Moderate | N= 256; workers at 4 industrial sites (a steel mill, meat/food packaging, electronics, and plastics). | electrodiagnostic test and symptoms at 11 years | endocrine condition | repetitious movement, heavy lifting, keyboard use, vibration tools, force, cigarette use, Gender/Sex, age, BMI, avocational activities, hormone use, race/ethnicity, endocrine condition, years on job | logistic regression odds ratio | .23 (.04–1.24) | NS |

*TABLE 57 RISK FACTOR: EXERTION*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Burt,S. 2011 | Moderate | N= 448 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | Exerts/min cat 2 versus 1 if BMI<30 | Model 1 Peak force match cat 2 versus 1, Peak force match cat 3 versus 1, Exerts/min cat 2 versus 1 if BMI<30, Exerts/min cat 3 versus 1 if BMI<30, Exerts/min cat 2 versus 1 if BMI>=30, Exerts/min cat 3 versus 1 if BMI>=30, BMI>=30 versus <30 if exerts/min cat¼1, BMI>=30 versus <30 if exerts/min cat¼2 1.60, BMI>=30 versus <30 if exerts/min cat¼3 | logistic regression odds ratio | 1.40 (0.45-4.34) | NS |
| Burt,S. 2011 | Moderate | N= 448 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | Exerts/min cat 3 versus 1 if BMI<30 | Model 1 Peak force match cat 2 versus 1, Peak force match cat 3 versus 1, Exerts/min cat 2 versus 1 if BMI<30, Exerts/min cat 3 versus 1 if BMI<30, Exerts/min cat 2 versus 1 if BMI>=30, Exerts/min cat 3 versus 1 if BMI>=30, BMI>=30 versus <30 if exerts/min cat¼1, BMI>=30 versus <30 if exerts/min cat¼2 1.60, BMI>=30 versus <30 if exerts/min cat¼3 | logistic regression odds ratio | 1.13 (0.44-2.93) | NS |
| Burt,S. 2011 | Moderate | N= 448 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | Exerts/min cat 2 versus 1 if BMI>=30 | Model 1 Peak force match cat 2 versus 1, Peak force match cat 3 versus 1, Exerts/min cat 2 versus 1 if BMI<30, Exerts/min cat 3 versus 1 if BMI<30, Exerts/min cat 2 versus 1 if BMI>=30, Exerts/min cat 3 versus 1 if BMI>=30, BMI>=30 versus <30 if exerts/min cat¼1, BMI>=30 versus <30 if exerts/min cat¼2 1.60, BMI>=30 versus <30 if exerts/min cat¼3 | logistic regression odds ratio | 2.92 (0.90-9.46) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Burt,S. 2011 | Moderate | N= 448 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | Exerts/min cat 3 versus 1 if BMI>=30 | Model 1 Peak force match cat 2 versus 1, Peak force match cat 3 versus 1, Exerts/min cat 2 versus 1 if BMI<30, Exerts/min cat 3 versus 1 if BMI<30, Exerts/min cat 2 versus 1 if BMI>=30, Exerts/min cat 3 versus 1 if BMI>=30, BMI>=30 versus <30 if exerts/min cat¼1, BMI>=30 versus <30 if exerts/min cat¼2 1.60, BMI>=30 versus <30 if exerts/min cat¼3 | logistic regression odds ratio | 3.35 (1.14-9.87) | the highest frequency of exertions per minute(>= 15) increases the odds of CTS among obese workers |
| Burt,S. 2011 | Moderate | N= 456 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | peak worker perceived exertion rating (0-10) | Model 2: peak worker perceived exertion rating (0-10), BMI, Hand Activity Level among females, Hand Activity Level among males, Gender/Sex | logistic regression odds ratio | 1.14 (1.01-1.29) | worker perceived exertion rating increases odds of CTS |
| Burt,S. 2013 | Moderate | N= 347 ; workers from hospital, school bus manufacturing plant, and engine assembly plant | electrodiagnostic test, symptoms, hand diagram at 2 years | time in forceful exertion between 20 and 60% vs <20% | model1: time in forceful exertion, BMI>=30, threshold limit value, job strain | hazard ratios | 2.83(1.18,6.79) | Having between 20% and 60% of work time involve forceful exertion is associated with higher risk of CTS than workers with <20% forceful exertion time |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Burt,S. 2013 | Moderate | N= 347 ; workers from hospital, school bus manufacturing plant, and engine assembly plant | electrodiagnostic test, symptoms, hand diagram at 2 years | time in forceful exertion between greater than 60% vs <20% | model1: time in forceful exertion, BMI>=30, threshold limit value, job strain | hazard ratios | 19.57(5.96,64.24) | Having greater than 60% of work time involve forceful exertion is associated with higher risk of CTS than workers with <20% forceful exertion time |

*TABLE 58 RISK FACTOR: FARMING*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Roquelaure,Y. 2008 | Moderate | N= 193802 ; French prospectively CTS surveillance system | clinical and electrodiagnostic tests at 3 years | Farmers vs unemployed | matched by: among men ; covariates: controlled for age, stratified by gender/sex | relative risk ratio | 1.3 [0.8-2.3] | NS |
| Roquelaure,Y. 2008 | Moderate | N= 194276 ; French prospectively CTS surveillance system | clinical and electrodiagnostic tests at 3 years | Farmers vs unemployed | matched by: among women ; covariates: controlled for age, stratified by gender/sex | relative risk ratio | 1.2 [0.8-2.0] | NS |

*TABLE 59 RISK FACTOR: FEMALE RISK FACTORS*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | Perimenopause vs premenopausal | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 1.53(1.01–2.32) | perimenopausal at higher odds of CTS than premenopausal |
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | Postmenopausal vs premenopausal | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 1.43(0.89–2.29) | NS |
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | Hysterectomy After controlling for menopause | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 1.2(0.89–1.63) | NS |
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | Current use of HRT | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 0.85(0.62–1.16) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Kaplan,Y. 2008 | Low | N= 221 ; all were postmenopausal women | NCS | number of pregnancies | matched by: age matched females ; covariates: number of pregnancies | mean difference | 1.07(0.67, 1.47) | number of pregnancies was higher in postmenopausal CTS women than postmenopausal healthy controls |
| Wright, C. 2014 | Low | (3155 w/o CTS diagnosis and 91 with CTS diagnosis); EMR of a cohort of pregnant women receiving prenatal care at a large obstetrics unit; representative of those served by the urban academic center, with a large proportion of black patients | clinically diagnosed with ICD 9 diagnosis code for CTS | Second or Third live birth versus first live birth | age, race/ethnicity, education, smoking, parity, hypertension, diabetes, maternal weight category (constructed variable including information about maternal BMI and GWG), and number prenatal care visits | Logistical Regression OR | 1.22 (1.05-1.75) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Wright, C. 2014 | Low | (3155 w/o CTS diagnosis and 91 with CTS diagnosis); EMR of a cohort of pregnant women receiving prenatal care at a large obstetrics unit; representative of those served by the urban academic center, with a large proportion of black patients | clinically diagnosed with ICD 9 diagnosis code for CTS | 10+ prenatal care visits versus <10 prenatal care visits | age, race/ethnicity, education, smoking, parity, hypertension, diabetes, maternal weight category (constructed variable including information about maternal BMI and GWG), and number prenatal care visits | Logistical Regression OR | 2.95 (1.88-4.62) | NS |
| Wright, C. 2014 | Low | (3155 w/o CTS diagnosis and 91 with CTS diagnosis); EMR of a cohort of pregnant women receiving prenatal care at a large obstetrics unit; representative of those served by the urban academic center, with a large proportion of black patients | clinically diagnosed with ICD 9 diagnosis code for CTS | Normal BMI 18.5+ kg/m sq (excessive Gestational Weight Gain) versus Normal BMI 18.5+ kg/m sq (adequate Gestational Weight Gain) | age, race/ethnicity, education, smoking, parity, hypertension, diabetes, maternal weight category (constructed variable including information about maternal BMI and GWG), and number prenatal care visits | Logistical Regression OR | 1.33 (0.41-3.86) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Wright, C. 2014 | Low | (3155 w/o CTS diagnosis and 91 with CTS diagnosis); EMR of a cohort of pregnant women receiving prenatal care at a large obstetrics unit; representative of those served by the urban academic center, with a large proportion of black patients | clinically diagnosed with ICD 9 diagnosis code for CTS | Overweight BMI 25+ to 29.9 kg/m sq (excessive Gestational Weight Gain) versus Normal BMI 18.5+ kg/m sq (adequate Gestational Weight Gain) | age, race/ethnicity, education, smoking, parity, hypertension, diabetes, maternal weight category (constructed variable including information about maternal BMI and GWG), and number prenatal care visits | Logistical Regression OR | 1.75 (0.38-12.48) | NS |
| Wright, C. 2014 | Low | (3155 w/o CTS diagnosis and 91 with CTS diagnosis); EMR of a cohort of pregnant women receiving prenatal care at a large obstetrics unit; representative of those served by the urban academic center, with a large proportion of black patients | clinically diagnosed with ICD 9 diagnosis code for CTS | Obese BMI 30+ kg/m sq (normal Gestational Weight Gain) versus Normal BMI 18.5+ kg/m sq (adequate Gestational Weight Gain) | age, race/ethnicity, education, smoking, parity, hypertension, diabetes, maternal weight category (constructed variable including information about maternal BMI and GWG), and number prenatal care visits | Logistical Regression OR | 2.99 (1.81-16.79) | BMI of 30 or more increases odds of CTS even with normal gestational weight gain |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Wright, C. 2014 | Low | (3155 w/o CTS diagnosis and 91 with CTS diagnosis); EMR of a cohort of pregnant women receiving prenatal care at a large obstetrics unit; representative of those served by the urban academic center, with a large proportion of black patients | clinically diagnosed with ICD 9 diagnosis code for CTS | Obese BMI 30+ kg/m sq (excessive Gestational Weight Gain) | age, race/ethnicity, education, smoking, parity, hypertension, diabetes, maternal weight category (constructed variable including information about maternal BMI and GWG), and number prenatal care visits | Logistical Regression OR | 1.27 (0.11-12.74) | NS |
| Geoghegan,J.M. 2004 | Moderate | N= 2355 ; patients from the UK General Practice Research Database | diagnosed CTS | hormone replacement therapy use | matched by: age, gender/sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 0.95 (0.84–1.08) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Geoghegan,J.M. 2004 | Moderate | N= 1932 ; patients from the UK General Practice Research Database | diagnosed CTS | combined oral contraceptive pill use | matched by: age, gender/sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 0.82 (0.71–0.95) | NS |
| Mondelli,M. 2006 | Moderate | N= 145 ; female hospital floor cleaners in Italy | diagnosed according to AAN criteria: population of hospital floor cleaners | Oral contraceptive yes vs no | Age, BMI, duration of occupational exposure to current job, occupational exposure to the same job for previous employers, manual hobbies (including motorcycle use, diseases known to be associated with CTS (diabetes connective tissue diseases, hypothyroidism, and wrist/hand trauma), hospital (to adjust for center effects) | logistic regression OR | 1.52 (0.58-4.04) | NS |
| Morgenstern,H. 1991 | Moderate | N= 1049 ; grocery store checkers belonging to local California union | symptoms of CTS indicated in questionnaire | Use of oral contraceptives | matched by: all members were members of union food and commercial workers union ; covariates: age, hours per work week, years worked, age*years worked interaction, use of laser scanner to check items, unload basket before checking, load and lift grocery bags after checking, currently pregnant, contraceptive use, use of exogenous estrogen, use of diuretics, history of broken wrist | logistic regression odds ratio | 0.84 (0.46, 1.56) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| de Krom,M.C. 1990 | Moderate | N= 629; 28 cases and all controls were identified through random sample of patients in the Netherlands. An additional 128 cases were added from a single hospital in the area | clinical history and neurophysiologic testing | menopause in last year vs premenopausal | matched by: age and gender/sex stratified random sample ; covariates: height, weight(kg), slimming courses(yes/no), Hours/week in flexion activities, hours/week for extension activities, Varicosis (for men only), for women: years since menopause onset vs pre-menopausal, hysterectomy vs premenopausal | logistic regression odds ratio | 2.32(0.79, 6.81) | NS |
| de Krom,M.C. 1990 | Moderate | N= 629; 28 cases and all controls were identified through random sample of patients in the Netherlands. An additional 128 cases were added from a single hospital in the area | clinical history and neurophysiologic testing | menopause 2 to 5 years ago vs premenopausal | matched by: age and gender/sex stratified random sample ; covariates: height, weight(kg), slimming courses(yes/no), Hours/week in flexion activities, hours/week for extension activities, Varicosis (for men only), for women: years since menopause onset vs pre-menopausal, hysterectomy vs premenopausal | logistic regression odds ratio | 0.87(0.26, 2.93) | NS |
| de Krom,M.C. 1990 | Moderate | N= 629; 28 cases and all controls were identified through random sample of patients in the Netherlands. An additional 128 cases were added from a single hospital in the area | clinical history and neurophysiologic testing | menopause more than 5 years ago vs premenopausal | matched by: age and gender/sex stratified random sample ; covariates: height, weight(kg), slimming courses(yes/no), Hours/week in flexion activities, hours/week for extension activities, Varicosis (for men only), for women: years since menopause onset vs pre-menopausal, hysterectomy vs premenopausal | logistic regression odds ratio | 0.49(0.17, 1.39) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| de Krom,M.C. 1990 | Moderate | N= 629; 28 cases and all controls were identified through random sample of patients in the Netherlands. An additional 128 cases were added from a single hospital in the area | clinical history and neurophysiologic testing | hysterectomy vs premenopausal | matched by: age and gender/sex stratified random sample ; covariates: height, weight(kg), slimming courses(yes/no), Hours/week in flexion activities, hours/week for extension activities, Varicosis (for men only), for women: years since menopause onset vs pre-menopausal, hysterectomy vs premenopausal | logistic regression odds ratio | 1.8(0.87, 3.73) | NS |
| de Krom,M.C. 1990 | Moderate | N= 629; 28 cases and all controls were identified through random sample of patients in the Netherlands. An additional 128 cases were added from a single hospital in the area | clinical history and neurophysiologic testing | hysterectomy vs menopause more than 5 years ago | matched by: age and gender/sex stratified random sample ; covariates: height, weight(kg), slimming courses(yes/no), Hours/week in flexion activities, hours/week for extension activities, Varicosis (for men only), for women: years since menopause onset vs pre-menopausal, hysterectomy vs premenopausal | logistic regression odds ratio | | women who have had a hysterectomy are significantly more likely to get CTS than greater than 5 year post-menopausal women |

*TABLE 60 RISK FACTOR: FIBROMYALGIA*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Fahmi,D.S. 2013 | Moderate | N= 100 ; all are housewives with moderate socio-economic standing | electrophysiologically diagnosed | fibromyalgia | fibromyalgia | risk ratio | 6.65(2.33, 19.027) | odds higher in fibromyalgia patients |

*TABLE 61 RISK FACTOR: FORCE*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | upper extremity force derived from factor analysis(includes Occupational Information Network(O*NET): general physical activity, static strength, explosive strength on ) 2nd quartile vs 1st quartile | Model 3 with O*NET factor variables: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 2.15 (1.10, 4.18) | Workers who use more upper extremity force are at higher odds of median neuropathy |
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | upper extremity force derived from factor analysis(includes Occupational Information Network(O*NET): general physical activity, static strength, explosive strength on ) 2nd quartile vs 1st quartile | Model 3 with O*NET factor variables: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 3.48 (1.81, 6.66) | Workers who use more upper extremity force are at higher odds of median neuropathy |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | upper extremity force derived from factor analysis(includes Occupational Information Network(O*NET): general physical activity, static strength, explosive strength on ) 3rd quartile vs 1st quartile | Model 3 with O*NET factor variables: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 2.48 (1.19, 5.15) | Workers who use more upper extremity force are at higher odds of median neuropathy |
| Bonfiglioli,R. 2013 | High | N= 2299 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms and NCS test at 3 years | peak force, unitary increase (1-7) | Gender/sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) |  | 1.09(.97, 1.22) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Burt,S. 2011 | Moderate | N= 448 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | Peak force match cat 2 versus 1 | Model 1 Peak force match cat 2 versus 1, Peak force match cat 3 versus 1, Exerts/min cat 2 versus 1 if BMI<30, Exerts/min cat 3 versus 1 if BMI<30, Exerts/min cat 2 versus 1 if BMI>=30, Exerts/min cat 3 versus 1 if BMI>=30, BMI>=30 versus <30 if exerts/min cat¼1, BMI>=30 versus <30 if exerts/min cat¼2 1.60, BMI>=30 versus <30 if exerts/min cat¼3 | logistic regression odds ratio | 1.33 (0.58-3.04) | NS |
| Burt,S. 2011 | Moderate | N= 448 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | Peak force match cat 3 versus 1 | Model 1 Peak force match cat 2 versus 1, Peak force match cat 3 versus 1, Exerts/min cat 2 versus 1 if BMI<30, Exerts/min cat 3 versus 1 if BMI<30, Exerts/min cat 2 versus 1 if BMI>=30, Exerts/min cat 3 versus 1 if BMI>=30, BMI>=30 versus <30 if exerts/min cat¼1, BMI>=30 versus <30 if exerts/min cat¼2 1.60, BMI>=30 versus <30 if exerts/min cat¼3 | logistic regression odds ratio | 2.74 (1.32-5.68) | highest level of peak force increases the odds of CTS versus the lowest level of peak force |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | Forceful gripping in most recent job | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 2.70 (1.26, 5.78) | increased odds of CTS for those conducting forceful activities (lifting and gripping) |

*TABLE 62 RISK FACTOR: FRACTURE*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Dyer,G. 2008 | Low | N= 100 ; all had fractures associated with the distal radius | progressive numbness in the median nerve distribution with or without weakness of palmar abduction | fracture translation percentage | matched by: age and Gender/Sex ; covariates: all bivariate associations with P values over .08 were excluded from multivariate model | logistic regression odds ratio and p value | .26 p=.02 | percent distal radius fracture translation increases the odds of CTS |
| Geoghegan,J.M. 2004 | Moderate | N= 190 ; patients from the UK General Practice Research Database | diagnosed CTS | Wrist fracture | matched by: age, gender/sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 2.29 (1.67–3.12) | wrist fracture patients at higher odds of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Morgenstern,H. 1991 | Moderate | N= 1049 ; grocery store checkers belonging to local California union | symptoms of CTS indicated in questionnaire | history of broken wrist | matched by: all members were members of union food and commercial workers union ; covariates: age, hours per work week, years worked, age*years worked interaction, use of laser scanner to check items, unload basket before checking, load and lift grocery bags after checking, currently pregnant, contraceptive use, use of exogenous estrogen, use of diuretics, history of broken wrist | logistic regression odds ratio | 1.13 (0.54, 2.37) | NS |

*TABLE 63 RISK FACTOR: GENDER/SEX (F)*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | Gender/Sex: male vs female | model 2 best fitting model: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 1.13(.64-2.02) | NS |
| Bonfiglioli,R. 2013 | High | N= 2492 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms at 3 years | being female vs male | Gender/sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | incident rate ratio from Poisson regression | 2.37 (1.83, 3.06) | females are at higher risk of CTS symptoms |
| Bonfiglioli,R. 2013 | High | N= 2299 ; part of Observational Prospective Unified Study (OCTOPUS), enrolled workers in large and small domestic appliance, underwear, ceramic tile and shoe factories | CTS symptoms and NCS test at 3 years | being female vs male | Gender/sex, age, BMI personal history of diseases predisposing to CTS (diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) | incident rate ratio from Poisson regression | 2.85 (1.51, 5.37) | being female increases risk of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Evanoff,B. 2014 | High | 711 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | Female Gender/Sex | adjusted for age, Gender/Sex, and BMI; past diagnosis of CTS or other upper extremity peripheral neuropathy, had a pacemaker or internal defibrillator, or were pregnant at the time of enrollment excluded | Multivariable mixed logistic regression models OR | 1.09 (0.49,2.43) | NS |
| Bland,J.D. 2005 | Low | N= 4155 ; all patients referred to the neurophysiology service at hospital for suspicion of CTS | NCS confirmed CTS | Gender/Sex: female vs male | Gender/Sex, smoking, age, BMI*age interaction | logistic regression OR | 1.11(0.96,1.27) | NS |
| Burt,S. 2011 | Moderate | N= 456 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | Gender/Sex female vs male at the mean hand activity level | Model 2: peak worker perceived exertion rating (0-10), BMI, Hand Activity Level among females, Hand Activity Level among males, Gender/Sex | logistic regression odds ratio | 2.21 (1.17-4.15) | females are at higher CTS odds |
| Burt,S. 2011 | Moderate | N= 455 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | Gender/Sex female vs male at the mean hand activity level | Model 3: peak worker perceived exertion rating (0-10), BMI, Hand Activity Level among females, Hand Activity Level among males, Gender/Sex female vs male at the mean hand activity level | logistic regression odds ratio | 1.77 (0.99-3.17) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Eleftheriou,A. 2012 | Moderate | N= 441 ; 548 workers of a Governmental data entry & processing unit | personal history of CTS or newly diagnosed CTS with CTS-7 algorithm score of 12 or more | Gender/sex (female vs male) | Keyboard strokes, gender/sex, physical activity, age | logistic regression OR | 4.08 (1.51 to 11.04) | females have greater odds of CTS |
| Shin,J. 2008 | Moderate | N= 123 ; All were hemodialysis patients | pain or pain in median nerve distribution and Tinel's sign | Gender/Sex | age, gender/sex, predialysis plasma BMG level in 1990, duration of dialysis | logistic regression OR | 0.89(0.05,15.51) | NS |
| Silverstein,B.A. 1987 | Moderate | N= 652 ; workers form seven different industrial sites | based on phalen and tinel's signs and symptoms mentioned in interview | Gender/Sex | Gender/Sex, age, years on job, work repetition, level of force involved in job, dummy variables controlling for job center effects | logistic regression OR | 1.17(0.29,4.69) | NS |
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of “classic/ probable” or “possible” symptoms of CTS | Female Gender/Sex | gender/sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 4.0 (2.3– 6.7) | Odds of CTS were significantly greater in Females |

*TABLE 64 RISK FACTOR: GENERAL COMORBIDITIES*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Estirado de, Cabo E. 2003 | Low | N= 727 ; all patients had toxic oil syndrome | some were previously diagnosed by physician, others were diagnosed with electrodiagnostic tests and Tinel's and/or Phalen’s sign at 9 years | Toxic Oil Syndrome (TOS) with concomitant neuropathy vs toxic oil syndrome alone | Model1 (all patients):TOS with Neuropathy, TOS with Thromboembolic events, TOS with scleroderma, smoking | logistic regression odds ratio | 3.32(1.47-7.5) | TOS patients with Neuropathy were at higher odds of CTS than TOS patients without neuropathy |
| Estirado de, Cabo E. 2003 | Low | N= 727 ; all patients had toxic oil syndrome | some were previously diagnosed by physician, others were diagnosed with electrodiagnostic tests and Tinel's and/or Phalen’s sign at 9 years | Toxic Oil Syndrome (TOS) with concomitant Thromboembolic events vs toxic oil syndrome alone | Model1 (all patients):TOS with Neuropathy, TOS with Thromboembolic events, TOS with scleroderma, smoking | logistic regression odds ratio | 2.85(1.14-7.13) | TOS patients with thromboembolic events were at higher odds of CTS than TOS patients without thromboembolitic events |
| Estirado de, Cabo E. 2003 | Low | N= 727 ; all patients had toxic oil syndrome | some were previously diagnosed by physician, others were diagnosed with electrodiagnostic tests and Tinel's and/or Phalen’s sign at 9 years | Toxic Oil Syndrome (TOS) with concomitant scleroderma vs toxic oil syndrome alone | Model1 (all patients):TOS with Neuropathy, TOS with Thromboembolitic events, TOS with scleroderma, smoking | logistic regression odds ratio | .43(.24-.8) | TOS patients with scleroderma were at lower odds of CTS than TOS patients without scleroderma |
| Estirado de, Cabo E. 2003 | Low | N= 727 ; all patients had toxic oil syndrome | some were previously diagnosed by physician, others were diagnosed with electrodiagnostic tests and Tinel's and/or Phalen’s sign at 9 years | TOS patients with fibrositis vs TOS patients without Fibrositis | Model1 (all patients):TOS with Neuropathy, TOS with Thromboembolitic events, TOS with scleroderma, smoking | logistic regression odds ratio | NR | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Estirado de, Cabo E. 2003 | Low | N= 495 ; all female patients had toxic oil syndrome | some were previously diagnosed by physician, others were diagnosed with electrodiagnostic tests and Tinel's and/or Phalen’s sign at 9 years | TOS women with fibrositis vs TOS women without Fibrositis | Model 2: female patients (with fibrosis as covariate)TOS with Neuropathy, TOS with Thromboembolitic events, TOS with scleroderma, smoking, fibrosis | logistic regression odds ratio | 2.53(1.06-3.2) | women with fibrositis and TOS are at higher odds of CTS than TOS women patients without fibrositis |
| Estirado de, Cabo E. 2003 | Low | N= 495 ; all female patients had toxic oil syndrome | some were previously diagnosed by physician, others were diagnosed with electrodiagnostic tests and Tinel's and/or Phalen’s sign at 9 years | TOS women who had miscarriages versus women with TOS who did not have a miscarriage | Model 3: female TOS (with miscarriages as a covariate) with Neuropathy, TOS with Thromboembolitic events, TOS with scleroderma, smoking, miscarriages | logistic regression odds ratio | 1.84(1.04-3.2) | women who had miscarriages and have TOS are at higher odds of CTS than TOS women who did not have a miscarriage |
| Keese,G.R. 2006 | Low | N= 72 ; CTS cases and control patients selected from one clinic | symptoms and neurodiagnostic test at 6 months | bilateral agenesis vs none | matched by: age, Gender/Sex, industrial exposures, diabetes, thyroid disease, alcohol abuse and rheumatoid arthritis ; covariates: bilateral agenesis vs none | odds ratio | 0.23(0.024, 2.167) | ns |
| Keese,G.R. 2006 | Low | N= 72 ; CTS cases and control patients selected from one clinic | symptoms and neurodiagnostic test at 6 months | unilateral agenesis vs none | matched by: age, Gender/Sex, industrial exposures, diabetes, thyroid disease, alcohol abuse and rheumatoid arthritis ; covariates: unilateral agenesis vs none | odds ratio | .099(.005, 1.909) | odds are higher in patients with unilateral agenesis |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Kopec,J. 2011 | Low | N= 386 ; all patients were on hemodialysis | signs and symptoms verified by nerve conduction studies | presence of Anti-HCV antibodies | presence of Anti-HCV antibodies | p value from chi squared test | <.00001 | presence of anti-hcv antibodies increased the odds of CTS |
| Vogelsang,L.M. 1994 | Low | N= 100 ; all were worked in what were considered high risk occupations(automotive parts or assembly workers, keyboard operators, electronics industry workers, and garment industry workers from East Tennessee, and sign language interpreters). Each case was matched by age, Gender/Sex, race/ethnicity, height, weight, body type, length of time, job duties | diagnosed by orthopaedist | RMC, Related Medical Conditions | social readjustment scale, self-control schedule, life style approaches scale, self-control questionnaire, perceived stress scales, Cohen-Hoberman Inventory of Physical Symptoms, related medical condition, suspected medical risk, related musculoskeletal problems | p value logistic regression | <.05 | patients with CTS were more likely to have related medical conditions |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Vogelsang,L.M. 1994 | Low | N= 100 ; all were worked in what were considered high risk occupations(automotive parts or assembly workers, keyboard operators, electronics industry workers, and garment industry workers from East Tennessee, and sign language interpreters). Each case was matched by age, Gender/Sex, race/ethnicity, height, weight, body type, length of time, job duties | diagnosed by orthopaedist | MR, Suspected Medical Risk factors related to CTS | social readjustment scale, self-control schedule, life style approaches scale, self-control questionnaire, perceived stress scales, Cohen-Hoberman Inventory of Physical Symptoms, related medical condition, suspected medical risk, related musculoskeletal problems | p value logistic regression | >.05 | NS |
| Burt,S. 2011 | Moderate | N= 455 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | High blood pressure vs no | Model 3: peak worker perceived exertion rating (0-10), BMI, Hand Activity Level among females, Hand Activity Level among males, Gender/Sex female vs male at the mean hand activity level | logistic regression odds ratio | 1.89 (1.01-3.53) | High blood pressure increases CTS odds |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Mondelli,M. 2006 | Moderate | N= 145 ; female hospital floor cleaners in Italy | diagnosed according to AAN criteria: population of hospital floor cleaners | other diseases(diabetes connective tissue diseases, hypothyroidism, and wrist/hand trauma) vs none | Age, BMI, duration of occupational exposure to current job, occupational exposure to the same job for previous employers, manual hobbies (including motorcycle use, diseases known to be associated with CTS (diabetes connective tissue diseases, hypothyroidism, and wrist/hand trauma), hospital (to adjust for center effects) | logistic regression OR | 1.47 (0.45-4.79) | NS |

*TABLE 65 RISK FACTOR: GENETICS/FAMILY HISTORY*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | monozygotic vs dizygotic twins(supposed to be a measure of genetic risk of CTS) | matched by: pairs of twins ; covariates: age, height, weight, menopausal status, and physical activity | heritability statistic | .47(.34, .59) | 47 percent of the variation in CTS diagnoses was attributable to whether the twins in this population were monozygotic as opposed to dizygotic |
| Bland,J.D. 2005 | Low | N= 4155 ; all patients referred to the neurophysiology service at hospital for suspicion of CTS | NCS confirmed CTS | Family history | Gender/Sex, smoking, age, BMI*age interaction | logistic regression OR | 1.11(0.91,1.34) | NS |
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS symptoms | CTS familiar history | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 1.68(0.74–3.82) | NS |
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS diagnosis with clinical and electrodiagnostic examinations | CTS familiar history | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 3.6(1.20–10.75) | CTS family history increases risk |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Burt,S. 2011 | Moderate | N= 456 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | Hand Activity Level among females | Model 2: peak worker perceived exertion rating (0-10), BMI, Hand Activity Level among females, Hand Activity Level among males, Gender/Sex | logistic regression odds ratio | 1.03 (0.83-1.28) | NS |
| Burt,S. 2011 | Moderate | N= 456 ; healthcare and manufacturing workers | electrodiagnostic tests, hand diagram and symptoms | Hand Activity Level among males | Model 2: peak worker perceived exertion rating (0-10), BMI, Hand Activity Level among females, Hand Activity Level among males, Gender/Sex | logistic regression odds ratio | 1.38 (1.05-1.81) | Higher hand activity level increases the odds of CTS |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Parent, child, or sibling had CTS | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 1.87 (0.97, 3.60) | NS |
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of "classic/ probable" or "possible" symptoms of CTS | family history (yes versus no) | gender/sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 1.2 (0.7–2.0) | NS |

*TABLE 66 RISK FACTOR: GRIP*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | using forceful hand grip | model 1:age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, using vibrating tools, assembly line work, twisting forearm work, bending wrist work, using forceful hand grip, using fingers/thumb as pressing tool, using fingers in a pinch grip | logistic regression OR | 1.68 (1.12, 2.53) | using forceful hand grip is associated with higher odds of median neuropathy |
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | using fingers in pinch grip | model 1:age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, using vibrating tools, assembly line work, twisting forearm work, bending wrist work, using forceful hand grip, using fingers/thumb as pressing tool, using fingers in a pinch grip | logistic regression OR | 1.24 (0.82, 1.86) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | peak exposure to Forceful gripping | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 2.21 (1.03, 4.73) | increased risk of CTS for those conducting forceful activities (lifting and gripping) |
| Evanoff,B. 2012 | Moderate | N= 745 ; newly employed workers | symptoms and NCS at 3 years | pinch grip | age, Gender/Sex, lifting at least 1kg, forceful grip, finger/thumb pressing, using vibrating tools, pinch grip, forearm rotation, hand/wrist bending | NR | NR | NS |
| Evanoff,B. 2012 | Moderate | N= 745 ; newly employed workers | symptoms and NCS at 3 years | forceful gripping | age, Gender/Sex, lifting at least 1kg, forceful grip, finger/thumb pressing, using vibrating tools, pinch grip, forearm rotation, hand/wrist bending | logistic regression odds ratio | 2.59(1.12-5.99) | forceful gripping increases CTS odds |

*TABLE 67 RISK FACTOR: HEIGHT*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of "classic/ probable" or "possible" symptoms of CTS | tall height with short forearm length versus short height and short forearm length (tall/long=50th percentile or higher) | gender/sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 0.5 (0.3– 0.9) | being tall with a short forearm significantly decreases odds of CTS compared to short stature with short forearm |

*TABLE 68 RISK FACTOR: HOBBIES*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | Gardening | Model1: ACGIH Hand Activity Level (HAL) ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 3.02 (1.28–7.15) | gardening is a risk factor for CTS |
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | Gardening | Model 2: strain index ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 3.17 (1.34–7.46) | gardening is a risk factor for CTS |
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | Leisure activity (low vs. high level) | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 1(0.80–1.26) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Tang,X. 1999 | Low | N= 122 ; female cases and controls recruited from one hospital neurology department | CTS signs and symptoms with selective abnormalities of the MN conduction distal to the wrist that showed slowing compared to a separately cited average values from another population | duration knitting hours per week | matched by: age and diabetes ; covariates: duration knitting hours per week | odds ratio | 1 | NS |
| Tang,X. 1999 | Low | N= 122 ; female cases and controls recruited from one hospital neurology department | CTS signs and symptoms with selective abnormalities of the MN conduction distal to the wrist that showed slowing compared to a separately cited average values from another population | knitting more than 2 hours per week | matched by: age and diabetes ; covariates: knitting more than 2 hours per week | odds ratio | 1.13(.57,2.22) | NS |
| Ali,K.M. 2006 | Moderate | N= 648 ; computer professionals from 21 companies | Phalen's and Tinel's test | internet use | age, Gender/Sex, smoking, alcohol use, BMI, years of computer work, hours of computer work per day, system administrator job vs other job functions, and internet use in leisure time | logistic regression odds ratio | 1.7(1.2,2.7) | internet use increases odds of CTS |
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS symptoms | Hand-knitting/needlework | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 2.21(1.09–4.47) | people who hand-knit/do needle work are at higher odds for CTS symptoms |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS diagnosis with clinical and electrodiagnostic examinations | Hand-knitting/needlework | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 2(0.68–5.87) | NS |
| Eleftheriou,A. 2012 | Moderate | N= 441 ; 548 workers of a Governmental data entry & processing unit | personal history of CTS | history of physical sports activity (yes vs no) | Keyboard strokes, age, physical activity, smoking | logistic regression OR | 0.38 (0.16 to 0.87) | history of physical activity is associated with lower risk of CTS |
| Eleftheriou,A. 2012 | Moderate | N= 441 ; 548 workers of a Governmental data entry & processing unit | personal history of CTS or newly diagnosed CTS with CTS-7 algorithm score of 12 or more | history of physical sports activity (yes vs no) | Keyboard strokes, gender/sex, physical activity, age | logistic regression OR | 0.72 (0.44 to 1.20) | NS |
| Goodson, J.T. 2014 | Moderate | 87 CTS and 74 sex-matched general orthopedic patients from an outpatient orthopedic clinic in the Western US. | (1)Electrodiagnostic (EDX) testing results suggestive of abnormal slowing of the median nerve, (2) the presence of clinical symptoms of CTS, and (3) no confounding syndromes/disorders | vigorous exercise | excluded confounding conditions; gender/sex, age, education levels, ethnicity, and EDX testing results | Logistical Regression OR | 0.997(0.995,0.999) | Vigorous exercise decreases odds |
| Goodson, J.T. 2014 | Moderate | 87 CTS and 74 sex-matched general orthopedic patients from an outpatient orthopedic clinic in the Western US. | (1)Electrodiagnostic (EDX) testing results suggestive of abnormal slowing of the median nerve, (2) the presence of clinical symptoms of CTS, and (3) no confounding syndromes/disorders | physical activities with wrist strain | excluded confounding conditions; gender/sex, age, education levels, ethnicity, and EDX testing results | Logistical Regression OR | 1.002(1,1.004) | physical activity that involves wrist strain increases odds of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Mondelli,M. 2006 | Moderate | N= 145 ; female hospital floor cleaners in Italy | diagnosed according to AAN criteria: population of hospital floor cleaners | hobbies (including motorcycle riding) vs none | Age, BMI, duration of occupational exposure to current job, occupational exposure to the same job for previous employers, manual hobbies (including motorcycle use, diseases known to be associated with CTS (diabetes connective tissue diseases, hypothyroidism, and wrist/hand trauma), hospital (to adjust for center effects) | logistic regression OR | 1.73 (0.75-3.98) | NS |

*TABLE 69 RISK FACTOR: HOSPITAL WORK*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | hospital vs clerical work | model 2 best fitting model: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 2.42 (0.96, 6.09) | NS |

*TABLE 70 RISK FACTOR: HOUSEWORK*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Hakim,A.J. 2002 | High | N= 3674 ; twins from the UK Adult Twin Registry | hand diagram: classic or probable CTS | Home activity (low vs. high level) | matched by: pairs of twins ; covariates: age, BMI, home activity level, leisure activity level, clerical vs not clerical occupation, menopausal status, hysterectomy, use of hormone replacement therapy, current use of thyroxine replacement therapy | logit regression odds ratio with adjustment for pair codependency | 1.21(0.95–1.55) | NS |
| Tang,X. 1999 | Low | N= 122 ; female cases and controls recruited from one hospital neurology department | CTS signs and symptoms with selective abnormalities of the MN conduction distal to the wrist that showed slowing compared to a separately cited average values from another population | washing clothes manually more than 2 hours per week | matched by: age and diabetes ; covariates: washing clothes manually more than 2 hours per week | odds ratio | 3.86(1.79,8.33) | washing clothes manually more than 2 hours per week increase odds of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Tang,X. 1999 | Low | N= 122 ; female cases and controls recruited from one hospital neurology department | CTS signs and symptoms with selective abnormalities of the MN conduction distal to the wrist that showed slowing compared to a separately cited average values from another population | continuous duration of washing clothes per week | matched by: age and diabetes ; covariates: continuous duration of washing clothes per week | odds ratio | 2.33(.63-8.64) | NS |
| Tang,X. 1999 | Low | N= 122 ; female cases and controls recruited from one hospital neurology department | CTS signs and symptoms with selective abnormalities of the MN conduction distal to the wrist that showed slowing compared to a separately cited average values from another population | kneading or rolling dough manually more than 2 hours per week | matched by: age and diabetes ; covariates: kneading or rolling dough manually more than 2 hours per week | odds ratio | 6.25(2.5,15.63) | kneading or rolling dough more than 2 hours per week increases odds of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Tang,X. 1999 | Low | N= 122 ; female cases and controls recruited from one hospital neurology department | CTS signs and symptoms with selective abnormalities of the MN conduction distal to the wrist that showed slowing compared to a separately cited average values from another population | continuous duration of kneading or rolling dough per week | matched by: age and diabetes ; covariates: continuous duration of kneading or rolling dough per week | odds ratio | 1.88(.81,4.38) | NS |
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS symptoms | Children | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 1.61(0.83–3.13) | NS |
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS diagnosis with clinical and electrodiagnostic examinations | Children | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 2.16(0.67–6.95) | the presence of children increases odds of CTS |

*TABLE 71 RISK FACTOR: INDUSTRIAL*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Process, plant, and machine operatives vs. Associate professional and technical occupations | matched by: all males ; covariates: Process, plant, and machine operatives vs. Associate professional and technical occupations | univariate odds ratios | 2.69 (1.58–4.76) | odds are higher than in associate professional and technical occupations |
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Process, plant, and machine operatives vs. Associate professional and technical occupations | matched by: all females ; covariates: Process, plant, and machine operatives vs. Associate professional and technical occupations | univariate odds ratios | 1.99 (1.12–3.51) | odds are higher than in associate professional and technical occupations |
| Leclerc,A. 1998 | Low | N= 601 ; clothing and shoe (non packaging) workers and non-repetitive workers(cleaning, maintenance or catering jobs) | Tinel or phalen test positive or nerve condition velocity had been established before medical examination | clothing and shoe industry (non-packaging) vs non repetitive work (cleaning, maintenance and catering) | matched by: all were of similar education level ; covariates: gender/sex, age, psychological problems, BMI | logistic regression odds ratio | 4.12 (1.95 to 8.71) | odds of CTS are significantly higher in clothing and shoe industry workers |
| Leclerc,A. 1998 | Low | N= 644 ; food industry (non-packaging) workers and non-repetitive workers( or catering jobs) | Tinel or phalen test positive or nerve condition velocity had been established before medical examination | food industry workers (non-packaging) vs non repetitive work (cleaning, maintenance and catering) | matched by: all were of similar education level ; covariates: gender/sex, age, psychological problems, BMI | logistic regression odds ratio | 3.14 (1.38 to 7.15) | odds of CTS are significantly higher in food (non-packaging) workers |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Leclerc,A. 1998 | Low | N= 497 ; packaging workers and non-repetitive workers( or catering jobs) | Tinel or phalen test positive or nerve condition velocity had been established before medical examination | packaging workers vs non repetitive work (cleaning, maintenance and catering) | matched by: all were of similar education level ; covariates: gender/sex, age, psychological problems, BMI | logistic regression odds ratio | 6.55 (3.02 to 14.2) | odds of CTS are significantly higher in packaging workers |
| Roquelaure,Y. 2008 | Moderate | N= 194276 ; French prospectively CTS surveillance system | clinical and electrodiagnostic tests at 3 years | Blue-collar workers vs unemployed | matched by: among women ; covariates: controlled for age, stratified by gender/sex | relative risk ratio | 3.0 [2.5-3.6] | risk significantly higher than in the unemployed |
| Roquelaure,Y. 2008 | Moderate | N= 193802 ; French prospectively CTS surveillance system | clinical and electrodiagnostic tests at 3 years | Blue-collar workers vs unemployed | matched by: among men ; covariates: controlled for age, stratified by gender/sex | relative risk ratio | 4.2 [3.3-5.5] | risk significantly higher than in the unemployed |

*TABLE 72 RISK FACTOR: JOB CONTROL*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Coggon,D. 2013 | Moderate | N= 1230; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs healthy controls | little job control in work done, in timetables, or breaks | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking, mental health, repeated movements, vibrating tools, job control, level of supervisor/colleague support | logistic regression OR | 1.4 (1.1-2.0) | odds higher in patients with little job control |
| Coggon,D. 2013 | Moderate | N= 855; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs negatively tested patients | job includes targets, bonuses or deadlines | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking habits, diabetes, other arthritis present, number of moderately distressing somatic symptoms per week, use of keyboard 4 or more hours per day, use of vibrating tools, job includes bonuses/targets/deadlines | logistic regression OR | 1.2 (0.9-1.7) | NS |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | IOSH Job control (0=least) 2.8-3.4 vs1-2.7 | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 1.05 (0.48, 2.27) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | IOSH Job control (0=least) 3.6-3.8 vs1-2.7 | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 0.34 (0.14, 0.82) | higher job control associated with lower CTS odds |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | IOSH Job control (0=least) 4-4.4 vs1-2.7 | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 0.64 (0.29, 1.42) | NS |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | IOSH Job control (0=least) 4.6-4.8 vs1-2.7 | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 0.35 (0.14, 0.91) | higher job control associated with lower CTS odds |

*TABLE 73 RISK FACTOR: LACK OF COWORKER SUPPORT*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Werner,R.A. 2005 | Low | N= 189 ; all were automobile assembly line workers | hand diagram symptoms, and median sensory evoked response that .5 msec longer than ipsilateral ulnar sensory response at 1 year | coworker support level | Gender/Sex, wrist/hand tendonitis, diabetes, coworker support, median ulnar peak latency on dominant side, elbow posture rating | logistic regression odds ratio | .69(.48,.99) | higher levels of coworker support was associated with lower odds of CTS |
| Coggon,D. 2013 | Moderate | N= 1230; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs healthy controls | little level of support from supervisors or colleagues | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking, mental health, repeated movements, vibrating tools, job control, level of supervisor/colleague support | logistic regression OR | 1.6 (1.1-2.3) | odds higher in patients with little level of support |

*TABLE 74 RISK FACTOR: LENGTH OF EMPLOYMENT*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS symptoms | Previous at-risk jobs | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 1.01(0.94–1.09) | NS |
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS diagnosis with clinical and electrodiagnostic examinations | Previous at-risk jobs | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 0.95(0.84–1.07) | NS |
| Mondelli,M. 2006 | Moderate | N= 145 ; female hospital floor cleaners in Italy | diagnosed according to AAN criteria: population of hospital floor cleaners | same job with previous employers yes vs no | Age, BMI, duration of occupational exposure to current job, occupational exposure to the same job for previous employers, manual hobbies (including motorcycle use, diseases known to be associated with CTS (diabetes connective tissue diseases, hypothyroidism, and wrist/hand trauma), hospital (to adjust for center effects) | logistic regression OR | 12.15 (2.96-49.93) | patients who had same floor cleaner job with a previous employer had greater odds of CTS than those who did not have same job at previous employer |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Worked 4880-5383 vs 2954 hours | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 0.29 (0.12, 0.72) | more hours worked since 1993 was associated with lower odds of CTS |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Worked 6647-15510 vs 2954 hours | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 0.29 (0.10, 0.78) | more hours worked since 1993 was associated with lower odds of CTS |

*TABLE 75 RISK FACTOR: LEVEL OF SATISFACTION*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Goodson, J.T. 2014 | Moderate | 87 CTS and 74 gender/sex-matched general orthopedic patients from an outpatient orthopedic clinic in the Western US. | (1)Electrodiagnostic (EDX) testing results suggestive of abnormal slowing of the median nerve, (2) the presence of clinical symptoms of CTS, and (3) no confounding syndromes/disorders | Job Satisfaction | excluded confounding conditions; gender/sex, age, education levels, ethnicity, and EDX testing results | Logistical Regression OR | 0.66(0.5,0.88) | Job satisfaction decreases odds of CTS |

*TABLE 76 RISK FACTOR: LIFTING*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | lifting 2 or more pounds/day | model 1:age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, using vibrating tools, assembly line work, twisting forearm work, bending wrist work, using forceful hand grip, using fingers/thumb as pressing tool, using fingers in a pinch grip | logistic regression OR | 3.31(1.54, 7.12) | lifting 2 or more pounds/day significantly increases CTS odds |
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | lifting 2 or more pounds/day | model 2 best fitting model: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 2.67 (1.21, 5.88) | lifting 2 or more pounds/day is associated with higher odds of median neuropathy |
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | peak exposure to Lifting objects | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 3.61 (1.41, 9.24) | Peak exposure to lifting increases odds of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | Lifting objects in most recent job | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 2.98 (1.41, 6.31) | Lifting increases odds |
| Evanoff,B. 2012 | Moderate | N= 745 ; newly employed workers | symptoms and NCS at 3 years | lifting more than 1 kg/day | age, Gender/Sex, lifting at least 1kg, forceful grip, finger/thumb pressing, using vibrating tools, pinch grip, forearm rotation, hand/wrist bending | logistic regression odds ratio | 3.27(1.27, 8.44) | lifting at least 1 kg increases CTS odds |
| Nathan,P.A. 2005 | Moderate | N= 148 ; industrial workers in Portland Oregon area | clinical and electrodiagnostic tests at 15-16 years | heavy lifting | repetitious movement, heavy lifting, keyboard use, vibration tools, force, cigarette use, Gender/Sex, age, BMI | logistic regression odds ratio | 1.31 (p-value=.63) | NS |

*TABLE 77 RISK FACTOR: MANAGERIAL JOBS*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Managers, directors, and senior officials vs. Associate professional and technical occupations | matched by: all males ; covariates: Managers, directors, and senior officials vs. Associate professional and technical occupations | univariate odds ratios | 0.88 (0.43–1.77) | NS |
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Managers, directors, and senior officials vs. Associate professional and technical occupations | matched by: all females ; covariates: Managers, directors, and senior officials vs. Associate professional and technical occupations | univariate odds ratios | 1.69 (0.99–2.91) | NS |

*TABLE 78 RISK FACTOR: MARITAL STATUS*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Kaplan,Y. 2008 | Low | N= 221 ; all were postmenopausal women | NCS | marital status-married versus other | matched by: age matched females ; covariates: marital status | p-value | >.05 | NS |

*TABLE 79 RISK FACTOR: MENTAL*

| **Study** | **Quality** | **Population** | **CTS Diagnostics** | **Risk Factor** | **Confounding Adjustment** | **Stat. Type** | **Results** | **Significance** |
|---|---|---|---|---|---|---|---|---|
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the mid-west | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | feeling down or blue or depressed never vs seldom | Model1: ACGIH Hand Activity Level (HAL) ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 0.08 (.01–0.62) | depression/feeling down is associated with CTS |
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | feeling down or blue or depressed often vs seldom | Model1: ACGIH Hand Activity Level (HAL) ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 0.99 0.44–2.24) | NS |
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | feeling down or blue or depressed always vs seldom | Model1: ACGIH Hand Activity Level (HAL) ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 8.19 1.69–39.72) | depression/feeling down is associated with CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | feeling down or blue or depressed never vs seldom | Model 2: strain index ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 0.10 (0.01–0.71) | depression/feeling down is associated with CTS |
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | feeling down or blue or depressed often vs seldom | Model 2: strain index ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 0.94 (0.42–2.12) | NS |
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | feeling down or blue or depressed always vs seldom | Model 2: strain index ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 8.44 1.73–41.16) | depression/feeling down is associated with CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Roquelaure,Y. 2001 | Low | N= 162 ; footwear factory workers | psychological distressed measured by G at 2 year | psychological distress measured by General Health Questionnaire (GHQ-12) greater or equal to 90th percentile | BMI over 30,GHQ-12 score, rapid trigger movements, work strongly controlled by superiors | logistic regression odds ratio | 4.3 (1.0-18.6) | having high levels of psychological distress on the GHQ-12 (90th percentile) was associated with greater odds of CTS |
| Coggon,D. 2013 | Moderate | N= 1230; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs healthy controls | intermediate mental health vs good mental health | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking, mental health, repeated movements, vibrating tools, job control, level of supervisor/colleague support | logistic regression OR | 1.3 (0.9-1.7) | NS |
| Coggon,D. 2013 | Moderate | N= 1230; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs healthy controls | poor mental health vs good mental health | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking, mental health, repeated movements, vibrating tools, job control, level of supervisor/colleague support | logistic regression OR | 1.4 (1.0-1.9) | odds higher in patients with poor mental health |

*TABLE 80 RISK FACTOR: MODERATE ALCOHOL USE*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of “classic/ probable” or “possible” symptoms of CTS | Moderate alcohol consumption (defined as 2 to 4 drinks per week) | gender/sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 0.2 (0.1–1.0) | Moderate alcohol consumption decreases odds of CTS. Greater alcohol consumption did not significantly affect odds of CTS |

*TABLE 81 RISK FACTOR: MUSCULOSKELETAL*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | 1 to 2 distal upper extremity musculoskeletal disorders vs zero disorders | Model1: ACGIH Hand Activity Level (HAL) ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 2.45 (1.21–5.08) | more distal upper extremity musculoskeletal disorders is associated with higher CTS risk |
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | 3 or more distal upper extremity musculoskeletal disorders vs zero disorders | Model1: ACGIH Hand Activity Level (HAL) ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 3.85 (1.08–13.8) | more distal upper extremity musculoskeletal disorders is associated with higher CTS risk |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | 1 to 2 distal upper extremity musculoskeletal disorders vs zero disorders | Model 2: strain index ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 2.66 (1.30–5.45) | more distal upper extremity musculoskeletal disorders is associated with higher CTS risk |
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | 3 or more distal upper extremity musculoskeletal disorders vs zero disorders | Model 2: strain index ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 3.70 (1.02–13.46) | more distal upper extremity musculoskeletal disorders is associated with higher CTS risk |
| Bayrak,I.K. 2008 | Low | N= 290 ; CTS patients were from electrophysiology clinic, and controls were selected from patients who underwent ultrasound for other reasons | clinically and electrophysiologically | bifid median nerve | bifid median nerve | chi squared p value | <.01 | bifid median nerve was more frequent in CTS case patients than in control patients |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Keese,G.R. 2006 | Low | N= 72 ; CTS cases and control patients selected from one clinic | symptoms and neurodiagnostic test at 6 months | Palmaris long us present vs Absent | matched by: age, Gender/Sex, industrial exposures, diabetes, thyroid disease, alcohol abuse and rheumatoid arthritis ; covariates: Palmaris long us present vs Absent | odds ratio | 10(1.18, 84.779) | odds of CTS is significantly higher when Palmaris long us is present |
| Vogelsang,L.M. 1994 | Low | N= 100 ; all were worked in what were considered high risk occupations(automotive parts or assembly workers, keyboard operators, electronics industry workers, and garment industry workers from East Tennessee, and sign language interpreters). Each case was matched by age, Gender/Sex, race/ethnicity, height, weight, body type, length of time, job duties | diagnosed by orthopaedist | GMP, Generic Musculoskeletal Problems. | social readjustment scale, self-control schedule, life style approaches scale, self-control questionnaire, perceived stress scales, Cohen-Hoberman Inventory of Physical Symptoms, related medical condition, suspected medical risk, related musculoskeletal problems | p value logistic regression | <.05 | patients with CTS were more likely to have related generic musculoskeletal problems besides CTS |
| Aktas,I. 2008 | Moderate | N= 90 ; patients referred to electrophysiological laboratory | electrophysiologically diagnosed | benign joint hypermobility | benign joint hypermobility | Pearson’s correlation | 0.59 | joint hypermobility increases CTS risk |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Musculoskeletal condition | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 2.54 (l.03, 6.23) | Odds are greater in patients with musculoskeletal conditions |

*TABLE 82 RISK FACTOR: OFFICE WORK*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Roquelaure,Y. 2008 | Moderate | N= 194276 ; French prospectively CTS surveillance system | clinical and electrodiagnostic tests at 3 years | Lower-grade white-collar workers vs unemployed | matched by: among women ; covariates: controlled for age, stratified by gender/sex | relative risk ratio | 2.5 [2.2-3.0] | risk significantly higher than in the unemployed |
| Roquelaure,Y. 2008 | Moderate | N= 193802 ; French prospectively CTS surveillance system | clinical and electrodiagnostic tests at 3 years | Lower-grade white-collar workers vs unemployed | matched by: among men ; covariates: controlled for age, stratified by gender/sex | relative risk ratio | 1.3 [0.8-2.I] | NS |

*TABLE 83 RISK FACTOR: OTHER*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Elementary occupations vs. Associate professional and technical occupations | matched by: all males ; covariates: Elementary occupations vs. Associate professional and technical occupations | univariate odds ratios | 3.08 (1.78–5.51) | odds are higher than in associate professional and technical occupations |
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Elementary occupations vs. Associate professional and technical occupations | matched by: all females ; covariates: Elementary occupations vs. Associate professional and technical occupations | univariate odds ratios | 4.85 (3.21–7.55) | odds are higher than in associate professional and technical occupations |
| Kaplan,Y. 2008 | Low | N= 221 ; all were postmenopausal women | NCS | home maker versus employed outside of home | matched by: age matched females ; covariates: homemaker versus employed | odds ratio | 1.10 (0.64, 1.89) | NS |
| Wolf,J.M. 2009 | Low | N= ; all were in military | method of diagnosis not explained and done by multiple physicians and specialists | rank junior enlisted vs junior officer | age, Gender/Sex, and race/ethnicity | Poisson regression rate ratio | 1.53 (1.47, 1.59) | junior enlisted soldiers had a significantly higher rate of CTS than junior officers |
| Wolf,J.M. 2009 | Low | N= ; all were in military | method of diagnosis not explained and done by multiple physicians and specialists | rank senior enlisted vs junior officer | age, Gender/Sex, and race/ethnicity | Poisson regression rate ratio | 3.18 (3.06, 3.30) | senior enlisted soldiers had a significantly higher rate of CTS than junior officers |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Wolf,J.M. 2009 | Low | N= ; all were in military | method of diagnosis not explained and done by multiple physicians and specialists | rank senior officer vs junior officer | age, Gender/Sex, and race/ethnicity | Poisson regression rate ratio | 2.72 (2.60, 2.85) | senior officer soldiers had a significantly higher rate of CTS than junior officers |
| Cartwright,M.S. 2012 | Moderate | N= 287 ; Latino manual labor workers in 4 North Carolina counties | diagnosed with a combination of symptoms reported through Katz hand diagram, and nerve conduction studies | poultry worker vs not a poultry worker | age, BMI, Gender/Sex, accounting for center and within person wrist correlation | logistic regression | 2.51(1.8, 3.5) | odds higher in poultry workers |
| Cartwright,M.S. 2014 | Moderate | N= 173 ; Latino poultry and non-poultry manual workers | diagnosed with a combination of symptoms reported through Katz hand diagram, and nerve conduction studies at 1 year | poultry worker vs not a poultry worker | age, BMI, Gender/Sex, accounting for center and within person wrist correlation | logistic regression odds ratio | 1.81(.83, 3.98) | NS |
| Roquelaure,Y. 2008 | Moderate | N= 193802 ; French prospectively CTS surveillance system | clinical and electrodiagnostic tests at 3 years | Craftswomen, saleswomen, and managers vs unemployed | matched by: among men ; covariates: controlled for age, stratified by gender/sex | relative risk ratio | 0.8 [0.4-1.6] | NS |
| Roquelaure,Y. 2008 | Moderate | N= 194276 ; French prospectively CTS surveillance system | clinical and electrodiagnostic tests at 3 years | Craftswomen, saleswomen, and managers vs unemployed | matched by: among women ; covariates: controlled for age, stratified by gender/sex | relative risk ratio | 0.5 [0.3-1.2] | NS |

*TABLE 84 RISK FACTOR: PARAPLEGIC*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Akbar,M., 2014 | Low | N= 112 ; paraplegic recruited from hospital database, and controls recruited through advertisements in the community | history, phalen and Tinel | paraplegic vs healthy controls | matched by: age, Gender/Sex ; covariates: paraplegic vs not | odds ratio | 21.67 (6.85, 68.56) | odds higher in paraplegics |
| Akbar,M., 2014 | Low | N= 112 ; paraplegic recruited from hospital database, and controls recruited through advertisements in the community | electrodiagnostic | paraplegic vs healthy controls | matched by: age, Gender/Sex ; covariates: paraplegic vs not | odds ratio | 7.14 (3.07, 16.62) | odds higher in paraplegics |

*TABLE 85 RISK FACTOR: PIECEWORK PAYMENT*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Petit,A. 2015 | Moderate | French salaried workers working in manufacturing industry and services sector as skilled and unskilled blue collar workers | CTS symptoms on the day of medical exam (or for at least 4 days during the preceding 7 days) | payment on a piecework basis | Gender/Sex, age, use of vibrating hand tools, exposure to cold temperature, holding objects in pinch grip, extreme wrist bending posture, pressing with palm base, force, and work organization factors | Logistical Regression OR | 2 (1.1-3.5) | payment on a piecework basis rather than according to working hours increases odds of CTS |

*TABLE 86 RISK FACTOR: PRESSING*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | using fingers/thumbs as pressing tool | model 1:age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, using vibrating tools, assembly line work, twisting forearm work, bending wrist work, using forceful hand grip, using fingers/thumb as pressing tool, using fingers in a pinch grip | logistic regression OR | 1.19 (0.80, 1.76) | NS |
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | peak exposure to Thumb pressing | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 1.12 (0.54, 2.35) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | Thumb pressing in most recent job | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 1.71 (0.76, 3.86) | NS |

## *TABLE 87 RISK FACTOR: PROFESSIONAL JOBS*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Forst,L. 2006 | Low | N= 371 ; physician and non physician members of North American Spine Society (NASS) | Varied. Based on modified version of questionnaire, and self-diagnosis by physicians | practicing professionally for greater or equal to 5 years | age, ethnicity, surgical specialty, obesity (body mass index [BMI]   30), working as a surgeon for 5 years, use of the Kerrison rongeur (an instrument used for bone removal) | logistic regression odds ratio | 4.24(1.54,4.81) | surgeons with greater than or equal to 5 years experience had significantly greater odds of CTS than those with less experience |
| Forst,L. 2006 | Low | N= 371 ; physician and non-physician members of North American Spine Society (NASS) | Varied. Based on modified version of questionnaire, and self-diagnosis by physicians | being a surgeon who uses the Kerrison rongeur tool versus not using the tool | age, ethnicity, surgical specialty, obesity (body mass index [BMI]   30), working as a surgeon for 5 years, use of the Kerrison rongeur (an instrument used for bone removal) | logistic regression odds ratio | 2.72(1.54, 11.69) | surgeons who used the Kerrison rongeur tool had significantly higher odds of CTS |
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Professional occupations vs. Associate professional and technical occupations | matched by: all males ; covariates: Professional occupations vs. Associate professional and technical occupations | univariate odds ratios | 2.45 (1.38–4.56) | odds are higher than in associate professional and technical occupations |
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Professional occupations vs. Associate professional and technical occupations | matched by: all females ; covariates: Professional occupations vs. Associate professional and technical occupations | univariate odds ratios | 4.85 (3.16–7.64) | odds are higher than in associate professional and technical occupations |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Roquelaure,Y. 2008 | Moderate | N= 194276 ; French prospectively CTS surveillance system | clinical and electrodiagnostic tests at 3 years | Professionals vs unemployed | matched by: among women ; covariates: controlled for age, stratified by gender/sex | relative risk ratio | 0.9 [0.6-1.4] | NS |
| Roquelaure,Y. 2008 | Moderate | N= 193802 ; French prospectively CTS surveillance system | clinical and electrodiagnostic tests at 3 years | Professionals vs unemployed | matched by: among men ; covariates: controlled for age, stratified by gender/sex | relative risk ratio | 0.6 [0.4-1.0] | NS |

*TABLE 88 RISK FACTOR: RACE/ETHNICITY (WHITE VS NON-WHITE)*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Wright, C. 2014 | Low | (3155 w/o CTS diagnosis and 91 with CTS diagnosis); EMR of a cohort of pregnant women receiving prenatal care at a large obstetrics unit; representative of those served by the urban academic center, with a large proportion of black patients | clinically diagnosed with ICD 9 diagnosis code for CTS | Race/Ethnicity Black versus White | age, race/ethnicity, education, smoking, parity, hypertension, diabetes, maternal weight category (constructed variable including information about maternal BMI and GWG), and number prenatal care visits | Logistical Regression OR | 1.2 (0.7-2) | NS |
| Nathan,P.A. 2002 | Moderate | N= 256; workers at 4 industrial sites (a steel mill, meat/food packaging, electronics, and plastics). | electrodiagnostic test and symptoms at 11 years | Race/Ethnicity white vs nonwhite | repetitious movement, heavy lifting, keyboard use, vibration tools, force, cigarette use, Gender/Sex, age, BMI, avocational activities, hormone use, race/ethnicity, endocrine condition, years on job | logistic regression odds ratio | 1.11 (.25–4.89) | NS |

*TABLE 89 RISK FACTOR: RAYNAUD'S*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Winn,F.J.,Jr., 1989 | Low | N= 58 ; cases were seen at Baltimore neurology clinic, healthy controls were selected by those who responded to advertisements in the same area | median nerve or motor sensory symptoms | Raynaud's Symptoms | matched by: age and gender/sex ; covariates: Raynaud's symptoms and median nerve motor function | logistic regression odds ratio | 20.19(4.1,99.33) | Raynaud's Symptoms result in higher CTS diagnosis odds |

*TABLE 90 RISK FACTOR: REPETITION*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; follow worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | factor analysis | repetition (O*NET subscales: time spent making repetitive motions and time spent handling objects) 4th quartile vs 1st | Model 3 with O*NET factor variables: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 1.79 (1.01-3.18) | Work with high hand repetition increases odds of CTS |
| Armstrong,T. 2008 | High | N= 1071; follow worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | factor analysis | repetition (O*NET subscales: time spent making repetitive motions and time spent handling objects) 3rd quartile vs 1st | Model 3 with O*NET factor variables: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 1.11 (0.61-2) | NS |
| Armstrong,T. 2008 | High | N= 1071; follow worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | factor analysis | repetition (O*NET subscales: time spent making repetitive motions and time spent handling objects) 2nd quartile vs 1st | Model 3 with O*NET factor variables: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 1.48 (0.8-2.74) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Evanoff,B. 2014 | High | 711 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | Repetitive Motion required | adjusted for age, Gender/Sex, and BMI; past diagnosis of CTS or other upper extremity peripheral neuropathy, had a pacemaker or internal defibrillator, or were pregnant at the time of enrollment excluded | Multivariable mixed logistic regression models OR | 2.48(1.05-5.86) | Repetitive Motion in Current Job increases odds of CTS |
| Yagev,Y. 2001 | Low | N= 145 ; all male patients from one electrophysiological lab at one hospital | electrodiagnostically diagnosed | low force-high repetitive motion jobs vs low force-low repetitive jobs | matched by: all males ; covariates: job force-repetition level, age, ethnic origin, education, obesity, smoking habits, | logistic regression odds ratio | 2.2(0.5,9.9) | NS |
| Yagev,Y. 2001 | Low | N= 120 ; all female patients from one electrophysiological lab at one hospital | electrodiagnostically diagnosed | low force-high repetitive motion jobs vs low force-low repetitive jobs | matched by: all females ; covariates: job force-repetition level, age, ethnic origin, education, obesity, smoking habits, | logistic regression odds ratio | 7.4(1.9,28) | odds of CTS were significantly greater among females with low force-higher repetitive jobs than those low force low repetitive jobs |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Yagev,Y. 2001 | Low | N= 265 ; all patients from one electrophysiological lab at one hospital | electrodiagnostically diagnosed | low force-high repetitive motion jobs vs low force-low repetitive jobs | job force-repetition level, age, ethnic origin, education, obesity, smoking habits, | logistic regression odds ratio | 4.72(1.8,12.5) | odds of CTS were significantly greater among people with low force-high repetitive jobs than those low force low repetitive jobs |
| Yagev,Y. 2001 | Low | N= 102 ; all male patients from one electrophysiological lab at one hospital | electrodiagnostically diagnosed | high force-low repetitive motion jobs vs low force-low repetitive jobs | matched by: all males ; covariates: job force-repetition level, age, ethnic origin, education, obesity, smoking habits, | logistic regression odds ratio | 2.8(1.1,6.9) | odds of CTS were significantly greater among males with high force-low repetitive jobs than those low force low repetitive jobs |
| Yagev,Y. 2001 | Low | N= 138 ; all female patients from one electrophysiological lab at one hospital | electrodiagnostically diagnosed | high force-low repetitive motion jobs vs low force-low repetitive jobs | matched by: all females ; covariates: job force-repetition level, age, ethnic origin, education, obesity, smoking habits, | logistic regression odds ratio | 7.0(0.8,6.2) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Yagev,Y. 2001 | Low | N= 240 ; all patients from one electrophysiological lab at one hospital | electrodiagnostically diagnosed | high force-low repetitive motion jobs vs low force-low repetitive jobs | job force-repetition level, age, ethnic origin, education, obesity, smoking habits, | logistic regression odds ratio | 3.21(1.5,6.9) | odds of CTS were significantly greater among people with high force-low repetitive jobs than those low force low repetitive jobs |
| Chiang,H.C. 1990 | Moderate | N= 269 ; workers at frozen food plants | neurological examinations and electrophysiological tests | job requires repetitive movement (frozen food packers and non-frozen food packers) vs no repetitive movement(office work) | Age, gender/sex, length of employment, exposure to cold(frozen food packers), repetitive movement (frozen and non-frozen food packers), and cold*repetitious movement interaction | logistic regression odds ratio | 1.87 (1.11, 3.16) | repetitious movement is associated with CTS |
| Chiang,H.C. 1990 | Moderate | N= 269 ; workers at frozen food plants | neurological examinations and electrophysiological tests | combined effect of repetitive movement and working in the cold(interaction term) | , length of employment, exposure to cold(frozen food packers), repetitive movement (frozen and non-frozen food packers), and cold*repetitious movement interaction | logistic regression odds ratio | 1.83 (1.35, 2.48) | exposure to cold increases the effect of repetitious movement on CTS odds |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Coggon,D. 2013 | Moderate | N= 1230; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs healthy controls | use of other repeated movements of the wrist/fingers>4 hours per day | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking, mental health, repeated movements, vibrating tools, job control, level of supervisor/colleague support | logistic regression OR | 1.5 (1.1-1.9) | odds higher in patients with repeated movements >4 hours per day |
| Goodson, J.T. 2014 | Moderate | 87 CTS and 74 gender/sex-matched general orthopedic patients from an outpatient orthopedic clinic in the Western US. | (1)Electrodiagnostic (EDX) testing results suggestive of abnormal slowing of the median nerve, (2) the presence of clinical symptoms of CTS, and (3) no confounding syndromes/disorders | occupational repetition | excluded confounding conditions; gender/sex, age, BMI, education levels, ethnicity, and EDX testing results | Logistical Regression OR | 1.84(1.27,2.67) | occupational repetition increases odds |
| Silverstein,B.A. 1987 | Moderate | N= 652 ; workers form seven different industrial sites | based on phalen and tinel's signs and symptoms mentioned in interview | high force-low repetitive motion jobs vs low force-low repetitive jobs | Gender/Sex, age, years on job, work repetition, level of force involved in job, dummy variables controlling for job center effects | logistic regression OR | 1.8(0.16,20.59) | NS |
| Silverstein,B.A. 1987 | Moderate | N= 652 ; workers form seven different industrial sites | based on phalen and tinel's signs and symptoms mentioned in interview | low force-high repetitive motion jobs vs low force-low repetitive jobs | Gender/Sex, age, years on job, work repetition, level of force involved in job, dummy variables controlling for job center effects | logistic regression OR | 2.7(0.26,28.36) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Silverstein,B.A. 1987 | Moderate | N= 652 ; workers form seven different industrial sites | based on phalen and tinel's signs and symptoms mentioned in interview | high force-high repetitive motion jobs vs low force-low repetitive jobs | Gender/Sex, age, years on job, work repetition, level of force involved in job, dummy variables controlling for job center effects | logistic regression OR | 15.52(1.7,141.52) | working in a high force-High repetition job was associated with higher odds of CTS than Low force-low repetition jobs |

## *TABLE 91 RISK FACTOR: ROTATION*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | twisting forearm | model 1:age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, using vibrating tools, assembly line work, twisting forearm work, bending wrist work, using forceful hand grip, using fingers/thumb as pressing tool, using fingers in a pinch grip | logistic regression OR | 1.78 (1.18, 2.69) | twisting forearm is associated with higher odds of median neuropathy |
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | peak exposure to Forearm rotation | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 1.36 (0.66, 2.83) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | Forearm rotation in most recent job | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 1.23 (0.51, 2.94) | NS |
| Evanoff,B. 2012 | Moderate | N= 745 ; newly employed workers | symptoms and NCS at 3 years | forearm rotation | age, Gender/Sex, lifting at least 1kg, forceful grip, finger/thumb pressing, using vibrating tools, pinch grip, forearm rotation, hand/wrist bending | NR | NR | NS |

*TABLE 92 RISK FACTOR: SF-36 PHYSICAL COMPONENT*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Goodson, J.T. 2014 | Moderate | 87 CTS and 74 gender/sex-matched general orthopedic patients from an outpatient orthopedic clinic in the Western US. | (1)Electrodiagnostic (EDX) testing results suggestive of abnormal slowing of the median nerve, (2) the presence of clinical symptoms of CTS, and (3) no confounding syndromes/disorders | Physical component summary scores (subset of SF-36) | excluded confounding conditions; gender/sex, age, education levels, ethnicity, and EDX testing results | Logistical Regression OR | 0.94(0.9,0.99) | Better SF-36 scores are associated with decreased odds of CTS |

*TABLE 93 RISK FACTOR: SALES*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Sales and customer service occupations vs. Associate professional and technical occupations | matched by: all males ; covariates: Sales and customer service occupations vs. Associate professional and technical occupations | univariate odds ratios | 2.26 (1.024–4.83) | odds are higher than in associate professional and technical occupations |
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Sales and customer service occupations vs. Associate professional and technical occupations | matched by: all females ; covariates: Sales and customer service occupations vs. Associate professional and technical occupations | univariate odds ratios | 2.17 (1.38–3.48) | odds are higher than in associate professional and technical occupations |

*TABLE 94 RISK FACTOR: SERVICE OCCUPATIONS*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Caring, leisure, and other service occupations vs. Associate professional and technical occupations | matched by: all males ; covariates: Caring, leisure, and other service occupations vs. Associate professional and technical occupations | univariate odds ratios | 5.64 (2.77–11.42) | odds are higher than in associate professional and technical occupations |
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Caring, leisure, and other service occupations vs. Associate professional and technical occupations | matched by: all females ; covariates: Caring, leisure, and other service occupations vs. Associate professional and technical occupations | univariate odds ratios | 4.21 (2.77–6.56) | odds are higher than in associate professional and technical occupations |
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS symptoms | Part-time cashiers vs office worker | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 1.26(0.59–2.67) | NS |
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS symptoms | Full-time cashiers vs office worker | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 2.74(1.18–6.32) | full time cashiers are at higher odds than office workers |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS diagnosis with clinical and electrodiagnostic examinations | Part-time cashiers vs office worker | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 1.06(0.35–3.21) | NS |
| Bonfiglioli,R. 2007 | Moderate | N= 269 ; cashiers and office workers from 4 big supermarket stores | CTS diagnosis with clinical and electrodiagnostic examinations | Full-time cashiers vs office worker | work(cashiers vs office workers), BMI, age, previous at risk jobs, CTS family history, presence of children, do hand-knitting/needle work, over 8 years of education, | logistic regression odds ratio | 1.81(0.52–6.34) | NS |
| Morgenstern,H. 1991 | Moderate | N= 1052 ; grocery store checkers belonging to local California union | symptoms of CTS indicated in questionnaire | use of laser scanner to check items | matched by: all members were members of union food and commercial workers union ; covariates: age, hours per work week, years worked, age*years worked interaction, use of laser scanner to check items, unload basket before checking, load and lift grocery bags after checking, currently pregnant, contraceptive use, use of exogenous estrogen, use of diuretics, history of broken wrist | logistic regression odds ratio | 0.99(0.65, l .49) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Morgenstern,H. 1991 | Moderate | N= 1054 ; grocery store checkers belonging to local California union | symptoms of CTS indicated in questionnaire | unload basket before checking | matched by: all members were members of union food and commercial workers union ; covariates: age, hours per work week, years worked, age*years worked interaction, use of laser scanner to check items, unload basket before checking, load and lift grocery bags after checking, currently pregnant, contraceptive use, use of exogenous estrogen, use of diuretics, history of broken wrist | logistic regression odds ratio | 0.97(0.66, 1.44) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Morgenstern,H. 1991 | Moderate | N= 1049 ; grocery store checkers belonging to local California union | symptoms of CTS indicated in questionnaire | load and lift groceries after checking | matched by: all members were members of union food and commercial workers union ; covariates: age, hours per work week, years worked, age*years worked interaction, use of laser scanner to check items, unload basket before checking, load and lift grocery bags after checking, currently pregnant, contraceptive use, use of exogenous estrogen, use of diuretics, history of broken wrist | logistic regression odds ratio | 0.94(0.35, 2.57) | NS |

*TABLE 95 RISK FACTOR: SKILLED TRADES*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Skilled trades occupations vs. Associate professional and technical occupations | matched by: all males ; covariates: Skilled trades occupations vs. Associate professional and technical occupations | univariate odds ratios | 4.19 (2.57–7.18) | odds are higher than in associate professional and technical occupations |
| Jenkins,P.J. 2013 | Low | N= unclear ; prospective audit database of General Registrar Office for Scotland | symptoms and phalen and tinel's sign at 66 months | Skilled trades occupations vs. Associate professional and technical occupations | matched by: all females ; covariates: Skilled trades occupations vs. Associate professional and technical occupations | univariate odds ratios | 8.26 (4.98–13.86) | odds are higher than in associate professional and technical occupations |

*TABLE 96 RISK FACTOR: SMOKING*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Bland,J.D. 2005 | Low | N= 4155 ; all patients referred to the neurophysiology service at hospital for suspicion of CTS | NCS confirmed CTS | Smoking | Gender/Sex, smoking, age, BMI*age interaction | logistic regression OR | 1.11(0.94,1.29) | NS |
| Wright, C. 2014 | Low | (3155 w/o CTS diagnosis and 91 with CTS diagnosis);<br>EMR of a cohort of pregnant women receiving prenatal care at a large obstetrics unit; representative of those served by the urban academic center, with a large proportion of black patients | clinically diagnosed with ICD 9 diagnosis code for CTS | Non-Smoking versus smoker | age, race/ethnicity, education, smoking, parity, hypertension, diabetes, maternal weight category (constructed variable including information about maternal BMI and GWG), and number prenatal care visits | Logistical Regression OR | 1.32 (0.37-5.85) | NS |
| Coggon,D. 2013 | Moderate | N= 1230; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs healthy controls | ex-smoker vs non smoker | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking, mental health, repeated movements, vibrating tools, job control, level of supervisor/colleague support | logistic regression OR | 1.1 (0.8-1.4) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Coggon,D. 2013 | Moderate | N= 1230; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs healthy controls | current smoker vs non smoker | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking, mental health, repeated movements, vibrating tools, job control, level of supervisor/colleague support | logistic regression OR | 0.6 (0.4-0.8) | odds lower in smokers than non-smokers |
| Coggon,D. 2013 | Moderate | N= 855; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs negatively tested patients | ex-smoker vs non smoker | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking habits, diabetes, other arthritis present, number of moderately distressing somatic symptoms per week, use of keyboard 4 or more hours per day, use of vibrating tools, job includes bonuses/targets/deadlines | logistic regression OR | 1.2 (0.9-1.7) | NS |
| Coggon,D. 2013 | Moderate | N= 855; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs negatively tested patients | current smoker vs non smoker | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking habits, diabetes, other arthritis present, number of moderately distressing somatic symptoms per week, use of keyboard 4 or more hours per day, use of vibrating tools, job includes bonuses/targets/deadlines | logistic regression OR | 0.8 (0.5-1.1) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Eleftheriou,A. 2012 | Moderate | N= 441 ; 548 workers of a Governmental data entry & processing unit | personal history of CTS | ever smoked(yes vs no) | Keyboard strokes, age, physical activity, smoking | logistic regression OR | 1.99 (1.01 to 3.54) | having ever smoked is associated with CTS |
| Geoghegan,J.M. 2004 | Moderate | N= 3350 ; patients from the UK General Practice Research Database | diagnosed CTS | Smoker | matched by: age, gender/sex, and general practice ; covariates: consulting rate, BMI, smoking, diabetes, insulin use, metformin use, sulphonyl use, hormone replacement therapy, corticosteroid use, combined oral contraceptive pill use, Thyroxine use, Rheumatoid arthritis, wrist fracture, arthritis, also adjusted for missing data on smoking and BMI | logistic regression OR | 1.03 (0.93–1.13) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Violante,F.S. 2007 | Moderate | Blue-collar workers of several factories (producing large and small domestic appliances, underwear, ceramic tiles, and shoes and workers employed in all municipal nursery schools. | occurrence within last month of “classic/ probable” or “possible” symptoms of CTS | Smoking (ever smoked versus not) | gender/sex, age, biomechanical load, BMI*wrist interaction effect, height*forearm interaction effect, family history of CTS, pathologies facilitating CTS onset(diabetes mellitus, amyloidosis, gout, progressive systemic sclerosis, rheumatoid arthritis, systemic lupus erythematosus, thyroid disorders, tendonitis of the finger flexors, and chronic renal failure) alcohol consumption, smoking status, previous exposure to biomechanical overload | Logistic Regression OR | 1.7(1.2-1.4) | having ever smoked increases odds of CTS |

*TABLE 97 RISK FACTOR: STATIC STRENGTH*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Evanoff,B. 2014 | High | 711 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | Static strength importance in current job | adjusted for age, Gender/Sex, and BMI; past diagnosis of CTS or other upper extremity peripheral neuropathy, had a pacemaker or internal defibrillator, or were pregnant at the time of enrollment excluded | Multivariable mixed logistic regression models OR | 2.7(.85- 8.55) | NS |

*TABLE 98 RISK FACTOR: STRAIN*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Garg,A. 2012 | High | N= 536 ; workers from a wide range of manufacturing facilities in the Midwest | symptoms (tingling and/or numbness) in at least 2 median nerve served digits, symptoms at least 25% of days in previous month, symptoms for at least 2 or more consecutive monthly follow ups, abnormal NCS at 6 years | Strain index above 6.1 vs less than or equal to 6.1 | Model 2: strain index ,age, BMI (continuous), number of other distal upper extremity musculoskeletal disorders, gardening, feeling down, blue or depressed, rheumatoid arthritis | cox proportional hazard ratio | 2.5 (1.00–6.13) | having high job strain is associated with higher risk of CTS |
| Burt,S. 2013 | Moderate | N= 347 ; workers from hospital, school bus manufacturing plant, and engine assembly plant | electrodiagnostic test, symptoms, hand diagram at 2 years | Job Strain(Job Content Questionnaire) | model 2: threshold limit value, BMI, Job strain | hazard ratios | 2.13 (1.001, 4.54) | having high job strain is associated with higher risk of CTS |

*TABLE 99 RISK FACTOR: SYMPTOMS*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Gell,N. 2005 | Low | N= 414 ; workers from 4 industrial and 3 clerical work sites | numbness, tingling, burning, or pain in the distribution of the median nerve (based on a hand diagram score of “probable” or “definite”) with ipsilateral median nerve conduction slowing at average 5.4 years | median ulnar peak latency difference | BMI>27,median ulnar peak latency difference, numbness tingling, burning, pain in the hand at baseline | logistic regression odds ratio | 1.29(1.2,1.4) | for each one unit increase in median ulnar peak latency difference, CTS odds are increase by a factor of 1.29 |
| Vogelsang,L.M. 1994 | Low | N= 100 ; all were worked in what were considered high risk occupations(automotive parts or assembly workers, keyboard operators, electronics industry workers, and garment industry workers from East Tennessee, and sign language interpreters). Each case was matched by age, Gender/Sex, race/ethnicity, height, weight, body type, length of time, job duties | diagnosed by orthopaedist | CHIPS, Cohen-Hoberman Inventory of Physical Symptoms | social readjustment scale, self-control schedule, life style approaches scale, self-control questionnaire, perceived stress scales, Cohen-Hoberman Inventory of Physical Symptoms, related medical condition, suspected medical risk, related musculoskeletal problems | p value logistic regression | <.05 | higher scores on the physical symptoms inventory increased the odds of CTS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Werner,R.A. 2005 | Low | N= 189 ; all were automobile assembly line workers | hand diagram symptoms, and median sensory evoked response that .5 msec longer than ipsilateral ulnar sensory response at 1 year | Median–ulnar peak latency at least 0.8 msec | Gender/Sex, wrist/hand tendonitis, diabetes, coworker support, median ulnar peak latency on dominant side, elbow posture rating | logistic regression odds ratio | 7.75(1.3, 45.84) | having a median–ulnar peak latency at least 0.8 msec significantly increased the odds of CTS |
| Winn,F.J.,Jr., 1989 | Low | N= 58 ; cases were seen at Baltimore neurology clinic, healthy controls were selected by those who responded to advertisements in the same area | median nerve or motor sensory symptoms | median nerve motor function | matched by: age and gender/sex ; covariates: Raynaud's symptoms and median nerve motor function | logistic regression odds ratio | 0.31(0.13,0.73) | better median nerve motor function is associated with decreased CTS odds |
| Coggon,D. 2013 | Moderate | N= 855; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs negatively tested patients | 1 moderately distressing somatic symptom vs no distressing somatic symptoms in past week | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking habits, diabetes, other arthritis present, number of moderately distressing somatic symptoms per week, use of keyboard 4 or more hours per day, use of vibrating tools, job includes bonuses/targets/deadlines | logistic regression OR | 0.7 (0.4-1.0) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Coggon,D. 2013 | Moderate | N= 855; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs negatively tested patients | 2 or more moderately distressing somatic symptom vs no distressing somatic symptoms in past week | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking habits, diabetes, other arthritis present, number of moderately distressing somatic symptoms per week, use of keyboard 4 or more hours per day, use of vibrating tools, job includes bonuses/targets/deadlines | logistic regression OR | 0.6 (0.4-0.9) | positive tested patients were less likely to have 2 or more moderately distressing somatic symptoms than negative tested patients |

## *TABLE 100 RISK FACTOR: TECHNICAL JOBS*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Roquelaure,Y. 2008 | Moderate | N= 194276 ; French prospectively CTS surveillance system | clinical and electrodiagnostic tests at 3 years | Technicians associate professionals vs unemployed | matched by: among women ; covariates: controlled for age, stratified by gender/sex | relative risk ratio | 0.6 [0.5-0.8] | risk significantly lower than in the unemployed |
| Roquelaure,Y. 2008 | Moderate | N= 193802 ; French prospectively CTS surveillance system | clinical and electrodiagnostic tests at 3 years | Technicians associate professionals vs unemployed | matched by: among men ; covariates: controlled for age, stratified by gender/sex | relative risk ratio | 0.6 [0.4-0.8] | risk significantly lower than in the unemployed |

*TABLE 101 RISK FACTOR: TENDONITIS*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | shoulder tendonitis history | model 2 best fitting model: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 2.66 (0.97, 7.29) | NS |
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | shoulder tendonitis history | Model 3 with O*NET factor variables: age, gender, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 2.95 (1.09, 7.95) | History of shoulder tendonitis increases odds of CTS |
| Werner,R.A. 2005 | Low | N= 189 ; all were automobile assembly line workers | hand diagram symptoms, and median sensory evoked response that .5 msec longer than ipsilateral ulnar sensory response at 1 year | Wrist/hand/finger tendonitis at baseline | Gender/Sex, wrist/hand tendonitis, diabetes, coworker support, median ulnar peak latency on dominant side, elbow posture rating | logistic regression odds ratio | 4.74(1.09–20.43) | wrist/hand/finger tendonitis significantly increased the odds of CTS |

*TABLE 102 RISK FACTOR: VARICOSIS*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| de Krom,M.C. 1990 | Moderate | N= 629; 28 cases and all controls were identified through random sample of patients in the Netherlands. An additional 128 cases were added from a single hospital in the area | clinical history and neurophysiologic testing | varicosis | matched by: age and gender/sex stratified random sample ; covariates: height, weight(kg), slimming courses(yes/no), Hours/week in flexion activities, hours/week for extension activities, Varicosis (for men only), for women: years since menopause onset vs pre-menopausal, hysterectomy vs premenopausal | logistic regression odds ratio | 9.78(2.73, 34.95) | varicosis is significantly associated with increased odds of CTS in males |

*TABLE 103 RISK FACTOR: VIBRATION*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | using vibrating hand tools | model 1:age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, using vibrating tools, assembly line work, twisting forearm work, bending wrist work, using forceful hand grip, using fingers/thumb as pressing tool, using fingers in a pinch grip | logistic regression OR | 1.88(1.23, 2.85) | using vibrating hand tools is associated with higher odds of median neuropathy |
| Armstrong,T. 2008 | High | N= 1071; following worker populations: carpenters, workers, engineers, laboratory workers, computer workers, and hospital support staff. | median neuropathy cases | using vibrating hand tools | model 2 best fitting model: age, Gender/Sex, body mass index, wrist index, history of diabetes, and history of shoulder tendonitis, lifting more than 2lbs/day, assembly line work, hospital vs clerical work, construction vs clerical work | logistic regression OR | 1.50 (0.98, 2.31) | NS |
| Coggon,D. 2013 | Moderate | N= 1230; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs healthy controls | Work for > 1 hour per day with vibrating tools. | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking, mental health, repeated movements, vibrating tools, job control, level of supervisor/colleague support | logistic regression OR | 2.4 (1.6-3.8) | odds higher in patients using vibrating tools |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Coggon,D. 2013 | Moderate | N= 855; cases were selected from the neurophysiology department and controls for the accident and emergency services at Southampton general hospital. All were aged 20-64 | neurophysiologically positive patients vs negatively tested patients | work with vibrating tools >1 hours per day | matched by: gender/sex, age ; covariates: ethnicity, BMI, smoking habits, diabetes, other arthritis present, number of moderately distressing somatic symptoms per week, use of keyboard 4 or more hours per day, use of vibrating tools, job includes bonuses/targets/deadlines | logistic regression OR | 1.4 (0.9-2.2) | NS |
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | peak exposure to Using vibrating tools | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 2.24 (1.02, 4.92) | increased odds of CTS for those using vibrating tool use at work |
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | Using vibrating tools in most recent job | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 2.04 (0.82, 5.09) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Power tool use 0.08-0.75 hours/day vs none | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 0.53 (0.17, 1.64) | NS |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Power tool use 1-2 hours/day vs none | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 1.43 (0.52, 3.90) | NS |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Power tool use 2.5-5.5 hours/day vs none | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 1.58 (0.63, 4.00) | NS |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Power tool use 6-11 hours/day vs none | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 3.30(1.11, 9.8) | odds higher in workers who use power tools 6-11 hours/day |

*TABLE 104 RISK FACTOR: WORK LENGTH*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Matias,A.C. 1998 | Moderate | N= 100 ; video display terminal operators at Midwestern university | "medically diagnosed" CTS | work day duration | work day duration | logistic regression odds ratio | 1.015(.0479) | longer work day is associated with increased CTS odds |
| Mondelli,M. 2006 | Moderate | N= 145 ; female hospital floor cleaners in Italy | diagnosed according to AAN criteria: population of hospital floor cleaners | current job length 2nd vs 1st quartile | Age, BMI, duration of occupational exposure to current job, occupational exposure to the same job for previous employers, manual hobbies (including motorcycle use, diseases known to be associated with CTS (diabetes connective tissue diseases, hypothyroidism, and wrist/hand trauma), hospital (to adjust for center effects) | logistic regression OR | 0.83 (0.26-2.69) | NS |
| Mondelli,M. 2006 | Moderate | N= 145 ; female hospital floor cleaners in Italy | diagnosed according to AAN criteria: population of hospital floor cleaners | current job length 3rd vs 1st quartile | Age, BMI, duration of occupational exposure to current job, occupational exposure to the same job for previous employers, manual hobbies (including motorcycle use, diseases known to be associated with CTS (diabetes connective tissue diseases, hypothyroidism, and wrist/hand trauma), hospital (to adjust for center effects) | logistic regression OR | 0.77 (0.24-2.43) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Mondelli,M. 2006 | Moderate | N= 145 ; female hospital floor cleaners in Italy | diagnosed according to AAN criteria: population of hospital floor cleaners | current job length 4th vs 1st quartile | Age, BMI, duration of occupational exposure to current job, occupational exposure to the same job for previous employers, manual hobbies (including motorcycle use, diseases known to be associated with CTS (diabetes connective tissue diseases, hypothyroidism, and wrist/hand trauma), hospital (to adjust for center effects) | logistic regression OR | 1.75 (0.54-5.65) | NS |
| Morgenstern,H. 1991 | Moderate | N= 1058 ; grocery store checkers belonging to local California union | symptoms of CTS indicated in questionnaire | hours worked per week | matched by: all members were members of union food and commercial workers union ; covariates: age, hours per work week, years worked, age*years worked interaction, use of laser scanner to check items, unload basket before checking, load and lift grocery bags after checking, currently pregnant, contraceptive use, use of exogenous estrogen, use of diuretics, history of broken wrist | logistic regression odds ratio | 1.03(p=.0081) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Morgenstern,H. 1991 | Moderate | N= 1058 ; grocery store checkers belonging to local California union | symptoms of CTS indicated in questionnaire | years worked | matched by: all members were members of union food and commercial workers union ; covariates: age, hours per work week, years worked, age*years worked interaction, use of laser scanner to check items, unload basket before checking, load and lift grocery bags after checking, currently pregnant, contraceptive use, use of exogenous estrogen, use of diuretics, history of broken wrist | logistic regression odds ratio | .1238(p=.055) | NS |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | worked 3048-4857 vs 2954 hours | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 1.54 (0.74, 3.20) | NS |
| Nordstrom,D.L. 1997 | Moderate | N= 417 ; only incident cases diagnosed between 1994 and 1995 were eligible as cases in Marshfield Wisconsin, and controls were a random sample from this area | Diagnosed by physician, or had explicit treatment for CTS and hand symptoms within one month of date of diagnosis. | Worked 5464-6507 vs 2954 hours | matched by: age ; covariates: musculoskeletal condition, BMI, Parent/sibling/child has CTS, power tool use, hours bending or twisting wrists, hours contacted with solvents per day, IOSH job control measure, cumulative hours worked since 1993 | logistic regression OR | 0.43 (0.18, 1.05) | NS |

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Silverstein,B.A. 1987 | Moderate | N= 652 ; workers form seven different industrial sites | based on phalen and tinel's signs and symptoms mentioned in interview | years on job | Gender/Sex, age, years on job, work repetition, level of force involved in job, dummy variables controlling for job center effects | logistic regression OR | 0.9(0.8,1.02) | NS |

*TABLE 105 RISK FACTOR: FINGER PINCH*

| Study | Quality | Population | CTS Diagnostics | Risk Factor | Confounding Adjustment | Stat. Type | Results | Significance |
|---|---|---|---|---|---|---|---|---|
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | peak exposure to Finger pinching | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 0.87 (0.39, 1.93) | NS |
| Dale, A.M. 2014 | Moderate | 710 clerical, service, and construction workers from eight participating employers and three construction trade unions between July 2004and October 2006 into the PrediCTS study | Presence of specific nerve symptoms in survey and median neuropathy by NCS (DML, MUDS, DSL) at 3 years | Finger pinching in most recent job | age, BMI, Gender/Sex, med history, pregnancy, history of CTS or peripheral neuropathy, or other contraindication to receiving nerve conduction studies (NCS), lifting objects, vibrating tools, forearm rotation, wrist bending, forceful gripping, thumb pressing, finger pinching | Logistical Regression OR | 0.62 (0.18, 2.08) | NS |

# NONOPERATIVE TREATMENTS FOR CARPAL TUNNEL SYNDROME

## A. IMMOBILIZATION

Strong evidence supports that the use of immobilization (brace/splint/orthosis) should improve patient reported outcomes.

**Strength of Recommendation: Strong Evidence** ★★★★

Description: Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention.

**Rationale**

There are two high quality studies (Hall 2013 and Manente 2001) that directly compare the use of brace/splint to no use of brace/splint to treat carpal tunnel syndrome. Hall 2013 compared 8 weeks of full-time splinting versus no splinting. The authors showed statistically significant improvement in pain and function (Boston Questionnaire for assessment of carpal tunnel symptom functional status scale, Boston Questionnaire for assessment of carpal tunnel symptom severity, AS, phalens, grip strength, Purdue Pegboard Test score, Semmes Weinstein monofilaments). The authors describe statistically significant differences when comparing percent change in these factors from pre to post treatment. There were some baseline/pretreatment differences between the groups, such that it calls into question whether these factors were actually statistically different after treatment. Manente 2001 compared four weeks of night bracing to no intervention. The treated group showed a reduction in the Boston Carpal Tunnel Questionnaire symptomatic score (from 2.75 to 1.54 at 4 weeks; p<0.001) and functional score (from 1.89 to 1.48 at 4 weeks; p<0.001). Subjects’ Global Impression of Change Questionnaire documented improvement in the braced group at 4 weeks (p=0.006). Subjects’ Global Impression of Change Questionnaire documented improvement in the braced group at 4 weeks (p=0.006).

**Risks and Harms of Implementing this Recommendation**

No harm in implementation of brace/splint use, if tolerated by patient.

## B. STEROID INJECTIONS

Strong evidence supports that the use of steroid (methylprednisolone) injection should improve patient reported outcomes.

**Strength of Recommendation: Strong Evidence** ★★★★

Description: Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention.

**Rationale**

There is one high quality study (Atroshi 2013) that directly compares the use of steroid injection to placebo to treat carpal tunnel syndrome. In a prospective, randomized, double-blinded, placebo controlled study, the efficacies of 40mg methylprednisolone and 80mg methylprednisolone were compared to placebo injection at various time lines (10 weeks and 1 year). At 10 weeks, there was greater improvement in the CTS symptom severity score in the group receiving injections of 40mg or 80mg methylprednisolone (p<0.003) versus placebo injections; but there was no difference amongst the groups at 1 year. However, patients receiving 80mg methylprednisolone injection were less likely to go on to need surgery than placebo injection (p=0.04). A small p-value (p<.05) indicates that this difference was not observed due to chance, subsequently favoring the alternative hypothesis of methylprednisolone injection improving patient outcomes.

Several high quality studies (Dammers 2006[1-3], Wong 2001, and Wong 2005) compare various doses of injected or routes of administration of methylprednisolone to treat carpal tunnel syndrome. In a double blinded, randomized study, Dammers 2006 compare the efficacy of 20, 40, and 60mg methylprednisolone injections to treat carpal tunnel syndrome. There was no significant difference in treatment response at 1 year. In a randomized double blind controlled trial, Wong 2005 compare a the effects of a single 80mg methylprednisolone injection with saline injection at 8 weeks versus two 80mg methylprednisolone injections 8 weeks apart. There was no significant difference between groups respect to Global Symptom Score, electrophysiological study, or functional outcomes (p=0.26). In a prospective randomized double-blind study, Wong 2001 compared 25mg methylprednisolone orally for 10 days and placebo injection to 15mg methylprednisolone injection with oral placebo. The steroid injection provided significant improvement based on Global Symptom Score at 12 weeks.

**Risks and Harms of Implementing this Recommendation**
There is potential harm of corticosteroid injection in the vicinity of flexor tendons and neurovascular structures.

## C. MAGNET THERAPY

Strong evidence supports not using magnet therapy for the treatment of carpal tunnel syndrome.

**Strength of Recommendation: Strong Evidence** ★★★★

Description: Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention.

**Rationale**
Several high quality studies (Colbert 2010, Weintraub 2008) evaluated the use of magnets in treating carpal tunnel syndrome. In a prospective randomized double-blinded controlled trial, Weintraub 2008 evaluated the efficacy of a magnet (simultaneous static and time-varying dynamic magnetic field stimulation 4 hours/day for two months). No significant measures of improvement were noted. In a randomized, double-blind controlled trial, Colbert 2010 evaluated the efficacy of magnet (wore nightly for 6 weeks a neodymium magnet of 15 or 45mTesla) versus placebo magnet on the treatment of carpal tunnel syndrome. No significant measures of improvement were noted.

**Risks and Harms of Implementing this Recommendation**
Magnet use may lead to sleep disturbance.

## D. ORAL TREATMENTS

Moderate evidence supports no benefit of oral treatments (diuretic, gabapentin, astaxanthin capsules, NSAIDs, or pyridoxine) compared to placebo.

**Strength of Recommendation: Moderate Evidence** ★★★☆

Description: Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.

**Rationale**

Two high quality studies (Chang 1998 and Hui 2011) compare various oral regimens to treat carpal tunnel syndrome. In a prospective randomized double-blind study placebo controlled study, Chang 1993 compare various 4 week oral medication regimens (diuretic [trichlormethiazide 2mg daily] versus NSAID [tenoxicam-SR 20mg daily] versus steroid [2 weeks of prednisolone 20mg daily followed by 2 weeks of 10mg daily]) to placebo. No significant changes from baseline were noted in the placebo, diuretic, or NSAID arms. However, the steroid arm improved significantly at 4 weeks, based on GSS Questionnaire. A review of the data provided indicates that at 4 weeks, the steroid arm had statistically significant improvement over the NSAID and diuretic arms based on GSS Questionnaire. Hui 2011 failed to show any significance when comparing oral Gabapentin to placebo.

**Risks and Harms of Implementing this Recommendation**

There is potential harm of oral NSAID or steroid use.

## E. ORAL STEROIDS

Moderate evidence supports that oral steroids could improve patient reported outcomes as compared to placebo.

**Strength of Recommendation: Moderate Evidence** ★★★☆

Description: Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.

**Rationale**

Two high quality studies (Chang 1998 and Hui 2011) compare various oral regimens to treat carpal tunnel syndrome. In a prospective randomized double-blind study placebo controlled study, Chang 1993 compare various 4 week oral medication regimens (diuretic [trichlormethiazide 2mg daily] versus NSAID [tenoxicam-SR 20mg daily] versus steroid [2 weeks of prednisolone 20mg daily followed by 2 weeks of 10mg daily]) to placebo. No significant changes from baseline were noted in the placebo, diuretic, or NSAID arms. However, the steroid arm improved significantly at 4 weeks, based on GSS Questionnaire. A review of the data provided indicates that at 4 weeks, the steroid arm had statistically significant improvement over the NSAID and diuretic arms based on GSS Questionnaire. Hui 2011 failed to show any significance when comparing oral Gabapentin to placebo.

**Risks and Harms of Implementing this Recommendation**

There is potential harm of oral NSAID or steroid use.

## F. KETOPROFEN PHONOPHORESIS

Moderate evidence supports that ketoprofen phonophoresis could provide reduction in pain compared to placebo.

**Strength of Recommendation: Moderate Evidence** ★★★☆

Description: Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.

**Rationale**

In a randomized controlled trial, Soyupek 2012 compared phonophoresis with corticosteroid versus phonophoresis with nonsteroidal anti-inflammatory drug use. Phonophoresis with corticosteroid showed statistically significant improved in VAS score. In a prospective, randomized, double-blinded controlled trial, Yildiz 2011 compared the efficacy of 2 weeks of treatment with placebo ultrasound, ultrasound, or ketoprofen phonophoresis. The group that underwent ketoprofen phonophoresis for two weeks demonstrated significant improvement in VAS score over the sham ultrasound and the ultrasound group at two weeks and eight weeks.

**Risks and Harms of Implementing this Recommendation**

No known harm in use of phonophoresis.

## G. THERAPEUTIC ULTRASOUND

Limited evidence supports that therapeutic ultrasound might be effective compared to placebo.

**Strength of Recommendation: Limited Evidence** ★★☆☆

Description: Evidence from one or more “Low” quality studies with consistent findings **or** evidence from a single “Moderate” quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

**Rationale**

One high quality study (Ebenbichler 1998) evaluated the use of ultrasound in treating carpal tunnel syndrome. In a randomized controlled trial, Ebenbichler 1998 evaluated the efficacy of ultrasound (20 sessions of 15 minute interventions of 1MHz, 1.0 W/cm, pulse mode 1:4 at 5 sessions/week for 2 weeks followed by 2 sessions/week) versus placebo ultrasound on the treatment of carpal tunnel syndrome. Multiple measures showed significant improvement in the ultrasound group: grip strength, motor distal latency ($p<0.001$), and pinch strength.

**Risks and Harms of Implementing this Recommendation**

No known harm in use of ultrasound.

## H. LASER THERAPY

Limited evidence supports that laser therapy might be effective compared to placebo.

**Strength of Recommendation: Limited Evidence** ★★☆☆

Description: Evidence from one or more “Low” quality studies with consistent findings **or** evidence from a single “Moderate” quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

### Rationale

Several high quality studies (Chang 2008, Evcik 2007, Fusakul 2014) evaluated the use of laser therapy in treating carpal tunnel syndrome. In a randomized, controlled trial, Chang 2008 evaluated the efficacy of a laser (830nm diode with 10Hz, 50% duty cycle, 60 mW, 9.7J/cm) versus placebo laser on the treatment of carpal tunnel syndrome. The treatment was rendered for 10 minutes daily for 5 days a week for two weeks. After 4 weeks, the laser treatment provided significantly improved grip strengths, digital prehension, and lateral prehension ($p<0.05$). In a randomized controlled trial, Evcik 2007 evaluated the efficacy of laser (7J/2min) versus placebo laser. The treatment was rendered five times per week for two weeks. After four weeks, significant improvement in grip strength and pinch strength was noted ($p<0.001$); there was also significant improvement in sensory nerve velocity, sensory distal latency, and motor distal latency ($p<0.001$). In a randomized double-blinded controlled trial, Fusakul 2014 evaluated the efficacy of laser (gallium-aluminum-arsenide at a dose of 18J/session) versus placebo laser. Grip strength and pinch strength was significantly improved. At 12 weeks follow up, distal motor latency was significantly improved ($p<0.05$).

### Risks and Harms of Implementing this Recommendation

Potential harm of laser therapy is unknown.

### Future Research for Nonoperative Treatments

Further research in acupuncture is warranted. In a prospective randomized double-blind controlled study, Yao et al evaluated the efficacy of acupuncture (weekly sessions for 6 weeks) versus placebo to treat carpal tunnel syndrome. No significant measures of improvement were noted. Soft tissue manipulation: further research in manipulation is warranted. Many different techniques are utilized and the terminology distinguishing them is loosely utilized. Further research into linseed oil’s biological mechanism of action, along with technical refinements and specifics in its manufacture are warranted.

## *STUDY QUALITY TABLE OF CONSERVATIVE TREATMENTS*

### Table 106. Intervention Quality Evaluations

| Study | Random Sequence Generation | Allocation Concealment | Blinding | Incomplete Outcome Data | Selective Reporting | Other Bias | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | ● | ● | ● | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Bakhtiary,A.H., 2004 | ● | ◑ | ◑ | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Burke,J., 2007 | ● | ◑ | ● | ● | ◑ | ◑ | ● | ● | ● | Include | High Quality |
| Chang,M.H., 1998 | ◑ | ● | ● | ● | ● | ◑ | ● | ● | ● | Include | High Quality |
| Chang,W.D., 2008 | ● | ◑ | ● | ● | ◑ | ◑ | ● | ● | ● | Include | High Quality |
| Chang,Y.W., 2014 | ◑ | ● | ◑ | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Colbert,A.P., 2010 | ● | ◑ | ● | ● | ● | ○ | ● | ● | ● | Include | High Quality |
| Dammers,J.W., 2006 | ● | ● | ● | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Ebenbichler,G.R., 1998 | ● | ● | ● | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Evcik,D., 2007 | ◑ | ◑ | ● | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Fusakul,Y., 2014 | ◑ | ● | ◑ | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Hall,B., 2013 | ● | ◑ | ○ | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Hui,A.C., 2011 | ● | ◑ | ● | ● | ◑ | ◑ | ● | ● | ● | Include | High Quality |

| Study | Random Sequence Generation | Allocation Concealment | Blinding | Incomplete Outcome Data | Selective Reporting | Other Bias | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Madjdinasab,N., 2008 | ◑ | ◑ | ● | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Manente,G., 2001 | ◑ | ◑ | ◑ | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Pratelli,E., 2015 | ● | ◑ | ◑ | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Saeed,F.-U., 2012 | ● | ● | ○ | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Soyupek,F., 2012 | ◑ | ◑ | ◑ | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Weintraub,M.I., 2008 | ● | ◑ | ● | ● | ● | ○ | ● | ● | ● | Include | High Quality |
| Wong,S.M., 2001 | ● | ● | ● | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Wong,S.M., 2005 | ● | ◑ | ● | ● | ◑ | ◑ | ● | ● | ● | Include | High Quality |
| Yagci,I., 2009 | ● | ● | ◑ | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Yang,C.P., 2011 | ● | ◑ | ● | ● | ◑ | ◑ | ● | ● | ● | Include | High Quality |
| Yildiz,N., 2011 | ● | ● | ● | ● | ◑ | ○ | ● | ● | ● | Include | High Quality |

## RESULTS

### *SUMMARY OF DATA FINDINGS*

*TABLE 107: SUMMARY OF FINDINGS PICO 6 PART 1 IMMOBILIZATION (EARLY FOLLOW-UP (<90DAYS))*

| Favors treatment 1 🟢<br>Favors treatment 2 ●<br>Not significant ○ | High Quality | | | | | | Meta-Analysis |
|---|---|---|---|---|---|---|---|
| **Outcomes** | **Hall,B., 2013** | **Madjdinasab,N., 2008** | **Manente,G., 2001** | **Soyupek,F., 2012 (1)** | **Soyupek,F., 2012 (2)** | **Yagci,I., 2009** | |
| **Function** | | | | | | | |
| **Grip Strength** | 🟢 | | | | | ○ | **NA** |
| **NCS (CMAP)** | | | | 🟢 | 🟢 | 🟢 | **NA** |
| **NCS (DML)** | | ○ | ○ | ○ | ○ | ○ | ○ |
| **NCS (DSL)** | | ○ | | ○ | ○ | | **NA** |
| **NCS (MCV)** | | ○ | | | | | **NA** |
| **NCS (NCV)** | | | | ○ | ○ | | **NA** |
| **NCS (SNAP)** | | | 🟢 | ○ | ○ | ○ | **NA** |
| **NCS (SNCV)** | | ○ | ○ | | | ○ | ○ |
| **Phalen's test score** | | | | ○ | ○ | | **NA** |
| **Questionnaire (Boston-FSS)** | 🟢 | | 🟢 | ○ | 🟢 | ○ | **NA** |
| **Semmes-Weinstein Monofilaments Test (SW test)** | 🟢 | | | | | | **NA** |
| **Tinel's Sign/Test** | | | | ○ | ○ | | **NA** |
| **Ultrasound (US)** | | | | | | | |
| Anterior-prosterior diameter of median nerve | | | | ● | ● | | **NA** |
| Cross-sectional area of median nerve | | | | ● | ○ | | **NA** |
| Transverse diameter of median nerve | | | | ○ | ○ | | **NA** |
| **Other** | | | | | | | |
| **Purdue Pegboard test score** | 🟢 | | | | | | **NA** |
| **Questionnaire (GICQ)** | | | | | | | |
| Global Impression Change Questionnaire | | | 🟢 | | | | **NA** |
| **Pain** | | | | | | | |
| **Questionnaire/Scale (VAS-pain)** | 🟢 | | | ○ | ○ | | **NA** |
| **Symptoms** | | | | | | | |
| **Questionnaire (Boston-SSS)** | 🟢 | | 🟢 | 🟢 | 🟢 | ○ | **NA** |

*TABLE 108: SUMMARY OF FINDINGS PICO 6 PART 2 STEROID INJECTION (EARLY FOLLOW-UP (<90DAYS))*

**Favors treatment 1** 🟢
**Favors treatment 2** ●
**Not significant** ○

| | High Quality | | | | | |
|---|---|---|---|---|---|---|
| **Outcomes** | **Atroshi,I., 2013 (1)** | **Atroshi,I., 2013 (2)** | **Atroshi,I., 2013 (3)** | **Wong,S.M., 2001** | **Wong,S.M., 2005** | **Meta-Analysis** |
| **Function** | | | | | | |
| **Grip Strength** | ○ | ○ | 🟢 | | ○ | **NA** |
| **NCS (DML)** | | | | | ○ | **NA** |
| **Pinch Strength** | ○ | ○ | 🟢 | | | **NA** |
| **Two-point discrimination** | ○ | ○ | ○ | | | **NA** |
| **Other** | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | |
| SF-6D score | | | | | | |
| 35 days | ○ | 🟢 | ○ | | | **NA** |
| 70 days | ○ | 🟢 | 🟢 | | | **NA** |
| **Pain** | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | |
| SF-36 bodily pain score | ○ | 🟢 | 🟢 | | | **NA** |
| **Symptoms** | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | |
| CTS symptom severity score | ○ | 🟢 | 🟢 | | | **NA** |
| **Questionnaire (DASH-Quick DASH)** | ○ | 🟢 | 🟢 | | | **NA** |
| **Questionnaire/Scale (GSS)** | | | | 🟢 | ○ | **NA** |

*TABLE 109: SUMMARY OF FINDINGS PICO 6 PART 2 STEROID INJECTION (LATE FOLLOW-UP (>90DAYS))*

| | High Quality | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **Atroshi,I., 2013 (1)** | **Atroshi,I., 2013 (2)** | **Atroshi,I., 2013 (3)** | **Dammers,J.W., 2006 (1)** | **Dammers,J.W., 2006 (2)** | **Dammers,J.W., 2006 (3)** | **Wong,S.M., 2005** | **Meta-Analysis** |
| **Complications** | | | | | | | | |
| **Treatment Failure** | ○ | ○ | ○ | ○ | ○ | ○ | | **NA** |
| Second Injection | | | | | | | | |
| 180 days | | | | ○ | ○ | 🟢 | | **NA** |
| 365 days | | | | ○ | ○ | ○ | | **NA** |
| **Function** | | | | | | | | |
| **Grip Strength** | ○ | ○ | ○ | | | | | **NA** |
| Kilograms (left hand) | | | | | | | ○ | **NA** |
| Kilograms (right hand) | | | | | | | ○ | **NA** |
| **NCS (DML)** | | | | | | | | |
| Distal motor latency (left hand) | | | | | | | ○ | **NA** |
| Distal motor latency (right hand) | | | | | | | 🟢 | **NA** |
| **Pinch Strength** | ○ | ○ | ○ | | | | | **NA** |
| **Two-point discrimination** | ○ | ○ | ○ | | | | | **NA** |
| **Other** | | | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | | | |
| SF-6D score | ○ | ○ | ○ | | | | | **NA** |
| **Pain** | | | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | | | |
| SF-36 bodily pain score | ○ | ○ | ○ | | | | | **NA** |
| **Symptoms** | | | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | | | |
| CTS symptom severity score | ○ | ○ | ○ | | | | | **NA** |
| **Questionnaire (DASH-Quick DASH)** | ○ | ○ | ○ | | | | | **NA** |
| **Questionnaire/Scale (GSS)** | | | | | | | ○ | **NA** |
| **Symptom relief (general)** | | | | ○ | ○ | ○ | | **NA** |

*TABLE 110: SUMMARY OF FINDINGS PICO 6 PART 4 ORAL TREATMENT (EARLY FOLLOW-UP (<90DAYS))*

| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○ | **High Quality** | | | | | | | | | **Meta-Analysis** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Outcomes** | **Chang,M.H., 1998 (1)** | **Chang,M.H., 1998 (2)** | **Chang,M.H., 1998 (3)** | **Chang,M.H., 1998 (4)** | **Chang,M.H., 1998 (5)** | **Chang,M.H., 1998 (6)** | **Hui,A.C., 2011** | **MacDermid,J.C., 2012** | **Spooner,G.R., 1993** | |
| **Function** | | | | | | | | | | |
| **Grip Strength** | | | | | | | | ○ | | **NA** |
| **Hand dexterity** | | | | | | | | ○ | | **NA** |
| **NCS (DML)** | | | | | | | | | ○ | **NA** |
| **NCS (MA)** | | | | | | | | | ○ | **NA** |
| **NCS (MCV)** | | | | | | | | | ○ | **NA** |
| **Phalen's test score** | | | | | | | | | ○ | **NA** |
| **Questionnaire (General/Undefined)** | | | | | | | | | | |
| CTS Functional Scale, no mention of Boston or Levine | | | | | | | | ○ | | **NA** |
| **Questionnaire (DASH)** | | | | | | | | ○ | | **NA** |
| **SF-36 (physical functioning)** | | | | | | | | | | |
| Physical Component Summary Score (US norm=50) | | | | | | | | | | **NA** |
| 42 days | | | | | | | | ○ | | **NA** |
| 84 days | | | | | | | | ○ | | **NA** |
| **Tactile perception threshold** | | | | | | | | ○ | | **NA** |
| **Tinel's Sign/Test** | | | | | | | | | ○ | **NA** |
| **Vibrometry** | | | | | | | | ○ | | **NA** |
| **Other** | | | | | | | | | | |
| **SF-36 (mental health)** | | | | | | | | ○ | | **NA** |
| **Symptoms** | | | | | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | | | | | |
| Not questionnaire, incidence of movement discomfort | | | | | | | | | 🟢 | **NA** |
| Not questionnaire, incidence of night discomfort | | | | | | | | | ○ | **NA** |
| Not questionnaire, incidence of poor coordination | | | | | | | | | ○ | **NA** |
| Not questionnaire, incidence of swelling | | | | | | | | | 🟢 | **NA** |
| **Questionnaire (Boston-SSS)** | | | | | | | | ○ | | **NA** |
| **Questionnaire/Scale (GSS)** | ● | ○ | ○ | ● | ● | ○ | ○ | | | **NA** |

*TABLE 111: SUMMARY OF FINDINGS PICO 6 PART 5 TOPICAL TREATMENT (EARLY FOLLOW-UP (<90DAYS))*

| | High Quality | | | | Meta-Analysis |
|---|---|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **Chang,Y.W., 2014** | **Soyupek,F., 2012 (3)** | **Yildiz,N., 2011 (1)** | **Yildiz,N., 2011 (2)** | |
| **Function** | | | | | |
| **Questionnaire (Boston-FSS)** | | ○ | | | **NA** |
| **Questionnaire (General/Undefined)** | | | | | |
| CTS Functional Scale, no mention of Boston or Levine | | | ○ | ○ | **NA** |
| **NCS (CMAP)** | | ○ | | | **NA** |
| **NCS (DML)** | ○ | ○ | ○ | ○ | **NA** |
| **NCS (DSL)** | ○ | ○ | ○ | ○ | **NA** |
| **NCS (NCV)** | | ○ | | | **NA** |
| **NCS (SNAP)** | | ○ | | | **NA** |
| **Phalen's test score** | | ○ | | | **NA** |
| **Pinch Strength** | ○ | | | | **NA** |
| **Questionnaire (Boston-FSS)** | ○ | | | | **NA** |
| **Semmes-Weinstein Monofilaments Test (SW test)** | ○ | | | | **NA** |
| **Tinel's Sign/Test** | | ○ | | | **NA** |
| **Ultrasound (US)** | | ○ | | | **NA** |
| **Pain** | | | | | |
| **Questionnaire/Scale (VAS-pain)** | ○ | ● | 🟢 | 🟢 | **NA** |
| **Symptoms** | | | | | |
| **Questionnaire (Boston-SSS)** | ○ | ○ | ○ | ○ | **NA** |

*TABLE 112: SUMMARY OF FINDINGS PICO 6 PART 6 OTHER TREATMENTS (EARLY FOLLOW-UP (<90DAYS))*

**Favors treatment 1** 🟢
**Favors treatment 2** ●
**Not significant** ○

| | **High Quality** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Outcomes** | **Bakhtiary,A.H., 2004** | **Chang,W.D., 2008** | **Colbert,A.P., 2010 (1)** | **Colbert,A.P., 2010 (2)** | **Colbert,A.P., 2010 (3)** | **Ebenbichler,G.R., 1998** | **Evcik,D., 2007** | **Fusakul,Y., 2014** | **Saeed,F.-U., 2012** | **Weintraub,M.I., 2008** | **Yang,C.P., 2011** | **Yildiz,N., 2011 (3)** | **Meta-Analysis** |
| **Function** | | | | | | | | | | | | | |
| **Grip Strength** | | | | | | | | | | | | | |
| Kilograms | | | | | | | | | | | | | |
| 0 days | | | | | | ○ | | | | | | | **NA** |
| 28 days | | 🟢 | | | | | ○ | | | | | | **NA** |
| 49 days | | | | | | 🟢 | | | | | | | **NA** |
| 84 days | | | | | | | 🟢 | | | | | | **NA** |
| Kilograms (digital prehension) (at 28 days) | | 🟢 | | | | | | | | | | | **NA** |
| Kilograms (lateral prehension) | | | | | | | | | | | | | |
| 28 days | | 🟢 | | | | | | | | | | | **NA** |
| Units not reported | | | | | | | | | | | | | |
| 35 days | | | | | | | | ● | | | | | **NA** |
| 49 days | ● | | | | | | | | | | | | **NA** |
| 84 days | | | | | | | | 🟢 | | | | | **NA** |
| **NCS** | | | | | | | | | | | | | |
| Index SAP amplitude | ● | | | | | | | | | | | | **NA** |
| Motor nerve velocity, (m/sn) | | | | | | | ○ | | | | | | **NA** |
| Sensory peak latency of the median nerve (ms) | | 🟢 | | | | | | | | | | | **NA** |
| Thumb SAP amplitude | ● | | | | | | | | | | | | **NA** |
| **NCS (CMAP)** | ○ | | ○ | ○ | ○ | | | ○ | | | ○ | | **NA** |
| **NCS (DML)** | | | | | | | | | | | | | |
| Distal motor latency (ms) | | | | | | | | | | | | | |
| 0 days | | | | | | ○ | | | | | | | **NA** |
| 28 days | | 🟢 | | | | | | | 🟢 | | | | **NA** |
| 30 days | | | | | | | | | | | 🟢 | | **NA** |
| 42 days | | | ○ | ○ | ○ | | | | | | | | **NA** |
| 49 days | ● | | | | | 🟢 | | | | | | | **NA** |
| 84 days | | | | | | | | 🟢 | | | | | **NA** |
| 90 days | | | | | | | ○ | | | | | | **NA** |
| Median motor distal latency | | | | | | | | | | | | ○ | **NA** |
| **NCS (DSL)** | ● | | ○ | ○ | ○ | | ○ | 🟢 | 🟢 | | ● | ○ | **NA** |
| **NCS (Motor amplitude (uV))** | | | | | | | | | | | | | **NA** |
| **NCS (MCV)** | | | | | | | | | | | ○ | | **NA** |
| **NCS (Sensory amplitude, (uV))** | | | | | | | ○ | | | | | | **NA** |
| **NCS (SNAP)** | | | ○ | ○ | ○ | | | 🟢 | | | ○ | | **NA** |
| **NCS (SNCV)** | | | | | | | | | | | | | |
| Sensory nerve conduction velocity (antidromic) | | | | | | | | | | | | | |
| 0 days | | | | | | ○ | | | | | | | **NA** |
| 49 days | | | | | | 🟢 | | | | | | | **NA** |
| Sensory nerve conduction velocity (prolonged antidromic wristpalm) | | | | | | | | | | | ● | | **NA** |
| Sensory nerve velocity, (m/sn) | | | | | | | ○ | | | | | | **NA** |
| **Pinch Strength** | | | | | | | | | | | | | |
| Kilograms | | | | | | | | | | | | | |
| 0 days | | | | | | ○ | | | | | | | **NA** |
| 28 days | | | | | | | ○ | | | | | | **NA** |
| 49 days | | | | | | 🟢 | | | | | | | **NA** |
| 84 days | | | | | | | 🟢 | | | | | | **NA** |
| Units not reported | | | | | | | | | | | | | |
| 35 days | | | | | | | | 🟢 | | | | | **NA** |
| 49 days | ● | | | | | | | | | | | | **NA** |
| 84 days | | | | | | | | ○ | | | | | **NA** |
| **Questionnaire (Boston-FSS)** | | 🟢 | ○ | ○ | ○ | | | ○ | 🟢 | | | ○ | **NA** |

## *CONT'D SUMMARY OF FINDINGS PICO 6 PART 6 OTHER TREATMENTS (EARLY FOLLOW-UP (<90DAYS))*

**Favors treatment 1** 🟢
**Favors treatment 2** ●
**Not significant** ○

| | High Quality | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Outcomes** | **Bakhtiary,A.H., 2004** | **Chang,W.D., 2008** | **Colbert,A.P., 2010 (1)** | **Colbert,A.P., 2010 (2)** | **Colbert,A.P., 2010 (3)** | **Ebenbichler,G.R., 1998** | **Evcik,D., 2007** | **Fusakul,Y., 2014** | **Saeed,F.-U., 2012** | **Weintraub,M.I., 2008** | **Yang,C.P., 2011** | **Yildiz,N., 2011 (3)** | **Meta-Analysis** |
| **Pain** | | | | | | | | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | | | | | | | | |
| NPS 10. Neuropathic pain scale (NPS) | | | | | | | | | | ○ | | | **NA** |
| NPS 4. Neuropathic pain scale (NPS) | | | | | | | | | | ○ | | | **NA** |
| NPS 8. Neuropathic pain scale (NPS) | | | | | | | | | | ○ | | | **NA** |
| NPS NA. Neuropathic pain scale (NPS) | | | | | | | | | | ○ | | | **NA** |
| **Questionnaire/Scale (VAS-pain)** | ● | 🟢 | | | | | | ● | 🟢 | ○ | | ○ | **NA** |
| VAS pain (day): 0-10 scale | | | | | | | | | | | | | |
| 28 days | | | | | | | ○ | | | | | | **NA** |
| 84 days | | | | | | | ○ | | | | | | **NA** |
| VAS pain (night): 0-10 scale | | | | | | | | | | | | | |
| 28 days | | | | | | | ○ | | | | | | **NA** |
| 84 days | | | | | | | ○ | | | | | | **NA** |
| **Questionnaire/Scale (VAS-patient satisfaction)** | | | | | | | | | | | | | |
| Sleep interference | | | | | | | | | | ● | | | **NA** |
| **Symptoms** | | | | | | | | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | | | | | | | | |
| Not a questionnaire, worst complaint (cm) | | | | | | | | | | | | | |
| 0 days | | | | | | ○ | | | | | | | **NA** |
| 49 days | | | | | | 🟢 | | | | | | | **NA** |
| No mention of Boston scale, rather merely "symptom severity scale" | | 🟢 | | | | | | | 🟢 | | | ○ | **NA** |
| **Questionnaire (Boston-SSS)** | | | | | | | | | | | | | |
| 35 days | | | | | | | | ● | | | | | **NA** |
| 42 days | | | ○ | ○ | ○ | | | | | | | | **NA** |
| 84 days | | | | | | | | ○ | | | | | **NA** |
| **Questionnaire/Scale (GSS)** | | | | | | | | | | | ○ | | **NA** |
| **Sensory loss** | | | | | | | | | | | | | |
| 0 days | | | | | | ○ | | | | | | | **NA** |
| 49 days | | | | | | 🟢 | | | | | | | **NA** |
| **Complications** | | | | | | | | | | | | | |
| **Complications (general)** | | | | | | | | | | | | | |
| Pain or paraesthesia complaints | | | | | | | | | | | | | |
| 0 days | | | | | | ● | | | | | | | **NA** |
| 49 days | | | | | | 🟢 | | | | | | | **NA** |

*TABLE 113: SUMMARY OF FINDINGS PICO 6 PART 6 OTHER TREATMENTS (LATE FOLLOW-UP (>90DAYS))*

| Favors treatment 1 🟢<br>Favors treatment 2 ●<br>Not significant ○ | High Quality | | | | | Meta-Analysis |
|---|---|---|---|---|---|---|
| **Outcomes** | Colbert,A.P., 2010 (1) | Colbert,A.P., 2010 (2) | Colbert,A.P., 2010 (3) | Ebenbichler,G.R., 1998 | Yang,C.P., 2011 | |
| **Complications** | | | | | | |
| **Complications (general)** | | | | | | |
| Pain or paraesthesia complaints | | | | 🟢 | | NA |
| **Function** | | | | | | |
| **Grip strength (kilograms)** | | | | 🟢 | | NA |
| **NCS (CMAP)** | ○ | ○ | ● | | ○ | NA |
| **NCS (DML)** | ○ | ○ | ○ | 🟢 | 🟢 | NA |
| **NCS (DSL)** | ○ | ○ | ○ | | ○ | NA |
| **NCS (MCV)** | | | | | 🟢 | NA |
| **NCS (SNAP)** | ○ | ○ | ○ | | ○ | NA |
| **NCS (SNCV)** | | | | 🟢 | ○ | NA |
| **Pinch Strength (kilograms)** | | | | 🟢 | | NA |
| **Questionnaire (Boston-FSS)** | ○ | ○ | ○ | | | NA |
| **Symptoms** | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | |
| Not questionnaire, worst complaint (cm) | | | | 🟢 | | NA |
| **Questionnaire (Boston-SSS)** | ○ | ○ | ○ | | | NA |
| **Questionnaire/Scale (GSS)** | | | | | 🟢 | NA |
| **Sensory loss** | | | | 🟢 | | NA |

## *DETAILED DATA FINDINGS*

## *TABLE 114: PICO 6 PART 1- IMMOBILIZATION: FUNCTION*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hall,B., 2013 | High Quality | Grip strength(Kilograms) | 1.8 months | Splint (Splint) | 30 | 25.01(9.37) | No splint (No splint) | 24 | 23.9(8.88) | Mean Difference | 1.11(-3.78, 5.995145) | Not Significant (P-value>.05) |
| Hall,B., 2013 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 1.8 months | Splint (Splint) | 30 | 2.04(0.74) | No splint (No splint) | 24 | 2.08(0.70) | Mean Difference | -0.04(-0.43, 0.345427) | Not Significant (P-value>.05) |
| Hall,B., 2013 | High Quality | Semmes-Weinstein Monofilaments Test (SW test)(swm score, palmar side) | 1.8 months | Splint (Splint) | 30 | 89.78(78.98) | No splint (No splint) | 24 | 99.68(87.96) | Mean Difference | -9.9(-55.04, 35.23541) | Not Significant (P-value>.05) |
| Hall,B., 2013 | High Quality | Grip strength(Kilograms) | 1.8 months | Splint (Splint) | 30 | Mean change= 1.07 (p value = 0.018) | No splint (No splint) | 24 | Mean change= 1.85 (p value = 0.107) | Difference between Mean Changes | 0.78 (p value = 0.02) | **Splint (Splint) (P-value>.05)** |
| Hall,B., 2013 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 1.8 months | Splint (Splint) | 30 | Mean change = -0.20 (p value = 0.013) | No splint (No splint) | 24 | Mean change= 0.08 (p value = 0.413) | Difference between Mean Changes | 0.28 (p value = 0.015) | **Splint (Splint) (P-value>.05)** |
| Hall,B., 2013 | High Quality | Semmes-Weinstein Monofilaments Test (SW test)(swm score, palmar side) | 1.8 months | Splint (Splint) | 30 | Mean change= -11.13 (p value = 0.073) | No splint (No splint) | 24 | Mean change= -9.63 (p value = 0.313) | Difference between Mean Changes | 1.52 (p value <0.001) | **Splint (Splint) (P-value>.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Madjdinasab, N., 2008 | High Quality | NCS (DML)(Distal motor latency (ms)) | 1.4 months | Splint (Splint-splint for six weeks) | 21 | 5.21(1.17) | Steroid (Steroid (no splint)-daily for two weeks) | 22 | 4.92(0.91) | Mean Difference | 0.29(-0.34,0.918505) | Not Significant (P-value>.05) |
| Madjdinasab, N., 2008 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 1.4 months | Splint (Splint-splint for six weeks) | 21 | 3.51(0.78) | Steroid (Steroid (no splint)-daily for two weeks) | 22 | 3.31(0.45) | Mean Difference | 0.2(-0.18,0.582957) | Not Significant (P-value>.05) |
| Madjdinasab, N., 2008 | High Quality | NCS (MCV)(Motor nerve conduction velocity (ms)) | 1.4 months | Splint (Splint-splint for six weeks) | 21 | 52.04(4.46) | Steroid (Steroid (no splint)-daily for two weeks) | 22 | 49.97(4.95) | Mean Difference | 2.07(-0.74,4.883790) | Not Significant (P-value>.05) |
| Madjdinasab, N., 2008 | High Quality | NCS (SNCV)(Sensory conduction velocity) | 1.4 months | Splint (Splint-splint for six weeks) | 21 | 41.46(12.51) | Steroid (Steroid (no splint)-daily for two weeks) | 22 | 44.38(8.47) | Mean Difference | -2.92(-9.34,3.495321) | Not Significant (P-value>.05) |
| Manente,G., 2001 | High Quality | NCS (DML)(Distal motor latency (ms)) | 1 month | Brace (Immobilization-brace) | 40 | 4.45(1.30) | No brace (Non-immobilization-no brace) | . | 4.47(0.80) | Mean Difference | -0.02(-.49,.45) | Not Significant (P-value>.05) |
| Manente,G., 2001 | High Quality | NCS (SNAP)(Sensory nerve action potential (?V)) | 1 month | Brace (Immobilization-brace) | 40 | 18.74(15.80) | No brace (Non-immobilization-no brace) | 40 | 12.44(9.40) | Mean Difference | 6.3(0.60,11.99) | **Brace (Immobilization-brace)**<br>**(P-value<.05)** |
| Manente,G., 2001 | High Quality | NCS (SNCV)(Sensory conduction velocity) | 1 month | Brace (Immobilization-brace) | 40 | 37.2(11.70) | No brace (Non-immobilization-no brace) | 40 | 37.92(11.70) | Mean Difference | -0.72(-5.85,4.4) | Not Significant (P-value>.05) |

| **Reference Title** | **Quality** | **Outcome Details** | **Duration** | **Treatment 1 (Details)** | **Group1 N** | **Mean1/P1 (SD1)** | **Treatment 2 (Details)** | **Group2 N** | **Mean2/P2 (SD2)** | **Effect Measure** | **Result (95% CI)** | **Favored Treatment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Manente,G., 2001 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 1 month | Brace (Immobilization-brace) | 40 | 1.48(0.50) | No brace (Non-immobilization-no brace) | 40 | 2.03(0.70) | Mean Difference | -0.55(-0.82,-0.28) | **Brace (Immobilization-brace)**<br>**(P-value<.05)** |
| Soyupek,F., 2012 | High Quality | NCS (CMAP)(Compound muscle action potential) | 3 months | Splinting (Splinting) | 23 | 11.92(3.01) | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 9.97(3.34) | Mean Difference | 1.95(0.11,3.78) | **Splinting (Splinting)**<br>**(P-value<.05)** |
| Soyupek,F., 2012 | High Quality | NCS (CMAP)(Compound muscle action potential) | 3 months | Splinting (Splinting) | 23 | 11.92(3.01) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 10.36(2.57) | Mean Difference | 1.56(0.00,3.11) | **Splinting (Splinting)**<br>**(P-value<.05)** |
| Soyupek,F., 2012 | High Quality | NCS (DML)(Distal motor latency (ms)) | 3 months | Splinting (Splinting) | 23 | 4.28(0.80) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 4.39(0.87) | Mean Difference | -0.11(-0.57,0.349067) | Not Significant (P-value>.05) |

| **Reference Title** | **Quality** | **Outcome Details** | **Duration** | **Treatment 1 (Details)** | **Group1 N** | **Mean1/P1 (SD1)** | **Treatment 2 (Details)** | **Group2 N** | **Mean2/P2 (SD2)** | **Effect Measure** | **Result (95% CI)** | **Favored Treatment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soyupek,F., 2012 | High Quality | NCS (DML)(Distal motor latency (ms)) | 3 months | Splinting (Splinting) | 23 | 4.28(0.80) | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 4.5(1.15) | Mean Difference | -0.22(-0.79,0.352528) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 3 months | Splinting (Splinting) | 23 | 3.47(1.00) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 3.08(0.96) | Mean Difference | 0.39(-0.15,0.931728) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 3 months | Splinting (Splinting) | 23 | 3.47(1.00) | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 3.52(1.02) | Mean Difference | -0.05(-0.63,0.533780) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soyupek,F., 2012 | High Quality | NCS (NCV)(Motor nerve conduction velocity) | 3 months | Splinting (Splinting) | 23 | 52.28(3.27) | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 53.12(5.04) | Mean Difference | -0.84(-3.30,1.615345) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | NCS (NCV)(Motor nerve conduction velocity) | 3 months | Splinting (Splinting) | 23 | 52.28(3.27) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 52.26(4.00) | Mean Difference | 0.02(-1.98,2.015292) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | NCS (NCV)(Sensory nerve conduction velocity) | 3 months | Splinting (Splinting) | 23 | 37.65(10.50) | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 36.91(10.16) | Mean Difference | 0.74(-5.23,6.711264) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soyupek,F., 2012 | High Quality | NCS (NCV)(Sensory nerve conduction velocity) | 3 months | Splinting (Splinting) | 23 | 37.65(10.50) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 40.44(12.83) | Mean Difference | -2.79(-9.19,3.613043) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | NCS (SNAP)(Sensory nerve action potential amplitude) | 3 months | Splinting (Splinting) | 23 | 16.86(8.56) | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 17.95(11.27) | Mean Difference | -1.09(-6.87,4.693862) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | NCS (SNAP)(Sensory nerve action potential amplitude) | 3 months | Splinting (Splinting) | 23 | 16.86(8.56) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 17.7(9.04) | Mean Difference | -0.84(-5.68,4.002603) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | Phalen's test score(% positive) | 3 months | Splinting (Splinting) | 23 | 52.17% | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 50.00% | RR | 1.04(0.61,1.79) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soyupek,F., 2012 | High Quality | Phalen's test score(% positive) | 3 months | Splinting (Splinting) | 23 | 52.17% | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 39.13% | RR | 1.33(0.70,2.54) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 3 months | Splinting (Splinting) | 23 | 12.86(3.74) | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 15.86(5.65) | Mean Difference | -3(-5.77,-0.23085) | **Splinting (Splinting)**<br>**(P-value<.05)** |
| Soyupek,F., 2012 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 3 months | Splinting (Splinting) | 23 | 12.86(3.74) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 15.6(6.37) | Mean Difference | -2.74(-5.55,0.071306) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soyupek,F., 2012 | High Quality | Tinel's Sign/Test(% positive) | 3 months | Splinting (Splinting) | 23 | 60.87% | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 65.22% | RR | 0.93(0.60,1.45) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | Tinel's Sign/Test(% positive) | 3 months | Splinting (Splinting) | 23 | 60.87% | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 50.00% | RR | 1.22(0.74,2.00) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | Ultrasound (US)(anterior-posterior diameter of median nerve) | 3 months | Splinting (Splinting) | 23 | 2.45(0.35) | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 2.13(0.42) | Mean Difference | 0.32(0.10,0.543437) | **NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soyupek,F., 2012 | High Quality | Ultrasound (US)(anterior-posterior diameter of median nerve) | 3 months | Splinting (Splinting) | 23 | 2.45(0.35) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 2.07(0.41) | Mean Difference | 0.38(0.17,0.588624) | **Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) (P-value<.05)** |
| Soyupek,F., 2012 | High Quality | Ultrasound (US)(cross-sectional area of median nerve) | 3 months | Splinting (Splinting) | 23 | 0.12(0.03) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 0.1(0.03) | Mean Difference | 0.02(0.00,0.036547) | **Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) (P-value<.05)** |
| Soyupek,F., 2012 | High Quality | Ultrasound (US)(cross-sectional area of median nerve) | 3 months | Splinting (Splinting) | 23 | 0.12(0.03) | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 0.11(0.02) | Mean Difference | 0.01(-0.00,0.024735) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | Ultrasound (US)(transverse diameter of median nerve) | 3 months | Splinting (Splinting) | 23 | 6.82(1.03) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 6.61(1.20) | Mean Difference | 0.21(-0.40,0.822181) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soyupek,F., 2012 | High Quality | Ultrasound (US)(transverse diameter of median nerve) | 3 months | Splinting (Splinting) | 23 | 6.82(1.03) | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 6.74(0.91) | Mean Difference | 0.08(-0.48,0.641704) | Not Significant (P-value>.05) |
| Yagci,I., 2009 | High Quality | Grip strength(Kilograms) | 3 months | Splinting (Splinting) | 24 | 26.83(7.16) | Laser (w/ splinting) (Splinting + Low-Level Laser Therapy) | 21 | 30.49(6.93) | Mean Difference | -3.66(-7.78,0.462046) | Not Significant (P-value>.05) |
| Yagci,I., 2009 | High Quality | NCS (CMAP)(Compound muscle action potential) | 3 months | Splinting (Splinting) | 24 | 11.94(2.83) | Laser (w/ splinting) (Splinting + Low-Level Laser Therapy) | 21 | 10.3(2.15) | Mean Difference | 1.64(0.18,3.098618) | **Splinting (Splinting)**<br>**(P-value<.05)** |
| Yagci,I., 2009 | High Quality | NCS (DML)(Median motor nerve distal latency) | 3 months | Splinting (Splinting) | 24 | 3.41(0.45) | Laser (w/ splinting) (Splinting + Low-Level Laser Therapy) | 21 | 3.55(0.53) | Mean Difference | -0.14(-0.43,0.149481) | Not Significant (P-value>.05) |
| Yagci,I., 2009 | High Quality | NCS (SNAP)(Sensory nerve action potential (palm-wrist median)) | 3 months | Splinting (Splinting) | 24 | 31.64(5.36) | Laser (w/ splinting) (Splinting + Low-Level Laser Therapy) | 21 | 32.7(7.41) | Mean Difference | -1.06(-4.89,2.766639) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yagci,I., 2009 | High Quality | NCS (SNAP)(Sensory nerve action potential amplitude (3rd digit-wrist median)) | 3 months | Splinting (Splinting) | 24 | 34.27(8.27) | Laser (w/ splinting) (Splinting + Low-Level Laser Therapy) | 21 | 35.52(12.49) | Mean Difference | -1.25(-7.53,5.033712) | Not Significant (P-value>.05) |
| Yagci,I., 2009 | High Quality | NCS (SNCV)(Sensory nerve conduction velocity (3rd digit-wrist)) | 3 months | Splinting (Splinting) | 24 | 43.16(5.06) | Laser (w/ splinting) (Splinting + Low-Level Laser Therapy) | 21 | 43.47(6.09) | Mean Difference | -0.31(-3.61,2.988929) | Not Significant (P-value>.05) |
| Yagci,I., 2009 | High Quality | NCS (SNCV)(Sensory nerve conduction velocity (Palm-wrist)) | 3 months | Splinting (Splinting) | 24 | 38.86(4.49) | Laser (w/ splinting) (Splinting + Low-Level Laser Therapy) | 21 | 38.54(7.01) | Mean Difference | 0.32(-3.18,3.815185) | Not Significant (P-value>.05) |
| Yagci,I., 2009 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 3 months | Splinting (Splinting) | 24 | 2.38(0.71) | Laser (w/ splinting) (Splinting + Low-Level Laser Therapy) | 21 | 2.1(0.63) | Mean Difference | 0.28(-0.11,0.671530) | Not Significant (P-value>.05) |

*TABLE 115: PICO 6 PART 1- IMMOBILIZATION: OTHER*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hall,B., 2013 | High Quality | Purdue pegboard test score(t (minutes)) | 1.8 months | Splint (Splint) | 30 | 51.4(15.30) | No splint (No splint) | 24 | 53.72(11.29) | Mean Difference | -2.32(-9.42,4.777799) | Not Significant (P-value>.05) |
| Hall,B., 2013 | High Quality | Purdue pegboard test score(t (minutes)) | 1.8 months | Splint (Splint) | 30 | Mean change= 4.53 (p value = 0.477) | No splint (No splint) | 24 | Mean change= 12.91 (p value = 0.582) | Difference between Mean Changes | 8.38 (p value =0.021) | **Splint (Splint)**<br>**(P-value>.05)** |
| Manente,G., 2001 | High Quality | Questionnaire (GICQ)(Global Impression Change Questionnaire) | 1 month | Brace (Immobilization-brace) | 40 | . % | No brace (Non-immobilization-no brace) | . | . % | Author Reported | NA | **Brace (Immobilization-brace)**<br>**(P-value<.05)** |

*TABLE 116: PICO 6 PART 1- IMMOBILIZATION: PAIN*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hall,B., 2013 | High Quality | Questionnaire/Scale (VAS-pain)(VAS pain) | 1.8 months | Splint (Splint) | 30 | 4.26(2.67) | No splint (No splint) | 24 | 5.65(2.54) | Mean Difference | -1.39(-2.78,0.004835) | Not Significant (P-value>.05) |
| Hall,B., 2013 | High Quality | Questionnaire/Scale (VAS-pain)(VAS pain) | 1.8 months | Splint (Splint) | 30 | Mean change= -1.58 (p value = 0.001) | No splint (No splint) | 24 | Mean change= 0.65 (p value = 0.118) | Difference between Mean Changes | 2.23 (p value =0.001) | **Splint (Splint)**<br>**(P-value>.05)** |
| Soyupek,F., 2012 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 3 months | Splinting (Splinting) | 23 | 37.91(23.94) | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 45.65(23.65) | Mean Difference | -7.74(-21.49,6.013110) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 3 months | Splinting (Splinting) | 23 | 37.91(23.94) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 30.35(18.15) | Mean Difference | 7.56(-4.31,19.43111) | Not Significant (P-value>.05) |

*TABLE 117: PICO 6 PART 1- IMMOBILIZATION: SYMPTOMS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hall,B., 2013 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 1.8 months | Splint (Splint) | 30 | 2.38(0.77) | No splint (No splint) | 24 | 2.6(0.62) | Mean Difference | -0.22(-0.59,0.150745) | Not Significant (P-value>.05) |
| Hall,B., 2013 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 1.8 months | Splint (Splint) | 30 | Mean change= -0.42 (p value <0.001) | No splint (No splint) | 24 | Mean change= 0.03 (p value = 0.749) | Difference between Mean Changes | 0.45 (p value <0.001) | **Splint (Splint)**<br>**(P-value>.05)** |
| Manente,G., 2001 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 1 month | Brace (Immobilization-brace) | 40 | 1.54(0.40) | No brace (Non-immobilization-no brace) | 40 | 2.61(0.60) | Mean Difference | -1.07(-1.29,-0.84652) | **Brace (Immobilization-brace)**<br>**(P-value<.05)** |
| Soyupek,F., 2012 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 3 months | Splinting (Splinting) | 23 | 14.08(6.67) | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 26(5.43) | Mean Difference | -11.92(-15.44,-8.40495) | **Splinting (Splinting)**<br>**(P-value<.05)** |

| **Reference Title** | **Quality** | **Outcome Details** | **Duration** | **Treatment 1 (Details)** | **Group1 N** | **Mean1/P1 (SD1)** | **Treatment 2 (Details)** | **Group2 N** | **Mean2/P2 (SD2)** | **Effect Measure** | **Result (95% CI)** | **Favored Treatment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soyupek,F., 2012 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 3 months | Splinting (Splinting) | 23 | 14.08(6.67) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 23.46(5.95) | Mean Difference | -9.38(-12.89,-5.87457) | **Splinting (Splinting)**<br>**(P-value<.05)** |
| Yagci,I., 2009 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 3 months | Splinting (Splinting) | 24 | 2.35(0.65) | Laser (w/ splinting) (Splinting + Low-Level Laser Therapy) | 21 | 2.25(0.79) | Mean Difference | 0.1(-0.33,0.527054) | Not Significant (P-value>.05) |

## *TABLE 118: PICO 6 PART 2- INJECTION (STEROID): COMPLICATIONS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Treatment Failure(Rate of surgery @ 1 year) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 81.08% | No steroid (placebo) (Placebo injection) | 37 | 72.97% | RR | 1.11(0.87,1.43) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Treatment Failure(Rate of surgery @ 1 year) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 81.08% | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | 72.97% | RR | 1.11(0.87,1.43) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Treatment Failure(Rate of surgery @ 1 year) | 1 years | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | 72.97% | No steroid (placebo) (Placebo injection) | 37 | 72.97% | RR | 1.00(0.76,1.32) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Treatment Failure(Referred to surgery) | 5.9 months | Steroid (injection)-20mg (20mg Methylprednisolone injection) | 45 | 13.33% | Steroid (injection)-40mg (40mg Methylprednisolone injection) | 43 | 6.98% | RR | 1.91(0.51,7.16) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Treatment Failure(Referred to surgery) | 5.9 months | Steroid (injection)-20mg (20mg Methylprednisolone injection) | 45 | 13.33% | Steroid (injection)-60mg (60mg Methylprednisolone injection) | 44 | 6.82% | RR | 1.96(0.52,7.34) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dammers,J. W., 2006 | High Quality | Treatment Failure(Second Injection) | 5.9 months | Steroid (injection)-20mg (20mg Methylprednisolone injection) | 45 | 28.89% | Steroid (injection)-40mg (40mg Methylprednisolone injection) | 43 | 39.53% | RR | 0.73(0.41,1.32) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Treatment Failure(Second Injection) | 5.9 months | Steroid (injection)-20mg (20mg Methylprednisolone injection) | 45 | 28.89% | Steroid (injection)-60mg (60mg Methylprednisolone injection) | 44 | 18.18% | RR | 1.59(0.73,3.45) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Treatment Failure(Referred to surgery) | 1 years | Steroid (injection)-20mg (20mg Methylprednisolone injection) | 45 | 13.33% | Steroid (injection)-40mg (40mg Methylprednisolone injection) | 43 | 9.30% | RR | 1.43(0.43,4.73) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Treatment Failure(Referred to surgery) | 1 years | Steroid (injection)-20mg (20mg Methylprednisolone injection) | 45 | 13.33% | Steroid (injection)-60mg (60mg Methylprednisolone injection) | 44 | 9.09% | RR | 1.47(0.44,4.85) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Treatment Failure(Second Injection) | 1 years | Steroid (injection)-20mg (20mg Methylprednisolone injection) | 45 | 37.78% | Steroid (injection)-40mg (40mg Methylprednisolone injection) | 43 | 48.84% | RR | 0.77(0.48,1.26) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Treatment Failure(Second Injection) | 1 years | Steroid (injection)-20mg (20mg Methylprednisolone injection) | 45 | 37.78% | Steroid (injection)-60mg (60mg Methylprednisolone injection) | 44 | 36.36% | RR | 1.04(0.60,1.79) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Treatment Failure(Referred to surgery) | 5.9 months | Steroid (injection)-40mg (40mg Methylprednisolone injection) | 43 | 6.98% | Steroid (injection)-60mg (60mg Methylprednisolone injection) | 44 | 6.82% | RR | 1.02(0.22,4.79) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dammers,J. W., 2006 | High Quality | Treatment Failure(Second Injection) | 5.9 months | Steroid (injection)-40mg (40mg Methylprednisolone injection) | 43 | 39.53% | Steroid (injection)-60mg (60mg Methylprednisolone injection) | 44 | 18.18% | RR | 2.17(1.05,4.50) | **Steroid (injection)-60mg (60mg Methylprednisolone injection)**<br>**(P-value<.05)** |
| Dammers,J. W., 2006 | High Quality | Treatment Failure(Referred to surgery) | 1 years | Steroid (injection)-40mg (40mg Methylprednisolone injection) | 43 | 9.30% | Steroid (injection)-60mg (60mg Methylprednisolone injection) | 44 | 9.09% | RR | 1.02(0.27,3.83) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Treatment Failure(Second Injection) | 1 years | Steroid (injection)-40mg (40mg Methylprednisolone injection) | 43 | 48.84% | Steroid (injection)-60mg (60mg Methylprednisolone injection) | 44 | 36.36% | RR | 1.34(0.82,2.21) | Not Significant (P-value>.05) |

## *TABLE 119: PICO 6 PART 2- INJECTION (STEROID): FUNCTION*

| **Reference Title** | **Quality** | **Outcome Details** | **Duration** | **Treatment 1 (Details)** | **Group1 N** | **Mean1/ P1 (SD1)** | **Treatment 2 (Details)** | **Group2 N** | **Mean2/ P2 (SD2)** | **Effect Measure** | **Result (95% CI)** | **Favored Treatment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Grip strength(Kilograms) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 2.3(4.40) | No steroid (placebo) (Placebo injection) | 35 | 0.1(6.00) | Mean Difference | 2.2(-0.24,4.641608) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Grip strength(Kilograms) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 2.3(4.40) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 2.8(4.10) | Mean Difference | -0.5(-2.45,1.450360) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Grip strength(Kilograms) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 1.6(8.70) | No steroid (placebo) (Placebo injection) | 37 | 0.6(5.10) | Mean Difference | 1(-2.25,4.249493) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Grip strength(Kilograms) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 1.6(8.70) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | 1.9(7.50) | Mean Difference | -0.3(-4.00,3.401207) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Grip strength(Kilograms) | 2.3 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 2.8(4.10) | No steroid (placebo) (Placebo injection) | 35 | 0.1(6.00) | Mean Difference | 2.7(0.30,5.096909) | **80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) Significant (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Grip strength(Kilograms) | 1 years | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | 1.9(7.50) | No steroid (placebo) (Placebo injection) | 37 | 0.6(5.10) | Mean Difference | 1.3(-1.62,4.222466) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Pinch Strength(Kilograms) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 0.7(1.50) | No steroid (placebo) (Placebo injection) | 35 | 0.3(1.40) | Mean Difference | 0.4(-0.27,1.069880) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Pinch Strength(Kilograms) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 0.7(1.50) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 1.2(1.10) | Mean Difference | -0.5(-1.10,0.102271) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Pinch Strength(Kilograms) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 1.3(1.90) | No steroid (placebo) (Placebo injection) | 37 | 1.1(1.50) | Mean Difference | 0.2(-0.58,0.980016) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Pinch Strength(Kilograms) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 1.3(1.90) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | 1.5(1.80) | Mean Difference | -0.2(-1.04,0.643335) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Pinch Strength(Kilograms) | 2.3 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 1.2(1.10) | No steroid (placebo) (Placebo injection) | 35 | 0.3(1.40) | Mean Difference | 0.9(0.31,1.486728) | **80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Pinch Strength(Kilograms) | 1 years | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | 1.5(1.80) | No steroid (placebo) (Placebo injection) | 37 | 1.1(1.50) | Mean Difference | 0.4(-0.35,1.154990) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Two-point discrimination(Millimeters) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -0.06(1.00) | No steroid (placebo) (Placebo injection) | 35 | 0.02(0.90) | Mean Difference | -0.08(-0.52,0.359013) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Two-point discrimination(Millimeters) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -0.06(1.00) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -0.07(1.50) | Mean Difference | 0.01(-0.58,0.596452) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Two-point discrimination(Millimeters) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -0.26(0.90) | No steroid (placebo) (Placebo injection) | 37 | -0.47(0.90) | Mean Difference | 0.21(-0.20,0.620121) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Two-point discrimination(Millimeters) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -0.26(0.90) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | -0.34(0.70) | Mean Difference | 0.08(-0.29,0.447389) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Two-point discrimination(Millimeters) | 2.3 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -0.07(1.50) | No steroid (placebo) (Placebo injection) | 35 | 0.02(0.90) | Mean Difference | -0.09(-0.66,0.483590) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Two-point discrimination(Millimeters) | 1 years | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | -0.34(0.70) | No steroid (placebo) (Placebo injection) | 37 | -0.47(0.90) | Mean Difference | 0.13(-0.24,0.497389) | Not Significant (P-value>.05) |
| Wong,S.M., 2005 | High Quality | Grip strength(Kilograms (left hand)) | 1.8 months | Steroid (single injection) (Single injection (methylprednisolone acetate)) | 20 | 20.4(5.10) | Steroid (double injection) (Double injection (methylprednisolone acetate+saline)) | 20 | 20.6(6.20) | Mean Difference | -0.2(-3.72,3.318459) | Not Significant (P-value>.05) |
| Wong,S.M., 2005 | High Quality | Grip strength(Kilograms (right hand)) | 1.8 months | Steroid (single injection) (Single injection (methylprednisolone acetate)) | 20 | 20.9(6.20) | Steroid (double injection) (Double injection (methylprednisolone acetate+saline)) | 20 | 21.9(7.20) | Mean Difference | -1(-5.16,3.164250) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wong,S.M. , 2005 | High Quality | Grip strength(Kilograms (left hand)) | 9.2 months | Steroid (single injection) (Single injection (methylprednisolone acetate)) | 20 | 20.2(6.60) | Steroid (double injection) (Double injection (methylprednisolone acetate+saline)) | 20 | 18.2(6.60) | Mean Difference | 2(-2.09,6.090722) | Not Significant (P-value>.05) |
| Wong,S.M. , 2005 | High Quality | Grip strength(Kilograms (right hand)) | 9.2 months | Steroid (single injection) (Single injection (methylprednisolone acetate)) | . | 21.4(6.60) | Steroid (double injection) (Double injection (methylprednisolone acetate+saline)) | 20 | 20(7.00) | Mean Difference | 1.4(.,) | Not Significant (P-value>.05) |
| Wong,S.M. , 2005 | High Quality | NCS (DML)(Distal motor latency (right hand)) | NA | Steroid (single injection) (Single injection (methylprednisolone acetate)) | 20 | 4.5(1.00) | Steroid (double injection) (Double injection (methylprednisolone acetate+saline)) | 20 | 5.4(1.90) | Mean Difference | -0.9(-1.84,0.041004) | Not Significant (P-value>.05) |
| Wong,S.M. , 2005 | High Quality | NCS (DML)(Distal motor latency (left hand)) | 1.8 months | Steroid (single injection) (Single injection (methylprednisolone acetate)) | 20 | 4.4(0.90) | Steroid (double injection) (Double injection (methylprednisolone acetate+saline)) | 20 | 4.3(1.10) | Mean Difference | 0.1(-0.52,0.722897) | Not Significant (P-value>.05) |
| Wong,S.M. , 2005 | High Quality | NCS (DML)(Distal motor latency (right hand)) | 1.8 months | Steroid (single injection) (Single injection (methylprednisolone acetate)) | 20 | 4.5(1.00) | Steroid (double injection) (Double injection (methylprednisolone acetate+saline)) | 20 | 5(1.50) | Mean Difference | -0.5(-1.29,0.290101) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wong,S.M. , 2005 | High Quality | NCS (DML)(Distal motor latency (left hand)) | 9.2 months | Steroid (single injection) (Single injection (methylprednisolone acetate)) | 20 | 4.2(1.10) | Steroid (double injection) (Double injection (methylprednisolone acetate+saline)) | 20 | 4.5(1.00) | Mean Difference | -0.3(-0.95,0.351534) | Not Significant (P-value>.05) |
| Wong,S.M. , 2005 | High Quality | NCS (DML)(Distal motor latency (right hand)) | 9.2 months | Steroid (single injection) (Single injection (methylprednisolone acetate)) | 20 | 4.3(1.00) | Steroid (double injection) (Double injection (methylprednisolone acetate+saline)) | 20 | 5.2(1.50) | Mean Difference | -0.9(-1.69,-0.10989) | **Steroid (single injection) (Single injection (methylprednisolone acetate))**<br>**(P-value<.05)** |

*TABLE 120: PICO 6 PART 2- INJECTION (STEROID): OTHER*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-6D score) | 1.2 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 0.14(0.14) | No steroid (placebo) (Placebo injection) | 37 | 0.06(0.10) | Mean Difference | 0.08(0.02,0.135437) | **40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-6D score) | 1.2 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 0.14(0.14) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 0.1(0.10) | Mean Difference | 0.04(-0.02,0.095696) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-6D score) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 0.08(0.15) | No steroid (placebo) (Placebo injection) | 35 | 0(0.11) | Mean Difference | 0.08(0.02,0.140532) | **40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-6D score) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 0.08(0.15) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 0.06(0.10) | Mean Difference | 0.02(-0.04,0.078337) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-6D score) | 5.5 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 0.07(0.12) | No steroid (placebo) (Placebo injection) | 35 | 0.09(0.16) | Mean Difference | -0.02(-0.09,0.045612) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-6D score) | 5.5 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 0.07(0.12) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 0.08(0.12) | Mean Difference | -0.01(-0.07,0.045061) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-6D score) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 0.11(0.13) | No steroid (placebo) (Placebo injection) | 37 | 0.1(0.17) | Mean Difference | 0.01(-0.06,0.078958) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-6D score) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 0.11(0.13) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | 0.12(0.15) | Mean Difference | -0.01(-0.07,0.053959) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-6D score) | 1.2 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 0.1(0.10) | No steroid (placebo) (Placebo injection) | 37 | 0.06(0.10) | Mean Difference | 0.04(-0.01,0.085884) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-6D score) | 2.3 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 0.06(0.10) | No steroid (placebo) (Placebo injection) | 35 | 0(0.11) | Mean Difference | 0.06(0.01,0.108940) | **80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-6D score) | 5.5 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 0.08(0.12) | No steroid (placebo) (Placebo injection) | 35 | 0.09(0.16) | Mean Difference | -0.01(-0.08,0.055927) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-6D score) | 1 years | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | 0.12(0.15) | No steroid (placebo) (Placebo injection) | 37 | 0.1(0.17) | Mean Difference | 0.02(-0.05,0.093052) | Not Significant (P-value>.05) |

*TABLE 121: PICO 6 PART 2- INJECTION (STEROID): PAIN*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-36 bodily pain score) | 1.2 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 30(32.60) | No steroid (placebo) (Placebo injection) | 37 | 8.8(18.90) | Mean Difference | 21.2(9.06,33.34212) | **40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-36 bodily pain score) | 1.2 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 30(32.60) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 34.3(29.50) | Mean Difference | -4.3(-18.56,9.955123) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-36 bodily pain score) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 24.6(29.90) | No steroid (placebo) (Placebo injection) | 35 | 3.3(25.00) | Mean Difference | 21.3(8.59,34.00521) | **40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-36 bodily pain score) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 24.6(29.90) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 23.4(28.50) | Mean Difference | 1.2(-12.20,14.59770) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-36 bodily pain score) | 5.5 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 19.6(28.40) | No steroid (placebo) (Placebo injection) | 35 | 25.3(27.40) | Mean Difference | -5.7(-18.59,7.189768) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-36 bodily pain score) | 5.5 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 19.6(28.40) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 28.8(30.10) | Mean Difference | -9.2(-22.63,4.232202) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-36 bodily pain score) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 30(32.60) | No steroid (placebo) (Placebo injection) | 37 | 29.3(33.00) | Mean Difference | 0.7(-14.25,15.64693) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-36 bodily pain score) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | 30(32.60) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | 34.3(29.50) | Mean Difference | -4.3(-18.47,9.866816) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(SF-36 bodily pain score) | 1.2 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 34.3(29.50) | No steroid (placebo) (Placebo injection) | 37 | 8.8(18.90) | Mean Difference | 25.5(14.10,36.89971) | **80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined )(SF-36 bodily pain score) | 2.3 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 23.4(28.50) | No steroid (placebo) (Placebo injection) | 35 | 3.3(25.00) | Mean Difference | 20.1(7.64,32.56098) | **80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined )(SF-36 bodily pain score) | 5.5 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | 28.8(30.10) | No steroid (placebo) (Placebo injection) | 35 | 25.3(27.40) | Mean Difference | 3.5(-9.88,16.88225) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined )(SF-36 bodily pain score) | 1 years | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | 34.3(29.50) | No steroid (placebo) (Placebo injection) | 37 | 29.3(33.00) | Mean Difference | 5(-9.26,19.26264) | Not Significant (P-value>.05) |

*TABLE 122: PICO 6 PART 2- INJECTION (STEROID): SYMPTOMS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)( CTS symptom severity score) | 1.2 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -1.33(0.98) | No steroid (placebo) (Placebo injection) | 37 | -0.47(0.60) | Mean Difference | -0.86(-1.23,-0.48973) | **40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)( CTS symptom severity score) | 1.2 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -1.33(0.98) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -1.12(0.93) | Mean Difference | -0.21(-0.65,0.228189) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)( CTS symptom severity score) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -1.17(0.95) | No steroid (placebo) (Placebo injection) | 35 | -0.3(0.66) | Mean Difference | -0.87(-1.25,-0.49381) | **40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)( CTS symptom severity score) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -1.17(0.95) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -0.9(1.00) | Mean Difference | -0.27(-0.72,0.177677) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(CTS symptom severity score) | 5.5 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -1.16(0.86) | No steroid (placebo) (Placebo injection) | 35 | -1.49(0.82) | Mean Difference | 0.33(-0.06,0.718063) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(CTS symptom severity score) | 5.5 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -1.16(0.86) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -1.22(0.93) | Mean Difference | 0.06(-0.35,0.471199) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(CTS symptom severity score) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -1.52(1.08) | No steroid (placebo) (Placebo injection) | 37 | -1.55(0.79) | Mean Difference | 0.03(-0.40,0.461163) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(CTS symptom severity score) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -1.52(1.08) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | -1.37(0.86) | Mean Difference | -0.15(-0.59,0.294853) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(CTS symptom severity score) | 1.2 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -1.12(0.93) | No steroid (placebo) (Placebo injection) | 37 | -0.47(0.60) | Mean Difference | -0.65(-1.01,-0.28989) | **80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(CTS symptom severity score) | 2.3 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -0.9(1.00) | No steroid (placebo) (Placebo injection) | 35 | -0.3(0.66) | Mean Difference | -0.6(-0.99,-0.20690) | **80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(CTS symptom severity score) | 5.5 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -1.22(0.93) | No steroid (placebo) (Placebo injection) | 35 | -1.49(0.82) | Mean Difference | 0.27(-0.14,0.677550) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (General/undefined)(CTS symptom severity score) | 1 years | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | -1.37(0.86) | No steroid (placebo) (Placebo injection) | 37 | -1.55(0.79) | Mean Difference | 0.18(-0.20,0.556283) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (DASH-Quick DASH)(Primarily symptomatic domain but includes a functional component as well) | 1.2 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -22.6(20.50) | No steroid (placebo) (Placebo injection) | 37 | -9.8(12.90) | Mean Difference | -12.8(-20.60,-4.99543) | **40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (DASH-Quick DASH)(Primarily symptomatic domain but includes a functional component as well) | 1.2 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -22.6(20.50) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -20.2(17.60) | Mean Difference | -2.4(-11.16,6.357176) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Questionnaire (DASH-Quick DASH)(Primarily symptomatic domain but includes a functional component as well) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -19.4(24.70) | No steroid (placebo) (Placebo injection) | 35 | -4.1(14.50) | Mean Difference | -15.3(-24.60,-6.00371) | **40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (DASH-Quick DASH)(Primarily symptomatic domain but includes a functional component as well) | 2.3 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -19.4(24.70) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -15.5(19.40) | Mean Difference | -3.9(-14.07,6.273771) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (DASH-Quick DASH)(Primarily symptomatic domain but includes a functional component as well) | 5.5 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -16.8(17.60) | No steroid (placebo) (Placebo injection) | 35 | -25.3(22.80) | Mean Difference | 8.5(-0.95,17.94558) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (DASH-Quick DASH)(Primarily symptomatic domain but includes a functional component as well) | 5.5 months | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -16.8(17.60) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -19.2(22.10) | Mean Difference | 2.4(-6.78,11.58042) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (DASH-Quick DASH)(Primarily symptomatic domain but includes a functional component as well) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -27.3(20.90) | No steroid (placebo) (Placebo injection) | 37 | -28.7(21.90) | Mean Difference | 1.4(-8.35,11.15444) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2013 | High Quality | Questionnaire (DASH-Quick DASH)(Primarily symptomatic domain but includes a functional component as well) | 1 years | 40mg Methylprednisolone injection (40mg Methylprednisolone injection (corticosteroid)) | 37 | -27.3(20.90) | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | -26(18.40) | Mean Difference | -1.3(-10.27,7.672422) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (DASH-Quick DASH)(Primarily symptomatic domain but includes a functional component as well) | 1.2 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -20.2(17.60) | No steroid (placebo) (Placebo injection) | 37 | -9.8(12.90) | Mean Difference | -10.4(-17.49,-3.30544) | **80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (DASH-Quick DASH)(Primarily symptomatic domain but includes a functional component as well) | 2.3 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -15.5(19.40) | No steroid (placebo) (Placebo injection) | 35 | -4.1(14.50) | Mean Difference | -11.4(-19.35,-3.44771) | **80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid))**<br>**(P-value<.05)** |
| Atroshi,I., 2013 | High Quality | Questionnaire (DASH-Quick DASH)(Primarily symptomatic domain but includes a functional component as well) | 5.5 months | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 36 | -19.2(22.10) | No steroid (placebo) (Placebo injection) | 35 | -25.3(22.80) | Mean Difference | 6.1(-4.35,16.54875) | Not Significant (P-value>.05) |
| Atroshi,I., 2013 | High Quality | Questionnaire (DASH-Quick DASH)(Primarily symptomatic domain but includes a functional component as well) | 1 years | 80mg Methylprednisolone injection (80mg Methylprednisolone injection (corticosteroid)) | 37 | -26(18.40) | No steroid (placebo) (Placebo injection) | 37 | -28.7(21.90) | Mean Difference | 2.7(-6.52,11.91673) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dammers,J. W., 2006 | High Quality | Symptom relief (general)(No or only minor symptoms requiring no further treatment) | 5.9 months | Steroid (injection)-20mg (20mg Methylprednisolone injection) | 45 | 55.56% | Steroid (injection)-60mg (60mg Methylprednisolone injection) | 44 | 72.73% | RR | 0.76(0.56,1.05) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Symptom relief (general)(No or only minor symptoms requiring no further treatment) | 5.9 months | Steroid (injection)-20mg (20mg Methylprednisolone injection) | 45 | 55.56% | Steroid (injection)-40mg (40mg Methylprednisolone injection) | 43 | 53.49% | RR | 1.04(0.71,1.52) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Symptom relief (general)(No or only minor symptoms requiring no further treatment) | 1 years | Steroid (injection)-20mg (20mg Methylprednisolone injection) | 45 | 46.67% | Steroid (injection)-60mg (60mg Methylprednisolone injection) | 44 | 52.27% | RR | 0.89(0.59,1.36) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Symptom relief (general)(No or only minor symptoms requiring no further treatment) | 1 years | Steroid (injection)-20mg (20mg Methylprednisolone injection) | 45 | 46.67% | Steroid (injection)-40mg (40mg Methylprednisolone injection) | 43 | 41.86% | RR | 1.11(0.70,1.79) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Symptom relief (general)(No or only minor symptoms requiring no further treatment) | 5.9 months | Steroid (injection)-40mg (40mg Methylprednisolone injection) | 43 | 53.49% | Steroid (injection)-60mg (60mg Methylprednisolone injection) | 44 | 72.73% | RR | 0.74(0.53,1.03) | Not Significant (P-value>.05) |
| Dammers,J. W., 2006 | High Quality | Symptom relief (general)(No or only minor symptoms requiring no further treatment) | 1 years | Steroid (injection)-40mg (40mg Methylprednisolone injection) | 43 | 41.86% | Steroid (injection)-60mg (60mg Methylprednisolone injection) | 44 | 52.27% | RR | 0.80(0.51,1.26) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wong,S.M., 2001 | High Quality | Questionnaire/Scale (GSS)( ) | 1.8 months | Steroid (injection) (prednisolone 25 mg daily for 10 days and the same volume of saline injection into the carpal tunnel) | 30 | 13.67(8.27) | Steroid (oral) (oral placebo daily for 10 days and a single 15-mg methylprednisolone acetate injection3 locally into the carpal tunnel) | 30 | 20.83(8.73) | Mean Difference | -7.16(-11.46,-2.85683) | **Steroid (injection) (prednisolone 25 mg daily for 10 days and the same volume of saline injection into the carpal tunnel) (P-value<.05)** |
| Wong,S.M., 2001 | High Quality | Questionnaire/Scale (GSS)( ) | 2.8 months | Steroid (injection) (prednisolone 25 mg daily for 10 days and the same volume of saline injection into the carpal tunnel) | 30 | 14.3(8.42) | Steroid (oral) (oral placebo daily for 10 days and a single 15-mg methylprednisolone acetate injection3 locally into the carpal tunnel) | 30 | 21.4(9.64) | Mean Difference | -7.1(-11.68,-2.51977) | **Steroid (injection) (prednisolone 25 mg daily for 10 days and the same volume of saline injection into the carpal tunnel) (P-value<.05)** |
| Wong,S.M., 2005 | High Quality | Questionnaire/Scale (GSS)(Both hands) | 1.8 months | Steroid (single injection) (Single injection (methylprednisolone acetate)) | 20 | 15.2(9.90) | Steroid (double injection) (Double injection (methylprednisolone acetate+saline)) | 20 | 11.4(7.60) | Mean Difference | 3.8(-1.67,9.269945) | Not Significant (P-value>.05) |
| Wong,S.M., 2005 | High Quality | Questionnaire/Scale (GSS)(Both hands) | 5.5 months | Steroid (single injection) (Single injection (methylprednisolone acetate)) | 20 | 15.9(10.60) | Steroid (double injection) (Double injection (methylprednisolone acetate+saline)) | 20 | 13(9.70) | Mean Difference | 2.9(-3.40,9.197214) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wong,S.M., 2005 | High Quality | Questionnaire/Scale (GSS)(Both hands) | 9.2 months | Steroid (single injection) (Single injection (methylprednisolone acetate)) | 20 | 12.6(9.10) | Steroid (double injection) (Double injection (methylprednisolone acetate+saline)) | 20 | 14.1(11.00) | Mean Difference | -1.5(-7.76,4.756822) | Not Significant (P-value>.05) |

*TABLE 123: PICO 6 PART 4- ORAL TREATMENTS: SYMPTOMS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chang,M.H., 1998 | High Quality | Questionnaire/Scale (GSS)(Global symptom score) | 1 month | Steroid (Steroid) | 23 | 10(7.50) | Placebo (Placebo) | 16 | 20.8(6.60) | Mean Difference | -10.8(-15.26,-6.34422) | **Steroid (Steroid) (P-value<.05)** |
| Chang,M.H., 1998 | High Quality | Questionnaire/Scale (GSS)(Global symptom score) | 1 month | Diuretic (oral treatment) (Diuretic (oral treatment)) | 16 | 21.6(6.30) | Steroid (Steroid) | 23 | 10(7.50) | Mean Difference | 11.6(7.25,15.95026) | **Steroid (Steroid) (P-value<.05)** |
| Chang,M.H., 1998 | High Quality | Questionnaire/Scale (GSS)(Global symptom score) | 1 month | Diuretic (oral treatment) (Diuretic (oral treatment)) | 16 | 21.6(6.30) | Placebo (Placebo) | 16 | 20.8(6.60) | Mean Difference | 0.8(-3.67,5.270830) | Not Significant (P-value>.05) |
| Chang,M.H., 1998 | High Quality | Questionnaire/Scale (GSS)(Global symptom score) | 1 month | Diuretic (oral treatment) (Diuretic (oral treatment)) | 16 | 21.6(6.30) | NSAID (NSAID) | 18 | 24(9.70) | Mean Difference | -2.4(-7.84,3.041549) | Not Significant (P-value>.05) |
| Chang,M.H., 1998 | High Quality | Questionnaire/Scale (GSS)(Global symptom score) | 1 month | NSAID (NSAID) | 18 | 24(9.70) | Steroid (Steroid) | 23 | 10(7.50) | Mean Difference | 14(8.57,19.42919) | **Steroid (Steroid) (P-value<.05)** |
| Chang,M.H., 1998 | High Quality | Questionnaire/Scale (GSS)(Global symptom score) | 1 month | Placebo (Placebo) | 16 | 20.8(6.60) | NSAID (NSAID) | 18 | 24(9.70) | Mean Difference | -3.2(-8.73,2.326269) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hui,A.C., 2011 | High Quality | Questionnaire/Scale (GSS)(Global symptom score) | 1.8 months | Oral treatment (Gabapentin) (300 mg once daily for 1 week, 300 mg twice daily for 1 week, and from then on three times daily) | 71 | 13.4(9.70) | Oral treatment (placebo) (Same as active treatment group, but a placebo) | 69 | 12.5(8.90) | Mean Difference | 0.9(-2.18,3.982365) | Not Significant (P-value>.05) |

*TABLE 124: PICO 6 PART 5- TOPICAL TREATMENTS: FUNCTION*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chang,Y.W. , 2014 | High Quality | NCS (DML)(Distal motor latency (ms)) | 1.8 months | Paraffin therapy (Paraffin & splint) | 43 | 4.98(1.51) | Ultrasound (Ultrasound & splint) | 37 | 5.08(1.30) | Mean Difference | -0.1(-0.72,0.515768) | Not Significant (P-value>.05) |
| Chang,Y.W. , 2014 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 1.8 months | Paraffin therapy (Paraffin & splint) | 43 | 3.4(0.80) | Ultrasound (Ultrasound & splint) | 37 | 3.6(1.40) | Mean Difference | -0.2(-0.71,0.310566) | Not Significant (P-value>.05) |
| Chang,Y.W. , 2014 | High Quality | Pinch Strength(Kilograms) | 1.8 months | Paraffin therapy (Paraffin & splint) | 43 | 3.6(1.50) | Ultrasound (Ultrasound & splint) | 37 | 3.6(1.10) | Mean Difference | 0(-0.57,0.571528) | Not Significant (P-value>.05) |
| Chang,Y.W. , 2014 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 1.8 months | Paraffin therapy (Paraffin & splint) | 23 | 1.8(0.90) | Ultrasound (Ultrasound & splint) | 24 | 1.6(0.70) | Mean Difference | 0.2(-0.26,0.662302) | Not Significant (P-value>.05) |
| Chang,Y.W. , 2014 | High Quality | Semmes Weinstein Monofilaments Test (SW test)( ) | 1.8 months | Paraffin therapy (Paraffin & splint) | 43 | 30.7(3.00) | Ultrasound (Ultrasound & splint) | 37 | 30.9(2.70) | Mean Difference | -0.2(-1.45,1.049381) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | NCS (CMAP)(Compound muscle action potential) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 9.97(3.34) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 10.36(2.57) | Mean Difference | -0.39(-2.05,1.274172) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soyupek,F., 2012 | High Quality | NCS (DML)(Distal motor latency (ms)) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 4.5(1.15) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 4.39(0.87) | Mean Difference | 0.11(-0.46,0.679858) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 3.52(1.02) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 3.08(0.96) | Mean Difference | 0.44(-0.11,0.987921) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | NCS (NCV)(Motor nerve conduction velocity) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 53.12(5.04) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 52.26(4.00) | Mean Difference | 0.86(-1.68,3.397307) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | NCS (NCV)(Sensory nerve conduction velocity) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 36.91(10.16) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 40.44(12.83) | Mean Difference | -3.53(-9.84,2.780761) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | NCS (SNAP)(Sensory nerve action potential amplitude) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 17.95(11.27) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 17.7(9.04) | Mean Difference | 0.25(-5.44,5.944442) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soyupek,F., 2012 | High Quality | Phalen's test score(% positive) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 39.13% | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 50.00% | RR | 0.78(0.42,1.47) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 15.86(5.65) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 15.6(6.37) | Mean Difference | 0.26(-3.04,3.561369) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | Tinel's Sign/Test(% positive) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 65.22% | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 50.00% | RR | 1.30(0.81,2.10) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | Ultrasound (US)(anterior-posterior diameter of median nerve) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 2.13(0.42) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 2.07(0.41) | Mean Difference | 0.06(-0.17,0.289187) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | Ultrasound (US)(cross-sectional area of median nerve) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 0.11(0.02) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 0.1(0.03) | Mean Difference | 0.01(-0.00,0.023794) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soyupek,F., 2012 | High Quality | Ultrasound (US)(transverse diameter of median nerve) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 6.74(0.91) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 6.61(1.20) | Mean Difference | 0.13(-0.45,0.709553) | Not Significant (P-value>.05) |
| Yildiz,N., 2011 | High Quality | NCS (DML)(Median motor distal latency) | 1.8 months | Sham ultrasound (w/ splinting) (Sham ultrasound+splinting. Included the intention-intention-to-treat analysis data) | 17 | 4.32(0.60) | Ketoprofen phonophoresis (w/ splinting) (Ketoprofen phonophoresis (w/ splinting). Included the intention-intention-to-treat analysis data) | 17 | 4.15(0.34) | Mean Difference | 0.17(-0.16,0.497832) | Not Significant (P-value>.05) |
| Yildiz,N., 2011 | High Quality | NCS (DML)(Median motor distal latency) | 1.8 months | Ultrasound (w/ splinting) (Ultrasound+splinting. Included the intention-intention-to-treat analysis data (Group 2)) | 17 | 4.43(0.55) | Ketoprofen phonophoresis (w/ splinting) (Ketoprofen phonophoresis (w/ splinting). Included the intention-intention-to-treat analysis data) | 17 | 4.15(0.34) | Mean Difference | 0.28(-0.03,0.587377) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yildiz,N., 2011 | High Quality | NCS (DSL)(Median sensory distal latency) | 1.8 months | Sham ultrasound (w/ splinting) (Sham ultrasound+splinting. Included the intention-intention-to-treat analysis data) | 17 | 3.94(0.47) | Ketoprofen phonophoresis (w/ splinting) (Ketoprofen phonophoresis (w/ splinting). Included the intention-intention-to-treat analysis data) | 17 | 3.79(0.33) | Mean Difference | 0.15(-0.12,0.422996) | Not Significant (P-value>.05) |
| Yildiz,N., 2011 | High Quality | NCS (DSL)(Median sensory distal latency) | 1.8 months | Ultrasound (w/ splinting) (Ultrasound+splinting. Included the intention-intention-to-treat analysis data (Group 2)) | 17 | 3.87(0.29) | Ketoprofen phonophoresis (w/ splinting) (Ketoprofen phonophoresis (w/ splinting). Included the intention-intention-to-treat analysis data) | 17 | 3.79(0.33) | Mean Difference | 0.08(-0.13,0.288838) | Not Significant (P-value>.05) |
| Yildiz,N., 2011 | High Quality | Questionnaire (General/undefined)(FSS) | 1.8 months | Sham ultrasound (w/ splinting) (Sham ultrasound+splinting. Included the intention-intention-to-treat analysis data) | 17 | 2.19(0.89) | Ketoprofen phonophoresis (w/ splinting) (Ketoprofen phonophoresis (w/ splinting). Included the intention-intention-to-treat analysis data) | 17 | 1.79(0.80) | Mean Difference | 0.4(-0.17,0.968876) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yildiz,N., 2011 | High Quality | Questionnaire (General/undefined)(FSS) | 1.8 months | Ultrasound (w/ splinting) (Ultrasound+splinting. Included the intention-intention-to-treat analysis data (Group 2)) | 17 | 1.98(0.78) | Ketoprofen phonophoresis (w/ splinting) (Ketoprofen phonophoresis (w/ splinting). Included the intention-intention-to-treat analysis data) | 17 | 1.79(0.80) | Mean Difference | 0.19(-0.34,0.721139) | Not Significant (P-value>.05) |

*TABLE 125: PICO 6 PART 5- TOPICAL TREATMENTS: PAIN*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chang,Y. W., 2014 | High Quality | Questionnaire /Scale (VAS-pain)(0-100) | 1.8 months | Paraffin therapy (Paraffin & splint) | 23 | 50.7(22.70) | Ultrasound (Ultrasound & splint) | 24 | 54.2(22.60) | Mean Difference | -3.5(-16.45,9.454633) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | Questionnaire /Scale (VAS-pain)( ) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 45.65(23.65) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 30.35(18.15) | Mean Difference | 15.3(3.53,27.07362) | **Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group"))**<br>**(P-value<.05)** |
| Yildiz,N., 2011 | High Quality | Questionnaire /Scale (VAS-pain)( ) | 1.8 months | Sham ultrasound (w/ splinting) (Sham ultrasound+splinting. Included the intention-intention-to-treat analysis data) | 17 | 3.28(2.74) | Ketoprofen phonophoresis (w/ splinting) (Ketoprofen phonophoresis (w/ splinting). Included the intention-intention-to-treat analysis data) | 17 | 0.98(1.65) | Mean Difference | 2.3(0.78,3.820447) | **Ketoprofen phonophoresis (w/ splinting) (Ketoprofen phonophoresis (w/ splinting). Included the intention-intention-to-treat analysis data)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yildiz,N., 2011 | High Quality | Questionnaire /Scale (VAS-pain)( ) | 1.8 months | Ultrasound (w/ splinting) (Ultrasound+splinting. Included the intention-intention-to-treat analysis data (Group 2)) | 17 | 2.77(2.74) | Ketoprofen phonophoresis (w/ splinting) (Ketoprofen phonophoresis (w/ splinting). Included the intention-intention-to-treat analysis data) | 17 | 0.98(1.65) | Mean Difference | 1.79(0.27,3.310447) | **Ketoprofen phonophoresis (w/ splinting) (Ketoprofen phonophoresis (w/ splinting). Included the intention-intention-to-treat analysis data)**<br>**(P-value<.05)** |

*TABLE 126: PICO 6 PART 5- TOPICAL TREATMENTS: SYMPTOMS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chang,Y.W., 2014 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 1.8 months | Paraffin therapy (Paraffin & splint) | 23 | 1.9(0.70) | Ultrasound (Ultrasound & splint) | 24 | 2.1(0.80) | Mean Difference | -0.2(-0.63,0.229284) | Not Significant (P-value>.05) |
| Soyupek,F., 2012 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 3 months | NSAID with ultrasound (Phonophoresis (ultrasound) with nonsteroid anti-inflammatory drug (PNSAI)) | 23 | 26(5.43) | Steroid with ultrasound (Phonophoresis (ultrasound) with corticosteroid ("PCS group")) | 28 | 23.46(5.95) | Mean Difference | 2.54(-0.59,5.667614) | Not Significant (P-value>.05) |

*TABLE 127: PICO 6 PART 6- OTHER TREATMENTS: COMPLICATIONS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Complications (general)(Pain or paraesthesia complaints) | NA | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 3.3(2.80) | Sham ultrasound (No ultrasound) | 34 | 2(1.90) | Mean Difference | 1.3(0.16,2.437416) | **Sham ultrasound (No ultrasound) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Complications (general)(Pain or paraesthesia complaints) | 1.6 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | -2.14(3.03) | Sham ultrasound (No ultrasound) | 34 | -0.17(2.20) | Mean Difference | -1.97(-3.23,-0.71) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Complications (general)(Pain or paraesthesia complaints) | 7.9 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | -2.76(3.06) | Sham ultrasound (No ultrasound) | 34 | -0.08(2.92) | Mean Difference | -2.68(-4.10,-1.26) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yildiz,N., 2011 | High Quality | Questionnaire (General/undefined)(SSS) | 1.8 months | Sham ultrasound (w/ splinting) (Sham ultrasound+splinting. Included the intention-intention-to-treat analysis data) | 17 | 2.08(0.82) | Ketoprofen phonophoresis (w/ splinting) (Ketoprofen phonophoresis (w/ splinting). Included the intention-intention-to-treat analysis data) | 17 | 1.63(0.73) | Mean Difference | 0.45(-0.07,0.971890) | Not Significant (P-value>.05) |
| Yildiz,N., 2011 | High Quality | Questionnaire (General/undefined)(SSS) | 1.8 months | Ultrasound (w/ splinting) (Ultrasound+splinting. Included the intention-intention-to-treat analysis data (Group 2)) | 17 | 1.97(0.65) | Ketoprofen phonophoresis (w/ splinting) (Ketoprofen phonophoresis (w/ splinting). Included the intention-intention-to-treat analysis data) | 17 | 1.63(0.73) | Mean Difference | 0.34(-0.12,0.804648) | Not Significant (P-value>.05) |

*TABLE 128: PICO 6 PART 6- OTHER TREATMENTS: FUNCTION*

| **Reference Title** | **Quality** | **Outcome Details** | **Duration** | **Treatment 1 (Details)** | **Group1 N** | **Mean1/ P1 (SD1)** | **Treatment 2 (Details)** | **Group2 N** | **Mean2/ P2 (SD2)** | **Effect Measure** | **Result (95% CI)** | **Favored Treatment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bakhtiary,A. H., 2004 | High Quality | Grip strength(Units not reported) | 1.6 months | Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) | . | . % | Laser (15 daily treatment sessions (5 sessions/week).) | . | . % | Author Reported | NA | **Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) (P-value<.05)** |
| Bakhtiary,A. H., 2004 | High Quality | NCS(Index SAP amplitude (?A)) | 1.6 months | Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) | . | . % | Laser (15 daily treatment sessions (5 sessions/week).) | . | . % | Author Reported | NA | **Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) (P-value<.05)** |
| Bakhtiary,A. H., 2004 | High Quality | NCS(Thumb SAP amplitude (?A)) | 1.6 months | Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) | . | . % | Laser (15 daily treatment sessions (5 sessions/week).) | . | . % | Author Reported | NA | **Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) (P-value<.05)** |
| Bakhtiary,A. H., 2004 | High Quality | NCS (CMAP)(Compound muscle action potential (mV)) | 1.6 months | Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) | . | . % | Laser (15 daily treatment sessions (5 sessions/week).) | . | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bakhtiary,A. H., 2004 | High Quality | NCS (DML)(Distal motor latency (ms)) | 1.6 months | Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) | . | . % | Laser (15 daily treatment sessions (5 sessions/week).) | . | . % | Author Reported | NA | **Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) (P-value<.05)** |
| Bakhtiary,A. H., 2004 | High Quality | NCS (DSL)(Antidromic index sensory latency (ms)) | 1.6 months | Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) | . | . % | Laser (15 daily treatment sessions (5 sessions/week).) | . | . % | Author Reported | NA | **Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) (P-value<.05)** |
| Bakhtiary,A. H., 2004 | High Quality | NCS (DSL)(Antidromic thumb sensory latency (ms)) | 1.6 months | Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) | . | . % | Laser (15 daily treatment sessions (5 sessions/week).) | . | . % | Author Reported | NA | **Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) (P-value<.05)** |
| Bakhtiary,A. H., 2004 | High Quality | Pinch Strength(Units not reported) | 1.6 months | Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) | . | . % | Laser (15 daily treatment sessions (5 sessions/week).) | . | . % | Author Reported | NA | **Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) (P-value<.05)** |
| Chang,W.D., 2008 | High Quality | Grip strength(Digital prehension (kilograms)) | 1 month | Laser (Laser treatment) | 20 | 5.2(0.83) | Placebo (Sham laser (placebo)) | 20 | 4.43(1.06) | Mean Difference | 0.77(0.18,1.360038) | **Laser (Laser treatment) (P-value<.05)** |

| **Reference Title** | **Quality** | **Outcome Details** | **Duration** | **Treatment 1 (Details)** | **Group1 N** | **Mean1/ P1 (SD1)** | **Treatment 2 (Details)** | **Group2 N** | **Mean2/ P2 (SD2)** | **Effect Measure** | **Result (95% CI)** | **Favored Treatment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chang,W.D., 2008 | High Quality | Grip strength(Kilograms) | 1 month | Laser (Laser treatment) | 20 | 21.19(4.12) | Placebo (Sham laser (placebo)) | 20 | 17.38(3.56) | Mean Difference | 3.81(1.42,6.196375) | **Laser (Laser treatment)**<br>**(P-value<.05)** |
| Chang,W.D., 2008 | High Quality | Grip strength(Kilograms (lateral prehension)) | 1 month | Laser (Laser treatment) | 20 | 5.33(1.33) | Placebo (Sham laser (placebo)) | 20 | 4.35(1.09) | Mean Difference | 0.98(0.23,1.733644) | **Laser (Laser treatment)**<br>**(P-value<.05)** |
| Chang,W.D., 2008 | High Quality | NCS(Sensory peak latency of the median n. (ms)) | 1 month | Laser (Laser treatment) | 20 | 3.67(0.21) | Placebo (Sham laser (placebo)) | 20 | 3.8(0.11) | Mean Difference | -0.13(-0.23,-0.02610) | **Laser (Laser treatment)**<br>**(P-value<.05)** |
| Chang,W.D., 2008 | High Quality | NCS (DML)(Distal motor latency (ms)) | 1 month | Laser (Laser treatment) | 20 | 3.87(0.30) | Placebo (Sham laser (placebo)) | 20 | 4.1(0.21) | Mean Difference | -0.23(-0.39,-0.06950) | **Laser (Laser treatment)**<br>**(P-value<.05)** |
| Chang,W.D., 2008 | High Quality | Questionnaire (General/undefined)(Functional Status Scale) | 1 month | Laser (Laser treatment) | 20 | 11.04(0.43) | Placebo (Sham laser (placebo)) | 20 | 19.6(1.02) | Mean Difference | -8.56(-9.05,-8.07486) | **Laser (Laser treatment)**<br>**(P-value<.05)** |
| Colbert,A.P., 2010 | High Quality | NCS (CMAP)(Compound muscle action potential (mV)) | 1.4 months | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 5.1(2.60) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 5.6(2.70) | Mean Difference | -0.5(-2.19,1.185456) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (CMAP)(Compound muscle action potential (mV)) | 4.1 months | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 4.8(2.10) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 4.3(0.70) | Mean Difference | 0.5(-0.50,1.495353) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (CMAP)(Compound muscle action potential (mV)) | 1.4 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 5.9(1.90) | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 5.1(2.60) | Mean Difference | 0.8(-0.64,2.235343) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (CMAP)(Compound muscle action potential (mV)) | 1.4 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 5.9(1.90) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 5.6(2.70) | Mean Difference | 0.3(-1.17,1.772199) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Colbert,A.P., 2010 | High Quality | NCS (CMAP)(Compound muscle action potential (mV)) | 4.1 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 5.9(3.00) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 4.3(0.70) | Mean Difference | 1.6(0.25,2.951958) | **Sham magnet therapy (No magnet therapy (sham 0mT))**<br>**(P-value<.05)** |
| Colbert,A.P., 2010 | High Quality | NCS (CMAP)(Compound muscle action potential (mV)) | 4.1 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 5.9(3.00) | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 4.8(2.10) | Mean Difference | 1.1(-0.52,2.718757) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (DML)(Distal motor latency (ms)) | 1.4 months | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 5.1(1.60) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 5(0.80) | Mean Difference | 0.1(-0.70,0.904367) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (DML)(Distal motor latency (ms)) | 4.1 months | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 5.2(1.00) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 5.2(2.40) | Mean Difference | 0(-1.17,1.169102) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (DML)(Distal motor latency (ms)) | 1.4 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 5(1.30) | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 5.1(1.60) | Mean Difference | -0.1(-1.02,0.817725) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (DML)(Distal motor latency (ms)) | 1.4 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 5(1.30) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 5(0.80) | Mean Difference | 0(-0.67,0.673807) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (DML)(Distal motor latency (ms)) | 4.1 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 5.1(1.30) | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 5.2(1.00) | Mean Difference | -0.1(-0.83,0.625813) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (DML)(Distal motor latency (ms)) | 4.1 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 5.1(1.30) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 5.2(2.40) | Mean Difference | -0.1(-1.32,1.120338) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Colbert,A.P., 2010 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 1.4 months | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 4.2(0.50) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 4.7(1.00) | Mean Difference | -0.5(-1.00,0.002729) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 4.1 months | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 4.3(0.70) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 4.8(1.20) | Mean Difference | -0.5(-1.12,0.124680) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 1.4 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 4.2(0.90) | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 4.2(0.50) | Mean Difference | 0(-0.45,0.454017) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 1.4 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 4.2(0.90) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 4.7(1.00) | Mean Difference | -0.5(-1.10,0.098142) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 4.1 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 4.3(0.90) | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 4.3(0.70) | Mean Difference | 0(-0.50,0.504636) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 4.1 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 4.3(0.90) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 4.8(1.20) | Mean Difference | -0.5(-1.17,0.168384) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (SNAP)(Sensory nerve action potential (uV)) | 1.4 months | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 18.5(8.30) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 16(8.80) | Mean Difference | 2.5(-2.94,7.939336) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (SNAP)(Sensory nerve action potential (uV)) | 4.1 months | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 16.9(6.30) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 16.2(10.30) | Mean Difference | 0.7(-4.73,6.129105) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (SNAP)(Sensory nerve action potential (uV)) | 1.4 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 18.2(7.70) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 16(8.80) | Mean Difference | 2.2(-3.00,7.400574) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Colbert,A.P., 2010 | High Quality | NCS (SNAP)(Sensory nerve action potential (uV)) | 1.4 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 18.2(7.70) | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 18.5(8.30) | Mean Difference | -0.3(-5.33,4.731625) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (SNAP)(Sensory nerve action potential (uV)) | 4.1 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 18.3(7.90) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 16.2(10.30) | Mean Difference | 2.1(-3.68,7.882559) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | NCS (SNAP)(Sensory nerve action potential (uV)) | 4.1 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 18.3(7.90) | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 16.9(6.30) | Mean Difference | 1.4(-3.07,5.873545) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 1.4 months | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 1.7(0.50) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 1.8(0.60) | Mean Difference | -0.1(-0.45,0.251191) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 4.1 months | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 1.9(0.80) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 2(0.80) | Mean Difference | -0.1(-0.61,0.408726) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 1.4 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 1.7(0.40) | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 1.7(0.50) | Mean Difference | 0(-0.29,0.285096) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 1.4 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 1.7(0.40) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 1.8(0.60) | Mean Difference | -0.1(-0.42,0.221746) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Colbert,A.P., 2010 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 4.1 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 1.8(0.60) | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 1.9(0.80) | Mean Difference | -0.1(-0.55,0.345589) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 4.1 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 1.8(0.60) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 2(0.80) | Mean Difference | -0.2(-0.65,0.245589) | Not Significant (P-value>.05) |
| Ebenbichler, G.R., 1998 | High Quality | Grip strength(Kilograms) | NA | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 15.8(10.90) | Sham ultrasound (No ultrasound) | 34 | 19.8(10.00) | Mean Difference | -4(-8.97,0.972218) | Not Significant (P-value>.05) |

| **Reference Title** | **Quality** | **Outcome Details** | **Duration** | **Treatment 1 (Details)** | **Group1 N** | **Mean1/ P1 (SD1)** | **Treatment 2 (Details)** | **Group2 N** | **Mean2/ P2 (SD2)** | **Effect Measure** | **Result (95% CI)** | **Favored Treatment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Grip strength(Kilograms) | 1.6 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 3.87(5.35) | Sham ultrasound (No ultrasound) | 34 | -0.09(5.77) | Mean Difference | 3.96(1.32,6.60) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Grip strength(Kilograms) | 7.9 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 5.44(7.50) | Sham ultrasound (No ultrasound) | 34 | -1.99(6.19) | Mean Difference | 7.43(4.16,10.70) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | NCS (DML)(Distal motor latency (ms)) | NA | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 5.2(1.00) | Sham ultrasound (No ultrasound) | 34 | 5.2(1.20) | Mean Difference | 0(-0.53,0.525063) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | NCS (DML)(Distal motor latency (ms)) | 1.6 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | -0.55(0.48) | Sham ultrasound (No ultrasound) | 34 | 0.06(0.45) | Mean Difference | -0.61(-0.83,-0.39) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | NCS (DML)(Distal motor latency (ms)) | 7.9 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | -0.31(0.39) | Sham ultrasound (No ultrasound) | 34 | 0.04(0.45) | Mean Difference | -0.35(-0.55,-0.15) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | NCS (SNCV)(Sensory nerve conduction velocity (antidromic)) | NA | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 40(7.20) | Sham ultrasound (No ultrasound) | 34 | 42.1(7.20) | Mean Difference | -2.1(-5.52,1.322662) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | NCS (SNCV)(Sensory nerve conduction velocity (antidromic)) | 1.6 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 7.35(1.07) | Sham ultrasound (No ultrasound) | 34 | -0.89(0.68) | Mean Difference | 8.24(7.81,8.67) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | NCS (SNCV)(Sensory nerve conduction velocity (antidromic)) | 7.9 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 2.69(0.89) | Sham ultrasound (No ultrasound) | 34 | -0.27(0.71) | Mean Difference | 2.96(2.58,3.34) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Pinch Strength(Kilograms) | NA | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 5.5(1.80) | Sham ultrasound (No ultrasound) | 34 | 5.8(1.80) | Mean Difference | -0.3(-1.16,0.555665) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Pinch Strength(Kilograms) | 1.6 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 0.33(0.51) | Sham ultrasound (No ultrasound) | 34 | 0.06(0.95) | Mean Difference | 0.27(-0.09,0.63) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Pinch Strength(Kilograms) | 7.9 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 0.49(0.62) | Sham ultrasound (No ultrasound) | 34 | -0.22(0.48) | Mean Difference | 0.71(0.45,0.97) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Evcik,D., 2007 | High Quality | Grip strength(Kilograms) | 1 month | Laser (Low-level laser therapy (LLLT)) | 41 | 22.4(6.70) | Laser (sham) (No laser therapy (placebo)) | 40 | 19.7(6.50) | Mean Difference | 2.7(-0.17,5.574677) | Not Significant (P-value>.05) |
| Evcik,D., 2007 | High Quality | Grip strength(Kilograms) | 2.8 months | Laser (Low-level laser therapy (LLLT)) | 41 | 22.8(6.90) | Laser (sham) (No laser therapy (placebo)) | 40 | 19.6(7.30) | Mean Difference | 3.2(0.11,6.294981) | **Laser (Low-level laser therapy (LLLT))**<br>**(P-value<.05)** |
| Evcik,D., 2007 | High Quality | NCS(Motor nerve velocity, (m/sn)) | 3 months | Laser (Low-level laser therapy (LLLT)) | 41 | 52(6.20) | Laser (sham) (No laser therapy (placebo)) | 40 | 50.3(6.30) | Mean Difference | 1.7(-1.02,4.422785) | Not Significant (P-value>.05) |
| Evcik,D., 2007 | High Quality | NCS (DML)(Distal motor latency (ms)) | 3 months | Laser (Low-level laser therapy (LLLT)) | 41 | 4.1(0.70) | Laser (sham) (No laser therapy (placebo)) | 40 | 4.2(1.08) | Mean Difference | -0.1(-0.50,0.297407) | Not Significant (P-value>.05) |
| Evcik,D., 2007 | High Quality | NCS (DSL)(Sensory distal latancy, (msn)) | 3 months | Laser (Low-level laser therapy (LLLT)) | 41 | 3(0.50) | Laser (sham) (No laser therapy (placebo)) | 40 | 3.1(0.60) | Mean Difference | -0.1(-0.34,0.140829) | Not Significant (P-value>.05) |
| Evcik,D., 2007 | High Quality | NCS (MA)(Motor amplitude (uV)) | 3 months | Laser (Low-level laser therapy (LLLT)) | 41 | 6.9(3.40) | Laser (sham) (No laser therapy (placebo)) | 40 | 7.2(4.00) | Mean Difference | -0.3(-1.92,1.318574) | Not Significant (P-value>.05) |
| Evcik,D., 2007 | High Quality | NCS (SA)(Sensory amplitude, (uV)) | 3 months | Laser (Low-level laser therapy (LLLT)) | 41 | 29.6(12.90) | Laser (sham) (No laser therapy (placebo)) | 40 | 27.9(13.40) | Mean Difference | 1.7(-4.03,7.430371) | Not Significant (P-value>.05) |
| Evcik,D., 2007 | High Quality | NCS (SNCV)(Sensory nerve velocity, (m/sn)) | 3 months | Laser (Low-level laser therapy (LLLT)) | 41 | 42.9(6.70) | Laser (sham) (No laser therapy (placebo)) | 40 | 41.1(7.10) | Mean Difference | 1.8(-1.21,4.807899) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Evcik,D., 2007 | High Quality | Pinch Strength(Kilograms) | 1 month | Laser (Low-level laser therapy (LLLT)) | 41 | 5.2(1.50) | Laser (sham) (No laser therapy (placebo)) | 40 | 4.6(1.50) | Mean Difference | 0.6(-0.05,1.253383) | Not Significant (P-value>.05) |
| Evcik,D., 2007 | High Quality | Pinch Strength(Kilograms) | 2.8 months | Laser (Low-level laser therapy (LLLT)) | 41 | 5.7(1.60) | Laser (sham) (No laser therapy (placebo)) | 40 | 4.8(1.50) | Mean Difference | 0.9(0.22,1.575244) | **Laser (Low-level laser therapy (LLLT))**<br>**(P-value<.05)** |
| Fusakul,Y., 2014 | High Quality | Grip strength(Units not reported) | 1.2 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 22.65(1.17) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 23.25(0.99) | Mean Difference | -0.6(-1.00,-0.19857) | **Placebo+splint (Placebo+splint (multiple treatments))**<br>**(P-value<.05)** |
| Fusakul,Y., 2014 | High Quality | Grip strength(Units not reported) | 2.8 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 24.49(1.15) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 23.6(1.00) | Mean Difference | 0.89(0.49,1.289153) | **Laser+splint (LLLT+splint (multiple treatments))**<br>**(P-value<.05)** |
| Fusakul,Y., 2014 | High Quality | NCS (CMAP)(Compound muscle action potential (mV)) | 2.8 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 9.95(0.33) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 9.94(0.39) | Mean Difference | 0.01(-0.12,0.143808) | Not Significant (P-value>.05) |
| Fusakul,Y., 2014 | High Quality | NCS (DML)(Distal motor latency (ms)) | 2.8 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 4.73(0.13) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 6.63(1.10) | Mean Difference | -1.9(-2.19,-1.60988) | **Laser+splint (LLLT+splint (multiple treatments))**<br>**(P-value<.05)** |
| Fusakul,Y., 2014 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 2.8 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 4.48(0.13) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 4.66(0.18) | Mean Difference | -0.18(-0.24,-0.12184) | **Laser+splint (LLLT+splint (multiple treatments))**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fusakul,Y., 2014 | High Quality | NCS (SNAP)(Sensory nerve action potential amplitude) | 2.8 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 23(1.74) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 21.91(1.77) | Mean Difference | 1.09(0.44,1.740084) | **Laser+splint (LLLT+splint (multiple treatments)) (P-value<.05)** |
| Fusakul,Y., 2014 | High Quality | Pinch Strength(Units not reported) | 1.2 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 8(3.56) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 4.65(0.30) | Mean Difference | 3.35(2.41,4.285725) | **Laser+splint (LLLT+splint (multiple treatments)) (P-value<.05)** |
| Fusakul,Y., 2014 | High Quality | Pinch Strength(Units not reported) | 2.8 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 5.4(0.28) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 5.47(0.31) | Mean Difference | -0.07(-0.18,0.039410) | Not Significant (P-value>.05) |
| Fusakul,Y., 2014 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 1.2 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 1.75(0.62) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 1.54(0.62) | Mean Difference | 0.21(-0.02,0.439651) | Not Significant (P-value>.05) |
| Fusakul,Y., 2014 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 2.8 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 1.53(0.57) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 1.37(0.49) | Mean Difference | 0.16(-0.04,0.356873) | Not Significant (P-value>.05) |
| Saeed,F.-U., 2012 | High Quality | NCS (DML)(Distal motor latency (ms)) | 1 month | Ultrasound (Ultrasound therapy) | 50 | -0.18(0.13) | Laser (Laser therapy) | 50 | -0.8(0.23) | Mean Difference | 0.62(0.55,0.693231) | **Laser (Laser therapy) (P-value<.05)** |
| Saeed,F.-U., 2012 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 1 month | Ultrasound (Ultrasound therapy) | 50 | -0.07(0.07) | Laser (Laser therapy) | 50 | -0.54(0.28) | Mean Difference | 0.47(0.39,0.550000) | **Laser (Laser therapy) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Saeed,F.-U., 2012 | High Quality | Questionnaire (General/undefined)( No mention of Boston scale, rather merely "functional status scale") | 1 month | Ultrasound (Ultrasound therapy) | 50 | -0.4(0.17) | Laser (Laser therapy) | 50 | -0.75(0.12) | Mean Difference | 0.35(0.29,0.407678) | **Laser (Laser therapy) (P-value<.05)** |
| Yang,C.P., 2011 | High Quality | NCS (CMAP)(Compound muscle action potential (mV)) | 1 month | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 7.2(2.70) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 7.6(2.80) | Mean Difference | -0.4(-1.63,0.828511) | Not Significant (P-value>.05) |
| Yang,C.P., 2011 | High Quality | NCS (CMAP)(Compound muscle action potential (mV)) | 1.1 years | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 7.8(2.50) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 8(3.60) | Mean Difference | -0.2(-1.58,1.181461) | Not Significant (P-value>.05) |
| Yang,C.P., 2011 | High Quality | NCS (DML)(Distal motor latency (ms)) | 1 month | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 4(0.70) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 4.7(1.00) | Mean Difference | -0.7(-1.08,-0.31524) | **Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) (P-value<.05)** |
| Yang,C.P., 2011 | High Quality | NCS (DML)(Distal motor latency (ms)) | 1.1 years | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 4.2(0.80) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 5.5(1.80) | Mean Difference | -1.3(-1.92,-0.68044) | **Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yang,C.P., 2011 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 1 month | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 3.3(0.70) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 3(0.60) | Mean Difference | 0.3(0.01,0.591543) | **Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2))** **(P-value<.05)** |
| Yang,C.P., 2011 | High Quality | NCS (DSL)(Distal sensory latency (ms)) | 1.1 years | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 3.4(0.60) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 3.7(1.10) | Mean Difference | -0.3(-0.69,0.094439) | Not Significant (P-value>.05) |
| Yang,C.P., 2011 | High Quality | NCS (MCV)(Motor nerve conduction velocity (ms)) | 1 month | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 53.7(3.80) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 52.4(3.60) | Mean Difference | 1.3(-0.35,2.954207) | Not Significant (P-value>.05) |
| Yang,C.P., 2011 | High Quality | NCS (MCV)(Motor nerve conduction velocity (ms)) | 1.1 years | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 52.7(4.00) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 49.7(4.60) | Mean Difference | 3(1.08,4.924014) | **Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1))** **(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yang,C.P., 2011 | High Quality | NCS (SNAP)(Sensory nerve action potential amplitude) | 1 month | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 18.4(9.80) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 20.8(9.90) | Mean Difference | -2.4(-6.80,2.000383) | Not Significant (P-value>.05) |
| Yang,C.P., 2011 | High Quality | NCS (SNAP)(Sensory nerve action potential amplitude) | 1.1 years | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 18.2(9.30) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 18.5(10.40) | Mean Difference | -0.3(-4.70,4.104284) | Not Significant (P-value>.05) |
| Yang,C.P., 2011 | High Quality | NCS (SNCV)(Sensory nerve conduction velocity (prolonged antidromic wrist palm)) | 1 month | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 43.9(8.00) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 48.6(6.20) | Mean Difference | -4.7(-7.90,-1.49742) | **Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2))**<br>**(P-value<.05)** |
| Yang,C.P., 2011 | High Quality | NCS (SNCV)(Sensory nerve conduction velocity (prolonged antidromic wrist palm)) | 1.1 years | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 44.7(7.00) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 45.6(8.70) | Mean Difference | -0.9(-4.42,2.622683) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yildiz,N., 2011 | High Quality | NCS (DML)(Median motor distal latency) | 1.8 months | Ultrasound (w/ splinting) (Ultrasound+splinting. Included the intention-intention-to-treat analysis data (Group 2)) | 17 | 4.43(0.55) | Sham ultrasound (w/ splinting) (Sham ultrasound+splinting. Included the intention-intention-to-treat analysis data) | 17 | 4.32(0.60) | Mean Difference | 0.11(-0.28,0.496923) | Not Significant (P-value>.05) |
| Yildiz,N., 2011 | High Quality | NCS (DSL)(Median sensory distal latency) | 1.8 months | Ultrasound (w/ splinting) (Ultrasound+splinting. Included the intention-intention-to-treat analysis data (Group 2)) | 17 | 3.87(0.29) | Sham ultrasound (w/ splinting) (Sham ultrasound+splinting. Included the intention-intention-to-treat analysis data) | 17 | 3.94(0.47) | Mean Difference | -0.07(-0.33,0.192531) | Not Significant (P-value>.05) |
| Yildiz,N., 2011 | High Quality | Questionnaire (General/undefined)(FSS) | 1.8 months | Ultrasound (w/ splinting) (Ultrasound+splinting. Included the intention-intention-to-treat analysis data (Group 2)) | 17 | 1.98(0.78) | Sham ultrasound (w/ splinting) (Sham ultrasound+splinting. Included the intention-intention-to-treat analysis data) | 17 | 2.19(0.89) | Mean Difference | -0.21(-0.77,0.352565) | Not Significant (P-value>.05) |

*TABLE 129: PICO 6 PART 6- OTHER TREATMENTS: PAIN*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chang,W.D., 2008 | high Quality | Questionnaire/Scale (VAS-pain)(VAS pain) | 1 month | Laser (Laser treatment) | 20 | . % | Placebo (Sham laser (placebo)) | 20 | . % | Author Reported | NA | **Laser (Laser treatment)**<br>**(P-value<.05)** |
| Bakhtiary,A.H., 2004 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 1.6 months | Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session)) | . | . % | Laser (15 daily treatment sessions (5 sessions/week).) | . | . % | Author Reported | NA | **Ultrasound (Ultrasound treatment (1 MHz, 1.0 W/cm2, pulse 1:4, 15 min/session))**<br>**(P-value<.05)** |
| Evcik,D., 2007 | High Quality | Questionnaire/Scale (VAS-pain)(VAS pain (day): 0-10 scale) | 1 month | Laser (Low-level laser therapy (LLLT)) | 41 | 3(0.98) | Laser (sham) (No laser therapy (placebo)) | 40 | 3(1.61) | Mean Difference | 0(-0.58,0.58) | Not Significant (P-value>.05) |
| Evcik,D., 2007 | High Quality | Questionnaire/Scale (VAS-pain)(VAS pain (night): 0-10 scale) | 1 month | Laser (Low-level laser therapy (LLLT)) | 41 | 3.8(1.63) | Laser (sham) (No laser therapy (placebo)) | 40 | 3.5(2.26) | Mean Difference | 0.3(-0.56,1.16) | Not Significant (P-value>.05) |
| Evcik,D., 2007 | High Quality | Questionnaire/Scale (VAS-pain)(VAS pain (day): 0-10 scale) | 2.8 months | Laser (Low-level laser therapy (LLLT)) | 41 | 2.2(0.98) | Laser (sham) (No laser therapy (placebo)) | 40 | 2.8(2.58) | Mean Difference | -0.6(-1.45,0.25) | Not Significant (P-value>.05) |
| Evcik,D., 2007 | High Quality | Questionnaire/Scale (VAS-pain)(VAS pain (night): 0-10 scale) | 2.8 months | Laser (Low-level laser therapy (LLLT)) | 41 | 2.7(1.96) | Laser (sham) (No laser therapy (placebo)) | 40 | 2.9(2.58) | Mean Difference | -0.2(-1.20,0.80) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fusakul,Y., 2014 | High Quality | Questionnaire/Scale (VAS-pain)() | 1.2 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 4.25(0.34) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 3.15(0.30) | Mean Difference | 1.1(0.98,1.218760) | **Placebo+splint (Placebo+splint (multiple treatments))**<br>**(P-value<.05)** |
| Fusakul,Y., 2014 | High Quality | Questionnaire/Scale (VAS-pain)() | 2.8 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 3.45(0.38) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 2.48(0.36) | Mean Difference | 0.97(0.83,1.107099) | **Placebo+splint (Placebo+splint (multiple treatments))**<br>**(P-value<.05)** |
| Saeed,F.-U., 2012 | High Quality | Questionnaire/Scale (VAS-pain)() | 1 month | Ultrasound (Ultrasound therapy) | 50 | -2.6(1.07) | Laser (Laser therapy) | 50 | -4.9(1.46) | Mean Difference | 2.3(1.80,2.801737) | **Laser (Laser therapy)**<br>**(P-value<.05)** |
| Weintraub,M.I., 2008 | High Quality | Questionnaire (General/undefined) (NPS 10. Neuropathic pain scale (NPS)) | 2 months | No magnet (sham) (Sham (no magnet therapy)) | 10 | 37.6(15.36) | Magnet (Magnet therapy) | 11 | 36.27(19.61) | Mean Difference | 1.33(-13.67,16.32780) | Not Significant (P-value>.05) |
| Weintraub,M.I., 2008 | High Quality | Questionnaire (General/undefined) (NPS 4. Neuropathic pain scale (NPS)) | 2 months | No magnet (sham) (Sham (no magnet therapy)) | 10 | 43.75(18.15) | Magnet (Magnet therapy) | 11 | 39.77(23.76) | Mean Difference | 3.98(-14.01,21.97188) | Not Significant (P-value>.05) |
| Weintraub,M.I., 2008 | High Quality | Questionnaire (General/undefined) (NPS 8. Neuropathic pain scale (NPS)) | 2 months | No magnet (sham) (Sham (no magnet therapy)) | 10 | 34.5(15.69) | Magnet (Magnet therapy) | 11 | 32.95(19.04) | Mean Difference | 1.55(-13.32,16.42201) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weintraub,M.I., 2008 | High Quality | Questionnaire (General/undefined) (NPS NA. Neuropathic pain scale (NPS)) | 2 months | No magnet (sham) (Sham (no magnet therapy)) | 10 | 38.75(14.31) | Magnet (Magnet therapy) | 11 | 36.25(20.48) | Mean Difference | 2.5(-12.50,17.50490) | Not Significant (P-value>.05) |
| Weintraub,M.I., 2008 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 2 months | No magnet (sham) (Sham (no magnet therapy)) | 10 | 3.78(2.27) | Magnet (Magnet therapy) | 11 | 4.15(2.13) | Mean Difference | -0.37(-2.26,1.517852) | Not Significant (P-value>.05) |
| Yildiz,N., 2011 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 1.8 months | Ultrasound (w/ splinting) (Ultrasound+splinting. Included the intention-intention-to-treat analysis data (Group 2)) | 17 | 2.77(2.74) | Sham ultrasound (w/ splinting) (Sham ultrasound+splinting. Included the intention-intention-to-treat analysis data) | 17 | 3.28(2.74) | Mean Difference | -0.51(-2.35,1.332032) | Not Significant (P-value>.05) |

*TABLE 130: PICO 6 PART 6- OTHER TREATMENTS: QUALITY OF LIFE*

| **Reference Title** | **Quality** | **Outcome Details** | **Duration** | **Treatment 1 (Details)** | **Group1 N** | **Mean1/P1 (SD1)** | **Treatment 2 (Details)** | **Group2 N** | **Mean2/P2 (SD2)** | **Effect Measure** | **Result (95% CI)** | **Favored Treatment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weintraub,M.I., 2008 | High Quality | Questionnaire/Scale (VAS-patient satisfaction)(Sleep interference) | 2 months | No magnet (sham) (Sham (no magnet therapy)) | 10 | 1.1(1.37) | Magnet (Magnet therapy) | 11 | 3.29(2.48) | Mean Difference | -2.19(-3.88,-0.49619) | **No magnet (sham) (Sham (no magnet therapy)) (P-value<.05)** |

*TABLE 131: PICO 6 PART 6- OTHER TREATMENTS: SYMPTOMS*

| **Reference Title** | **Quality** | **Outcome Details** | **Duration** | **Treatment 1 (Details)** | **Group1 N** | **Mean1/ P1 (SD1)** | **Treatment 2 (Details)** | **Group2 N** | **Mean2/ P2 (SD2)** | **Effect Measure** | **Result (95% CI)** | **Favored Treatment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chang,W.D., 2008 | High Quality | Questionnaire (General/undefined) (Symptom Severity Scale) | 1 month | Laser (Laser treatment) | 20 | 19.35(0.63) | Placebo (Sham laser (placebo)) | 20 | 28.71(0.85) | Mean Difference | -9.36(-9.82,-8.89630) | **Laser (Laser treatment)**<br>**(P-value<.05)** |
| Colbert,A.P., 2010 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 1.4 months | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 2.1(0.70) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 2.2(0.50) | Mean Difference | -0.1(-0.49,0.286807) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 4.1 months | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 2.4(0.80) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 2.3(0.80) | Mean Difference | 0.1(-0.41,0.608726) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 1.4 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 2(0.80) | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 2.1(0.70) | Mean Difference | -0.1(-0.57,0.371173) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 1.4 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 2(0.80) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 2.2(0.50) | Mean Difference | -0.2(-0.62,0.216507) | Not Significant (P-value>.05) |
| Colbert,A.P., 2010 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 4.1 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 2.3(0.70) | Magnet therapy (45mT) (Magnet therapy (45mT)-) | 19 | 2.3(0.80) | Mean Difference | 0(-0.47,0.472779) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Colbert,A.P., 2010 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 4.1 months | Sham magnet therapy (No magnet therapy (sham 0mT)) | 20 | 2.3(0.70) | Magnet therapy (15mT) (Magnet therapy (15mT)-) | 19 | 2.4(0.80) | Mean Difference | -0.1(-0.57,0.372779) | Not Significant (P-value>.05) |
| Ebenbichler, G.R., 1998 | High Quality | Questionnaire (General/undefined) (Not questionnaire, worst complaint (cm)) | NA | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 6.5(2.60) | Sham ultrasound (No ultrasound) | 34 | 5.8(2.80) | Mean Difference | 0.7(-0.58,1.984378) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Questionnaire (General/undefined) (Not questionnaire, worst complaint (cm)) | 1.6 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | -3.91(3.45) | Sham ultrasound (No ultrasound) | 34 | -1.56(3.03) | Mean Difference | -2.35(-3.89,-0.81) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Questionnaire (General/undefined) (Not questionnaire, worst complaint (cm)) | 7.9 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | -4.78(3.21) | Sham ultrasound (No ultrasound) | 34 | -0.95(4.43) | Mean Difference | -3.83(-5.67,-1.99) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Sensory loss( ) | NA | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | 2.4(2.40) | Sham ultrasound (No ultrasound) | 34 | 2(2.40) | Mean Difference | 0.4(-0.74,1.540887) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Sensory loss( ) | 1.6 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | -1.14(2.53) | Sham ultrasound (No ultrasound) | 34 | -0.07(2.35) | Mean Difference | -1.07(-2.23,0.09) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ebenbichler, G.R., 1998 | High Quality | Sensory loss( ) | 7.9 months | Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.) | 34 | -1.6(2.83) | Sham ultrasound (No ultrasound) | 34 | -0.08(2.50) | Mean Difference | -1.52(-2.79,-0.25) | **Ultrasound (20 sessions of ultrasound (active) treatment (1 MHz, 1.0 W/cm2, pulsed mode 1:4, 15 minutes per session) applied to the area over the carpal tunnel of one wrist, and indistinguishable sham ultrasound treatment applied to the other. The first 10 treatments were performed daily (5 sessions/week); 10 further treatments were twice weekly for 5 weeks.)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fusakul,Y., 2014 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 1.2 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 1.68(0.66) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 1.43(0.49) | Mean Difference | 0.25(0.03,0.465297) | **Placebo+splint (Placebo+splint (multiple treatments))**<br>**(P-value<.05)** |
| Fusakul,Y., 2014 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 2.8 months | Laser+splint (LLLT+splint (multiple treatments)) | 56 | 1.49(0.58) | Placebo+splint (Placebo+splint (multiple treatments)) | 56 | 1.35(0.51) | Mean Difference | 0.14(-0.06,0.342286) | Not Significant (P-value>.05) |
| Saeed,F.-U., 2012 | High Quality | Questionnaire (General/undefined)(No mention of Boston scale, rather merely "symptom severity scale") | 1 month | Ultrasound (Ultrasound therapy) | 50 | -0.44(0.18) | Laser (Laser therapy) | 50 | -0.87(0.18) | Mean Difference | 0.43(0.36,0.50056) | **Laser (Laser therapy)**<br>**(P-value<.05)** |
| Yang,C.P., 2011 | High Quality | Questionnaire/Scale (GSS)(Global symptom score (GSS)) | 1 month | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 4.4(3.10) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 5(3.70) | Mean Difference | -0.6(-2.12,0.923161) | Not Significant (P-value>.05) |
| Yang,C.P., 2011 | High Quality | Questionnaire/Scale (GSS)(Global symptom score (GSS)) | 6.9 months | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 3.4(5.80) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 7.2(5.40) | Mean Difference | -3.8(-6.30,-1.29537) | **Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/ P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yang,C.P., 2011 | High Quality | Questionnaire/Scale (GSS)(Global symptom score (GSS)) | 1.1 years | Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) | 38 | 4.5(7.70) | Steroid (2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily (Group 2)) | 39 | 11(8.60) | Mean Difference | -6.5(-10.14,-2.85594) | **Acupuncture (Acupuncture administered in 8 sessions over 4 weeks (Group 1)) (P-value<.05)** |
| Yildiz,N., 2011 | High Quality | Questionnaire (General/undefined) (SSS) | 1.8 months | Ultrasound (w/ splinting) (Ultrasound+splinting. Included the intention-intention-to-treat analysis data (Group 2)) | 17 | 1.97(0.65) | Sham ultrasound (w/ splinting) (Sham ultrasound+splinting. Included the intention-intention-to-treat analysis data) | 17 | 2.08(0.82) | Mean Difference | -0.11(-0.61,0.387414) | Not Significant (P-value>.05) |

***META-ANALYSES***

*FIGURE 11: PICO 6 PART 1 IMMOBILIZATION VERSUS NO IMMOBILIZATION: NCS DML-FUNCTION*

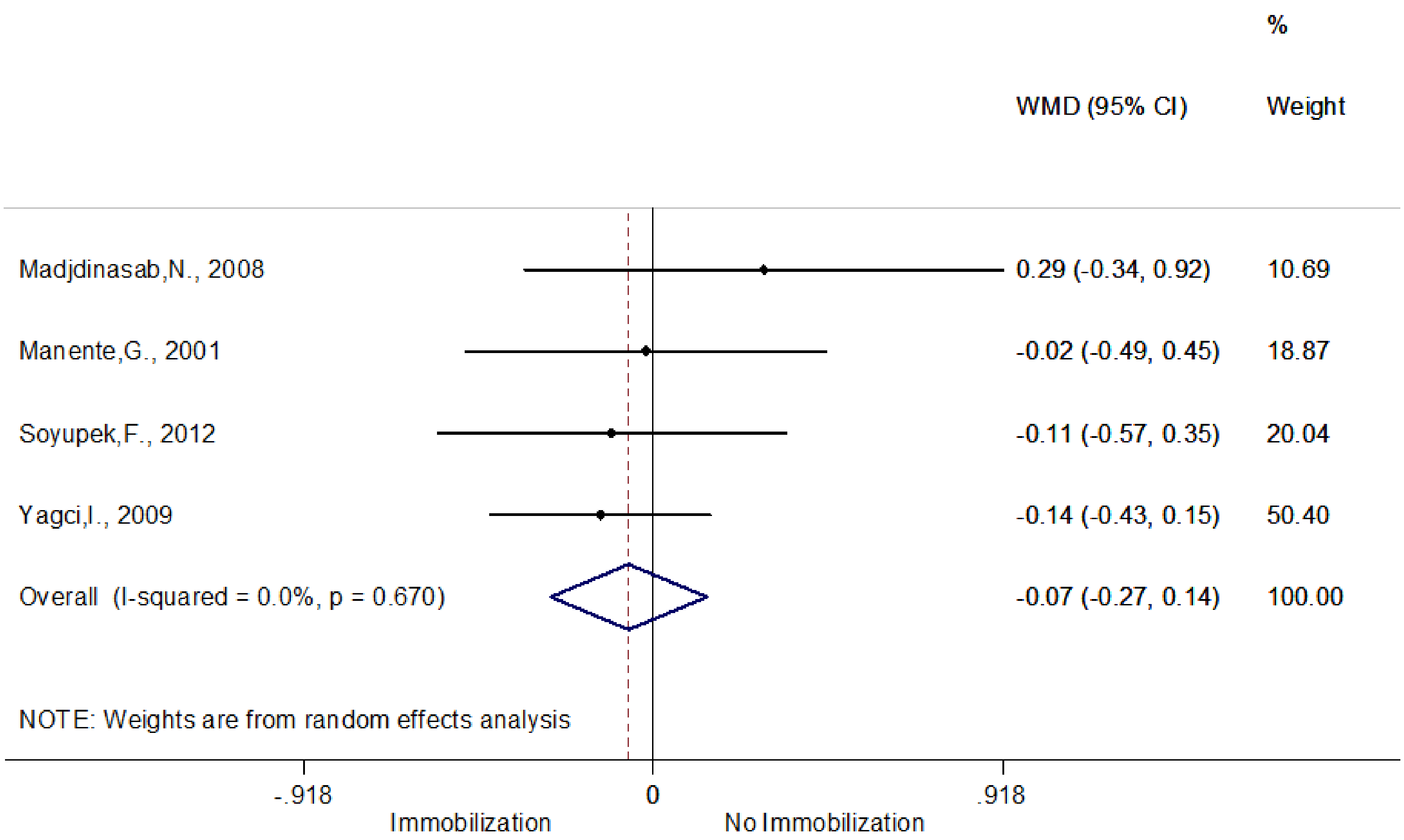
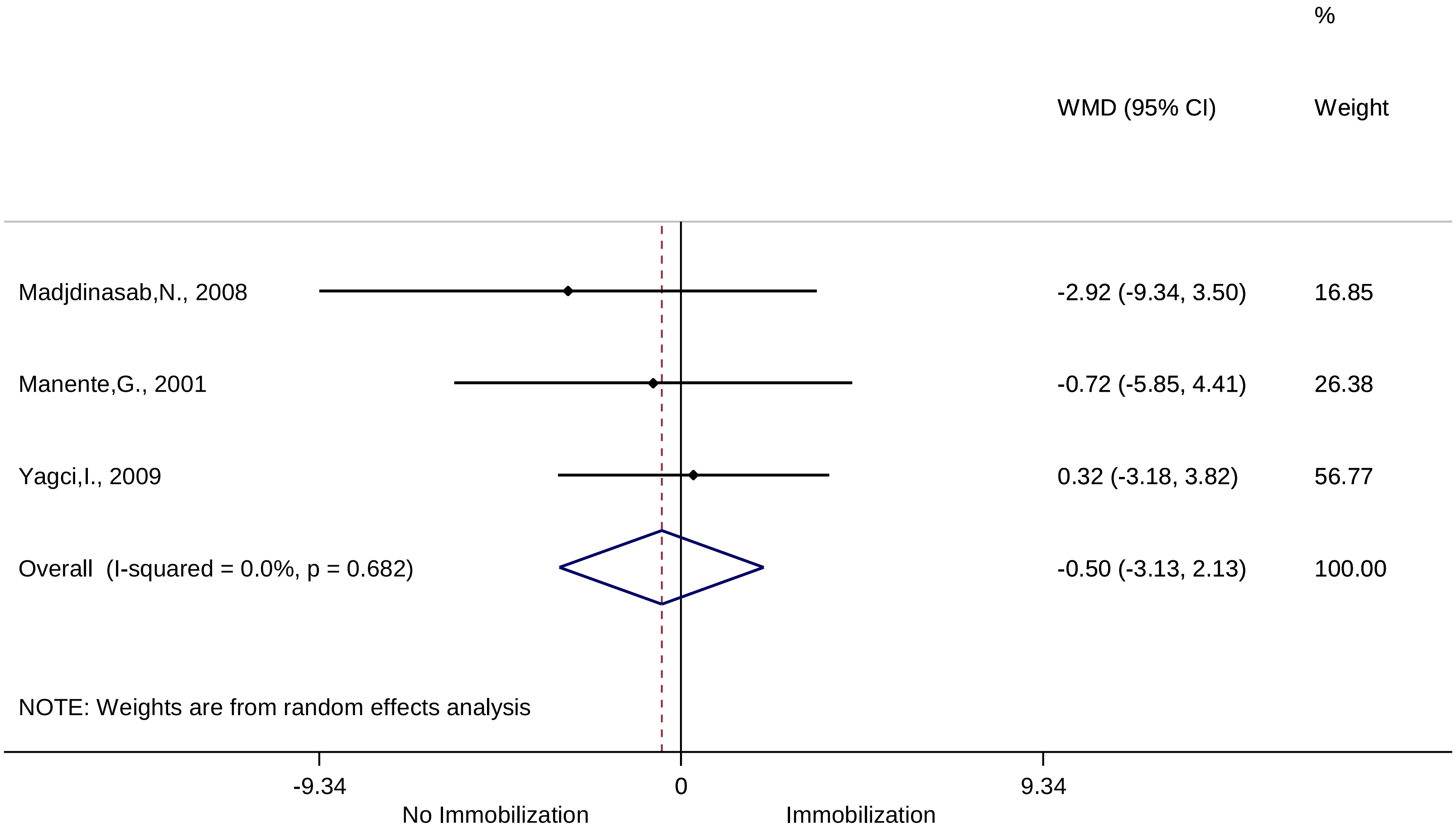


*FIGURE 12: PICO 6 PART 1 IMMOBILIZATION VERSUS NO IMMOBILIZATION: NCS SNCV*



# SURGICAL RELEASE FOR CARPAL TUNNEL SYNDROME (CTS) GUIDELINE RECOMMENDATIONS

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## A. SURGICAL RELEASE LOCATION

Strong evidence supports that surgical release of the transverse carpal ligament should relieve symptoms and improve function.

**Strength of Recommendation: Strong Evidence** ★★★★

Description: Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention.

**Rationale**
There were 17 high quality (Atroshi 2006, Castillo 2014, Cellocco 2005, Cellocco 2009, Cresswell 2008, Gerritsen 2002, Hamed 2009, Hui 2005, Ismatullah 2013, Jarvik 2009, Larsen 2013, Malhotra 2007, Saw 2003, Sennwald 1995, Suppaphol 2012, Trumble 2002, and Zyluk 2006) and 10 moderate quality (Andreu 2013, Aslani 2012, Capa-Grasa 2014, Dumontier 1995, Elsharif 2014, Faraj 2012, Ly-Pen 2012, Tarallo 2014, Tian 2007, and Ucar 2012) studies demonstrating that release of the transverse carpal ligament is an effective treatment for patients with CTS.

**Risks and Harms of Implementing this Recommendation**
The risks associated with implementing this recommendation are those of a small outpatient operative procedure.

## B. SURGICAL RELEASE PROCEDURE

Limited evidence supports that if surgery is chosen, a practitioner might consider using endoscopic carpal tunnel release based on possible short term benefits.

**Strength of Recommendation: Limited Evidence** ★★☆☆

Description: Evidence from one or more “Low” quality studies with consistent findings **or** evidence from a single “Moderate” quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

**Rationale**
Eleven high quality (Atroshi 2006, Atroshi 2009, Ejiri 2012, Kang 2013, Larsen 2013, MacDermid 2003, Malhotra 2007, Saw 2003, Sennwald 1995, Trumble 2002, and Wong 2003) and 6 moderate quality (Agee 1992, Aslani 2012, Dumontier 1995, Ferdinand 2002, Jacobsen 1996, and Tian 2007) studies evaluated whether endoscopic carpal tunnel release provided any benefit over open or “mini-open” release at early follow up (3 months to one year). Three high quality studies (Atroshi 2009, Saw 2003 and Trumble 2002) favored endoscopic release for symptom relief in the first 3-6 months after surgery and one study (Saw 2003) demonstrated an earlier return to work. One high quality (Atroshi 2009) and one moderate quality study (Tian

2007) examined long term outcomes for endoscopic release versus open release and did not find any advantage of one method over the other. Studies comparing “mini-open” to standard release were inconclusive.

**Risks and Harms of Implementing this Recommendation**
The risks associated with implementing this recommendation are those of a small outpatient operative procedure.

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## C. SURGICAL PROCEDURES VERSUS NONOPERATIVE TREATMENTS

Strong evidence supports that surgical treatment of carpal tunnel syndrome should have a greater treatment benefit at 6 and 12 months as compared to splinting, NSAIDs/therapy, and a single steroid injection.

**Strength of Recommendation: Strong Evidence** ★★★★

Description: Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention.

**Rationale**
Four high quality (Gerritsen 2002, Hui 2005, Ismatullah 2013, and Jarvik 2009) and 3 moderate quality (Andreu 2013, Ly 2005, and Ly-Pen 2012) studies compared the effectiveness of surgical treatment to non-operative treatment for the relief of CTS symptoms. All three studies showed that surgery was superior for the relief of daytime and nocturnal paresthesias and return of grip strength. Of these, one high quality (Gerritson 2002) and one moderate quality study (Andreu 2013) examined the long term outcomes for surgery versus conservative treatment and found better results with surgery

**Risks and Harms of Implementing this Recommendation**
The risks associated with implementing this recommendation are those of a small outpatient operative procedure.

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**Future Research for Surgical Release of Carpal Tunnel Syndrome**
Future research should focus on stratifying treatment outcomes based on preoperative symptom severity.

## STUDY QUALITY TABLE FOR SURGICAL TREATMENTS

### TABLE 132: INTERVENTION QUALITY EVALUATIONS

| Study | Random Sequence Generation | Allocation Concealment | Blinding | Incomplete Outcome Data | Selective Reporting | Other Bias | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Agee,J.M., 1992 | ◑ | ◑ | ○ | ● | ● | ● | ● | ● | ● | Include | Moderate Quality |
| Andreu,J.L., 2013 | ● | ◑ | ○ | ○ | ○ | ● | ● | ● | ● | Include | Moderate Quality |
| Aslani,H.R., 2012 | ◑ | ◑ | ○ | ● | ● | ● | ● | ● | ● | Include | Moderate Quality |
| Atroshi,I., 2006 | ● | ● | ◑ | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Atroshi,I., 2009 | ● | ● | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Capa-Grasa,A., 2014 | ● | ● | ○ | ● | ◑ | ◑ | ● | ● | ● | Include | Moderate Quality |
| Castillo,T.N., 2014 | ● | ● | ◑ | ● | ● | ○ | ● | ● | ● | Include | High Quality |
| Cellocco,P., 2005 | ◑ | ◑ | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Cellocco,P., 2009 | ● | ○ | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Cresswell,T.R., 2008 | ● | ● | ● | ○ | ● | ● | ● | ● | ● | Include | High Quality |
| Dumontier,C., 1995 | ◑ | ◑ | ◑ | ◑ | ● | ● | ● | ● | ● | Include | Moderate Quality |
| Ejiri,S., 2012 | ● | ◑ | ○ | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Elsharif,M., 2014 | ● | ● | ○ | ● | ● | ○ | ● | ● | ● | Include | Moderate Quality |
| Faraj,A.A., 2012 | ○ | ○ | ● | ● | ● | ● | ● | ● | ● | Include | Moderate Quality |

| Study | Random Sequence Generation | Allocation Concealment | Blinding | Incomplete Outcome Data | Selective Reporting | Other Bias | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ferdinand,R.D., 2002 | ◑ | ◑ | ◑ | ● | ◑ | ◑ | ● | ● | ● | Include | Moderate Quality |
| Gerritsen,A.A., 2002 | ● | ● | ○ | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Hamed,A.R., 2009 | ◑ | ● | ● | ● | ● | ○ | ● | ● | ● | Include | High Quality |
| Hui,A.C., 2005 | ● | ● | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Ismatullah,I., 2013 | ● | ◑ | ○ | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Jacobsen,M.B., 1996 | ◑ | ◑ | ● | ● | ○ | ○ | ● | ● | ● | Include | Moderate Quality |
| Jarvik,J.G., 2009 | ● | ● | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Jugovac,I., 2002 | ● | ● | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Kang,H.J., 2013 | ● | ◑ | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Larsen,M.B., 2013 | ● | ● | ○ | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Ly,Pen D., 2005 | ● | ◑ | ○ | ● | ◑ | ○ | ● | ● | ● | Include | Moderate Quality |
| Ly-Pen,D., 2012 | ● | ● | ○ | ● | ● | ○ | ● | ● | ● | Include | Moderate Quality |
| MacDermid,J.C., 2003 | ◑ | ◑ | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Malhotra,R., 2007 | ● | ● | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Saw,N.L., 2003 | ● | ● | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |

| Study | Random Sequence Generation | Allocation Concealment | Blinding | Incomplete Outcome Data | Selective Reporting | Other Bias | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sennwald,G.R., 1995 | ● | ◑ | ○ | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Suppaphol,S., 2012 | ● | ● | ◑ | ● | ● | ○ | ● | ● | ● | Include | High Quality |
| Tarallo,M., 2014 | ◑ | ◑ | ○ | ● | ● | ● | ● | ● | ● | Include | Moderate Quality |
| Tian,Y., 2007 | ◑ | ◑ | ● | ● | ● | ○ | ● | ● | ● | Include | Moderate Quality |
| Trumble,T.E., 2002 | ● | ● | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Ucar,B.Y., 2012 | ○ | ○ | ● | ● | ● | ● | ● | ● | ● | Include | Moderate Quality |
| Wong,K.C., 2003 | ● | ◑ | ● | ● | ○ | ● | ● | ● | ● | Include | High Quality |
| Yucetas,S.C., 2013 | ◑ | ◑ | ◑ | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Zyluk,A., 2006 | ● | ● | ◑ | ● | ● | ● | ● | ● | ● | Include | High Quality |

# RESULTS

## *SUMMARY OF DATA FINDINGS*

### *TABLE 133: SUMMARY OF FINDINGS PICO 7 PART 1 ENDOSCOPIC (EARLY FOLLOW-UP (3 MONTHS UP TO 1 YEAR))*

| | High Quality | | | | | | | | | | | | Moderate Quality | | | | | | Meta-Analysis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | Atroshi,I., 2006 | Atroshi,I., 2009 | Ejiri,S., 2012 | Kang,H.J., 2013 | Larsen,M.B., 2013 (1) | Larsen,M.B., 2013 (2) | MacDermid,J.C., 2003 | Malhotra,R., 2007 | Saw,N.L., 2003 | Sennwald,G.R., 1995 | Trumble,T.E., 2002 | Wong,K.C., 2003 | Agee,J.M., 1992 | Aslani,H.R., 2012 (1) | Aslani,H.R., 2012 (2) | Dumontier,C., 1995 | Ferdinand,R.D., 2002 | Jacobsen,M.B., 1996 | |
| **Complications** | | | | | | | | | | | | | | | | | | | |
| **Symptom occurrence (pillar pain)** | | | | | ○ | ○ | | | | | | ○ | ○ | | | | | | NA |
| **Symptom occurrence (scar tenderness)** | | | | | | | | 🟢 | ○ | | ○ | | ○ | | | | | | NA |
| **Function** | | | | | | | | | | | | | | | | | | | |
| **Grip Strength** | ○ | | ○ | | | | ○ | | | 🟢 | ○ | | ○ | | | 🟢 | ○ | | NA |
| Percentage of contralateral hand | | | | | | | | | | | | | | | | | | | |
| 84 days | | | | | ○ | 🟢 | | | | | | | | | | | | | NA |
| 168 days | | | | | ○ | ○ | | | | | | | | | | | | | NA |
| **Hand dexterity** | | | | | | | | | | | ○ | | ○ | | | | | | NA |
| **Jebsen taylor score** | | | | | | | | | | | | | | | | | ○ | | NA |
| **Key pinch strength** | | | | | | | | | | ○ | | | ○ | | | | | | NA |
| **NCS (DML)** | | | | | | | | ○ | | | | | | | | | | | NA |
| **NCS (NCV)** | | | | | | | | ○ | | | | | | | | | | | NA |
| **Phalen's test score** | | | | | | | | | | | | | ○ | ○ | ○ | | | | NA |
| **Pinch Strength** | 🟢 | | | | | | | | | | ○ | ○ | | | | | | | NA |
| **Pinch Strength (key pinch)** | | | | | | | ○ | | | | | | | | | | | | NA |
| **Pinch strength (pulp pinch)** | | | | | | | | | | | | | ○ | | | | | | NA |
| **Pinch Strength (tripod pinch)** | | | | | | | ○ | | | | | | | | | | | | NA |
| **Questionnaire (Boston-FSS)** | | | | ○ | | | | | | | | | | | | | | | NA |
| **Questionnaire (CTQ-functional status scale)** | | ○ | | | | | | | | | | | | | | | | | NA |
| **Questionnaire (Levine-FSS)** | | | | | | | | | ○ | | | | | | | | | | NA |
| 84 days | | | | | | | | | | | 🟢 | | | | | | | | NA |
| 182 days | | | | | | | | | | | ○ | | | | | | | | NA |
| 364 days | | | | | | | | | | | ○ | | | | | | | | NA |
| **Range of motion** | | | | | | | | | | | | | | | | | | | |
| Manual motor testing for thumb abduction (patients testing normal) | | | | | ○ | ○ | | | | | | | ○ | | | | | | NA |
| **Semmes-Weinstein Monofilaments Test (SW test)** | | | ○ | | | | | | | | ○ | | ○ | | | | | | NA |
| **Tinel's Sign/Test** | | | | | | | | | | | | | ○ | ○ | ○ | | | | NA |
| **Two-point discrimination** | | | ○ | | | | | | | | | ○ | | | | | ○ | ○ | NA |
| **Other** | | | | | | | | | | | | | | | | | | | |
| **Patient satisfaction (general-1=least satisfied to 5=most satisfied)** | | | | | | | | | | | | | | | | | | | |
| 84 days | | | | | | | | | | | 🟢 | | | | | | | | NA |
| 182 days | | | | | | | | | | | ○ | | | | | | | | NA |
| 364 days | | | | | | | | | | | 🟢 | | | | | | | | NA |
| Preferred Endoscopic CTR | | | | ○ | | | | | | | | | | | | | | | NA |
| **Questionnaire (DASH)** | | | | ○ | | | | | | | | | | | | | | | NA |
| **Questionnaire (SF-36)** | | | | | | | ○ | | | | | | | | | | | | NA |

## *CONT'D SUMMARY OF FINDINGS PICO 7 PART 1 ENDOSCOPIC (EARLY FOLLOW-UP (3 MONTHS UP TO 1 YEAR))*

**Favors treatment 1** 🟢
**Favors treatment 2** ●
**Not significant** ○

| | High Quality | | | | | | | | | | | Moderate Quality | | | | | | Meta-Analysis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Outcomes** | **Atroshi,I., 2006** | **Atroshi,I., 2009** | **Ejiri,S., 2012** | **Kang,H.J., 2013** | **Larsen,M.B., 2013 (1)** | **Larsen,M.B., 2013 (2)** | **MacDermid,J.C., 2003** | **Malhotra,R., 2007** | **Saw,N.L., 2003** | **Trumble,T.E., 2002** | **Wong,K.C., 2003** | **Agee,J.M., 1992** | **Aslani,H.R., 2012 (1)** | **Aslani,H.R., 2012 (2)** | **Dumontier,C., 1995** | **Ferdinand,R.D., 2002** | **Jacobsen,M.B., 1996** | |
| **Pain** | | | | | | | | | | | | | | | | | | |
| **Questionnaire/Scale (VAS-pain)** | | | | | ○ | ○ | | | | | ○ | | | | | | | **NA** |
| **Symptom recurrence (general)** | | | | | | | | | | | | | | | | | | |
| Night pain | | | | | | | | | | | | | ○ | ○ | | | | **NA** |
| Wrist pain | | | | | | | | | | | | | ● | ○ | | | | **NA** |
| **Symptom recurrence (pain)** | | | | | | | | | | | | | | | | | | |
| Patients reporting pain in 4-6 range on 10cm VAS scale | | | | | | | | ○ | | | | | | | ○ | | | **NA** |
| **Symptom relief (pain)** | | | | | | | | | | | | | | | | | | |
| 50-75% improvement | | | | | | | | ○ | | | | | | | | | | **NA** |
| McGill pain questionnaire | | | | | | | ○ | | | | | | | | | | | **NA** |
| Patients reporting pain in 0-3 range on 10cm VAS scale | | | | | | | | ○ | | | | | | | | | | **NA** |
| **Postoperative Pain Control** | | | | | | | | | | | | | | | | | | |
| **Analgesia (duration)** | | | | | | | | | | | | | | | | | ○ | **NA** |
| **Quality Of Life** | | | | | | | | | | | | | | | | | | |
| **Activity of daily living (ADL)** | | | | | | | | | | | | | | | | | | |
| Book Holding (100mm VAS) | | | ○ | | | | | | | | | | | | | | | **NA** |
| Buttoning (100mm VAS) | | | ○ | | | | | | | | | | | | | | | **NA** |
| Carpal tunnel syndrome functional status | ○ | | | | | | | | | | | | | | | | | **NA** |
| Chopstick use (100mm VAS) | | | ○ | | | | | | | | | | | | | | | **NA** |
| Receiver holding (100mm VAS) | | | ○ | | | | | | | | | | | | | | | **NA** |
| Writing (100mm VAS) | | | ○ | | | | | | | | | | | | | | | **NA** |
| **Patient satisfaction (general)** | | | | | | | | | | | | | | | | | | |
| Subjective improvement-excellent (Excellent, good, no improvement, or worse) | | | | | | | | ○ | | | | | | | | | | **NA** |
| Subjective improvement-good (Excellent, good, no improvement, or worse) | | | | | | | | ○ | | | | | | | | | | **NA** |
| **Return to Work** | | | | | | | | | 🟢 | | | | | | ○ | | | **NA** |
| **Symptoms** | | | | | | | | | | | | | | | | | | |
| **Paresthesia (VAS scale)** | | | | | ○ | ○ | | | | | | | | | | | | **NA** |
| **Questionnaire (Boston-SSS)** | | | | ○ | | | | | | | | | | | | | | **NA** |
| **Questionnaire (CTSQ symptoms severity scale)** | | ○ | | | | | | | | | | | | | | | | **NA** |
| **Questionnaire (Levine-SSS)** | | | | | | | ○ | | ○ | | | | | | | | | **NA** |
| 84 days | | | | | | | | | | ○ | | | | | | | | **NA** |
| 182 days | | | | | | | | | | 🟢 | | | | | | | | **NA** |
| 364 days | | | | | | | | | | ○ | | | | | | | | **NA** |
| **Semmes–Weinstein Monofilaments Test (SW test)** | | | | | | | | | | ○ | | | | | | | | |
| Thumb, patients testing normal | | | | | | | | | | | | ○ | | | | | | **NA** |
| **Symptom recurrence (general)** | | | | | | | | | | | | | ○ | ○ | | | | **NA** |
| Score range from 0 (no pain or tenderness in scar or proximal palm and no activity limitation) to 100 (severe pain in scar or proximal palm and severe activity limitation because of pain or tenderness) | | | | | | | | | | | | | | | | | | |
| 90 days | 🟢 | | | | | | | | | | | | | | | | | **NA** |
| 360 days | ○ | | | | | | | | | | | | | | | | | **NA** |
| Score range; carpal tunnel syndrome, 1 (no symptoms or disability) to 5 (most severe symptoms or disability) | | | | | | | | | | | | | | | | | | |
| 90 days | 🟢 | | | | | | | | | | | | | | | | | **NA** |
| 360 days | ○ | | | | | | | | | | | | | | | | | **NA** |
| **Symptom recurrence (numbness)** | | | | | | | | ○ | | | | ○ | ○ | ○ | | | | **NA** |
| **Symptom recurrence (pain)** | | | | | | | | ○ | | | | ○ | | | ○ | | | ○ |
| **Symptom recurrence (tingling)** | | | | | | | | | | | | ○ | | | | | | **NA** |
| **Symptom recurrence (weakness)** | | | | | | | | ○ | | | | ○ | ○ | ○ | | | | **NA** |
| **Symptom relief (general)** | | | | | | | | | | | | | | | | ○ | | **NA** |
| >75% improvement | | | | | | | | ○ | | | | | | | | | | **NA** |
| 100% improvement | | | | | | | | ○ | | | ○ | | | | | | | **NA** |

*TABLE 134: SUMMARY OF FINDINGS PICO 7 PART 1 ENDOSCOPIC (LATE FOLLOW-UP (> 1 YEAR))*

**Favors treatment 1** 🟢
**Favors treatment 2** ●
**Not significant** ○

| | **High Quality** | **Moderate Quality** | **Meta-Analysis** |
|---|---|---|---|
| **Outcomes** | **Atroshi,I., 2009** | **Tian,Y., 2007** | |
| **Complications** | | | |
| **Surgery failure (reoperation)** | ○ | | **NA** |
| **Symptom occurrence (scar tenderness)** | | 🟢 | **NA** |
| **Function** | | | |
| **Questionnaire (CTSQ functional status scale)** | ○ | | **NA** |
| **Two-point discrimination** | | ○ | **NA** |
| **Other** | | | |
| **Patient satisfaction (general)** | ○ | | **NA** |
| **Pain** | | | |
| **Symptom relief (pain)** | | | |
| No scar or palm pain | ○ | | **NA** |
| **Symptoms** | | | |
| **Questionnaire (CTSQ symptoms severity scale)** | ○ | | **NA** |
| **Symptom relief (general)** | | ○ | **NA** |

# *TABLE 135: SUMMARY OF FINDINGS PICO 7 PART 2 MINI (EARLY FOLLOW-UP (3 MONTHS UP TO 1 YEAR))*

| Favors treatment 1 🟢<br>Favors treatment 2 ●<br>Not significant ○ | High Quality | | | | | | Moderate Quality | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Outcomes** | Cresswell,T.R., 2008 | Jugovac,I., 2002 | Larsen,M.B., 2013 (3) | Suppaphol,S., 2012 | Yucetas,S.C., 2013 | Zyluk,A., 2006 | Aslani,H.R., 2012 (3) | Capa-Grasa,A., 2014 | Faraj,A.A., 2012 | Tarallo,M., 2014 | **Meta-Analysis** |
| **Complications** | | | | | | | | | | | |
| **Complications (general)** | ● | | | | ○ | | | | | | **NA** |
| **Symptom occurrence (pillar pain)** | | | ○ | | | | | | | | **NA** |
| **Symptom occurrence (scar length)** | | | | | | | | | 🟢 | | **NA** |
| **Symptom occurrence (scar tenderness)** | ○ | ○ | | | | | | | | | **NA** |
| **Function** | | | | | | | | | | | |
| **Grip Strength** | ○ | | | 🟢 | | ● | | ○ | | | **NA** |
| Percentage of contralateral hand | | | | | | | | | | | **NA** |
| 84 days | | | ● | | | | | | | | **NA** |
| 168 days | | | ○ | | | | | | | | **NA** |
| **Key pinch strength** | | | | | | | | | | | **NA** |
| 90 days | | | | | | ● | | | | | **NA** |
| 180 days | | | | | | ○ | | | | | **NA** |
| 360 days | | | | | | ○ | | | | | **NA** |
| **NCS (DML)** | | ○ | | | | | | | ○ | | **NA** |
| **NCS (EMG)** | | | | | ○ | | | | | | **NA** |
| **NCS (SNCV)** | | ○ | | | | | | | ○ | | **NA** |
| **Phalen's test score** | | | | | | | ○ | | | | **NA** |
| **Pinch Strength** | ○ | | | ○ | | | | | | | **NA** |
| **Pinch Strength (three-point pinch)** | | | | | | | | | | | |
| 90 days | | | | | | ● | | | | | **NA** |
| 180 days | | | | | | ● | | | | | **NA** |
| 360 days | | | | | | ○ | | | | | **NA** |
| **Pinch Strength (two-point pinch)** | | | | | | ● | | | | | **NA** |
| **Questionnaire (Boston-FSS)** | | | | | ○ | | | | | 🟢 | **NA** |
| **Questionnaire (DASH-Quick DASH)** | | | | | | | | 🟢 | | | **NA** |
| **Questionnaire (Levine-FSS)** | | | | ○ | | ○ | | | | | **NA** |
| **Range of motion** | | | ○ | | | | | | | | **NA** |
| **Semmes-Weinstein Monofilaments Test (SW test)** | | | | | | ○ | | | | | **NA** |
| **Tinel's Sign/Test** | | | | | | | ○ | | | | **NA** |
| **Two-point discrimination** | | | | ○ | | ○ | | | | ○ | **NA** |
| **Other** | | | | | | | | | | | |
| **Patient satisfaction (general)** | | | | | | | | | ○ | | **NA** |
| **Questionnaire/Scale (Vancouver scale)** | | | | | | | | | | 🟢 | **NA** |
| **Pain** | | | | | | | | | | | |
| **Questionnaire/Scale (VAS-pain)** | ○ | | ○ | | ○ | | | | | | **NA** |
| **Symptom recurrence (general)** | | | | | | | | | | | |
| Night pain | | | | | | | ○ | | | | **NA** |
| Wrist pain | | | | | | | ● | | | | **NA** |
| **Quality Of Life** | | | | | | | | | | | |
| **Return to normal activities** | | ○ | | | | | | | 🟢 | | **NA** |
| **Return to work** | | ○ | | | | | | | | | **NA** |
| **Symptoms** | | | | | | | | | | | |
| **Paresthesia (VAS scale)** | | | ○ | | | | | | | | **NA** |
| **Questionnaire (Boston-SSS)** | | | | | ○ | | | | | 🟢 | **NA** |
| **Questionnaire (Levine-SSS)** | ○ | | | ○ | | ○ | | | | | **NA** |
| **Symptom recurrence (general weakness)** | | | | | | | 🟢 | | | | **NA** |
| **Symptom recurrence (general stiffness)** | | | | | | | ○ | | | | **NA** |
| **Symptom recurrence (numbness)** | | | | | | | ○ | | | | **NA** |
| **Symptom relief (general)** | | ○ | | | | | | | | | **NA** |

## *TABLE 136: SUMMARY OF FINDINGS PICO 7 PART 2 MINI (LATE FOLLOW-UP (> 1 YEAR))*

**Favors treatment 1** 🟢
**Favors treatment 2** ⚫
**Not significant** ○

| | High Quality | | | Moderate Quality | | Meta-Analysis |
|---|---|---|---|---|---|---|
| **Outcomes** | **Cellocco,P., 2005** | **Cellocco,P., 2009** | **Cresswell,T.R., 2008** | **Elsharif,M., 2014** | **Ucar,B.Y., 2012** | |
| **Complications** | | | | | | |
| **Symptom occurrence (scar pain)** | | | | | ⚫ | **NA** |
| **Function** | | | | | | |
| **Questionnaire (Boston-FSS)** | | | | | ○ | **NA** |
| Boston CTS Questionnaire (functional status scale)-Italian modified version | | | | | | |
| 570 days | 🟢 | ⚫ | | | | **NA** |
| 900 days | ○ | ○ | | | | **NA** |
| 1800 days | | ○ | | | | **NA** |
| **Questionnaire (DASH-Quick DASH)** | | | | 🟢 | | **NA** |
| **Two-point discrimination** | ○ | 🟢 | | | | **NA** |
| **Other** | | | | | | |
| **Patient satisfaction (general)** | 🟢 | | | | | **NA** |
| Subjective satisfaction with their scar | | | | | | |
| 900 days | | ○ | | | | **NA** |
| 1800 days | | 🟢 | | | | **NA** |
| **Quality Of Life** | | | | | | |
| **Return to Work** | | 🟢 | | | | **NA** |
| **Symptoms** | | | | | | |
| **Questionnaire (Boston-SSS)** | | | | | ○ | **NA** |
| Boston CTS Questionnaire (symptom severity scale)-Italian modified version | | | | | | |
| 570 days | 🟢 | 🟢 | | | | **NA** |
| 900 days | ○ | ○ | | | | **NA** |
| 1800 days | | ○ | | | | **NA** |
| **Questionnaire (Levine-SSS)** | | | 🟢 | | | **NA** |
| **Symptom recurrence (general)** | | ○ | | | | **NA** |

*TABLE 137: SUMMARY OF FINDINGS PICO 7 PART 3 OPEN (EARLY FOLLOW-UP (3 MONTHS UP TO 1 YEAR))*

| | High Quality | | |
|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **Castillo,T.N., 2014** | **Hamed,A.R., 2009** | **Meta-Analysis** |
| **Complications** | | | |
| **Symptom occurrence (pillar pain)** | | | |
| 90 days | | 🟢 | **NA** |
| 180 days | ○ | ○ | **NA** |
| **Symptom occurrence (scar tenderness)** | | | |
| 90 days | | 🟢 | **NA** |
| 180 days | ○ | ○ | **NA** |
| **Function** | | | |
| **Grip Strength** | ○ | ○ | **NA** |
| **Pinch Strength** | 🟢 | | **NA** |
| **Questionnaire (BWCTQ-FSS)** | ○ | | **NA** |
| **Other** | | | |
| **Questionnaire (DASH)** | ○ | | **NA** |
| **Symptoms** | | | |
| **Questionnaire (BWCTQ-SSS)** | ○ | | **NA** |

## TABLE 138: SUMMARY OF FINDINGS PICO 7 PART 4 SURGICAL VS. CONSERVATIVE (EARLY FOLLOW-UP (3 MONTHS UP TO 1 YEAR))

| | High Quality | | | | Moderate Quality | | |
|---|---|---|---|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **Gerritsen,A.A., 2002** | **Hui,A.C., 2005** | **Ismatullah,I., 2013** | **Jarvik,J.G., 2009** | **Andreu,J.L., 2013** | **Ly,Pen D., 2005** | **Meta-Analysis** |
| **Complications** | | | | | | | |
| **Surgery Failure (success rate)** | 🟢 | | | | | | **NA** |
| **Treatment Failure** | | | | | | | |
| <20% VAS score improvement @ 3 months or worsening of symptoms | | | | | | ○ | **NA** |
| **Function** | | | | | | | |
| **Grip Strength** | | ● | | | | | **NA** |
| **NCS (Motor amplitude)** | | | | | ○ | | **NA** |
| **NCS (DML)** | | ○ | | | 🟢 | | **NA** |
| **NCS (DSL)** | ○ | | | | | | **NA** |
| **NCS (SA)** | | | | | ○ | | **NA** |
| **NCS (SNCV)** | | ○ | | | | | **NA** |
| **NCS( SNCV)** | | | | | ● | | **NA** |
| **Questionnaire (General/Undefined)** | | | | | | | |
| Vsual analog scale of functional impairment (100cm VAS) | | | | | | | |
| 90 days | | | | | ● | | **NA** |
| 180 days | | | | | ○ | | **NA** |
| 360 days | | | | | 🟢 | | **NA** |
| **Questionnaire (CTSAQ)** | | | | | | | |
| Function(1-5) | | | | 🟢 | | | **NA** |
| **Questionnaire (Levine-FSS)** | | | | | | | |
| 90 days | ○ | | | | | | **NA** |
| 180 days | 🟢 | | | | | | **NA** |
| 360 days | 🟢 | | | | | | **NA** |
| **Other** | | | | | | | |
| **Questionnaire (SF-36)** | | | | | | | |
| MCS | | | | ○ | | | **NA** |
| PCS | | | | | | | |
| 180 days | | | | ● | | | **NA** |
| 360 days | | | | ○ | | | **NA** |
| **Pain** | | | | | | | |
| **Questionnaire/Scale (VAS-pain 100cm)** | | | | | | | |
| 90 days | | | | | ● | | **NA** |
| 180 days | | | | | ○ | | **NA** |
| 360 days | | | | | 🟢 | | **NA** |
| **Symptom recurrence (nocturanal pain)** | | | | | | | |
| Number of nights waking up due to symptoms | | | | | | | |
| 90 days | ○ | | | | | | **NA** |
| 180 days | 🟢 | | | | | | **NA** |
| 360 days | ○ | | | | | | **NA** |
| **Symptom recurrence (pain)** | | | | | | | |
| Pain intensity(1-10) | | | | ○ | | | **NA** |
| Pain interference(1-10) | | | | ○ | | | **NA** |
| **Quality Of Life** | | | | | | | |
| **Activity of daily living (ADL)** | | | | | | | |
| Days of reduced work or housework | | | | | | | |
| 180 days | | | | ○ | | | **NA** |
| 360 days | | | | 🟢 | | | **NA** |
| **Symptoms** | | | | | | | |
| **Paresthesia** | | | | | | | |
| Daytime paresthesia | 🟢 | | | | | | **NA** |
| Nighttime paresthesia | 🟢 | | | | | | **NA** |
| Nocturnal paresthesia (100mm VAS scale) | | | | | | | |
| 90 days | | | | | ● | | **NA** |
| 180 days | | | | | ○ | | **NA** |
| 360 days | | | | | 🟢 | | **NA** |
| **Questionnaire (CTSAQ)** | | | | | | | |
| Symptoms(1-5) | | | | 🟢 | | | **NA** |
| **Questionnaire (Levine-SSS)** | | | | | | | |
| 90 days | ○ | | | | | | **NA** |
| 180 days | 🟢 | | | | | | **NA** |
| 360 days | 🟢 | | | | | | **NA** |
| **Questionnaire/Scale (GSS)** | | 🟢 | 🟢 | | | | **NA** |

*TABLE 139: SUMMARY OF FINDINGS PICO 7 PART 4 SURGICAL VS. CONSERVATIVE (LATE FOLLOW-UP (> 1 YEAR))*

| | High Quality | Moderate Quality | |
|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **Gerritsen,A.A., 2002** | **Ly-Pen,D., 2012** | **Meta-Analysis** |
| **Complications** | | | |
| **Complications (general)** | | | |
| Discomfort caused by splint | 🟢 | | **NA** |
| Overall | ● | | **NA** |
| Reflex sympathetic dystrophy | ○ | | **NA** |
| Scar pain | ● | | **NA** |
| Skin irritation | ● | | **NA** |
| Stiffness of wrist, hands, or fingers | ○ | | **NA** |
| Swelling of the wrist, hand or fingers | 🟢 | | **NA** |
| **Complications (haematoma)** | ● | | **NA** |
| **Complications (infection)** | ○ | | **NA** |
| **Surgery Failure (success rate)** | 🟢 | | **NA** |
| **Symptom occurrence (pillar pain)** | ○ | | **NA** |
| **Function** | | | |
| **Questionnaire (General/Undefined)** | | | |
| Reached 20% improvement in functional impairment on 100mm VAS scale | | ○ | **NA** |
| Reached 50% improvement in functional impairment on 100mm VAS scale | | ○ | **NA** |
| Reached 70% improvement in functional impairment on 100mm VAS scale | | ○ | **NA** |
| **Questionnaire (Levine-FSS)** | ○ | | **NA** |
| **Pain** | | | |
| **Symptom recurrence (nocturnal pain)** | ○ | | **NA** |
| **Symptom relief (pain)** | | | |
| Reached 20% improvement in pain on VAS 100mm scale | | ○ | **NA** |
| Reached 50% improvement in pain on VAS 100mm scale | | ○ | **NA** |
| Reached 70% improvement in pain on VAS 100mm scale | | ○ | **NA** |
| **Symptoms** | | | |
| **Paresthesia** | | | |
| Daytime paresthesia | 🟢 | | **NA** |
| Reached 20% improvement in nocturnal parthesia on VAS 100mm scale | | ○ | **NA** |
| Reached 50% improvement in nocturnal parthesia on VAS 100mm scale | | ○ | **NA** |
| Reached 70% improvement in nocturnal parthesia on VAS 100mm scale | | 🟢 | **NA** |
| **Questionnaire (Levine-SSS)** | 🟢 | | **NA** |

## *DETAILED DATA FINDINGS*

### *TABLE 140: PICO 7 PART 1- ENDOSCOPIC: COMPLICATIONS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2009 | High Quality | Surgery failure (reoperation)(Reoperation) | 5 years | CT release (endoscopic) (2-portal endoscopic release) | 63 | 4.76% | CT release (open) (Open carpal tunnel release) | 65 | 4.62% | RR | 1.03(0.22,4.92) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Symptom occurrence (pillar pain)( ) | 3 months | CT release (endoscopic ) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Symptom occurrence (pillar pain)( ) | 3 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Symptom occurrence (pillar pain)( ) | 5.5 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Symptom occurrence (pillar pain)( ) | 5.5 months | CT release (endoscopic ) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Malhotra,R., 2007 | High Quality | Symptom occurrence (scar tenderness)( ) | 5.9 months | CT release (endoscopic ) (single portal endoscopic release) | 30 | 0.00% | CT release (open) (short incision open release) | 31 | 29.03% | RD | -0.29(-0.45,-0.13) | **CT release (endoscopic ) (single portal endoscopic release)**<br>**(P-value<.05)** |
| Saw,N.L., 2003 | High Quality | Symptom occurrence (scar tenderness)(Anterior carpal tenderness) | 3 months | CT release (endoscopic ) (Endoscopic release) | 74 | 22(7.00) | CT release (open) (Open CTR) | 76 | 24(6.00) | Mean Difference | -2(-4.09,0.088891 ) | Not Significant (P-value>.05) |
| Trumble,T.E. , 2002 | High Quality | Symptom occurrence (scar tenderness)(Loads of pressure (in kg) able to withstand) | 12 months | CT release (endoscopic ) (single portal endoscopic release) | 75 | . % | CT release (open) (3-4cm incision) | 75 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Wong,K.C., 2003 | High Quality | Symptom occurrence (pillar pain)(Radial pillar pain) | 1 years | CT release (endoscopic ) (two-portal endoscopic release) | 30 | . % | CT release (open-limited) (limited-open release) | 29 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Wong,K.C., 2003 | High Quality | Symptom occurrence (pillar pain)(Ulnar pillar pain) | 1 years | CT release (endoscopic ) (two-portal endoscopic release) | 30 | . % | CT release (open-limited) (limited-open release) | 29 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agee,J.M., 1992 | Moderate Quality | Symptom occurrence (pillar pain)(Radial pillar pain (0=none to 4=severe)) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 72 | . % | CT release (open) (Conventional open surgery) | 55 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Symptom occurrence (pillar pain)(Radial pillar pain (0=none to 4=severe)) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 65 | . % | CT release (open) (Conventional open surgery) | 47 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Symptom occurrence (scar tenderness)(0=none to 4=severe) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 72 | . % | CT release (open) (Conventional open surgery) | 55 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Symptom occurrence (scar tenderness)(0=none to 4=severe) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 65 | . % | CT release (open) (Conventional open surgery) | 47 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tian,Y., 2007 | Moderate Quality | Symptom occurrence (scar tenderness)(Rate of scar tenderness) | 2 years | CT release (endoscopic) (one-portal endoscopics release) | 30 | . % | CT release (open) (traditional open release) | 32 | . % | Author Reported | NA | **CT release (endoscopic) (one-portal endoscopics release)**<br>**(P-value<.05)** |

*TABLE 141: PICO 7 PART 1- ENDOSCOPIC: OTHER QUESTIONNAIRE*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kang,H.J., 2013 | High Quality | Questionnaire (DASH)( ) | 3 months | CT release (endoscopic) (Endoscopic release using the Agee technique) | 52 | 11(11.04) | CT release (mini) (1.5-cm incision was made in the prox-imal palm over the transverse carpal ligament) | 52 | 11(11.04) | Mean Difference | 0(-4.24,4.24) | Not Significant (P-value>.05) |
| MacDermid,J.C., 2003 | High Quality | Questionnaire (SF-36)(Physical health- SF-36) | 3 months | CT release (endoscopic) (2 portal Chow technique) | 32 | 47(.) | CT release (open) (traditional long incision open release) | 91 | 42(.) | Author Reported | NA | Not Significant (P-value>.05) |

*TABLE 142: PICO 7 PART 1- ENDOSCOPIC: FUNCTION*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2006 | High Quality | Grip strength(Units not reported) | 3 months | CT release (endoscopic) (Endoscopic release injected subcutaneously at the proximal and distal portals) | 63 | 31.5(11.00) | CT release (open) (Open carpal tunnel release along the length of the incision) | 65 | 29.9(11.00) | Mean Difference | 1.6(-2.21,5.411770) | Not Significant (P-value>.05) |
| Atroshi,I., 2006 | High Quality | Pinch Strength(Units not reported) | 3 months | CT release (endoscopic) (Endoscopic release injected subcutaneously at the proximal and distal portals) | 63 | 6.7(2.20) | CT release (open) (Open carpal tunnel release along the length of the incision) | 65 | 6(1.80) | Mean Difference | 0.7(0.00,1.397582) | **CT release (endoscopic) (Endoscopic release injected subcutaneously at the proximal and distal portals) (P-value<.05)** |
| Atroshi,I., 2009 | High Quality | Questionnaire (CTQ)(CTSQ functional status scale) | 1 years | CT release (endoscopic) (2-portal endoscopic release) | 63 | 1.25(0.50) | CT release (open) (Open carpal tunnel release) | 65 | 1.19(0.40) | Mean Difference | 0.06(-0.10,0.217164) | Not Significant (P-value>.05) |
| Atroshi,I., 2009 | High Quality | Questionnaire (CTQ)(CTSQ functional status scale) | 5 years | CT release (endoscopic) (2-portal endoscopic release) | 63 | 1.3(0.50) | CT release (open) (Open carpal tunnel release) | 63 | 1.29(0.50) | Mean Difference | 0.01(-0.16,0.184610) | Not Significant (P-value>.05) |
| Ejiri,S., 2012 | High Quality | Grip strength(Kilograms) | 3 months | CT release (endoscopic) (Okutsu method) | 40 | . % | CT release (open) (3cm palmar incision) | 39 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ejiri,S., 2012 | High Quality | Semmes Weinstein Monofilaments Test (SW test)(lower scores=improvement) | 3 months | CT release (endoscopic) (Okutsu method) | 40 | -0.49(.) | CT release (open) (3cm palmar incision) | 39 | -0.24(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Ejiri,S., 2012 | High Quality | Two-point discrimination(Millimeters) | 3 months | CT release (endoscopic) (Okutsu method) | 40 | -3.3(.) | CT release (open) (3cm palmar incision) | 39 | -1.7(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Kang,H.J., 2013 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 3 months | CT release (endoscopic) (Endoscopic release using the Agee technique) | 52 | 1.5(0.37) | CT release (mini) (1.5-cm incision was made in the proximal palm over the transverse carpal ligament) | 52 | 1.7(-0.74) | Mean Difference | -0.2(-0.42,0.02) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Grip strength(Percentage of contralateral hand) | 3 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Grip strength(Percentage of contralateral hand) | 3 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | **CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Grip strength(Percentage of contralateral hand) | 5.5 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Grip strength(Percentage of contralateral hand) | 5.5 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Range of motion( ) | 3 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Range of motion( ) | 3 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Range of motion( ) | 5.5 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | . | . % | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Range of motion( ) | 5.5 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | . | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MacDermid,J. C., 2003 | High Quality | Grip strength(Kilograms ) | 3 months | CT release (endoscopic) (2 portal Chow technique) | 32 | 27(.) | CT release (open) (traditional long incision open release) | 91 | 27(.) | Author Reported | NA | Not Significant (P-value>.05) |
| MacDermid,J. C., 2003 | High Quality | Pinch Strength (key pinch)(Kilograms) | 3 months | CT release (endoscopic) (2 portal Chow technique) | 32 | 7(.) | CT release (open) (traditional long incision open release) | 91 | 5.6(.) | Author Reported | NA | Not Significant (P-value>.05) |
| MacDermid,J. C., 2003 | High Quality | Pinch Strength (tripod pinch)(Kilograms) | 3 months | CT release (endoscopic) (2 portal Chow technique) | 32 | 6.7(.) | CT release (open) (traditional long incision open release) | 91 | 6.5(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Malhotra,R., 2007 | High Quality | NCS (DML)(Distal motor latency (ms)) | 5.9 months | CT release (endoscopic) (single portal endoscopic release) | 30 | . % | CT release (open) (short incision open release) | 31 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Malhotra,R., 2007 | High Quality | NCS (NCV)(Nerve conduction velocity (ms)) | 5.9 months | CT release (endoscopic) (single portal endoscopic release) | 30 | . % | CT release (open) (short incision open release) | 31 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Saw,N.L., 2003 | High Quality | Questionnaire (Levine-FSS)(Levine functional score) | 3 months | CT release (endoscopic) (Endoscopic release) | 74 | . % | CT release (open) (Open CTR) | 76 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sennwald,G.R., 1995 | High Quality | Grip strength(Kilograms) | 3 months | CT release (endoscopic) (two-portal Chow technique) | 25 | . % | CT release (open) (traditional open release) | 22 | . % | Author Reported | NA | **CT release (endoscopic) (two-portal Chow technique)**<br>**(P-value<.05)** |
| Sennwald,G.R., 1995 | High Quality | Key pinch strength(Kilograms) | 3 months | CT release (endoscopic) (two-portal Chow technique) | 25 | . % | CT release (open) (traditional open release) | 22 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Trumble,T.E., 2002 | High Quality | Grip strength(Kilograms) | 3 months | CT release (endoscopic) (single portal endoscopic release) | 75 | . % | CT release (open) (3-4cm incision) | 72 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Trumble,T.E., 2002 | High Quality | Grip strength(Kilograms) | 12 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 32(.) | CT release (open) (3-4cm incision) | 72 | 34(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Trumble,T.E., 2002 | High Quality | Hand dexterity(Jebsen-Taylor test) | 3 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 44(.) | CT release (open) (3-4cm incision) | 72 | 44(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Trumble,T.E., 2002 | High Quality | Hand dexterity(Purdue pegboard test) | 3 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 20(.) | CT release (open) (3-4cm incision) | 72 | 20(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Trumble,T.E., 2002 | High Quality | Pinch Strength(Kilograms) | 3 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 7.9(.) | CT release (open) (3-4cm incision) | 72 | 8.1(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Trumble,T.E., 2002 | High Quality | Questionnaire (Levine-FSS)(CTS-FSS (1=least functional difficulty, 5=svere functional difficulty)) | 3 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 1.7(0.10) | CT release (open) (3-4cm incision) | 72 | 2.4(0.10) | Mean Difference | -0.7(-0.73,-0.66766) | **CT release (endoscopic) (single portal endoscopic release)**<br>**(P-value<.05)** |
| Trumble,T.E., 2002 | High Quality | Questionnaire (Levine-FSS)(CTS-FSS (1=least functional difficulty, 5=svere functional difficulty)) | 6 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 1.8(0.13) | CT release (open) (3-4cm incision) | 72 | 1.8(0.09) | Mean Difference | 0(-0.04,0.036025) | Not Significant (P-value>.05) |
| Trumble,T.E., 2002 | High Quality | Questionnaire (Levine-FSS)(CTS-FSS (1=least functional difficulty, 5=svere functional difficulty)) | 12 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 1.7(0.10) | CT release (open) (3-4cm incision) | 72 | 1.7(0.11) | Mean Difference | 0(-0.03,0.034026) | Not Significant (P-value>.05) |
| Trumble,T.E., 2002 | High Quality | Semmes-Weinstein Monofilaments Test (SW test)( ) | 12 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 3.26(.) | CT release (open) (3-4cm incision) | 72 | 3.2(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Wong,K.C., 2003 | High Quality | Pinch Strength(% improvement from baseline (units not reported)) | 1 years | CT release (endoscopic) (two-portal endoscopic release) | 30 | . % | CT release (open-limited) (limited-open release) | 29 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Wong,K.C., 2003 | High Quality | Two-point discrimination(Millimeters) | 1 years | CT release (endoscopic) (two-portal endoscopic release) | 30 | . % | CT release (open-limited) (limited-open release) | 29 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agee,J.M., 1992 | Moderate Quality | Grip strength(Jamar grip (mean percent change from baseline)) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 72 | . % | CT release (open) (Conventional open surgery) | 55 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Grip strength(Jamar grip (mean percent change from baseline)) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 64 | . % | CT release (open) (Conventional open surgery) | 48 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Hand dexterity(fine dexterity loss) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 74 | 14.86% | CT release (open) (Conventional open surgery) | 55 | 12.73% | RR | 1.17(0.48,2.82) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Hand dexterity(fine dexterity loss) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 65 | 12.31% | CT release (open) (Conventional open surgery) | 48 | 12.50% | RR | 0.98(0.37,2.65) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agee,J.M., 1992 | Moderate Quality | Key pinch strength(Mean % change from baseline) | 1.1 weeks | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 64 | . % | CT release (open) (Conventional open surgery) | 55 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Key pinch strength(Mean % change from baseline) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 72 | . % | CT release (open) (Conventional open surgery) | 48 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Phalen's test score(% negative) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 64 | 92.19% | CT release (open) (Conventional open surgery) | 46 | 93.48% | RR | 0.99(0.89,1.09) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Pinch strength (pulp pinch)(Mean % change from pre-op value (units not reported)) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 72 | . % | CT release (open) (Conventional open surgery) | 55 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agee,J.M., 1992 | Moderate Quality | Pinch strength (pulp pinch)(Mean % change from pre-op value (units not reported)) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 64 | . % | CT release (open) (Conventional open surgery) | 48 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Range of motion(Manual motor testing for thumb abduction (patients testing normal)) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 74 | 81.08% | CT release (open) (Conventional open surgery) | 74 | 74.32% | RR | 1.09(0.92,1.30) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Range of motion(Manual motor testing for thumb abduction (patients testing normal)) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 63 | 80.95% | CT release (open) (Conventional open surgery) | 83 | 83.13% | RR | 0.97(0.83,1.14) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Semmes-Weinstein Monofilaments Test (SW test)(Thumb, patients testing normal) | 1.1 weeks | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 57 | 71.93% | CT release (open) (Conventional open surgery) | 27 | 48.15% | RR | 1.49(0.98,2.28) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agee,J.M., 1992 | Moderate Quality | Semmes-Weinstein Monofilaments Test (SW test)(Index finger, Patients testing normal) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 37 | 62.16% | CT release (open) (Conventional open surgery) | 27 | 51.85% | RR | 1.20(0.77,1.87) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Semmes-Weinstein Monofilaments Test (SW test)(Little finger, Patients testing normal) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 37 | 75.68% | CT release (open) (Conventional open surgery) | 27 | 85.19% | RR | 0.89(0.70,1.13) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Semmes-Weinstein Monofilaments Test (SW test)(Long finger, Patients testing normal) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 37 | 64.86% | CT release (open) (Conventional open surgery) | 27 | 66.67% | RR | 0.97(0.68,1.39) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Semmes-Weinstein Monofilaments Test (SW test)(Thumb, patients testing normal) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 37 | 43.24% | CT release (open) (Conventional open surgery) | 42 | 64.29% | RR | 0.67(0.44,1.04) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agee,J.M., 1992 | Moderate Quality | Semmes-Weinstein Monofilaments Test (SW test)(Index finger, Patients testing normal) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 57 | 73.68% | CT release (open) (Conventional open surgery) | 42 | 80.95% | RR | 0.91(0.74,1.13) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Semmes-Weinstein Monofilaments Test (SW test)(Little finger, Patients testing normal) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 57 | 89.47% | CT release (open) (Conventional open surgery) | 42 | 90.48% | RR | 0.99(0.87,1.13) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Semmes-Weinstein Monofilaments Test (SW test)(Long finger, Patients testing normal) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 57 | 89.47% | CT release (open) (Conventional open surgery) | 42 | 76.19% | RR | 1.17(0.97,1.42) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Tinel's Sign/Test(% negative) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 64 | 87.50% | CT release (open) (Conventional open surgery) | 46 | 82.61% | RR | 1.06(0.90,1.25) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aslani,H.R., 2012 | Moderate Quality | Phalen's test score(% positive) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 6.25% | CT release (mini) (Mini palmer incision) | 28 | 10.71% | RR | 0.58(0.10,3.24) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Phalen's test score(% positive) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 6.25% | CT release (open) (large open incision) | 36 | 13.89% | RR | 0.46(0.10,2.22) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Tinel's Sign/Test(# positive) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 12.50% | CT release (mini) (Mini palmer incision) | 28 | 10.71% | RR | 1.17(0.29,4.77) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Tinel's Sign/Test(# positive) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 12.50% | CT release (open) (large open incision) | 36 | 19.44% | RR | 0.64(0.21,1.99) | Not Significant (P-value>.05) |
| Dumontier,C., 1995 | Moderate Quality | Grip strength(Kilograms) | 3 months | CT release (endoscopic) (two-portal endoscopic release) | 28 | . % | CT release (open) (Conventional palmar open release) | 30 | . % | Author Reported | NA | **CT release (endoscopic) (two-portal endoscopic release)**<br>**(P-value<.05)** |
| Ferdinand,R.D., 2002 | Moderate Quality | Grip strength(Pounds) | 1 years | CT release (endoscopic) (single portal endoscopic release) | 25 | . % | CT release (open) (traditional open release) | 25 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Ferdinand,R.D., 2002 | Moderate Quality | Jebsen Taylor score(Seconds) | 1 years | CT release (endoscopic) (single portal endoscopic release) | 25 | . % | CT release (open) (traditional open release) | 25 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ferdinand,R.D., 2002 | Moderate Quality | Two-point discrimination(Millimeters) | 1 years | CT release (endoscopic) (single portal endoscopic release) | 25 | . % | CT release (open) (traditional open release) | 25 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Jacobsen,M.B., 1996 | Moderate Quality | Two-point discrimination(Millimeters) | 5.9 months | CT release (endoscopic) (two-portal Chow technique) | 16 | 2.94(0.56) | CT release (open) (traditional open release) | 16 | 3.25(1.30) | Mean Difference | -0.31(-1.00,0.383588) | Not Significant (P-value>.05) |
| Tian,Y., 2007 | Moderate Quality | Two-point discrimination(Units not specified) | 2 years | CT release (endoscopic) (one-portal endoscopics release) | 30 | 5.9(1.50) | CT release (open) (traditional open release) | 32 | 5.3(1.70) | Mean Difference | 0.6(-0.20,1.396909) | Not Significant (P-value>.05) |

*TABLE 143: PICO 7 PART 1- ENDOSCOPIC: OTHER*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2009 | High Quality | Patient satisfaction (general)(Completely or very satisfied) | 5 years | CT release (endoscopic) (2-portal endoscopic release) | 63 | 85.71% | CT release (open) (Open carpal tunnel release) | 63 | 82.54% | RR | 1.04(0.89,1.21) | Not Significant (P-value>.05) |
| Kang,H.J., 2013 | High Quality | Patient satisfaction (general)(Preferred Endoscopic CTR) | 3 months | CT release (endoscopic) (Endoscopic release using the Agee technique) | 52 | 65.38% | CT release (mini) (1.5-cm incision was made in the prox-imal palm over the transverse carpal ligament) | 52 | 65.38% | RR | 1.00(0.76,1.32) | Not Significant (P-value>.05) |
| Trumble,T.E., 2002 | High Quality | Patient satisfaction (general)(1=least satisfied to 5=most satisfied) | 3 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 4.4(0.13) | CT release (open) (3-4cm incision) | 72 | 4(0.14) | Mean Difference | 0.4(0.36,0.443719) | **CT release (endoscopic) (single portal endoscopic release)**<br>**(P-value<.05)** |
| Trumble,T.E., 2002 | High Quality | Patient satisfaction (general)(1=least satisfied to 5=most satisfied) | 6 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 4.5(0.12) | CT release (open) (3-4cm incision) | 72 | 4.5(0.12) | Mean Difference | 0(-0.04,0.038806) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Trumble,T.E., 2002 | High Quality | Patient satisfaction (general)(1=least satisfied to 5=most satisfied) | 12 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 4.6(0.11) | CT release (open) (3-4cm incision) | 72 | 4.5(0.13) | Mean Difference | 0.1(0.06,0.139006) | **CT release (endoscopic) (single portal endoscopic release)**<br>**(P-value<.05)** |

*TABLE 144: PICO 7 PART 1- ENDOSCOPIC: PAIN*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2009 | High Quality | Symptom relief (pain)(No scar or palm pain) | 5 years | CT release (endoscopic) (2-portal endoscopic release) | 63 | 84.13% | CT release (open) (Open carpal tunnel release) | 63 | 82.54% | RR | 1.02(0.87,1.19) | Not Significant (P-value>.05) |
| Larsen,M.B., 2013 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 3 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 3 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 5.5 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 5.5 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| MacDermid,J.C., 2003 | High Quality | Symptom relief (pain)(McGill pain questionnaire) | 3 months | CT release (endoscopic) (2 portal Chow technique) | 32 | 12(.) | CT release (open) (traditional long incision open release) | 91 | 8(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Malhotra,R., 2007 | High Quality | Symptom recurrence (pain)(Patients reporting pain in 4-6 range on 10cm VAS scale) | 5.9 months | CT release (endoscopic) (single portal endoscopic release) | 30 | 6.67% | CT release (open) (short incision open release) | 31 | 6.45% | RR | 1.03(0.16,6.87) | Not Significant (P-value>.05) |
| Malhotra,R., 2007 | High Quality | Symptom relief (pain)(50-75% improvement) | 5.9 months | CT release (endoscopic) (single portal endoscopic release) | 30 | 3.33% | CT release (open) (short incision open release) | 31 | 6.45% | RR | 0.52(0.05,5.40) | Not Significant (P-value>.05) |
| Malhotra,R., 2007 | High Quality | Symptom relief (pain)(Patients reporting pain in 0-3 range on 10cm VAS scale) | 5.9 months | CT release (endoscopic) (single portal endoscopic release) | 30 | 93.33% | CT release (open) (short incision open release) | 31 | 93.55% | RR | 1.00(0.87,1.14) | Not Significant (P-value>.05) |
| Wong,K.C., 2003 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 1 years | CT release (endoscopic) (two-portal endoscopic release) | 30 | . % | CT release (open-limited) (limited-open release) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (general)(Night pain) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 0.00% | CT release (mini) (Mini palmer incision) | 28 | 0.00% | RD | 0.00(0.00,0.00) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (general)(Night pain) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 0.00% | CT release (open) (large open incision) | 36 | 0.00% | RD | 0.00(0.00,0.00) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (general)(Wrist pain) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 12.50% | CT release (mini) (Mini palmer incision) | 28 | 14.29% | RR | 0.88(0.24,3.18) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (general)(Wrist pain) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 12.50% | CT release (open) (large open incision) | 36 | 0.00% | RD | 0.13(0.01,0.24) | **CT release (open) (large open incision)**<br>**(P-value<.05)** |
| Dumontier,C., 1995 | Moderate Quality | Symptom recurrence (pain)(Patients still reporting pain) | 3 months | CT release (endoscopic) (two-portal endoscopic release) | 28 | 39.29% | CT release (open) (Conventional palmar open release) | 30 | 43.33% | RR | 0.91(0.49,1.68) | Not Significant (P-value>.05) |

*TABLE 145: PICO 7 PART 1- ENDOSCOPIC: POSTOPERATIVE PAIN CONTROL*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jacobsen,M.B., 1996 | Moderate Quality | Analgesia (duration)(Postoperative analgesia use) | 5.9 months | CT release (endoscopic) (two-portal Chow technique) | 16 | 5.5(.) | CT release (open) (traditional open release) | 16 | 5.2(.) | Author Reported | NA | Not Significant (P-value>.05) |

*TABLE 146: PICO 7 PART 1- ENDOSCOPIC: QUALITY OF LIFE*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2006 | High Quality | Activity of daily living (ADL)(Carpal tunnel syndrome functional status) | 3 months | CT release (endoscopic) (Endoscopic release injected subcutaneously at the proximal and distal portals) | 63 | 1.3(0.50) | CT release (open) (Open carpal tunnel release along the length of the incision) | 65 | 1.3(0.40) | Mean Difference | 0(-0.16,0.157164) | Not Significant (P-value>.05) |
| Atroshi,I., 2006 | High Quality | Activity of daily living (ADL)(Carpal tunnel syndrome functional status) | 11.8 months | CT release (endoscopic) (Endoscopic release injected subcutaneously at the proximal and distal portals) | 63 | 1.3(0.50) | CT release (open) (Open carpal tunnel release along the length of the incision) | 65 | 1.2(0.40) | Mean Difference | 0.1(-0.06,0.257164) | Not Significant (P-value>.05) |
| Ejiri,S., 2012 | High Quality | Activity of daily living (ADL)(Book Holding (100mm VAS)) | 3 months | CT release (endoscopic) (Okutsu method) | 40 | -23.7(.) | CT release (open) (3cm palmar incision) | 39 | -21.6(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Ejiri,S., 2012 | High Quality | Activity of daily living (ADL)(Buttoning (100mm VAS)) | 3 months | CT release (endoscopic) (Okutsu method) | 40 | -22.2(.) | CT release (open) (3cm palmar incision) | 39 | -31.6(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Ejiri,S., 2012 | High Quality | Activity of daily living (ADL)(Chopstick use (100mm VAS)) | 3 months | CT release (endoscopic) (Okutsu method) | 40 | -21.1(.) | CT release (open) (3cm palmar incision) | 39 | -15.6(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Ejiri,S., 2012 | High Quality | Activity of daily living (ADL)(Receiver holding (100mm VAS)) | 3 months | CT release (endoscopic) (Okutsu method) | 40 | -20.8(.) | CT release (open) (3cm palmar incision) | 39 | -22(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ejiri,S., 2012 | High Quality | Activity of daily living (ADL)(Writing (100mm VAS)) | 3 months | CT release (endoscopic) (Okutsu method) | 40 | -16.2(.) | CT release (open) (3cm palmar incision) | 39 | -13.9(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Malhotra,R., 2007 | High Quality | Patient satisfaction (general)(Subjective improvement-excellent (Excellent, good, no improvement, or worse)) | 5.9 months | CT release (endoscopic) (single portal endoscopic release) | 30 | 83.33% | CT release (open) (short incision open release) | 31 | 67.74% | RR | 1.23(0.92,1.65) | Not Significant (P-value>.05) |
| Malhotra,R., 2007 | High Quality | Patient satisfaction (general)(Subjective improvement-good (Excellent, good, no improvement, or worse)) | 5.9 months | CT release (endoscopic) (single portal endoscopic release) | 30 | 16.67% | CT release (open) (short incision open release) | 31 | 29.03% | RR | 0.57(0.22,1.52) | Not Significant (P-value>.05) |
| Saw,N.L., 2003 | High Quality | Return to Work(Days off work) | 3 months | CT release (endoscopic) (Endoscopic release) | 74 | 18(11.00) | CT release (open) (Open CTR) | 76 | 26(14.00) | Mean Difference | -8(-12.02,-3.97646) | **CT release (endoscopic) (Endoscopic release)**<br>**(P-value<.05)** |
| Dumontier,C., 1995 | Moderate Quality | Return to Work( ) | 3 months | CT release (open) (Conventional palmar open release) | 30 | . % | CT release (endoscopic) (two-portal endoscopic release) | 28 | . % | Author Reported | NA | Not Significant (P-value>.05) |

*TABLE 147: PICO 7 PART 1- ENDOSCOPIC: SYMPTOMS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2006 | High Quality | Symptom recurrence (general)(Score range from 0 (no pain or tenderness in scar or proximal palm and no activity limitation) to 100 (severe pain in scar or proximal palm and severe activity limitation because of pain or tenderness)) | 3 months | CT release (endoscopic) (Endoscopic release injected subcutaneously at the proximal and distal portals) | 63 | 23.5(26.00) | CT release (open) (Open carpal tunnel release along the length of the incision) | 65 | 36.2(20.00) | Mean Difference | -12.7(-20.75,-4.64633) | **CT release (endoscopic) (Endoscopic release injected subcutaneously at the proximal and distal portals) (P-value<.05)** |
| Atroshi,I., 2006 | High Quality | Symptom recurrence (general)(Score range; carpal tunnel syndrome, 1 (no symptoms or disability) to 5 (most severe symptoms or disability)) | 3 months | CT release (endoscopic) (Endoscopic release injected subcutaneously at the proximal and distal portals) | 1.5 | .(0.50) | CT release (open) (Open carpal tunnel release along the length of the incision) | 65 | 1.5(0.50) | Mean Difference | .(.,) | Not Significant (P-value>.05) |
| Atroshi,I., 2006 | High Quality | Symptom recurrence (general)(Score range from 0 (no pain or tenderness in scar or proximal palm and no activity limitation) to 100 (severe pain in scar or proximal palm and severe activity limitation because of pain or tenderness)) | 11.8 months | CT release (endoscopic) (Endoscopic release injected subcutaneously at the proximal and distal portals) | 63 | 8.7(21.00) | CT release (open) (Open carpal tunnel release along the length of the incision) | 65 | 13.9(22.00) | Mean Difference | -5.2(-12.65,2.249586) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atroshi,I., 2006 | High Quality | Symptom recurrence (general)(Score range; carpal tunnel syndrome, 1 (no symptoms or disability) to 5 (most severe symptoms or disability)) | 11.8 months | CT release (endoscopic) (Endoscopic release injected subcutaneously at the proximal and distal portals) | 63 | 1.4(0.60) | CT release (open) (Open carpal tunnel release along the length of the incision) | 65 | 1.4(0.50) | Mean Difference | 0(-0.19,0.191643) | Not Significant (P-value>.05) |
| Atroshi,I., 2009 | High Quality | Questionnaire (CTQ)(CTSQ symptoms severity scale) | 1 years | CT release (endoscopic) (2-portal endoscopic release) | 63 | 1.4(0.60) | CT release (open) (Open carpal tunnel release) | 65 | 1.38(0.50) | Mean Difference | 0.02(-0.17,0.211643) | Not Significant (P-value>.05) |
| Atroshi,I., 2009 | High Quality | Questionnaire (CTQ)(CTSQ symptoms severity scale) | 5 years | CT release (endoscopic) (2-portal endoscopic release) | 63 | 1.45(0.70) | CT release (open) (Open carpal tunnel release) | 63 | 1.42(0.70) | Mean Difference | 0.03(-0.21,0.274454) | Not Significant (P-value>.05) |
| Kang,H.J., 2013 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 3 months | CT release (endoscopic) (Endoscopic release using the Agee technique) | 52 | 1.5(0.37) | CT release (mini) (1.5-cm incision was made in the prox-imal palm over the transverse carpal ligament) | 52 | 1.4(0.74) | Mean Difference | 0.1(-0.12,0.32) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Paresthesia(Paresthesia (VAS scale)) | 3 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Paresthesia(Paresthesia (VAS scale)) | 3 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Paresthesia(Paresthesia (VAS scale)) | 5.5 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Paresthesia(Paresthesia (VAS scale)) | 5.5 months | CT release (endoscopic) (Endoscopic procedure using the Linvatec system as described by Menon (1993), which is a one-portal technique with a short transverse incision at the wrist using a disposable set of endoscopic instruments and a conventional 5 mm arthroscope. After trans-section the skin was sutured and a soft dressing without splinting applied) | 30 | . % | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| MacDermid,J.C., 2003 | High Quality | Questionnaire (Levine-SSS)(Levine's symptom severity score) | 3 months | CT release (endoscopic) (2 portal Chow technique) | 91 | 1.8(.) | CT release (open) (traditional long incision open release) | 32 | 2(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Malhotra,R., 2007 | High Quality | Symptom recurrence (numbness)( ) | 5.9 months | CT release (endoscopic) (single portal endoscopic release) | 30 | 6.67% | CT release (open) (short incision open release) | 31 | 12.90% | RR | 0.52(0.10,2.61) | Not Significant (P-value>.05) |
| Malhotra,R., 2007 | High Quality | Symptom recurrence (weakness)( ) | 5.9 months | CT release (endoscopic) (single portal endoscopic release) | 30 | 6.67% | CT release (open) (short incision open release) | 31 | 16.13% | RR | 0.41(0.09,1.97) | Not Significant (P-value>.05) |
| Malhotra,R., 2007 | High Quality | Symptom relief (general)(>75% improvement) | 5.9 months | CT release (endoscopic) (single portal endoscopic release) | 30 | 20.00% | CT release (open) (short incision open release) | 31 | 25.81% | RR | 0.78(0.31,1.97) | Not Significant (P-value>.05) |
| Malhotra,R., 2007 | High Quality | Symptom relief (general)(100% improvement) | 5.9 months | CT release (endoscopic) (single portal endoscopic release) | 30 | 76.67% | CT release (open) (short incision open release) | 31 | 64.52% | RR | 1.19(0.86,1.65) | Not Significant (P-value>.05) |
| Saw,N.L., 2003 | High Quality | Questionnaire (Levine-SSS)( ) | 3 months | CT release (endoscopic) (Endoscopic release) | 74 | . % | CT release (open) (Open CTR) | 76 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Trumble,T.E., 2002 | High Quality | Questionnaire (Levine-SSS)(CTS-SSS (1=fewest symptoms, 5=severe)) | 3 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 1.8(0.14) | CT release (open) (3-4cm incision) | 72 | 1.8(0.11) | Mean Difference | 0(-0.04,0.040614) | Not Significant (P-value>.05) |
| Trumble,T.E., 2002 | High Quality | Questionnaire (Levine-SSS)(CTS-SSS (1=fewest symptoms, 5=severe)) | 6 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 1.7(0.13) | CT release (open) (3-4cm incision) | 72 | 1.8(0.10) | Mean Difference | -0.1(-0.14,-0.06259) | **CT release (endoscopic) (single portal endoscopic release) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Trumble,T.E., 2002 | High Quality | Questionnaire (Levine-SSS)(CTS-SSS (1=fewest symptoms, 5=severe)) | 12 months | CT release (endoscopic) (single portal endoscopic release) | 75 | 1.8(0.15) | CT release (open) (3-4cm incision) | 72 | 1.8(0.10) | Mean Difference | 0(-0.04,0.041061) | Not Significant (P-value>.05) |
| Wong,K.C., 2003 | High Quality | Symptom relief (general)(complete relief of symptoms) | 1 years | CT release (endoscopic) (two-portal endoscopic release) | 30 | 56.67% | CT release (open-limited) (limited-open release) | 29 | 65.52% | RR | 0.86(0.57,1.30) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Symptom recurrence (numbness)(Patients with symptoms still present) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 74 | 21.62% | CT release (open) (Conventional open surgery) | 55 | 12.73% | RR | 1.70(0.75,3.84) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Symptom recurrence (numbness)(Patients with symptoms still present) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 65 | 12.31% | CT release (open) (Conventional open surgery) | 48 | 18.75% | RR | 0.66(0.27,1.58) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Symptom recurrence (pain)(Nocturnal pain, patients with symptoms still present) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 74 | 10.81% | CT release (open) (Conventional open surgery) | 55 | 10.91% | RR | 0.99(0.36,2.69) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Symptom recurrence (pain)(Nocturnal pain, patients with symptoms still present) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 65 | 7.69% | CT release (open) (Conventional open surgery) | 48 | 8.33% | RR | 0.92(0.26,3.26) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agee,J.M., 1992 | Moderate Quality | Symptom recurrence (tingling)(Patients with symptoms still present) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 74 | 20.27% | CT release (open) (Conventional open surgery) | 55 | 9.09% | RR | 2.23(0.86,5.77) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Symptom recurrence (tingling)(Patients with symptoms still present) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 65 | 13.85% | CT release (open) (Conventional open surgery) | 48 | 14.58% | RR | 0.95(0.38,2.37) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Symptom recurrence (weakness)(Patients with symptoms still present) | 3 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 74 | 32.43% | CT release (open) (Conventional open surgery) | 55 | 43.64% | RR | 0.74(0.48,1.16) | Not Significant (P-value>.05) |
| Agee,J.M., 1992 | Moderate Quality | Symptom recurrence (weakness)(Patients with symptoms still present) | 6 months | CT release (endoscopic w/ 3M device) (Endoscopic device inserted into incision at wrist) | 65 | 20.00% | CT release (open) (Conventional open surgery) | 48 | 35.42% | RR | 0.56(0.30,1.05) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (general)(Stiffness) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 12.50% | CT release (mini) (Mini palmer incision) | 28 | 0.00% | RD | 0.13(0.01,0.24) | **CT release (mini) (Mini palmer incision) (P-value<.05)** |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (general)(Stiffness) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 12.50% | CT release (open) (large open incision) | 36 | 5.56% | RR | 2.25(0.44,11.48) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (general)(Weakness) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 6.25% | CT release (mini) (Mini palmer incision) | 28 | 0.00% | RD | 0.06(-0.02,0.15) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (general)(Weakness) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 6.25% | CT release (open) (large open incision) | 36 | 11.11% | RR | 0.56(0.11,2.87) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (numbness)(Numbness) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 0.00% | CT release (mini) (Mini palmer incision) | 28 | 0.00% | RD | 0.00(0.00,0.00) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (numbness)(Numbness) | 3.9 months | CT release (endoscopic) (Endoscopic release) | 32 | 0.00% | CT release (open) (large open incision) | 36 | 0.00% | RD | 0.00(0.00,0.00) | Not Significant (P-value>.05) |
| Ferdinand,R.D., 2002 | Moderate Quality | Symptom relief (general)( ) | 1 years | CT release (endoscopic) (single portal endoscopic release) | 25 | . % | CT release (open) (traditional open release) | 25 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Tian,Y., 2007 | Moderate Quality | Symptom relief (general)(Patient satisfaction: excellent to good) | 2 years | CT release (endoscopic) (one-portal endoscopics release) | 30 | 93.33% | CT release (open) (traditional open release) | 32 | 90.63% | RR | 1.03(0.89,1.19) | Not Significant (P-value>.05) |

*TABLE 148: PICO 7 PART 2- MINI: COMPLICATIONS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cresswell,T.R., 2008 | High Quality | Complications (general)(Rate of complications) | 3 months | CT release (open) (Standard limited open palmer release) | 100 | 2.00% | CT release (mini-Indiana Tome) (Indiana Tome) | 95 | 9.47% | RR | 0.21(0.05,0.95) | **CT release (open) (Standard limited open palmer release)**<br>**(P-value<.05)** |
| Cresswell,T.R., 2008 | High Quality | Symptom occurrence (scar tenderness)( ) | 3 months | CT release (open) (Standard limited open palmer release) | 88 | 1.9(.) | CT release (mini-Indiana Tome) (Indiana Tome) | 88 | 1.7(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Jugovac,I., 2002 | High Quality | Symptom occurrence (scar tenderness)(Tenderness) | 3 months | CT release (open) (Traditional technique) | 36 | 22.22% | CT release (mini-limited incision) (limited palmer incision) | 36 | 8.33% | RR | 2.67(0.77,9.25) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Symptom occurrence (pillar pain)( ) | 3 months | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Symptom occurrence (pillar pain)( ) | 5.5 months | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Yucetas,S.C., 2013 | High Quality | Complications (general)(Complications or reoperation within 6 months) | 5.9 months | CT release (open) (Standard open CTR) | 37 | 18.92% | CT release (mini-open KnifeLight) (mini open KnifeLight instrument assisted) | 38 | 5.26% | RR | 3.59(0.80,16.19) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Faraj,A.A., 2012 | Moderate Quality | Symptom occurrence (scar length)(Length of scar (cm)) | 3 months | CT release (open) (traditional open release) | 20 | 5.15(0.26) | CT release (mini) (mini-transverse wrist incisions) | 20 | 1.4(0.17) | Mean Difference | 3.75(3.61,3.886145) | **CT release (mini) (mini-transverse wrist incisions) (P-value<.05)** |
| Ucar,B.Y., 2012 | Moderate Quality | Symptom occurrence (scar pain)( ) | 2.5 years | CT release (Mini-incision distal to flexor crease (group 1)) (2cm longitudinal incision made distal to flexor crease) | 45 | 24.44% | CT release (Mini-incision proximal to flexor crease (group 2)) (2cm longitudinal incision made proximal to flexor crease) | 45 | 6.67% | RR | 3.67(1.10,12.27) | **CT release (Mini-incision proximal to flexor crease (group 2)) (2cm longitudinal incision made proximal to flexor crease) (P-value<.05)** |

*TABLE 149: PICO 7 PART 2- MINI: FUNCTION*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cellocco,P., 2005 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)-Italian modified version) | 1.6 years | CT release (open-limited open) (limited open CTR) | 123 | 2.53(.) | CT release (mini-open blind technique) (mini-open blind technique) | 99 | 2.02(.) | Author Reported | NA | **CT release (mini-open blind technique) (mini-open blind technique)**<br>**(P-value<.05)** |
| Cellocco,P., 2005 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)-Italian modified version) | 2.5 years | CT release (open-limited open) (limited open CTR) | 123 | 1.73(.) | CT release (mini-open blind technique) (mini-open blind technique) | 99 | 1.87(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Cellocco,P., 2005 | High Quality | Two-point discrimination(Millimeters) | 2.5 years | CT release (open-limited open) (limited open CTR) | 123 | 4.3(.) | CT release (mini-open blind technique) (mini-open blind technique) | 99 | 4.7(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Cellocco,P., 2009 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)-Italian modified version) | 1.6 years | CT release (open) (3-4cm long limited-open palmar incision) | 123 | 2.05(0.82) | CT release (mini-knifelight) (Knifelight surgery) | 99 | 3.85(0.75) | Mean Difference | -1.8(-2.01,-1.59305) | **CT release (open) (3-4cm long limited-open palmar incision)**<br>**(P-value<.05)** |
| Cellocco,P., 2009 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)-Italian modified version) | 2.5 years | CT release (open) (3-4cm long limited-open palmar incision) | 123 | 1.39(0.72) | CT release (mini-knifelight) (Knifelight surgery) | 99 | 1.28(0.52) | Mean Difference | 0.11(-0.05,0.273351) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cellocco,P., 2009 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)-Italian modified version) | 4.9 years | CT release (open) (3-4cm long limited-open palmar incision) | 123 | 1.38(0.83) | CT release (mini-knifelight) (Knifelight surgery) | 99 | 1.33(0.64) | Mean Difference | 0.05(-0.14,0.243417) | Not Significant (P-value>.05) |
| Cellocco,P., 2009 | High Quality | Two-point discrimination(Millimeters) | 4.9 years | CT release (open) (3-4cm long limited-open palmar incision) | 99 | 4.5(.) | CT release (mini-knifelight) (Knifelight surgery) | 99 | 4.6(.) | Author Reported | NA | **CT release (mini-knifelight) (Knifelight surgery) (P-value<.05)** |
| Cresswell,T. R., 2008 | High Quality | Grip strength(Percentage of pre-op value) | 3 months | CT release (open) (Standard limited open palmer release) | 88 | . % | CT release (mini-Indiana Tome) (Indiana Tome) | 88 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Cresswell,T. R., 2008 | High Quality | Pinch Strength(% improvement from baseline (units not reported)) | 3 months | CT release (open) (Standard limited open palmer release) | 88 | . % | CT release (mini-Indiana Tome) (Indiana Tome) | 88 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Jugovac,I., 2002 | High Quality | NCS (DML)(Distal motor latency (ms)) | 3 months | CT release (open) (Traditional technique) | 36 | 4.08(0.80) | CT release (mini-limited incision) (limited palmer incision) | 36 | 4.12(0.90) | Mean Difference | -0.04(-0.43,0.353358) | Not Significant (P-value>.05) |
| Jugovac,I., 2002 | High Quality | NCS (SNCV)(Sensory nerve conduction velocity (m/s)) | 3 months | CT release (open) (Traditional technique) | 36 | 43.67(9.00) | CT release (mini-limited incision) (limited palmer incision) | 36 | 41.86(8.50) | Mean Difference | 1.81(-2.23,5.853943) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Grip strength(Percentage of contralateral hand) | 3 months | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | **CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Grip strength(Percentage of contralateral hand) | 5.5 months | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Range of motion( ) | 3 months | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Range of motion( ) | 5.5 months | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Suppaphol,S., 2012 | High Quality | Grip strength(Pounds) | 3 months | CT release (open) (Standard open carpal tunnel release) | 15 | 55.67(6.51) | CT release (mini) (Limited open carpal tunnel release direct vision and tunneling technique; 1.5 cm incision is made over the distal edge of transverse carpal ligament) | 15 | 62.67(5.62) | Mean Difference | -7(-11.35,-2.64766) | **CT release (mini) (Limited open carpal tunnel release direct vision and tunneling technique; 1.5 cm incision is made over the distal edge of transverse carpal ligament) (P-value<.05)** |
| Suppaphol,S., 2012 | High Quality | Pinch Strength(Pounds) | 3 months | CT release (open) (Standard open carpal tunnel release) | 15 | 12.47(1.55) | CT release (mini) (Limited open carpal tunnel release direct vision and tunneling technique; 1.5 cm incision is made over the distal edge of transverse carpal ligament) | 15 | 13.6(1.84) | Mean Difference | -1.13(-2.35,0.087526) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Suppaphol,S., 2012 | High Quality | Questionnaire (Levine-FSS)(Levine's functional score) | 3 months | CT release (open) (Standard open carpal tunnel release) | 15 | 1.45(0.50) | CT release (mini) (Limited open carpal tunnel release direct vision and tunneling technique; 1.5 cm incision is made over the distal edge of transverse carpal ligament) | 15 | 1.28(0.31) | Mean Difference | 0.17(-0.13,0.467722) | Not Significant (P-value>.05) |
| Suppaphol,S., 2012 | High Quality | Two-point discrimination(Millimeters) | 3 months | CT release (open) (Standard open carpal tunnel release) | 15 | 2.63(0.69) | CT release (mini) (Limited open carpal tunnel release direct vision and tunneling technique; 1.5 cm incision is made over the distal edge of transverse carpal ligament) | 15 | 2.75(0.62) | Mean Difference | -0.12(-0.59,0.349446) | Not Significant (P-value>.05) |
| Yucetas,S.C., 2013 | High Quality | NCS (EMG)( Electromyographical motor latency (ms)) | 3 months | CT release (open) (Standard open CTR) | 37 | 3.73(0.26) | CT release (mini-open KnifeLight) (mini open KnifeLight instrument assisted) | 38 | 3.67(0.30) | Mean Difference | 0.06(-0.07,0.186953) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yucetas,S.C., 2013 | High Quality | NCS (EMG)(Electromyographical motor latency (ms)) | 5.9 months | CT release (open) (Standard open CTR) | 37 | 3.75(0.26) | CT release (mini-open KnifeLight) (mini open KnifeLight instrument assisted) | 38 | 3.65(0.30) | Mean Difference | 0.1(-0.03,0.226953) | Not Significant (P-value>.05) |
| Yucetas,S.C., 2013 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 3 months | CT release (open) (Standard open CTR) | 37 | 2.22(0.63) | CT release (mini-open KnifeLight) (mini open KnifeLight instrument assisted) | 38 | 2.15(0.56) | Mean Difference | 0.07(-0.20,0.340022) | Not Significant (P-value>.05) |
| Yucetas,S.C., 2013 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 5.9 months | CT release (open) (Standard open CTR) | 37 | 2.22(0.62) | CT release (mini-open KnifeLight) (mini open KnifeLight instrument assisted) | 38 | 2.15(0.56) | Mean Difference | 0.07(-0.20,0.337608) | Not Significant (P-value>.05) |
| Zyluk,A., 2006 | High Quality | Grip strength(Kilograms) | 3 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | . % | CT release (mini-single incision) (Mini-open single incision release) | 40 | . % | Author Reported | NA | **CT release (mini-single incision) (Mini-open single incision release)**<br>**(P-value<.05)** |
| Zyluk,A., 2006 | High Quality | Grip strength(Kilograms) | 5.9 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | . % | CT release (mini-single incision) (Mini-open single incision release) | 40 | . % | Author Reported | NA | **CT release (mini-single incision) (Mini-open single incision release)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zyluk,A., 2006 | High Quality | Grip strength(Kilograms) | 11.8 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | . % | CT release (mini-single incision) (Mini-open single incision release) | 40 | . % | Author Reported | NA | **CT release (mini-single incision) (Mini-open single incision release)**<br>**(P-value<.05)** |
| Zyluk,A., 2006 | High Quality | Key pinch strength(Kilograms) | 3 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | . % | CT release (mini-single incision) (Mini-open single incision release) | 40 | . % | Author Reported | NA | **CT release (mini-single incision) (Mini-open single incision release)**<br>**(P-value<.05)** |
| Zyluk,A., 2006 | High Quality | Key pinch strength(Kilograms) | 5.9 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | . % | CT release (mini-single incision) (Mini-open single incision release) | 40 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Zyluk,A., 2006 | High Quality | Key pinch strength(Kilograms) | 11.8 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | . % | CT release (mini-single incision) (Mini-open single incision release) | 40 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zyluk,A., 2006 | High Quality | Pinch Strength (three-point pinch)(Kilograms) | 3 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | . % | CT release (mini-single incision) (Mini-open single incision release) | 40 | . % | Author Reported | NA | **CT release (mini-single incision) (Mini-open single incision release)**<br>**(P-value<.05)** |
| Zyluk,A., 2006 | High Quality | Pinch Strength (three-point pinch)(Kilograms) | 5.9 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | . % | CT release (mini-single incision) (Mini-open single incision release) | 40 | . % | Author Reported | NA | **CT release (mini-single incision) (Mini-open single incision release)**<br>**(P-value<.05)** |
| Zyluk,A., 2006 | High Quality | Pinch Strength (three-point pinch)(Kilograms) | 11.8 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | . % | CT release (mini-single incision) (Mini-open single incision release) | 40 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Zyluk,A., 2006 | High Quality | Pinch Strength (two-point pinch)(Kilograms) | 3 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | . % | CT release (mini-single incision) (Mini-open single incision release) | 40 | . % | Author Reported | NA | **CT release (mini-single incision) (Mini-open single incision release)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zyluk,A., 2006 | High Quality | Pinch Strength (two-point pinch)(Kilograms) | 5.9 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | . % | CT release (mini-single incision) (Mini-open single incision release) | 40 | . % | Author Reported | NA | **CT release (mini-single incision) (Mini-open single incision release)**<br>**(P-value<.05)** |
| Zyluk,A., 2006 | High Quality | Pinch Strength (two-point pinch)(Kilograms) | 11.8 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | . % | CT release (mini-single incision) (Mini-open single incision release) | 40 | . % | Author Reported | NA | **CT release (mini-single incision) (Mini-open single incision release)**<br>**(P-value<.05)** |
| Zyluk,A., 2006 | High Quality | Questionnaire (Levine-FSS)( ) | 11.8 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | 1.2(.) | CT release (mini-single incision) (Mini-open single incision release) | 40 | 1.2(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Zyluk,A., 2006 | High Quality | Semmes Weinstein Monofilaments Test (SW test)( ) | 11.8 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | 1.4(.) | CT release (mini-single incision) (Mini-open single incision release) | 40 | 1.3(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zyluk,A., 2006 | High Quality | Two-point discrimination(Millimeters) | 11.8 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | 1.3(.) | CT release (mini-single incision) (Mini-open single incision release) | 40 | 1.2(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Phalen's test score(% positive) | 3.9 months | CT release (open) (large open incision) | 36 | 13.89% | CT release (mini) (Mini palmer incision) | 28 | 10.71% | RR | 1.26(0.33,4.84) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Tinel's Sign/Test(# positive) | 3.9 months | CT release (open) (large open incision) | 36 | 19.44% | CT release (mini) (Mini palmer incision) | 28 | 10.71% | RR | 1.81(0.52,6.39) | Not Significant (P-value>.05) |
| Capa-Grasa,A., 2014 | Moderate Quality | Grip strength(Grip strength rate (units not reported)) | 3 months | CT release (mini-open) (Mini-OCTR respectively performed through a 1 mm or a 2 cm incision.) | 20 | 86.17(5.50) | CT release (Ultra-minimally invasive) (Sonographically guided technique for ultra-minimally-invasive (Ultra-MIS) CT release 1 mm or cm incision) | 20 | 87.22(4.76) | Mean Difference | -1.05(-4.24,2.137866) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Capa-Grasa,A., 2014 | Moderate Quality | Questionnaire (DASH-Quick DASH)( ) | 3 months | CT release (mini-open) (Mini-OCTR respectively performed through a 1 mm or a 2 cm incision.) | 20 | 14.54(3.12) | CT release (Ultra-minimally invasive) (Sonographically guided technique for ultra-minimally-invasive (Ultra-MIS) CT release 1 mm or cm incision) | 20 | 7.39(1.84) | Mean Difference | 7.15(5.56,8.737479) | **CT release (Ultra-minimally invasive) (Sonographically guided technique for ultra-minimally-invasive (Ultra-MIS) CT release 1 mm or cm incision)**<br>**(P-value<.05)** |
| Elsharif,M., 2014 | Moderate Quality | Questionnaire (DASH-Quick DASH)( ) | 10 years | CT release (open) ( ) | . | 34.1(23.27) | CT release (knifelight) ( ) | . | 13.22(13.62) | Mean Difference | 20.88(.,) | **CT release (knifelight)**<br>**(P-value<.05)** |
| Faraj,A.A., 2012 | Moderate Quality | NCS (DML)(Distal motor latency (ms)) | 3 months | CT release (open) (traditional open release) | 20 | 4.08(0.80) | CT release (mini) (mini-transverse wrist incisions) | 20 | 4.6(0.90) | Mean Difference | -0.52(-1.05,0.007746) | Not Significant (P-value>.05) |
| Faraj,A.A., 2012 | Moderate Quality | NCS (SNCV)(Sensory nerve conduction velocity (m/s)) | 3 months | CT release (open) (traditional open release) | 20 | 44.6(7.50) | CT release (mini) (mini-transverse wrist incisions) | 20 | 42.52(8.70) | Mean Difference | 2.08(-2.95,7.114186) | Not Significant (P-value>.05) |
| Tarallo,M., 2014 | Moderate Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 5.9 months | CT release (open) (Traditional) | 60 | 2.3(0.60) | CT release (mini) (2 cm long incision) | 60 | 1.4(0.40) | Mean Difference | 0.9(0.72,1.082466) | **CT release (mini) (2 cm long incision)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tarallo,M., 2014 | Moderate Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 11.8 months | CT release (open) (Traditional) | 60 | 1.5(0.20) | CT release (mini) (2 cm long incision) | 60 | 1.1(0.10) | Mean Difference | 0.4(0.34,0.456580) | **CT release (mini) (2 cm long incision)**<br>**(P-value<.05)** |
| Tarallo,M., 2014 | Moderate Quality | Two-point discrimination (2PD)() | 11.8 months | CT release (open) (Traditional) | 60 | . % | CT release (mini) (2 cm long incision) | 60 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Ucar,B.Y., 2012 | Moderate Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 2.5 years | CT release (Mini-incision distal to flexor crease (group 1)) (2cm longitudinal incision made distal to flexor crease) | 45 | 2.16(0.68) | CT release (Mini-incision proximal to flexor crease (group 2)) (2cm longitudinal incision made proximal to flexor crease) | 45 | 2.21(0.73) | Mean Difference | -0.05(-0.34,0.241492) | Not Significant (P-value>.05) |

*TABLE 150: PICO 7 PART 2- MINI: OTHER*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cellocco,P., 2005 | High Quality | Patient satisfaction (general)(Patients satisfied results at final follow-up) | 2.5 years | CT release (open-limited open) (limited open CTR) | 123 | 74.80% | CT release (mini-open blind technique) (mini-open blind technique) | 99 | 100.00% | RR | .(.,.) | **CT release (mini-open blind technique) (mini-open blind technique) (P-value<.05)** |
| Cellocco,P., 2009 | High Quality | Patient satisfaction (general)(Subjective satisfaction with their scar) | 2.5 years | CT release (open) (3-4cm long limited-open palmar incision) | 96 | 85.42% | CT release (mini-knifelight) (Knifelight surgery) | 99 | 77.78% | RR | 1.10(0.96,1.26) | Not Significant (P-value>.05) |
| Cellocco,P., 2009 | High Quality | Patient satisfaction (general)(Subjective satisfaction with their scar) | 4.9 years | CT release (open) (3-4cm long limited-open palmar incision) | 95 | 85.26% | CT release (mini-knifelight) (Knifelight surgery) | 99 | 100.00% | RR | .(.,.) | **CT release (mini-knifelight) (Knifelight surgery)**<br>**(P-value<.05)** |
| Faraj,A.A., 2012 | Moderate Quality | Patient satisfaction (general)(Satisfaction of patients with postoperative symptomatic relieve: Good) | 3 months | CT release (open) (traditional open release) | 20 | 80.00% | CT release (mini) (mini-transverse wrist incisions) | 20 | 60.00% | RR | 1.33(0.88,2.03) | Not Significant (P-value>.05) |
| Tarallo,M., 2014 | Moderate Quality | Questionnaire/Scale (Vancouver scale)(Patient satisfaction with scar - Good) | 11.8 months | CT release (open) (Traditional) | 60 | 30.00% | CT release (mini) (2 cm long incision) | 60 | 53.33% | RR | 0.56(0.36,0.89) | **CT release (mini) (2 cm long incision)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tarallo,M., 2014 | Moderate Quality | Questionnaire/Scale (Vancouver scale)(Patient satisfaction with scar - Satisfactory) | 11.8 months | CT release (open) (Traditional) | 60 | 36.67% | CT release (mini) (2 cm long incision) | 60 | 3.33% | RR | 11.00(2.71,44.72) | **CT release (mini) (2 cm long incision)**<br>**(P-value<.05)** |
| Tarallo,M., 2014 | Moderate Quality | Questionnaire/Scale (Vancouver scale)(Patient satisfaction with scar - Unsatisfactory) | 11.8 months | CT release (open) (Traditional) | 60 | 26.67% | CT release (mini) (2 cm long incision) | 60 | 3.33% | RR | 8.00(1.92,33.29) | **CT release (mini) (2 cm long incision)**<br>**(P-value<.05)** |
| Tarallo,M., 2014 | Moderate Quality | Questionnaire/Scale (Vancouver scale)(Patient satisfaction with scar - Very good) | 11.8 months | CT release (open) (Traditional) | 60 | 6.67% | CT release (mini) (2 cm long incision) | 60 | 40.00% | RR | 0.17(0.06,0.45) | **CT release (mini) (2 cm long incision)**<br>**(P-value<.05)** |

*TABLE 151: PICO 7 PART 2- MINI: PAIN*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cresswell,T.R., 2008 | High Quality | Questionnaire/Scale (VAS-pain)(visual analogue scale of 0 to 10) | 3 months | CT release (open) (Standard limited open palmer release) | 88 | 2(.) | CT release (mini-Indiana Tome) (Indiana Tome) | 88 | 1.9(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Larsen,M.B., 2013 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 3 months | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 5.5 months | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Yucetas,S.C., 2013 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 3 months | CT release (open) (Standard open CTR) | 37 | 3.35(1.74) | CT release (mini-open KnifeLight) (mini open KnifeLight instrument assisted) | 38 | 3.11(1.80) | Mean Difference | 0.24(-0.56,1.041182) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yucetas,S.C., 2013 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 5.9 months | CT release (open) (Standard open CTR) | 37 | 3.16(1.48) | CT release (mini-open KnifeLight) (mini open KnifeLight instrument assisted) | 38 | 2.84(1.53) | Mean Difference | 0.32(-0.36,1.001230) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (general)(Night pain) | 3.9 months | CT release (open) (large open incision) | 36 | 0.00% | CT release (mini) (Mini palmer incision) | 28 | 0.00% | RD | 0.00(0.00,0.00) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (general)(Wrist pain) | 3.9 months | CT release (open) (large open incision) | 36 | 0.00% | CT release (mini) (Mini palmer incision) | 28 | 14.29% | RD | -0.14(-0.27,-0.01) | **CT release (open) (large open incision)**<br>**(P-value<.05)** |

*TABLE 152: PICO 7 PART 2- MINI: QUALITY OF LIFE*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cellocco,P., 2009 | High Quality | Return to Work( ) | 4.9 years | CT release (open) (3-4cm long limited-open palmar incision) | . | . % | CT release (mini-knifelight) (Knifelight surgery) | 99 | . % | Author Reported | NA | **CT release (mini-knifelight) (Knifelight surgery) (P-value<.05)** |
| Jugovac,I., 2002 | High Quality | Return to Normal Activities(Return to daily activities days) | 3 months | CT release (open) (Traditional technique) | 36 | 86.11% | CT release (mini-limited incision) (limited palmer incision) | 36 | . % | RR | .(.,.) | **CT release (open) (Traditional technique) (P-value<.05)** |
| Jugovac,I., 2002 | High Quality | Return to Work(Return to work days) | 3 months | CT release (open) (Traditional technique) | 36 | . % | CT release (mini-limited incision) (limited palmer incision) | 36 | . % | Author Reported | NA | **CT release (mini-limited incision) (limited palmer incision) (P-value<.05)** |
| Faraj,A.A., 2012 | Moderate Quality | Return to Normal Activities(Days) | 3 months | CT release (open) (traditional open release) | 20 | 12.55(4.03) | CT release (mini) (mini-transverse wrist incisions) | 20 | 3.95(1.82) | Mean Difference | 8.6(6.66,10.53798) | **CT release (mini) (mini-transverse wrist incisions) (P-value<.05)** |

*TABLE 153: PICO 7 PART 2- MINI: SYMPTOMS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cellocco,P., 2005 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)-Italian modified version) | 1.6 years | CT release (open-limited open) (limited open CTR) | 123 | 2.04(.) | CT release (mini-open blind technique) (mini-open blind technique) | 99 | 1.46(.) | Author Reported | NA | **CT release (mini-open blind technique) (mini-open blind technique) (P-value<.05)** |
| Cellocco,P., 2005 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)-Italian modified version) | 2.5 years | CT release (open-limited open) (limited open CTR) | 123 | 1.39(.) | CT release (mini-open blind technique) (mini-open blind technique) | 99 | 1.28(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Cellocco,P., 2009 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)-Italian modified version) | 1.6 years | CT release (open) (3-4cm long limited-open palmar incision) | 123 | 2.54(0.88) | CT release (mini-knifelight) (Knifelight surgery) | 99 | 2.02(0.82) | Mean Difference | 0.52(0.30,0.744228) | **CT release (mini-knifelight) (Knifelight surgery) (P-value<.05)** |
| Cellocco,P., 2009 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)-Italian modified version) | 2.5 years | CT release (open) (3-4cm long limited-open palmar incision) | 123 | 1.73(0.83) | CT release (mini-knifelight) (Knifelight surgery) | 99 | 1.88(0.75) | Mean Difference | -0.15(-0.36,0.058190) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cellocco,P., 2009 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)-Italian modified version) | 4.9 years | CT release (open) (3-4cm long limited-open palmar incision) | 123 | 1.75(0.97) | CT release (mini-knifelight) (Knifelight surgery) | 99 | 1.8(0.78) | Mean Difference | -0.05(-0.28,0.180206) | Not Significant (P-value>.05) |
| Cellocco,P., 2009 | High Quality | Symptom recurrence (general)(Recurrent CTS) | 4.9 years | CT release (open) (3-4cm long limited-open palmar incision) | 123 | 3.25% | CT release (mini-knifelight) (Knifelight surgery) | 99 | 6.06% | RR | 0.54(0.16,1.85) | Not Significant (P-value>.05) |
| Cresswell,T.R., 2008 | High Quality | Questionnaire (Levine-SSS)( ) | 3 months | CT release (open) (Standard limited open palmer release) | 88 | 17.1(.) | CT release (mini-Indiana Tome) (Indiana Tome) | 88 | 18.5(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Cresswell,T.R., 2008 | High Quality | Questionnaire (Levine-SSS)( ) | 7 years | CT release (open) (Standard limited open palmer release) | 62 | 13(.) | CT release (mini-Indiana Tome) (Indiana Tome) | 53 | 16(.) | Author Reported | NA | **CT release (mini-Indiana Tome) (Indiana Tome) (P-value<.05)** |
| Jugovac,I., 2002 | High Quality | Symptom relief (general)(Complete symptomatic relief after the procedure) | 3 months | CT release (open) (Traditional technique) | 36 | 86.11% | CT release (mini-limited incision) (limited palmer incision) | 36 | 86.11% | RR | 1.00(0.83,1.20) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Paresthesia(Paresthesia (VAS scale)) | 3 months | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Larsen,M.B., 2013 | High Quality | Paresthesia(Paresthesia (VAS scale)) | 5.5 months | CT release (open) (7 cm curved incision just ulnar to the thenar crease and angulated over the flexion crease of the wrist in order to release the flexor retinaculum and antebrachial fascia under direct vision) | 30 | . % | CT release (mini) (Short incision: an incision of 3 cm in the mid-palm distal to the flexion crease of the wrist in order to release the distal portion of the flexor retinaculum under direct vision, and the proximal portion of the flexor retinaculum and antebrachial fascia were then carefully divided using scissor dissection in a plane deep to subcutaneous fat and skin) | 30 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Suppaphol,S., 2012 | High Quality | Questionnaire (Levine-SSS)(Levine's symptom severity score) | 3 months | CT release (open) (Standard open carpal tunnel release) | 15 | 1.23(0.50) | CT release (mini) (Limited open carpal tunnel release direct vision and tunneling technique; 1.5 cm incision is made over the distal edge of transverse carpal ligament) | 15 | 1.17(0.17) | Mean Difference | 0.06(-0.21,0.327260) | Not Significant (P-value>.05) |
| Yucetas,S.C., 2013 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 3 months | CT release (open) (Standard open CTR) | 37 | 1.89(0.33) | CT release (mini-open KnifeLight) (mini open KnifeLight instrument assisted) | 38 | 1.95(0.42) | Mean Difference | -0.06(-0.23,0.110704) | Not Significant (P-value>.05) |
| Yucetas,S.C., 2013 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 5.9 months | CT release (open) (Standard open CTR) | 37 | 1.87(0.35) | CT release (mini-open KnifeLight) (mini open KnifeLight instrument assisted) | 38 | 1.95(0.41) | Mean Difference | -0.08(-0.25,0.092374) | Not Significant (P-value>.05) |

| **Reference Title** | **Quality** | **Outcome Details** | **Duration** | **Treatment 1 (Details)** | **Group 1 N** | **Mean1/P1 (SD1)** | **Treatment 2 (Details)** | **Group 2 N** | **Mean2/P2 (SD2)** | **Effect Measure** | **Result (95% CI)** | **Favored Treatment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zyluk,A., 2006 | High Quality | Questionnaire (Levine-SSS)( ) | 11.8 months | CT release (mini-double incision) (Mini-open double incision release) | 33 | 1.2(.) | CT release (mini-single incision) (Mini-open single incision release) | 40 | 1.1(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (general)(Stiffness) | 3.9 months | CT release (open) (large open incision) | 36 | 5.56% | CT release (mini) (Mini palmer incision) | 28 | 0.00% | RD | 0.06(-0.02,0.13) | Not Significant (P-value>.05) |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (general)(Weakness) | 3.9 months | CT release (open) (large open incision) | 36 | 11.11% | CT release (mini) (Mini palmer incision) | 28 | 0.00% | RD | 0.11(0.01,0.21) | **CT release (mini) (Mini palmer incision) (P-value<.05)** |
| Aslani,H.R., 2012 | Moderate Quality | Symptom recurrence (numbness)(Numbness) | 3.9 months | CT release (open) (large open incision) | 36 | 0.00% | CT release (mini) (Mini palmer incision) | 28 | 0.00% | RD | 0.00(0.00,0.00) | Not Significant (P-value>.05) |
| Tarallo,M., 2014 | Moderate Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 5.9 months | CT release (open) (Traditional) | 60 | 2.7(0.60) | CT release (mini) (2 cm long incision) | 60 | 1.4(0.30) | Mean Difference | 1.3(1.13,1.469740) | **CT release (mini) (2 cm long incision) (P-value<.05)** |
| Tarallo,M., 2014 | Moderate Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 11.8 months | CT release (open) (Traditional) | 60 | 1.6(0.40) | CT release (mini) (2 cm long incision) | 60 | 1.1(0.10) | Mean Difference | 0.5(0.40,0.604328) | **CT release (mini) (2 cm long incision) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ucar,B.Y., 2012 | Moderate Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 2.5 years | CT release (Mini-incision distal to flexor crease (group 1)) (2cm longitudinal incision made distal to flexor crease) | 45 | 2.42(0.75) | CT release (Mini-incision proximal to flexor crease (group 2)) (2cm longitudinal incision made proximal to flexor crease) | 45 | 2.66(0.74) | Mean Difference | -0.24(-0.55,0.067844) | Not Significant (P-value>.05) |

*TABLE 154: PICO 7 PART 3- OPEN: COMPLICATIONS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Castillo,T.N., 2014 | High Quality | Symptom occurrence (pillar pain)( ) | 5.9 months | CT release (open-single incision) (Open single incision CTR) | 13 | . % | CT release (open-double incision) (Two-incision CTR) | 11 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Castillo,T.N., 2014 | High Quality | Symptom occurrence (pillar pain)( ) | 5.9 months | CT release (open-double incision) (Two-incision CTR) | 11 | . % | CT release (open-single incision) (Open single incision CTR) | 13 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Castillo,T.N., 2014 | High Quality | Symptom occurrence (scar tenderness)( ) | 5.9 months | CT release (open-single incision) (Open single incision CTR) | 13 | . % | CT release (open-double incision) (Two-incision CTR) | 11 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Castillo,T.N., 2014 | High Quality | Symptom occurrence (scar tenderness)( ) | 5.9 months | CT release (open-double incision) (Two-incision CTR) | 11 | . % | CT release (open-single incision) (Open single incision CTR) | 13 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Hamed,A.R., 2009 | High Quality | Symptom occurrence (pillar pain)( ) | 3 months | CT release (open-double incision) (Open double-incision technique) | 19 | 21.05% | CT release (open-single incision) (Standard single-incision technique) | 21 | 57.14% | RR | 0.37(0.14,0.95) | **CT release (open-double incision) (Open double-incision technique) (P-value<.05)** |
| Hamed,A.R., 2009 | High Quality | Symptom occurrence (pillar pain)( ) | 5.9 months | CT release (open-double incision) (Open double-incision technique) | 19 | 5.26% | CT release (open-single incision) (Standard single-incision technique) | 21 | 38.10% | RR | 0.14(0.02,1.00) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hamed,A.R., 2009 | High Quality | Symptom occurrence (scar tenderness)( ) | 3 months | CT release (open-double incision) (Open double-incision technique) | 19 | 10.53% | CT release (open-single incision) (Standard single-incision technique) | 21 | 47.62% | RR | 0.22(0.06,0.88) | **CT release (open-double incision) (Open double-incision technique) (P-value<.05)** |
| Hamed,A.R., 2009 | High Quality | Symptom occurrence (scar tenderness)( ) | 5.9 months | CT release (open-double incision) (Open double-incision technique) | 19 | 5.26% | CT release (open-single incision) (Standard single-incision technique) | 21 | 23.81% | RR | 0.22(0.03,1.73) | Not Significant (P-value>.05) |

*TABLE 155: PICO 7 PART 3- OPEN: OTHER QUESTIONNAIRE*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Castillo,T.N., 2014 | High Quality | Questionnaire (DASH)( ) | 5.9 months | CT release (open-double incision) (Two-incision CTR) | 11 | 13.5(22.46) | CT release (open-single incision) (Open single incision CTR) | 13 | 13.22(20.63) | Mean Difference | 0.28(-17.10,17.65642) | Not Significant (P-value>.05) |

*TABLE 156: PICO 7 PART 3- OPEN: FUNCTION*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Castillo,T.N., 2014 | High Quality | Grip strength(Pounds) | 5.9 months | CT release (open-double incision) (Two-incision CTR) | 11 | 43.6(14.15) | CT release (open-single incision) (Open single incision CTR) | 13 | 42.81(22.15) | Mean Difference | 0.79(-13.87,15.44973) | Not Significant (P-value>.05) |
| Castillo,T.N., 2014 | High Quality | Pinch Strength(Pounds) | 5.9 months | CT release (open-double incision) (Two-incision CTR) | 11 | 16.6(3.27) | CT release (open-single incision) (Open single incision CTR) | 13 | 12.25(6.04) | Mean Difference | 4.35(0.54,8.159848) | **CT release (open-double incision) (Two-incision CTR) (P-value<.05)** |
| Castillo,T.N., 2014 | High Quality | Questionnaire (BWCTQ-FSS)( ) | 5.9 months | CT release (open-double incision) (Two-incision CTR) | 11 | 1.6(0.87) | CT release (open-single incision) (Open single incision CTR) | 13 | 1.57(0.88) | Mean Difference | 0.03(-0.67,0.732266) | Not Significant (P-value>.05) |
| Hamed,A.R., 2009 | High Quality | Grip strength(Pounds) | 3 months | CT release (open-double incision) (Open double-incision technique) | 19 | 65(12.00) | CT release (open-single incision) (Standard single-incision technique) | 21 | 61(10.00) | Mean Difference | 4(-2.89,10.88539) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hamed,A.R., 2009 | High Quality | Grip strength(Pounds) | 5.9 months | CT release (open-double incision) (Open double-incision technique) | 19 | 70(16.00) | CT release (open-single incision) (Standard single-incision technique) | 21 | 65(16.00) | Mean Difference | 5(-4.93,14.92932) | Not Significant (P-value>.05) |

*TABLE 157: PICO 7 PART 3- OPEN: SYMPTOMS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Castillo,T.N., 2014 | High Quality | Questionnaire (BWCTQ-SSS)( ) | 5.9 months | CT release (open-double incision) (Two-incision CTR) | 11 | 1.33(0.53) | CT release (open-single incision) (Open single incision CTR) | 13 | 1.33(0.36) | Mean Difference | 0(-0.37,0.369321) | Not Significant (P-value>.05) |

*TABLE 158: PICO 7 PART 4- SURGICAL VERSUS CONSERVATIVE: COMPLICATIONS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gerritsen,A.A., 2002 | High Quality | Complications (general)(Discomfort caused by splint) | 1.5 years | Open CTR (traditional open release) | 68 | 0.00% | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 7.59% | RD | -0.08(-0.13,-0.02) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A.A., 2002 | High Quality | Complications (general)(Overall) | 1.5 years | Open CTR (traditional open release) | 68 | 85.29% | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 58.23% | RR | 1.46(1.19,1.81) | **Splinting (instructed to wear splint during the night for 6 weeks)**<br>**(P-value<.05)** |
| Gerritsen,A.A., 2002 | High Quality | Complications (general)(Reflex sympathetic dystrophy) | 1.5 years | Open CTR (traditional open release) | 68 | 1.47% | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 0.00% | RD | 0.01(-0.01,0.04) | Not Significant (P-value>.05) |
| Gerritsen,A.A., 2002 | High Quality | Complications (general)(Scar pain) | 1.5 years | Open CTR (traditional open release) | 68 | 77.94% | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 25.32% | RR | 3.08(2.07,4.59) | **Splinting (instructed to wear splint during the night for 6 weeks)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gerritsen,A.A., 2002 | High Quality | Complications (general)(skin irritation) | 1.5 years | Open CTR (traditional open release) | 68 | 27.94% | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 10.13% | RR | 2.76(1.29,5.90) | **Splinting (instructed to wear splint during the night for 6 weeks)**<br>**(P-value<.05)** |
| Gerritsen,A.A., 2002 | High Quality | Complications (general)(stiffness of wrist, hands, or fingers) | 1.5 years | Open CTR (traditional open release) | 68 | 35.29% | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 39.24% | RR | 0.90(0.59,1.37) | Not Significant (P-value>.05) |
| Gerritsen,A.A., 2002 | High Quality | Complications (general)(Swelling of the wrist, hand or fingers) | 1.5 years | Open CTR (traditional open release) | 68 | 0.00% | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 5.06% | RD | -0.05(-0.10,-0.00) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A.A., 2002 | High Quality | Complications (hematoma)(wound hematoma) | 1.5 years | Open CTR (traditional open release) | 68 | 14.71% | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 1.27% | RR | 11.62(1.53,88.45) | **Splinting (instructed to wear splint during the night for 6 weeks)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gerritsen,A.A., 2002 | High Quality | Complications (infection)(wound infection) | 1.5 years | Open CTR (traditional open release) | 68 | 7.35% | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 2.53% | RR | 2.90(0.58,14.49) | Not Significant (P-value>.05) |
| Gerritsen,A.A., 2002 | High Quality | Surgery Failure(Success Rate) | 3 months | Open CTR (traditional open release) | 78 | 79.49% | Splinting (instructed to wear splint during the night for 6 weeks) | 86 | 53.49% | RR | 1.49(1.18,1.86) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A.A., 2002 | High Quality | Surgery Failure(Success Rate) | 5.9 months | Open CTR (traditional open release) | 77 | 93.51% | Splinting (instructed to wear splint during the night for 6 weeks) | 84 | 67.86% | RR | 1.38(1.18,1.61) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A.A., 2002 | High Quality | Surgery Failure(Success Rate) | 11.8 months | Open CTR (traditional open release) | 73 | 91.78% | Splinting (instructed to wear splint during the night for 6 weeks) | 83 | 72.29% | RR | 1.27(1.09,1.47) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A.A., 2002 | High Quality | Surgery Failure(Success Rate) | 1.5 years | Open CTR (traditional open release) | 68 | 89.71% | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 74.68% | RR | 1.20(1.03,1.40) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gerritsen,A.A., 2002 | High Quality | Symptom occurrence (pillar pain)(severe pillar pain) | 1.5 years | Open CTR (traditional open release) | 68 | 2.94% | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 0.00% | RD | 0.03(-0.01,0.07) | Not Significant (P-value>.05) |
| Ly,Pen D., 2005 | Moderate Quality | Treatment Failure(<20% VAS score improvement @ 3 months or worsening of symptoms) | 3 months | CT release (mini) (Limited palmar incision technique) | 69 | 2.90% | Steroid (injection) (22-gauge needle used) | 82 | 1.22% | RR | 2.38(0.22,25.66) | Not Significant (P-value>.05) |
| Ly,Pen D., 2005 | Moderate Quality | Treatment Failure(<20% VAS score improvement @ 3 months or worsening of symptoms) | 5.9 months | CT release (mini) (Limited palmar incision technique) | 67 | 4.48% | Steroid (injection) (22-gauge needle used) | 80 | 3.75% | RR | 1.19(0.25,5.72) | Not Significant (P-value>.05) |
| Ly,Pen D., 2005 | Moderate Quality | Treatment Failure(<20% VAS score improvement @ 3 months or worsening of symptoms) | 11.8 months | CT release (mini) (Limited palmar incision technique) | 63 | 3.17% | Steroid (injection) (22-gauge needle used) | 77 | 10.39% | RR | 0.31(0.07,1.39) | Not Significant (P-value>.05) |

*TABLE 159: PICO 7 PART 4- SURGICAL VERSUS CONSERVATIVE: OTHER QUESTIONNAIRE*

| **Reference Title** | **Quality** | **Outcome Details** | **Duration** | **Treatment 1 (Details)** | **Group1 N** | **Mean1/P1 (SD1)** | **Treatment 2 (Details)** | **Group2 N** | **Mean2/P2 (SD2)** | **Effect Measure** | **Result (95% CI)** | **Favored Treatment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jarvik,J.G., 2009 | High Quality | Questionnaire (SF-36)(MCS) | 5.9 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 50 | 47(16.00) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 54 | 47(14.00) | Mean Difference | 0(-5.80,5.797635) | Not Significant (P-value>.05) |
| Jarvik,J.G., 2009 | High Quality | Questionnaire (SF-36)(PCS) | 5.9 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 50 | 39(12.00) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 54 | 47(14.00) | Mean Difference | -8(-13.00,-2.99926) | **No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks)**<br>**(P-value<.05)** |
| Jarvik,J.G., 2009 | High Quality | Questionnaire (SF-36)(MCS) | 11.8 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 49 | 45(15.00) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 52 | 47(15.00) | Mean Difference | -2(-7.85,3.853401) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jarvik,J.G., 2009 | High Quality | Questionnaire (SF-36)(PCS) | 11.8 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 49 | 39(14.00) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 52 | 37(12.00) | Mean Difference | 2(-3.10,7.099478) | Not Significant (P-value>.05) |

*TABLE 160: PICO 7 PART 4- SURGICAL VERSUS CONSERVATIVE: FUNCTION*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gerritsen,A.A., 2002 | High Quality | NCS (DSL)( ) | 11.8 months | Open CTR (traditional open release) | 56 | 1(1.00) | Splinting (instructed to wear splint during the night for 6 weeks) | 59 | 0.7(0.80) | Mean Difference | 0.3(-0.03,0.632071) | Not Significant (P-value>.05) |
| Gerritsen,A.A., 2002 | High Quality | Questionnaire (Levine-FSS)(Functional status scale) | 3 months | Open CTR (traditional open release) | 78 | 0.6(0.90) | Splinting (instructed to wear splint during the night for 6 weeks) | 86 | 0.4(0.70) | Mean Difference | 0.2(-0.05,0.448559) | Not Significant (P-value>.05) |
| Gerritsen,A.A., 2002 | High Quality | Questionnaire (Levine-FSS)(Functional status scale) | 5.9 months | Open CTR (traditional open release) | 77 | 1(0.90) | Splinting (instructed to wear splint during the night for 6 weeks) | 84 | 0.5(0.80) | Mean Difference | 0.5(0.24,0.763971) | **Open CTR (traditional open release) (P-value<.05)** |
| Gerritsen,A.A., 2002 | High Quality | Questionnaire (Levine-FSS)(Functional status scale) | 11.8 months | Open CTR (traditional open release) | 73 | 1(0.90) | Splinting (instructed to wear splint during the night for 6 weeks) | 83 | 0.7(0.80) | Mean Difference | 0.3(0.03,0.568789) | **Open CTR (traditional open release) (P-value<.05)** |
| Gerritsen,A.A., 2002 | High Quality | Questionnaire (Levine-FSS)(Functional status scale) | 1.5 years | Open CTR (traditional open release) | 68 | 0.9(0.90) | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 0.7(0.80) | Mean Difference | 0.2(-0.08,0.477276) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hui,A.C., 2005 | High Quality | Grip strength(Kilograms) | 4.6 months | CT release (open) (traditional open release) | 25 | 21.8(7.90) | No surgery (steroid injection) (15 mg of methylprednisolone acetate injected into carpal tunnel) | 25 | 26.6(7.40) | Mean Difference | -4.8(-9.04,-0.55679) | **No surgery (steroid injection) (15 mg of methylprednisolone acetate injected into carpal tunnel) (P-value<.05)** |
| Hui,A.C., 2005 | High Quality | NCS (DML)(Distal motor latency (ms)) | 4.6 months | CT release (open) (traditional open release) | 25 | 4.2(0.90) | No surgery (steroid injection) (15 mg of methylprednisolone acetate injected into carpal tunnel) | 25 | 4.4(0.90) | Mean Difference | -0.2(-0.70,0.298934) | Not Significant (P-value>.05) |
| Hui,A.C., 2005 | High Quality | NCS (SNCV)(Sensory nerve conduction velocity (m/s)) | 4.6 months | CT release (open) (traditional open release) | 25 | 42.2(8.00) | No surgery (steroid injection) (15 mg of methylprednisolone acetate injected into carpal tunnel) | 25 | 40.5(6.30) | Mean Difference | 1.7(-2.29,5.691668) | Not Significant (P-value>.05) |
| Jarvik,J.G., 2009 | High Quality | Questionnaire (CTSAQ)(Function(1-5)) | 5.9 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 50 | 1.91(0.88) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 54 | 2.44(0.87) | Mean Difference | -0.53(-0.87,-0.19333) | **CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jarvik,J.G., 2009 | High Quality | Questionnaire (CTSAQ)(Function(1 -5)) | 11.8 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 49 | 1.74(0.79) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 52 | 2.17(0.96 ) | Mean Difference | -0.43(-0.77,-0.08792) | **CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference)**<br>**(P-value<.05)** |
| Andreu,J.L. , 2013 | Moderate Quality | NCS(Motor amplitude) | 11.8 months | CT release (open) ( ) | 45 | 8.06(3.80) | No surgery (steroid injection) ( ) | 50 | 9.75(9.62 ) | Mean Difference | -1.69(-4.58,1.198442) | Not Significant (P-value>.05) |
| Andreu,J.L. , 2013 | Moderate Quality | NCS (DML)( ) | 11.8 months | CT release (open) ( ) | 45 | 4.74(1.30) | No surgery (steroid injection) ( ) | 50 | 5.39(1.67 ) | Mean Difference | -0.65(-1.25,-0.05120) | **CT release (open) (P-value<.05)** |
| Andreu,J.L. , 2013 | Moderate Quality | NCS (SA)( ) | 11.8 months | CT release (open) ( ) | 45 | 32.28(17.44 ) | No surgery (steroid injection) ( ) | 50 | 28.72(18.82) | Mean Difference | 3.56(-3.73,10.85236) | Not Significant (P-value>.05) |
| Andreu,J.L. , 2013 | Moderate Quality | NCS( SNCV)( ) | 11.8 months | CT release (open) ( ) | 45 | 43.74(7.64) | No surgery (steroid injection) ( ) | 50 | 36.9(11.74) | Mean Difference | 6.84(2.89,10.78620) | **No surgery (steroid injection)**<br>**(P-value<.05)** |
| Andreu,J.L. , 2013 | Moderate Quality | Questionnaire (General/undefined)( Vsual analog scale of functional impairment (100cm VAS)) | 3 months | CT release (open) ( ) | 67 | 17(23.00) | No surgery (steroid injection) ( ) | 80 | 6(13.00) | Mean Difference | 11(4.80,17.20054) | **No surgery (steroid injection)**<br>**(P-value<.05)** |
| Andreu,J.L. , 2013 | Moderate Quality | Questionnaire (General/undefined)( Vsual analog scale of functional impairment (100cm VAS)) | 5.9 months | CT release (open) ( ) | 63 | 7(15.00) | No surgery (steroid injection) ( ) | 77 | 8(15.00) | Mean Difference | -1(-5.99,3.994542) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Andreu,J.L., 2013 | Moderate Quality | Questionnaire (General/undefined)(Vsual analog scale of functional impairment (100cm VAS)) | 11.8 months | CT release (open) ( ) | 45 | 3(11.00) | No surgery (steroid injection) ( ) | 50 | 9(15.00) | Mean Difference | -6(-11.26,-0.74482) | **CT release (open) (P-value<.05)** |
| Ly-Pen,D., 2012 | Moderate Quality | Questionnaire (General/undefined)(Reached 20% improvement in functional impairment on 100mm VAS scale) | 2 years | CT release (mini) (limited palmar incision) | 80 | 65.00% | No surgery (Steroid injection) (paramethasone acetonide, 20mg in 1 ml) | 83 | 53.01% | RR | 1.23(0.95,1.59) | Not Significant (P-value>.05) |
| Ly-Pen,D., 2012 | Moderate Quality | Questionnaire (General/undefined)(Reached 50% improvement in functional impairment on 100mm VAS scale) | 2 years | CT release (mini) (limited palmar incision) | 80 | 63.75% | No surgery (Steroid injection) (paramethasone acetonide, 20mg in 1 ml) | 60 | 53.33% | RR | 1.20(0.90,1.60) | Not Significant (P-value>.05) |
| Ly-Pen,D., 2012 | Moderate Quality | Questionnaire (General/undefined)(Reached 70% improvement in functional impairment on 100mm VAS scale) | 2 years | CT release (mini) (limited palmar incision) | 80 | 60.00% | No surgery (Steroid injection) (paramethasone acetonide, 20mg in 1 ml) | 83 | 44.58% | RR | 1.35(1.00,1.82) | Not Significant (P-value>.05) |

*TABLE 161: PICO 7 PART 4- SURGICAL VERSUS CONSERVATIVE: PAIN*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gerritsen,A.A., 2002 | High Quality | Symptom recurrence (nocturnal pain)(Number of nights waking up due to symptoms) | 3 months | Open CTR (traditional open release) | 78 | 2.6(3.50) | Splinting (instructed to wear splint during the night for 6 weeks) | 86 | 2.2(3.10) | Mean Difference | 0.4(-0.62,1.416171) | Not Significant (P-value>.05) |
| Gerritsen,A.A., 2002 | High Quality | Symptom recurrence (nocturnal pain)(Number of nights waking up due to symptoms) | 5.9 months | Open CTR (traditional open release) | 77 | 3.6(2.80) | Splinting (instructed to wear splint during the night for 6 weeks) | 84 | 2.6(3.10) | Mean Difference | 1(0.09,1.911395) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A.A., 2002 | High Quality | Symptom recurrence (nocturnal pain)(Number of nights waking up due to symptoms) | 11.8 months | Open CTR (traditional open release) | 73 | 3.6(2.90) | Splinting (instructed to wear splint during the night for 6 weeks) | 83 | 2.9(3.00) | Mean Difference | 0.7(-0.23,1.626893) | Not Significant (P-value>.05) |
| Gerritsen,A.A., 2002 | High Quality | Symptom recurrence (nocturnal pain)(Number of nights waking up due to symptoms) | 1.5 years | Open CTR (traditional open release) | 68 | 3.6(2.90) | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 3.2(3.10) | Mean Difference | 0.4(-0.57,1.370787) | Not Significant (P-value>.05) |
| Jarvik,J.G., 2009 | High Quality | Symptom recurrence (pain)(Pain intensity(1-10)) | 5.9 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 50 | 4.7(3.20) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 54 | 5.7(3.10) | Mean Difference | -1(-2.21,0.212609) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jarvik,J.G., 2009 | High Quality | Symptom recurrence (pain)(Pain interference(1-10)) | 5.9 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 50 | 2.8(3.00) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 54 | 3.4(3.20) | Mean Difference | -0.6(-1.79,0.591624) | Not Significant (P-value>.05) |
| Jarvik,J.G., 2009 | High Quality | Symptom recurrence (pain)(Pain intensity(1-10)) | 11.8 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 49 | 3.5(3.00) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 52 | 4.3(3.30) | Mean Difference | -0.8(-2.03,0.428869) | Not Significant (P-value>.05) |
| Jarvik,J.G., 2009 | High Quality | Symptom recurrence (pain)(Pain interference(1-10)) | 11.8 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 49 | 2.1(6.90) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 52 | 3.1(3.30) | Mean Difference | -1(-3.13,1.130057) | Not Significant (P-value>.05) |
| Andreu,J.L., 2013 | Moderate Quality | Questionnaire/Scale (VAS-pain)(100cm) | 3 months | CT release (open) ( ) | 67 | 15(22.00) | No surgery (steroid injection) ( ) | 80 | 6(15.00) | Mean Difference | 9(2.79,15.20932) | **No surgery (steroid injection) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Andreu,J.L., 2013 | Moderate Quality | Questionnaire/Scale (VAS-pain)(100cm) | 5.9 months | CT release (open) ( ) | 63 | 5(16.00) | No surgery (steroid injection) ( ) | 77 | 8(18.00) | Mean Difference | -3(-8.64,2.636928) | Not Significant (P-value>.05) |
| Andreu,J.L., 2013 | Moderate Quality | Questionnaire/Scale (VAS-pain)(100cm) | 11.8 months | CT release (open) ( ) | 45 | 2(10.00) | No surgery (steroid injection) ( ) | 50 | 8(15.00) | Mean Difference | -6(-11.08,-0.91825) | **CT release (open) (P-value<.05)** |
| Ly-Pen,D., 2012 | Moderate Quality | Symptom relief (pain)(Reached 20% improvement in pain on VAS 100mm scale) | 2 years | CT release (mini) (limited palmar incision) | 80 | 65.00% | No surgery (Steroid injection) (paramethasone acetonide, 20mg in 1 ml) | 83 | 60.24% | RR | 1.08(0.85,1.37) | Not Significant (P-value>.05) |
| Ly-Pen,D., 2012 | Moderate Quality | Symptom relief (pain)(Reached 50% improvement in pain on VAS 100mm scale) | 2 years | CT release (mini) (limited palmar incision) | 80 | 63.75% | No surgery (Steroid injection) (paramethasone acetonide, 20mg in 1 ml) | 83 | 57.83% | RR | 1.10(0.86,1.41) | Not Significant (P-value>.05) |
| Ly-Pen,D., 2012 | Moderate Quality | Symptom relief (pain)(Reached 70% improvement in pain on VAS 100mm scale) | 2 years | CT release (mini) (limited palmar incision) | 80 | 63.75% | No surgery (Steroid injection) (paramethasone acetonide, 20mg in 1 ml) | 83 | 55.42% | RR | 1.15(0.89,1.48) | Not Significant (P-value>.05) |

*TABLE 162: PICO 7 PART 4- SURGICAL VERSUS CONSERVATIVE: QUALITY OF LIFE*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jarvik,J.G., 2009 | High Quality | Activity of daily living (ADL)(Days of reduced work or housework) | 5.9 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 50 | 4.3(8.80) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 54 | 6.3(9.40) | Mean Difference | -2(-5.50,1.497980) | Not Significant (P-value>.05) |
| Jarvik,J.G., 2009 | High Quality | Activity of daily living (ADL)(Days of reduced work or housework) | 11.8 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 49 | 2.2(5.60) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 52 | 5.2(8.80) | Mean Difference | -3(-5.86,-0.13999) | **CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference)**<br>**(P-value<.05)** |

*TABLE 163: PICO 7 PART 4- SURGICAL VERSUS CONSERVATIVE: SYMPTOMS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gerritsen,A. A., 2002 | High Quality | Paresthesia(Daytime paresthesia) | 3 months | Open CTR (traditional open release) | 78 | 4.8(3.20) | Splinting (instructed to wear splint during the night for 6 weeks) | 86 | 2.2(3.20) | Mean Difference | 2.6(1.62,3.580689) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A. A., 2002 | High Quality | Paresthesia(Nighttime paresthesia) | 3 months | Open CTR (traditional open release) | 78 | 4.6(3.80) | Splinting (instructed to wear splint during the night for 6 weeks) | 86 | 3.5(3.30) | Mean Difference | 1.1(0.01,2.194368) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A. A., 2002 | High Quality | Paresthesia(Daytime paresthesia) | 5.9 months | Open CTR (traditional open release) | 77 | 5.5(2.90) | Splinting (instructed to wear splint during the night for 6 weeks) | 84 | 3.7(3.20) | Mean Difference | 1.8(0.86,2.742280) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A. A., 2002 | High Quality | Paresthesia(Nighttime paresthesia) | 5.9 months | Open CTR (traditional open release) | 77 | 5.4(3.50) | Splinting (instructed to wear splint during the night for 6 weeks) | 84 | 4.1(3.70) | Mean Difference | 1.3(0.19,2.412318) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A. A., 2002 | High Quality | Paresthesia(Daytime paresthesia) | 11.8 months | Open CTR (traditional open release) | 73 | 5.5(2.90) | Splinting (instructed to wear splint during the night for 6 weeks) | 83 | 4(3.40) | Mean Difference | 1.5(0.51,2.488746) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A. A., 2002 | High Quality | Paresthesia(Daytime paresthesia) | 1.5 years | Open CTR (traditional open release) | 68 | 5.3(3.00) | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 4(3.60) | Mean Difference | 1.3(0.23,2.367081) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A. A., 2002 | High Quality | Questionnaire (Levine-SSS)(Symptom severity scale) | 3 months | Open CTR (traditional open release) | 78 | 1(0.90) | Splinting (instructed to wear splint during the night for 6 weeks) | 83 | 0.9(0.90) | Mean Difference | 0.1(-0.18,0.378179) | Not Significant (P-value>.05) |

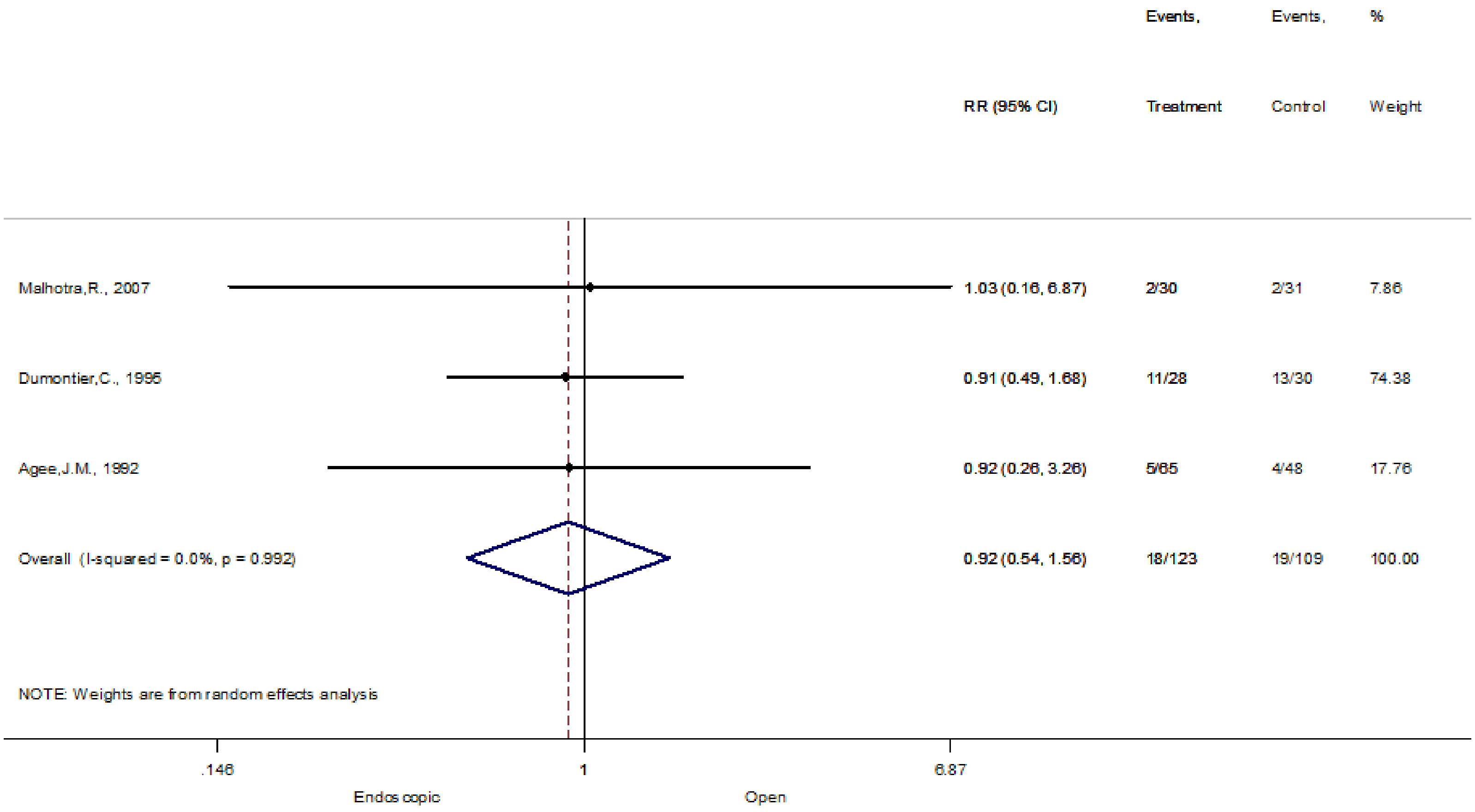
| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gerritsen,A.A., 2002 | High Quality | Questionnaire (Levine-SSS)(Symptom severity scale) | 5.9 months | Open CTR (traditional open release) | 77 | 1.3(0.80) | Splinting (instructed to wear splint during the night for 6 weeks) | 86 | 0.6(0.70) | Mean Difference | 0.7(0.47,0.931987) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A.A., 2002 | High Quality | Questionnaire (Levine-SSS)(Symptom severity scale) | 11.8 months | Open CTR (traditional open release) | 73 | 1.3(0.80) | Splinting (instructed to wear splint during the night for 6 weeks) | 84 | 0.9(0.80) | Mean Difference | 0.4(0.15,0.650896) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Gerritsen,A.A., 2002 | High Quality | Questionnaire (Levine-SSS)(Symptom severity scale) | 1.5 years | Open CTR (traditional open release) | 68 | 1.3(0.80) | Splinting (instructed to wear splint during the night for 6 weeks) | 79 | 0.9(0.90) | Mean Difference | 0.4(0.13,0.674854) | **Open CTR (traditional open release)**<br>**(P-value<.05)** |
| Hui,A.C., 2005 | High Quality | Questionnaire/Scale (GSS)(0 (no symptoms) to 50 (most severe)) | 4.6 months | CT release (open) (traditional open release) | 25 | 4.3(5.60) | No surgery (steroid injection) (15 mg of methylprednisolone acetate injected into carpal tunnel) | 25 | 16.6(12.30) | Mean Difference | -12.3(-17.60,-7.00219) | **CT release (open) (traditional open release) (P-value<.05)** |
| Ismatullah,I., 2013 | High Quality | Questionnaire/Scale (GSS)( ) | 3 months | CT release (open) (traditional open release) | 20 | 5.45(6.90) | No surgery (Steroid injection) (local steroid injection) | 20 | 22.1(6.90) | Mean Difference | -16.65(-20.93,-12.3738) | **CT release (open) (traditional open release) (P-value<.05)** |
| Jarvik,J.G., 2009 | High Quality | Questionnaire (CTSAQ)(Symptoms(1-5)) | 5.9 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 50 | 2.02(1.03) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 54 | 2.42(0.80) | Mean Difference | -0.4(-0.76,-0.04357) | **CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jarvik,J.G., 2009 | High Quality | Questionnaire (CTSAQ)(Symptoms(1-5)) | 11.8 months | CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference) | 49 | 1.74(0.76) | No surgery (NSAIDs w/ hand therapy) (Non-steroidal anti-inflammatory drugs and 6 hand therapy sessions over 6 weeks) | 52 | 2.07(0.88) | Mean Difference | -0.33(-0.65,-0.00985) | **CT release (Open/Endoscopic) (Open or Endoscopic CTR based on surgeon preference)**<br>**(P-value<.05)** |
| Andreu,J.L., 2013 | Moderate Quality | Paresthesia(Nocturnal paresthesia (100mm VAS scale)) | 3 months | CT release (open) ( ) | 67 | 16(25.00) | No surgery (steroid injection) ( ) | 80 | 8(17.00) | Mean Difference | 8(0.95,15.05078) | **No surgery (steroid injection)**<br>**(P-value<.05)** |
| Andreu,J.L., 2013 | Moderate Quality | Paresthesia(Nocturnal paresthesia (100mm VAS scale)) | 5.9 months | CT release (open) ( ) | 63 | 7(17.00) | No surgery (steroid injection) ( ) | 77 | 13(21.00) | Mean Difference | -6(-12.29,0.294796) | Not Significant (P-value>.05) |
| Andreu,J.L., 2013 | Moderate Quality | Paresthesia(Nocturnal paresthesia (100mm VAS scale)) | 11.8 months | CT release (open) ( ) | 45 | 3(11.00) | No surgery (steroid injection) ( ) | 50 | 12(19.00) | Mean Difference | -9(-15.17,-2.83023) | **CT release (open) (P-value<.05)** |
| Ly-Pen,D., 2012 | Moderate Quality | Paresthesia(Reached 20% improvement in nocturnal parthesia on VAS 100mm scale) | 2 years | CT release (mini) (limited palmar incision) | 80 | 68.75% | No surgery (Steroid injection) (paramethasone acetonide, 20mg in 1 ml) | 83 | 60.24% | RR | 1.14(0.91,1.43) | Not Significant (P-value>.05) |
| Ly-Pen,D., 2012 | Moderate Quality | Paresthesia(Reached 50% improvement in nocturnal parthesia on VAS 100mm scale) | 2 years | CT release (mini) (limited palmar incision) | 80 | 67.50% | No surgery (Steroid injection) (paramethasone acetonide, 20mg in 1 ml) | 83 | 56.63% | RR | 1.19(0.94,1.52) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/ P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ly-Pen,D., 2012 | Moderate Quality | Paresthesia(Reached 70% improvement in nocturnal parthesia on VAS 100mm scale) | 2 years | CT release (mini) (limited palmar incision) | 80 | 67.50% | No surgery (Steroid injection) (paramethasone acetonide, 20mg in 1 ml) | 83 | 50.60% | RR | 1.33(1.03,1.73) | **CT release (mini) (limited palmar incision)**<br>**(P-value<.05)** |

## *META-ANALYSES*

*FIGURE 13: PICO 7 PART 1 ENDOSCOPIC VERSUS OPEN: SYMPTOM RECURRENCE: PAIN*



## ADJUNCTIVE TECHNIQUES

Moderate evidence supports that there is no benefit to routine inclusion of the following adjunctive techniques: epineurotomy, neurolysis, flexor tenosynovectomy, and lengthening/reconstruction of the flexor retinaculum (transverse carpal ligament).

**Strength of Recommendation: Moderate Evidence** ★★★☆

Description: Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.

### Rationale

**Epineurotomy:** There are two high quality studies (Leinberry 1997and Crnkovic 2012) and one moderate quality study (Blair 1996) that evaluated carpal tunnel release alone versus the addition of epineurotomy of the median nerve. The Leinberry (1997) evaluated patients at 11.8 months after surgery. There was no significant difference found in clinical evaluation (Boston Questionnaire, APB strength, Phalen’s, Tinel’s, or two-point discrimination) or in symptom recurrence. Crnkovic (2012) studied nerve volume measured by MRI as an index of nerve recovery. Patients were evaluated at 3 and 6 months after surgery and no significant differences was noted at either time point. There were also no differences found for the symptoms of pain between the groups. Blair (1996) found no differences in post-operative two-point discrimination, pain, or ability to complete activities of daily living at a minimum of two years following surgery. There were also no differences electrodiagnostic parameters.

**Neurolysis:** There was one high quality study (Mackinnon 1991) and one moderate quality study (Lowry 1988) which evaluated the addition of neurolysis of the median nerve to a standard carpal tunnel release. The Mackinnon study focused on internal neurolysis and found no differences in thenar atrophy, muscle strength, pressure threshold, vibration threshold and static two-point discrimination at 12 months after surgery. No difference was noted in pinch or grip strength. The Lowry study evaluated the NCS findings at 3 months after surgery and did not find a difference in nerve conduction velocity or distal motor and sensory latency. Neither study found a difference in symptom relief or recurrence.

**Flexor Tenosynovectomy:** There was one high quality study (Shum 2002) evaluating flexor tenosynovectomy as an adjunct to carpal tunnel release. There was no difference in surgical site infection, scar sensitivity, wrist motion, finger motion, or Boston Carpal Tunnel Questionnaire at 12 months following surgery.

**Flexor Retinaculum Reconstruction/Lengthening:** There was one high quality study (Dias 2004) that evaluated flexor retinaculum lengthening/reconstruction. Six months following surgery there were no differences in grip strength, Jebsen Taylor score, Phalen test, pinch strength, Boston Carpal Tunnel Questionnaire score or symptom recurrence.

### Risks and Harms of Implementing this Recommendation

There are no known harms with implementation of this recommendation

## Future Research

Future research should be directed on conducting studies with larger sample sizes. There may also be certain subsets of patients who would benefit from regular inclusion of these adjunctive procedures, and future research can focus on such subsets.

## ***STUDY QUALITY TABLE OF ADJUNCTIVE SURGICAL TECHNIQUES***

*TABLE 164: OBSERVATIONAL STUDY QUALITY*

| Study | Design | Participant Recruitment | Allocation | Confounding Variables | Follow-Up Length | Other Bias? (If retrospective comparative, mark Yes) | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Shiota,E., 2001 | ○ | ● | ● | ● | ● | ○ | ● | ● | ● | Include | Low Quality |

*TABLE 165: RANDOMIZED TRIAL QUALITY*

| Study | Random Sequence Generation | Allocation Concealment | Blinding | Incomplete Outcome Data | Selective Reporting | Other Bias | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Crnkovi?-T, 2012 | ● | ● | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Blair,W.F., 1996 | ○ | ○ | ● | ◑ | ○ | ● | ● | ● | ● | Include | Moderate Quality |
| Dias,J.J., 2004 | ● | ● | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Kharwadkar,N., 2005 | ● | ● | ◑ | ● | ● | ○ | ● | ● | ● | Include | High Quality |
| Leinberry,C.F., 1997 | ● | ● | ● | ● | ○ | ● | ● | ● | ● | Include | High Quality |
| Lowry,W.E.,Jr., 1988 | ● | ● | ● | ● | ○ | ○ | ● | ● | ● | Include | Moderate Quality |
| Mackinnon,S.E., 1991 | ● | ● | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |
| Shum,C., 2002 | ● | ○ | ● | ● | ● | ● | ● | ● | ● | Include | High Quality |

# RESULTS

## *SUMMARY OF DATA FINDINGS*

*TABLE 166: SUMMARY OF FINDINGS PICO 8 ADJUNCTIVE/ALTERNATIVE SURGICAL TECHNIQUES (EARLY FOLLOW-UP (3 MONTHS UP TO 6 MONTHS))*

| | High Quality | | | Moderate Quality | Low Quality | Meta-Analysis |
|---|---|---|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **-Crnkovi?-T, 2012** | **Dias,J.J., 2004** | **Kharwadkar,N., 2005** | **Lowry,W.E.,Jr., 1988** | **Shiota,E., 2001** | |
| **Complications** | | | | | | |
| **Symptom occurrence (scar tenderness)** | | | ○ | | | **NA** |
| **Function** | | | | | | |
| **Grip Strength** | | ○ | | | 🟢 | **NA** |
| **Jebsen Taylor score** | | ○ | | | | **NA** |
| **NCS (DML)** | ○ | | | ○ | | **NA** |
| **NCS (DSL)** | ○ | | | ○ | | **NA** |
| **NCS (NCV)** | | | | ○ | | **NA** |
| **Phalen's test score** | | ○ | | | | **NA** |
| **Pinch Strength** | | ○ | | | | **NA** |
| **Questionnaire (Boston-FSS)** | | | ○ | | | **NA** |
| **Questionnaire (Levine-FSS)** | | ○ | | | | **NA** |
| **Pain** | | | | | | |
| **Questionnaire/Scale (VAS-pain)** | | | | | | |
| VAS for pillar pain (SD not provided for all subgroups) | | | ○ | | | **NA** |
| **Symptoms** | | | | | | |
| **Questionnaire (Boston-SSS)** | | | ○ | | | **NA** |
| **Questionnaire (Levine-SSS)** | | ○ | | | | **NA** |
| **Symptom recurrence (general)** | | ○ | | ○ | | **NA** |

*TABLE 167: SUMMARY OF FINDINGS PICO 8 ADJUNCTIVE/ALTERNATIVE SURGICAL TECHNIQUES (LATEFOLLOW-UP (> 6 MONTHS))*

**Favors treatment 1** 🟢
**Favors treatment 2** ●
**Not significant** ○

| | High Quality | | | Moderate Quality | Low Quality | |
|---|---|---|---|---|---|---|
| **Outcomes** | **Leinberry,C.F., 1997** | **Mackinnon,S.E., 1991** | **Shum,C., 2002** | **Blair,W.F., 1996** | **Shiota,E., 2001** | **Meta-Analysis** |
| **Complications** | | | | | | |
| **Surgical site infection** | | | ○ | | | **NA** |
| **Function** | | | | | | |
| **Grip Strength** | | | | | ○ | **NA** |
| **Improvement of strength** | | | | | | |
| Average strength of the abductor pollicis brevis muscle | ○ | | | | | **NA** |
| **NCS (motor conduction latency)** | | | | | ● | **NA** |
| **NCS (DML)** | | | | 🟢 | | **NA** |
| **NCS (motor amplitude)** | | | | 🟢 | | **NA** |
| **Phalen's test score** | ○ | | | | | **NA** |
| **Questionnaire (Levine-FSS)** | | | ○ | | | **NA** |
| **Thenar Atrophy** | | ○ | | | | **NA** |
| **Tinel's Sign/Test** | ○ | | | | | **NA** |
| **Two-point discrimination** | ○ | ○ | | | | **NA** |
| **Pain** | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | |
| General pain (non-questionnaire) | | | | ○ | | **NA** |
| **Quality Of Life** | | | | | | |
| **Activity of daily living (ADL)** | | | | | | |
| Difficulty in lifting | | | | ○ | | **NA** |
| **Symptoms** | | | | | | |
| **Questionnaire (Levine-SSS)** | | | ○ | | | **NA** |
| **Symptom recurrence (general)** | ○ | | | | 🟢 | **NA** |
| **Symptom recurrence (numbness)** | | | | 🟢 | | **NA** |
| **Symptom relief (general)** | | ○ | | | | **NA** |

## *DETAILED DATA FINDINGS*

### *TABLE 168: PICO 8 PART 1- ADJUNCTIVE/ALTERNATIVE SURGICAL TECHNIQUES: COMPLICATIONS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kharwadkar,N., 2005 | High Quality | Symptom occurrence (scar tenderness)(Mild, moderate, or severe) | 3 months | CT release-open (w/ absorbable sutures) (CT release (w/ absorbable sutures)) | 18 | 33.33% | CT release-open (w/ non-absorbable sutures) (CT release (w/ non-absorbable sutures)) | 18 | 44.44% | RR | 0.75(0.33,1.72) | Not Significant (P-value>.05) |
| Shum,C., 2002 | High Quality | Surgical site infection( ) | 11.8 months | CT release (w/ no flexor tenosynovectomy) (Wrists treated by open CT release w/ no flexor tenosynovectomy) | 44 | 0.00% | CT release (w/ flexor tenosynovectomy) (Wrists treated by open CT release with a flexor tenosynovectomy) | 44 | 0.00% | RD | 0.00(0.00,0.00) | Not Significant (P-value>.05) |

*TABLE 169: PICO 8 PART 1- ADJUNCTIVE/ALTERNATIVE SURGICAL TECHNIQUES: FUNCTION*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Crnkovi-T, 2012 | High Quality | NCS (DML)(Distal motor latency (ms) (# of patients not improved)) | 3 months | CT release (w/ no epineurotomy)-control (Open-field release without epineurotomy) | 25 | 32.00% | CT release (w/ epineurotomy)-test (Open-field surgical carpal tunnel release followed by a longitudinal epineurotomy of the nerve) | 25 | 24.00% | RR | 1.33(0.54,3.29) | Not Significant (P-value>.05) |
| Crnkovi-T, 2012 | High Quality | NCS (DML)(Distal motor latency (ms) (# of patients not improved)) | 5.9 months | CT release (w/ no epineurotomy)-control (Open-field release without epineurotomy) | 25 | 32.00% | CT release (w/ epineurotomy)-test (Open-field surgical carpal tunnel release followed by a longitudinal epineurotomy of the nerve) | 25 | 16.00% | RR | 2.00(0.69,5.80) | Not Significant (P-value>.05) |
| Crnkovi-T, 2012 | High Quality | NCS (DSL)(Distal sensory latency (ms) (# of patients not improved)) | 3 months | CT release (w/ no epineurotomy)-control (Open-field release without epineurotomy) | 25 | 52.00% | CT release (w/ epineurotomy)-test (Open-field surgical carpal tunnel release followed by a longitudinal epineurotomy of the nerve) | 24 | 54.17% | RR | 0.96(0.57,1.63) | Not Significant (P-value>.05) |
| Crnkovi-T, 2012 | High Quality | NCS (DSL)(Distal sensory latency (ms) (# of patients not improved)) | 5.9 months | CT release (w/ no epineurotomy)-control (Open-field release without epineurotomy) | 25 | 36.00% | CT release (w/ epineurotomy)-test (Open-field surgical carpal tunnel release followed by a longitudinal epineurotomy of the nerve) | 24 | 41.67% | RR | 0.86(0.43,1.75) | Not Significant (P-value>.05) |
| Dias,J.J., 2004 | High Quality | Grip strength(Kilograms) | 5.8 months | CT release-open (divide) (CT release (flexor retinaculum divided)) | 26 | 21.2(8.85) | CT release-open (lengthen) ( ) | 26 | 21.5(9.11) | Mean Difference | -0.3(-5.18,4.58) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dias,J.J., 2004 | High Quality | Jebsen Taylor score(Seconds) | 3 months | CT release-open (divide) (CT release (flexor retinaculum divided)) | 26 | 67.6(22.37) | CT release-open (lengthen) ( ) | 26 | 66.3(21.85) | Mean Difference | 1.3(-10.72,13.32) | Not Significant (P-value>.05) |
| Dias,J.J., 2004 | High Quality | Phalen's test score(# positive) | 5.8 months | CT release-open (divide) (CT release (flexor retinaculum divided)) | 26 | 3.85% | CT release-open (lengthen) ( ) | 26 | 3.85% | RR | 1.00(0.07,15.15) | Not Significant (P-value>.05) |
| Dias,J.J., 2004 | High Quality | Pinch Strength(Kilograms) | 5.8 months | CT release-open (divide) (CT release (flexor retinaculum divided)) | 26 | 6.4(1.82) | CT release-open (lengthen) ( ) | 26 | 6.5(1.82) | Mean Difference | -0.1(-1.09,0.89) | Not Significant (P-value>.05) |
| Dias,J.J., 2004 | High Quality | Questionnaire (Levine-FSS)( ) | 5.8 months | CT release-open (divide) (CT release (flexor retinaculum divided)) | 26 | 1.2(0.26) | CT release-open (lengthen) ( ) | 26 | 1.3(0.52) | Mean Difference | -0.1(-0.32,0.12) | Not Significant (P-value>.05) |
| Kharwadkar,N., 2005 | High Quality | Questionnaire (Boston-FSS)(Boston CTS Questionnaire (functional status scale)) | 3 months | CT release-open (w/ absorbable sutures) (CT release (w/ absorbable sutures)) | 18 | 1.1(0.39) | CT release-open (w/ non-absorbable sutures) (CT release (w/ non-absorbable sutures)) | 18 | 1.1(0.69) | Mean Difference | 0(-0.37,0.366158) | Not Significant (P-value>.05) |
| Leinberry,C.F., 1997 | High Quality | Improvement of strength(Average strength of the abductor pollicis brevis muscle) | 11.8 months | CT release (w/ no epineurotomy) (release of the transverse carpal ligament alone,) | 25 | 4.3(.) | CT release (w/ epineurotomy) (release and adjuvant epineurotomy of the median nerve.) | 25 | 4.2(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Leinberry,C.F., 1997 | High Quality | Phalen's test score(% positive) | 11.8 months | CT release (w/ no epineurotomy) (release of the transverse carpal ligament alone,) | 25 | 8.00% | CT release (w/ epineurotomy) (release and adjuvant epineurotomy of the median nerve.) | 25 | 16.00% | RR | 0.50(0.10,2.49) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Leinberry,C.F., 1997 | High Quality | Tinel's Sign/Test(% positive) | 11.8 months | CT release (w/ no epineurotomy) (release of the transverse carpal ligament alone,) | 25 | 24.00% | CT release (w/ epineurotomy) (release and adjuvant epineurotomy of the median nerve.) | 25 | 44.00% | RR | 0.55(0.24,1.25) | Not Significant (P-value>.05) |
| Leinberry,C.F., 1997 | High Quality | Two-point discrimination(Millimeters) | 11.8 months | CT release (w/ no epineurotomy) (release of the transverse carpal ligament alone,) | 25 | 5.1(.) | CT release (w/ epineurotomy) (release and adjuvant epineurotomy of the median nerve.) | 25 | 4.7(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Mackinnon,S.E., 1991 | High Quality | Thenar Atrophy((0-5 scale)) | 11.8 months | CT release (w/ no neurolysis) ( ) | 32 | 40.63% | CT release (w/ neurolysis) ( ) | 31 | 35.48% | RR | 1.14(0.61,2.16) | Not Significant (P-value>.05) |
| Mackinnon,S.E., 1991 | High Quality | Two-point discrimination(>3 millimeters) | 11.8 months | CT release (w/ no neurolysis) ( ) | 32 | 28.13% | CT release (w/ neurolysis) ( ) | 31 | 25.81% | RR | 1.09(0.48,2.46) | Not Significant (P-value>.05) |
| Shum,C., 2002 | High Quality | Questionnaire (Levine-FSS)(Mean functional status score) | 11.8 months | CT release (w/ no flexor tenosynovectomy) (Wrists treated by open CT release w/ no flexor tenosynovectomy) | 44 | 1.6(0.62) | CT release (w/ flexor tenosynovectomy) (Wrists treated by open CT release with a flexor tenosynovectomy) | 44 | 1.7(0.71) | Mean Difference | -0.1(-0.38,0.178521) | Not Significant (P-value>.05) |
| Blair,W.F., 1996 | Moderate Quality | NCS (DML)(Wrist motor latency) | 2 years | CT release (w/ no Epineurotomy) (CT release (w/o epineurotomy)) | 27 | . % | CT release (w/ Epineurotomy) (CT release (w/ epineurotomy)) | 48 | . % | Author Reported | NA | **CT release (w/ Epineurotomy) (CT release (w/ epineurotomy)) (P-value<.05)** |
| Blair,W.F., 1996 | Moderate Quality | NCS (MA)(Motor amplitude) | 2 years | CT release (w/ no Epineurotomy) (CT release (w/o epineurotomy)) | 24 | . % | CT release (w/ Epineurotomy) (CT release (w/ epineurotomy)) | 48 | . % | Author Reported | NA | **CT release (w/ Epineurotomy) (CT release (w/ epineurotomy)) (P-value<.05)** |
| Lowry,W.E.,Jr., 1988 | Moderate Quality | NCS (DML)(Distal motor latency (ms)) | 3 months | CT release (w/ no neurolysis) (Standard ligament release w/ no neurolysis) | 23 | 5(1.10) | CT release (w/ neurolysis) (Standard ligament release w/ neurolysis) | 23 | 4.8(0.90) | Mean Difference | 0.2(-0.38,0.780855) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lowry,W.E.,Jr., 1988 | Moderate Quality | NCS (DSL)(Distal sensory latency (ms)) | 3 months | CT release (w/ no neurolysis) (Standard ligament release w/ no neurolysis) | 23 | . % | CT release (w/ neurolysis) (Standard ligament release w/ neurolysis) | 24 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Lowry,W.E.,Jr., 1988 | Moderate Quality | NCS (NCV)(Nerve conduction velocity) | 3 months | CT release (w/ no neurolysis) (Standard ligament release w/ no neurolysis) | 23 | 48(6.50) | CT release (w/ neurolysis) (Standard ligament release w/ neurolysis) | 23 | 50(6.60) | Mean Difference | -2(-5.79,1.785829) | Not Significant (P-value>.05) |
| Shiota,E., 2001 | Low Quality | Grip strength(Kilograms) | 3.9 months | CT release (w/ no synovectomy) (CT release alone) | 43 | . % | CT release (w/ synovectomy) (Enlargement reconstruction of the flexor retinaculum with synovectomy) | 70 | . % | Author Reported | NA | **CT release (w/ synovectomy) (Enlargement reconstruction of the flexor retinaculum with synovectomy) (P-value<.05)** |
| Shiota,E., 2001 | Low Quality | Grip strength(Kilograms) | 6 months | CT release (w/ no synovectomy) (CT release alone) | 43 | 13.5(.) | CT release (w/ synovectomy) (Enlargement reconstruction of the flexor retinaculum with synovectomy) | 70 | 15(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Shiota,E., 2001 | Low Quality | NCS(Motor conduction latency (msec)) | 2 years | CT release (w/ no synovectomy) (CT release alone) | 43 | 3.7(1.60) | CT release (w/ synovectomy) (Enlargement reconstruction of the flexor retinaculum with synovectomy) | 70 | 4.6(1.50) | Mean Difference | -0.9(-1.49,-0.30654) | **CT release (w/ no synovectomy) (CT release alone)**<br>**(P-value<.05)** |

*TABLE 170: PICO 8 PART 1- ADJUNCTIVE/ALTERNATIVE SURGICAL TECHNIQUES: PAIN*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kharwadkar,N., 2005 | High Quality | Questionnaire/Scale (VAS-pain)(VAS for pillar pain (SD not provided for all subgroups)) | 3 months | CT release-open (w/ absorbable sutures) (CT release (w/ absorbable sutures)) | 18 | 0(.) | CT release-open (w/ non-absorbable sutures) (CT release (w/ non-absorbable sutures)) | 18 | 0.67(0.50) | Author Reported | NA | Not Significant (P-value>.05) |
| Blair,W.F., 1996 | Moderate Quality | Questionnaire (General/undefined)(General pain (non-questionnaire)) | 2 years | CT release (w/ no Epineurotomy) (CT release (w/o epineurotomy)) | 27 | 29.63% | CT release (w/ Epineurotomy) (CT release (w/ epineurotomy)) | 48 | 12.50% | RR | 2.37(0.92,6.12) | Not Significant (P-value>.05) |

*TABLE 171: PICO 8 PART 1- ADJUNCTIVE/ALTERNATIVE SURGICAL TECHNIQUES: QUALITY OF LIFE*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Blair,W.F., 1996 | Moderate Quality | Activity of daily living (ADL)(Difficulty in lifting) | 2 years | CT release (w/ no Epineurotomy) (CT release (w/o epineurotomy)) | 27 | 25.93% | CT release (w/ Epineurotomy) (CT release (w/ epineurotomy)) | 48 | 18.75% | RR | 1.38(0.58,3.29) | Not Significant (P-value>.05) |

*TABLE 172: PICO 8 PART 1- ADJUNCTIVE/ALTERNATIVE SURGICAL TECHNIQUES: SYMPTOMS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dias,J.J., 2004 | High Quality | Questionnaire (Levine-SSS)( ) | 5.8 months | CT release-open (divide) (CT release (flexor retinaculum divided)) | 26 | 1.3(0.52) | CT release-open (lengthen) ( ) | 26 | 1.3(0.52) | Mean Difference | 0(-0.28,0.28) | Not Significant (P-value>.05) |
| Dias,J.J., 2004 | High Quality | Symptom recurrence (general)(Wrist stiffness (mild or moderate)) | 5.8 months | CT release-open (divide) (CT release (flexor retinaculum divided)) | 26 | 3.85% | CT release-open (lengthen) ( ) | 26 | 0.00% | RD | 0.04(-0.04,0.11) | Not Significant (P-value>.05) |
| Kharwadkar,N., 2005 | High Quality | Questionnaire (Boston-SSS)(Boston CTS Questionnaire (symptom severity scale)) | 3 months | CT release-open (w/ absorbable sutures) (CT release (w/ absorbable sutures)) | 18 | 1.1(0.25) | CT release-open (w/ non-absorbable sutures) (CT release (w/ non-absorbable sutures)) | 18 | 1.1(0.21) | Mean Difference | 0(-0.15,0.150833) | Not Significant (P-value>.05) |
| Leinberry,C.F., 1997 | High Quality | Symptom recurrence (general)(@ 12 month post-op) | 11.8 months | CT release (w/ no epineurotomy) (release of the transverse carpal ligament alone,) | 25 | 40.00% | CT release (w/ epineurotomy) (release and adjuvant epineurotomy of the median nerve.) | 25 | 44.00% | RR | 0.91(0.47,1.75) | Not Significant (P-value>.05) |
| Mackinnon,S.E., 1991 | High Quality | Symptom relief (general)(# of events=patients' symptoms not relieving) | 11.8 months | CT release (w/ no neurolysis) ( ) | 32 | 12.50% | CT release (w/ neurolysis) ( ) | 31 | 19.35% | RR | 0.65(0.20,2.07) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shum,C., 2002 | High Quality | Questionnaire (Levine-SSS)(Mean symptom-severity score) | 11.8 months | CT release (w/ no flexor tenosynovectomy) (Wrists treated by open CT release w/ no flexor tenosynovectomy) | 44 | 1.6(0.70) | CT release (w/ flexor tenosynovectomy) (Wrists treated by open CT release with a flexor tenosynovectomy) | 44 | 1.6(0.68) | Mean Difference | 0(-0.29,0.288362) | Not Significant (P-value>.05) |
| Blair,W.F., 1996 | Moderate Quality | Symptom recurrence (numbness)(Numbness (pre-op numbness, and post-op numbness)) | 2 years | CT release (w/ no Epineurotomy) (CT release (w/o epineurotomy)) | 27 | 44.44% | CT release (w/ Epineurotomy) (CT release (w/ epineurotomy)) | 48 | 20.83% | RR | 2.13(1.07,4.27) | **CT release (w/ Epineurotomy) (CT release (w/ epineurotomy)) (P-value<.05)** |
| Lowry,W.E.,Jr., 1988 | Moderate Quality | Symptom recurrence (general)( ) | 3 months | CT release (w/ no neurolysis) (Standard ligament release w/ no neurolysis) | 23 | 8.70% | CT release (w/ neurolysis) (Standard ligament release w/ neurolysis) | 24 | 4.17% | RR | 2.09(0.20,21.48) | Not Significant (P-value>.05) |
| Shiota,E., 2001 | Low Quality | Symptom recurrence (general)(With mean follow-up of 1.6 years) | 2 years | CT release (w/ no synovectomy) (CT release alone) | 43 | 25.58% | CT release (w/ synovectomy) (Enlargement reconstruction of the flexor retinaculum with synovectomy) | 70 | 10.00% | RR | 2.56(1.07,6.10) | **CT release (w/ synovectomy) (Enlargement reconstruction of the flexor retinaculum with synovectomy) (P-value<.05)** |

## BILATERAL VERSUS STAGED CARPAL TUNNEL RELEASE

Limited evidence supports that simultaneous bilateral or staged endoscopic carpal tunnel release might be performed based on patient and surgeon preference. No evidence meeting the inclusion criteria was found addressing bilateral simultaneous open carpal tunnel release.

### Strength of Recommendation: Limited Evidence ★★☆☆

Description: Evidence from one or more “Low” quality studies with consistent findings **or** evidence from a single “Moderate” quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

### Rationale

There were two low strength studies (Fehringer 2002, Nesbitt 2006) which looked at simultaneous and staged endoscopic carpal tunnel releases. There were no studies that met our inclusion criteria which evaluated open release. The results of these studies were conflicting. For example, grip strength in short term follow-up was better in the staged group, but return to work was faster in the simultaneous group. Patient-specific factors, such as quality of life, non-employment work, care-giving, family and community responsibilities were not addressed. Both studies were limited in that there was no randomization of treatment protocols. Patients selected simultaneous or staged procedures, and both groups were satisfied with their choices. At 6 month follow up, there was no difference between the two groups.

Because no studies comparing simultaneous versus staged procedures for open release were considered, there are no data to support concurrent or sequential bilateral open carpal tunnel releases. This does not constitute a mandate that bilateral simultaneous carpal tunnel releases should be performed endoscopically.

Implications of two versus one surgical experience such as two anesthetics, total analgesic consumption, costs of two OR and perioperative nursing unit visits were not addressed.

### Risks and Harms of Implementing this Recommendation

There are no known harms associated with implementing this recommendation.

### Future Research

Studies of simultaneous versus staged open carpal tunnel releases with adequate follow up would be helpful in elucidating whether simultaneous open release should be considered as a treatment option.

Studies which define return to work status by rigorous, objective criteria would be helpful to define the strength of the recommendation regarding simultaneous releases.

## *STUDY QUALITY TABLE OF BILATERAL CARPAL TUNNEL RELEASE*

*TABLE 173. INTERVENTION QUALITY EVALUATIONS*

| Study | Design | Participant Recruitment | Allocation | Confounding Variables | Follow-Up Length | Other Bias? (If retrospective comparative, mark Yes) | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fehringer,E.V., 2002 | ○ | ● | ○ | ◑ | ● | ● | ● | ● | ● | Include | Low Quality |
| Nesbitt,K.S., 2006 | ○ | ● | ○ | ● | ● | ● | ● | ● | ● | Include | Low Quality |

## RESULTS

### *SUMMARY OF DATA FINDINGS*

*TABLE 174: SUMMARY OF FINDINGS PICO 9 SIMULTANEOUS BI-LATERAL RELEASE (EARLY FOLLOW-UP (3 MONTHS UP TO 6 MONTHS))*

| | Low Quality | | | Meta-Analysis |
|---|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **Nesbitt,K.S., 2006 (1)** | **Nesbitt,K.S., 2006 (2)** | **Nesbitt,K.S., 2006 (3)** | |
| **Function** | | | | |
| **Grip Strength** | ● | ● | 🟢 | **NA** |
| **Phalen's test score** | ○ | ○ | ○ | **NA** |
| **Pinch Strength** | ○ | ○ | ○ | **NA** |
| **Questionnaire (General/Undefined)** | | | | |
| Functional severity | ○ | ○ | ○ | **NA** |
| **Semmes-Weinstein Monofilaments Test (SW test)** | ○ | ○ | ○ | **NA** |
| **Tinel's Sign/Test** | ○ | ○ | ○ | **NA** |
| **Quality Of Life** | | | | |
| **Return to Work (weeks)** | 🟢 | 🟢 | ● | **NA** |
| **Symptoms** | | | | |
| **Questionnaire (General/Undefined)** | | | | |
| Symptom severity | ○ | ○ | ○ | **NA** |

*TABLE 175: SUMMARY OF FINDINGS PICO 9 SIMULTANEOUS BI-LATERAL RELEASE TECHNIQUES (LATEFOLLOW-UP (> 6 MONTHS))*

| | Low Quality | |
|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **Fehringer,E.V., 2002** | **Meta-Analysis** |
| **Quality Of Life** | | |
| **Patient satisfaction (general)** | ○ | **NA** |
| **Return to normal activities** | | |
| Average number of days before return to light duty | ○ | **NA** |
| Average number of days before return to return to Regular Duty | ○ | **NA** |

## *DETAILED DATA FINDINGS*

### *TABLE 176: PICO 9- CT RELEASE (SIMULTANEOUS VERSUS STAGED): FUNCTION*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nesbitt,K.S., 2006 | Low Quality | Grip strength(Kilograms) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 32(.) | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 27(.) | Author Reported | NA | **CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands))**<br>**(P-value<.05)** |
| Nesbitt,K.S., 2006 | Low Quality | Grip strength(Kilograms) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 32(.) | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 30(.) | Author Reported | NA | **CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands))**<br>**(P-value<.05)** |
| Nesbitt,K.S., 2006 | Low Quality | Grip strength(Kilograms) | 5.9 months | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 27(.) | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 30(.) | Author Reported | NA | **CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) (P-value<.05)** |
| Nesbitt,K.S., 2006 | Low Quality | Phalen's test score(% positive) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 8.33% | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 3.57% | RR | 2.33(0.16,34.31) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nesbitt,K.S., 2006 | Low Quality | Phalen's test score(% positive) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 8.33% | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 0.00% | RD | 0.08(-0.07,0.24) | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Phalen's test score(% positive) | 5.9 months | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 0.00% | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 3.57% | RD | -0.04(-0.10,0.03) | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Pinch Strength(Kilograms) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 8.1(.) | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 7.6(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Pinch Strength(Kilograms) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 8.1(.) | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 7.6(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Pinch Strength(Kilograms) | 5.9 months | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 7.6(.) | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 7.6(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nesbitt,K.S., 2006 | Low Quality | Questionnaire (General/undefined)(Functional severity) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 1.3(.) | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 1.3(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Questionnaire (General/undefined)(Functional severity) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 1.3(.) | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 1.3(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Questionnaire (General/undefined)(Functional severity) | 5.9 months | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 1.3(.) | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 1.3(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Semmes Weinstein Monofilaments Test (SW test)( ) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 1.7(.) | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 1.8(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Semmes Weinstein Monofilaments Test (SW test)( ) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 1.7(.) | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 1.7(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nesbitt,K.S., 2006 | Low Quality | Semmes Weinstein Monofilaments Test (SW test)( ) | 5.9 months | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 1.8(.) | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 1.7(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Tinel's Sign/Test(% positive) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 8.33% | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 3.57% | RR | 2.33(0.16,34.31) | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Tinel's Sign/Test(% positive) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 8.33% | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 6.45% | RR | 1.29(0.13,12.96) | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Tinel's Sign/Test(% positive) | 5.9 months | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 6.45% | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 3.57% | RR | 1.81(0.17,18.86) | Not Significant (P-value>.05) |

*TABLE 177: PICO 9- CT RELEASE (SIMULTANEOUS VERSUS STAGED): QUALITY OF LIFE*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fehringer,E.V., 2002 | Low Quality | Patient satisfaction (general)(Patient satisfaction (event=those who were not satisfied) | 11.8 months | CT release (simultaneous-endoscopic) (Group 2) | 48 | 4.17% | CT release (staged-endoscopic) (Group 1) | 48 | 10.42% | RR | 0.40(0.08,1.96) | Not Significant (P-value>.05) |
| Fehringer,E.V., 2002 | Low Quality | Return to Normal Activities(average number of days before return to light duty) | 11.8 months | CT release (simultaneous-endoscopic) (Group 2) | 48 | 17.8(.) | CT release (staged-endoscopic) (Group 1) | 48 | 33.7(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Fehringer,E.V., 2002 | Low Quality | Return to Normal Activities(average number of days before return to return to Regular Duty) | 11.8 months | CT release (simultaneous-endoscopic) (Group 2) | 48 | 82.2(.) | CT release (staged-endoscopic) (Group 1) | 48 | 112.6(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Return to Work(weeks) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 2.25(.) | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 8(.) | Author Reported | NA | **CT release (simultaneous-endoscopic) (12 (24 hands))**<br>**(P-value<.05)** |
| Nesbitt,K.S., 2006 | Low Quality | Return to Work(weeks) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 2.25(.) | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 6(.) | Author Reported | NA | **CT release (simultaneous-endoscopic) (12 (24 hands))**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nesbitt,K.S., 2006 | Low Quality | Return to Work(weeks) | 5.9 months | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 8(.) | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 6(.) | Author Reported | NA | **CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands))**<br>**(P-value<.05)** |

## *TABLE 178: PICO 9- CT RELEASE (SIMULTANEOUS VERSUS STAGED): SYMPTOMS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nesbitt,K.S., 2006 | Low Quality | Questionnaire (General/undefined)(Symptom severity) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 1.4(.) | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 1.4(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Questionnaire (General/undefined)(Symptom severity) | 5.9 months | CT release (simultaneous-endoscopic) (12 (24 hands)) | 12 | 1.4(.) | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 1.4(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nesbitt,K.S., 2006 | Low Quality | Questionnaire (General/undefined)(Symptom severity) | 5.9 months | CT release (staged-endoscopic [1-3 weeks apart]) (31 (62 hands)) | 31 | 1.4(.) | CT release (staged-endoscopic [>3weeks apart]) (28 (56 hands)) | 28 | 1.4(.) | Author Reported | NA | Not Significant (P-value>.05) |

# ANESTHESIA GUIDELINE RECOMMENDATIONS

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## A. LOCAL VERSUS INTRAVENOUS (IV) REGIONAL ANESTHESIA

Limited evidence supports the use of local anesthesia rather than intravenous regional anesthesia (Bier block) because it might offer longer pain relief after carpal tunnel release; no evidence meeting our inclusion criteria was found comparing general anesthesia to either regional or local anesthesia for carpal tunnel surgery.

**Strength of Recommendation: Limited Evidence** ★★☆☆

Description: Evidence from one or more “Low” quality studies with consistent findings **or** evidence from a single “Moderate” quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

### RATIONALE

There were two moderate quality studies comparing local anesthesia to intravenous regional anesthesia. Nabhan (2011) studied 43 patients randomized to receive either local anesthesia or intravenous regional anesthesia using prilocaine. Three patients in the intravenous regional anesthesia group and one patient in the local anesthesia group required supplementation with additional local infiltration at the surgery site. The tourniquet was inflated longer in the intravenous regional anesthesia group but the operating time was the same in both groups. There were no other differences between the groups.

Sorensen et al (2013) randomized 38 patients to have endoscopic carpal tunnel release under either local anesthesia with ropivicaine or intravenous regional anesthesia with mepivicaine. The group treated with local anesthesia had less pain at the end of the procedure as well as two hours after surgery was completed although pain during the procedure was equal in the two groups.

#### Risks and Harms of Implementing this Recommendation

The main concern with the local infiltration of anesthetic agents is the well-documented cardiotoxicity of bupivacaine[3].

### FUTURE RESEARCH STATEMENT

No evidence meeting our inclusion criteria was found specifically comparing local anesthesia to either general anesthesia or regional anesthesia using brachial plexus blocks. Studies evaluating the role of regional anesthesia administered via brachial plexus block might be valuable given the post-operative analgesia conferred by these methods. In the existing literature the main advantage of local infiltration compared with intravenous regional anesthesia was post-operative pain relief for up to two hours.

---

## B. BUFFERED VERSUS PLAIN LIDOCAINE

Moderate evidence supports the use of buffered lidocaine rather than plain lidocaine for local anesthesia because it could result in less injection pain.

**Strength of Recommendation: Moderate Evidence** ★★★☆

Description: Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.

## RATIONALE

There were two high quality studies evaluating the use of buffered lidocaine for local anesthesia. Vossinakis et al (2004) studied 21 patients undergoing sequential, bilateral carpal tunnel release under local anesthesia. In each case one hand was anesthetized with lidocaine buffered with sodium bicarbonate and the other hand with plain lidocaine. Following infiltration the patients reported pain on a 100 mm visual analog scale. Those receiving the buffered solution reported less pain and the difference between the groups was statistically significant.

Watts et al (2004) randomized 64 patients to have a carpal tunnel release under local anesthesia using either plain lidocaine or lidocaine buffered with sodium bicarbonate. One minute after infiltration, and before application of a tourniquet, pain was measured on a 100 mm visual analog scale. Although patients who received buffered lidocaine reported less pain, the difference from those receiving the plain lidocaine was not statistically significant.

### Risks and Harms of Implementing this Recommendation

The main concern with the local infiltration of anesthetic agents is the well-documented cardiotoxicity of bupivacaine.

## FUTURE RESEARCH STATEMENT

No evidence meeting our inclusion criteria was found specifically comparing local anesthesia to either general anesthesia or regional anesthesia using brachial plexus blocks. Studies evaluating the role of regional anesthesia administered via brachial plexus block might be valuable given the post-operative analgesia conferred by these methods. In the existing literature the main advantage of local infiltration compared with intravenous regional anesthesia was post-operative pain relief for up to two hours.

## *STUDY QUALITY TABLE OF SURGICAL ANESTHETIC*

*TABLE 179: OBSERVATIONAL STUDY QUALITY*

| Study | Design | Participant Recruitment | Allocation | Confounding Variables | Follow-Up Length | Other Bias? (If retrospective comparative, mark Yes) | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tomaino,M.M., 2001 | ○ | ● | ● | ● | ○ | ◑ | ● | ● | ● | Include | Low Quality |

*TABLE 180: RANDOMIZED TRIAL QUALITY*

| Study | Random Sequence Generation | Allocation Concealment | Blinding | Incomplete Outcome Data | Selective Reporting | Other Bias | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nabhan,A., 2011 | ● | ● | ◑ | ● | ○ | ◑ | ● | ● | ● | Include | Moderate Quality |
| Sorensen,A.M., 2013 | ◑ | ● | ◑ | ● | ◑ | ○ | ● | ● | ● | Include | Moderate Quality |
| Vossinakis,I.C., 2004 | ◑ | ● | ● | ● | ◑ | ◑ | ● | ● | ● | Include | High Quality |
| Watts,A.C., 2004 | ● | ● | ● | ● | ◑ | ● | ● | ● | ● | Include | High Quality |

## RESULTS

### *SUMMARY OF DATA FINDINGS*

*TABLE 181: SUMMARY OF FINDINGS PICO 11 PART 1 MODES OF ANALGESIA: LOCAL VS LOCAL (EARLY FOLLOW-UP (PRE-OP/INTRA-OP))*

**Favors treatment 1** 🟢
**Favors treatment 2** ●
**Not significant** ○

| | **High Quality** | | **Meta-Analysis** |
|---|---|---|---|
| **Outcomes** | **Vossinakis,I.C., 2004** | **Watts,A.C., 2004** | |
| **Pain** | | | |
| **Questionnaire/Scale (VAS-pain)** | | | |
| 0-10 (at 0.5 minutes) | 🟢 | | **NA** |
| Burning pain, 0-10 (at 0.5 minutes) | 🟢 | | **NA** |
| Pain 1 minute after injection, (0-100) (at 2 minutes) | | 🟢 | **NA** |
| Stinging pain, 0-10 (at 0.5 minutes) | ○ | | **NA** |
| Tension pain, 0-10 (at 0.5 minutes) | ○ | | **NA** |

*TABLE 182: SUMMARY OF FINDINGS PICO 11 PART 2 MODES OF ANALGESIA: LOCAL VS REGIONAL (EARLY FOLLOW-UP (PRE-OP/INTRA-OP))*

| | **Moderate Quality** | | **Low Quality** | |
|---|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **Nabhan,A., 2011** | **Sorensen,A.M., 2013** | **Tomaino,M.M., 2001** | **Meta-Analysis** |
| **Function** | | | | |
| **Questionnaire (MHQ-hand function)** | | | | |
| Hand function (Michigan Hand Outcomes Questionnaire, 0-100) | | | | |
| 0 | ○ | | | **NA** |
| **Other** | | | | |
| **Anxiety** | | | | |
| Anxiety during anesthetic administration, 0-10 | | | | |
| 0 | | | ○ | **NA** |
| **Pain** | | | | |
| **Questionnaire (MHQ-pain)** | | | | |
| Pain (Michigan Hand Outcomes Questionnaire, 0-100) | | | | |
| 0 | ○ | | | **NA** |
| **Questionnaire/Scale (VAS-pain)** | | | | |
| 0-10 | | | | |
| 0min | | ○ | | **NA** |
| 20min | | ○ | | **NA** |
| Pain during anesthetic administration, 0-10 | | | | |
| 0 | | | ○ | **NA** |
| Pain during surgery, 0-10 | | | | |
| 30min | | | ○ | **NA** |
| Pain related to tourniquet, 0-10 | | | | |
| 0 | ○ | | | **NA** |
| **Quality Of Life** | | | | |
| **Questionnaire (MHQ-activity of daily living)** | | | | |
| Activity of daily living (Michigan Hand Outcomes Questionnaire, 0-100) | | | | |
| 0 | ○ | | | **NA** |
| **Questionnaire (MHQ-patient satisfaction)** | | | | |
| Patient satisfaction (Michigan Hand Outcomes Questionnaire, 0-100) | | | | |
| 0 | ○ | | | **NA** |
| **Questionnaire (MHQ-work performance)** | | | | |
| Work performance (Michigan Hand Outcomes Questionnaire, 0-100) | | | | |
| 0 | ○ | | | **NA** |

*TABLE 183: SUMMARY OF FINDINGS PICO 11 PART 2 MODES OF ANALGESIA: LOCAL VS REGIONAL (LATE FOLLOW-UP (POST-OP))*

**Favors treatment 1** 🟢
**Favors treatment 2** ●
**Not significant** ○

| | Moderate Quality | | Low Quality | |
|---|---|---|---|---|
| **Outcomes** | **Nabhan,A., 2011** | **Sorensen,A.M., 2013** | **Tomaino,M.M., 2001** | **Meta-Analysis** |
| **Function** | | | | |
| **Questionnaire (MHQ-hand function)** | | | | |
| Hand function (Michigan Hand Outcomes Questionnaire, 0-100) | | | | |
| 14 days | ○ | | | **NA** |
| 180 days | ○ | | | **NA** |
| **Pain** | | | | |
| **Questionnaire (MHQ-pain)** | | | | |
| Pain (Michigan Hand Outcomes Questionnaire, 0-100) | | | | |
| 14 days | ○ | | | **NA** |
| 180 days | ○ | | | **NA** |
| **Questionnaire/Scale (VAS-pain)** | | | | |
| 0-10 | | | | |
| 40mins | | 🟢 | | **NA** |
| 2hrs | | 🟢 | | **NA** |
| 24hrs | | ○ | | **NA** |
| **Quality Of Life** | | | | |
| **Questionnaire (MHQ-activity of daily living)** | | | | |
| Activity of daily living (Michigan Hand Outcomes Questionnaire, 0-100) | | | | |
| 14 days | ○ | | | **NA** |
| 180 days | ○ | | | **NA** |
| **Questionnaire (MHQ-patient satisfaction)** | | | | |
| Patient satisfaction (Michigan Hand Outcomes Questionnaire, 0-100) | | | | |
| 14 days | ○ | | | **NA** |
| 180 days | ○ | | | **NA** |
| **Questionnaire (MHQ-work performance)** | | | | |
| Work performance (Michigan Hand Outcomes Questionnaire, 0-100) | | | | |
| 14 days | ○ | | | **NA** |
| 180 days | ○ | | | **NA** |
| **Questionnaire/Scale (VAS-patient satisfaction)** | | | | |
| Patient satisfaction with anesthesia | | | | |
| 90 days | | | ○ | **NA** |

## *DETAILED DATA FINDINGS*

### *TABLE 184: PICO 11 PART 1- LOCAL VERSUS LOCAL: PAIN*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vossinakis,I.C., 2004 | High Quality | Questionnaire/Scale (VAS-pain)(0-10) | 0.5 min (Intra-Op) | Local (lidocaine) (15mL 1% lidocaine + adrenaline 1:200,000) | 21 | 7.6(0.80) | Local (lidocaine-buffered) (15mL 1% lidocaine + adrenaline 1:200,000 buffered 8.4% sodium bicarbonate) | 21 | 3.6(0.50) | Mean Difference | 4(3.60,4.403498) | **Local (lidocaine-buffered) (15mL 1% lidocaine + adrenaline 1:200,000 buffered 8.4% sodium bicarbonate)**<br>**(P-value<.05)** |
| Vossinakis,I.C., 2004 | High Quality | Questionnaire/Scale (VAS-pain)(burning pain, 0-10) | 0.5 min (Intra-Op) | Local (lidocaine) (15mL 1% lidocaine + adrenaline 1:200,000) | 21 | 7.5(2.30) | Local (lidocaine-buffered) (15mL 1% lidocaine + adrenaline 1:200,000 buffered 8.4% sodium bicarbonate) | 21 | 2.3(1.30) | Mean Difference | 5.2(4.07,6.329988) | **Local (lidocaine-buffered) (15mL 1% lidocaine + adrenaline 1:200,000 buffered 8.4% sodium bicarbonate)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vossinakis,I.C., 2004 | High Quality | Questionnaire/Scale (VAS-pain)(stinging pain, 0-10) | 0.5 min (Intra-Op) | Local (lidocaine) (15mL 1% lidocaine + adrenaline 1:200,000) | 21 | 2.3(1.00) | Local (lidocaine-buffered) (15mL 1% lidocaine + adrenaline 1:200,000 buffered 8.4% sodium bicarbonate) | 21 | 2.4(0.80) | Mean Difference | -0.1(-0.65,0.447732) | Not Significant (P-value>.05) |
| Vossinakis,I.C., 2004 | High Quality | Questionnaire/Scale (VAS-pain)(Tension pain, 0-10) | 0.5 min (Intra-Op) | Local (lidocaine) (15mL 1% lidocaine + adrenaline 1:200,000) | 21 | 3.6(0.70) | Local (lidocaine-buffered) (15mL 1% lidocaine + adrenaline 1:200,000 buffered 8.4% sodium bicarbonate) | 21 | 3.5(0.50) | Mean Difference | 0.1(-0.27,0.467927) | Not Significant (P-value>.05) |
| Watts,A.C., 2004 | High Quality | Questionnaire/Scale (VAS-pain)(Pain 1 minute after injection, (0-100)) | 2 min (Intra-Op) | Local (lidocaine-buffered) (2% lidocaine buffered with sodium bicarbonate) | 32 | 17.3(2.70) | Local (lidocaine-not buffered) (2% plain lidocaine + sodium chloride) | 32 | 20(2.30) | Mean Difference | -2.7(-3.93,-1.47108) | **Local (lidocaine-buffered) (2% lidocaine buffered with sodium bicarbonate) (P-value<.05)** |

*TABLE 185: PICO 11 PART 2- LOCAL VERSUS REGIONAL: FUNCTION*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-hand function)(Hand function (Michigan Hand Outcomes Questionnaire, 0-100)) | NA (Pre-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 58(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 56(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-hand function)(Hand function (Michigan Hand Outcomes Questionnaire, 0-100)) | 2 weeks (Post-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 75(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 74(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-hand function)(Hand function (Michigan Hand Outcomes Questionnaire, 0-100)) | 6 months (Post-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 94(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 91(.) | Author Reported | NA | Not Significant (P-value>.05) |

*TABLE 186: PICO 11 PART 2- LOCAL VERSUS REGIONAL: OTHER*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tomaino,M.M., 2001 | Low Quality | Anxiety(Anxiety during anesthetic administration, 0-10) | 0 (Pre-Op) | Regional (lidocaine) (IVRA with lidocaine) | 15 | 1(.) | Local (lidocaine) (LA with lidocaine) | 15 | 0(.) | Author Reported | NA | Not Significant (P-value>.05) |

*TABLE 187: PICO 11 PART 2- LOCAL VERSUS REGIONAL: PAIN*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-pain)(Pain (Michigan Hand Outcomes Questionnaire, 0-100)) | NA (Pre-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 56(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 66(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-pain)(Pain (Michigan Hand Outcomes Questionnaire, 0-100)) | 2 weeks (Post-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 15(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 17(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-pain)(Pain (Michigan Hand Outcomes Questionnaire, 0-100)) | 6 months (Post-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 11(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 15(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nabhan,A., 2011 | Moderate Quality | Questionnaire/Scale (VAS-pain)(pain related to tourniquet, 0-10) | Intra-Op | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 4.6(0.90) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 4.5(1.60) | Mean Difference | 0.1(-0.68,0.880864) | Not Significant (P-value>.05) |
| Sorensen,A.M., 2013 | Moderate Quality | Questionnaire/Scale (VAS-pain)(0-10) | 0 min (Intra-Op) | Local (ropivacain) (7.5mg/ml Ropivacaine 10ml total) | 19 | 1.2(2.00) | Regional (mepivacaine) (1% Mepivacaine) | 19 | 1.4(2.30) | Mean Difference | -0.2(-1.57,1.170525) | Not Significant (P-value>.05) |
| Sorensen,A.M., 2013 | Moderate Quality | Questionnaire/Scale (VAS-pain)(0-10) | 40 min (Post-Op) | Local (ropivacain) (7.5mg/ml Ropivacaine 10ml total) | 19 | 0.2(0.60) | Regional (mepivacaine) (1% Mepivacaine) | 19 | 1.4(1.80) | Mean Difference | -1.2(-2.05,-0.34683) | **Local (ropivacain) (7.5mg/ml Ropivacaine 10ml total)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sorensen,A.M., 2013 | Moderate Quality | Questionnaire/Scale (VAS-pain)(0-10) | 20 min (Peri-Op) | Local (ropivacain) (7.5mg/ml Ropivacaine 10ml total) | 19 | 2.9(1.40) | Regional (mepivacaine) (1% Mepivacaine) | 19 | 3.6(2.70) | Mean Difference | -0.7(-2.07,0.667571) | Not Significant (P-value>.05) |
| Sorensen,A.M., 2013 | Moderate Quality | Questionnaire/Scale (VAS-pain)(0-10) | 2 hours (Post-Op) | Local (ropivacain) (7.5mg/ml Ropivacaine 10ml total) | 19 | 0.2(0.50) | Regional (mepivacaine) (1% Mepivacaine) | 19 | 1.4(1.80) | Mean Difference | -1.2(-2.04,-0.35997) | **Local (ropivacain) (7.5mg/ml Ropivacaine 10ml total)**<br>**(P-value<.05)** |
| Sorensen,A.M., 2013 | Moderate Quality | Questionnaire/Scale (VAS-pain)(0-10) | 24 hours (Post-Op) | Local (ropivacain) (7.5mg/ml Ropivacaine 10ml total) | 19 | 1.3(2.30) | Regional (mepivacaine) (1% Mepivacaine) | 19 | 1.1(1.70) | Mean Difference | 0.2(-1.09,1.486044) | Not Significant (P-value>.05) |
| Tomaino,M.M., 2001 | Low Quality | Questionnaire/Scale (VAS-pain)(pain during anesthetic administration, 0-10) | 0 (Pre-Op) | Regional (lidocaine) (IVRA with lidocaine) | 15 | 1(.) | Local (lidocaine) (LA with lidocaine) | 15 | 2(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Tomaino,M.M., 2001 | Low Quality | Questionnaire/Scale (VAS-pain)(Pain during surgery, 0-10) | 30 min (Intra-Op) | Regional (lidocaine) (IVRA with lidocaine) | 15 | 1(.) | Local (lidocaine) (LA with lidocaine) | 15 | 3(.) | Author Reported | NA | Not Significant (P-value>.05) |

*TABLE 188: PICO 11 PART 2- LOCAL VERSUS REGIONAL: QUALITY OF LIFE*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-activity of daily living)(Activity of daily living (Michigan Hand Outcomes Questionnaire, 0-100)) | NA (Pre-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 67(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 63(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-activity of daily living)(Activity of daily living (Michigan Hand Outcomes Questionnaire, 0-100)) | 2 weeks (Post-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 85(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 89(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-activity of daily living)(Activity of daily living (Michigan Hand Outcomes Questionnaire, 0-100)) | 6 months (Post-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 95(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 95(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-patient satisfaction)(Patient satisfaction (Michigan Hand Outcomes Questionnaire, 0-100)) | NA (Pre-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 32(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 36(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-patient satisfaction)(Patient satisfaction (Michigan Hand Outcomes Questionnaire, 0-100)) | 2 weeks (Post-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 85(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 79(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-patient satisfaction)(Patient satisfaction (Michigan Hand Outcomes Questionnaire, 0-100)) | 6 months (Post-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 88(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 85(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-work performance)(Work performance (Michigan Hand Outcomes Questionnaire, 0-100)) | NA (Pre-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 55(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 52(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-work performance)(Work performance (Michigan Hand Outcomes Questionnaire, 0-100)) | 2 weeks (Post-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 78(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 80(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nabhan,A., 2011 | Moderate Quality | Questionnaire (MHQ-work performance)(Work performance (Michigan Hand Outcomes Questionnaire, 0-100)) | 6 months (Post-Op) | Local (10ml of 1% prilocaine) (LA-20ml prilocaine) | 22 | 89(.) | Regional (30 ml of 1% prilocaine) (IVRA-30mL 1% prilocaine) | 21 | 87(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Tomaino,M.M., 2001 | Low Quality | Questionnaire/Scale (VAS-patient satisfaction)(patient satisfaction with anesthesia) | 90 days (Post-Op) | Regional (lidocaine) (IVRA with lidocaine) | 15 | 1(.) | Local (lidocaine) (LA with lidocaine) | 15 | 3(.) | Author Reported | NA | Not Significant (P-value>.05) |

## ASPIRIN USE

Limited evidence supports that the patient might continue the use of aspirin perioperatively; no evidence meeting our inclusion criteria addressed other anticoagulants.

### Strength of Recommendation: Limited Evidence ★★☆☆

Description: Evidence from one or more “Low” quality studies with consistent findings **or** evidence from a single “Moderate” quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

### Rationale

One low quality study (Brunetti 2013) met our inclusion criteria. This study examined only aspirin use that was either continued or stopped five days before surgery and resumed three days postoperatively. Compared with controls that were not on aspirin, there were no differences in either hematoma formation or other general complications. There is no evidence meeting our criteria on any other anticoagulant therapies.

### Risks and Harms of Implementing this Recommendation

There is a potential risk of bleeding in patients who undergo surgical procedures while on anticoagulants.

### Future Research

Investigate anticoagulant use in carpal tunnel surgery using different types of anesthesia and with and without the use of a tourniquet as well. More data is needed on other anticoagulant types including NSAIDs.

## ***STUDY QUALITY TABLE OF PERI-OPERATIVE ANTICOAGULATION CESSATION***

*TABLE 189. INTERVENTION QUALITY EVALUATIONS*

| Study | Design | Participant Recruitment | Allocation | Confounding Variables | Follow-Up Length | Other Bias? (If retrospective comparative, mark Yes) | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brunetti,S., 2013 | ○ | ● | ● | ● | ◑ | ● | ● | ● | ● | Include | Low Quality |

## RESULTS

### *SUMMARY OF DATA FINDINGS*

*TABLE 190: SUMMARY OF FINDINGS PICO 12 PERI-OPERATIVE ANTICOAGULATION CESSATION*

| | **Low Quality** | | | **Meta-Analysis** |
|---|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **Brunetti,S., 2013 (1)** | **Brunetti,S., 2013 (2)** | **Brunetti,S., 2013 (3)** | |
| **Complications** | | | | |
| Complications (general) | ○ | ○ | ○ | **NA** |
| Complications (haematoma) | ○ | ○ | ○ | **NA** |

## *DETAILED DATA FINDINGS*

### *TABLE 191: PICO 12- ANTICOAGULATION: COMPLICATIONS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Brunetti,S., 2013 | Low Quality | Complications (general)(Combination of major+minor complications) | 3 months | Group 2 (stop aspirin) (Aspirin stopped at least 5 d before surgery and resumed 3 d after) | 50 | 2.00% | Group 3 (never antiaggregated) (Patients did not take aspirin) | 50 | 2.00% | RR | 1.00(0.06,15.55) | Not Significant (P-value>.05) |
| Brunetti,S., 2013 | Low Quality | Complications (general)(Combination of major+minor complications) | 3 months | Anticoagulation (continued) (Non-stop Aspirin for 1 year) | 50 | 2.00% | Anticoagulation (cessation) (Aspirin stopped at least 5 d before surgery and resumed 3 d after) | 50 | 2.00% | RR | 1.00(0.06,15.55) | Not Significant (P-value>.05) |
| Brunetti,S., 2013 | Low Quality | Complications (general)(Combination of major+minor complications) | 3 months | Anticoagulation (continued) (Non-stop Aspirin for 1 year) | 50 | 2.00% | No anticoagulation (Patients did not take aspirin) | 50 | 2.00% | RR | 1.00(0.06,15.55) | Not Significant (P-value>.05) |
| Brunetti,S., 2013 | Low Quality | Complications (haematoma)(Major+minor Haematoma combined) | 3 months | Group 2 (stop aspirin) (Aspirin stopped at least 5 d before surgery and resumed 3 d after) | 50 | 18.00% | Group 3 (never antiaggregated) (Patients did not take aspirin) | 50 | 16.00% | RR | 1.13(0.47,2.68) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Brunetti,S., 2013 | Low Quality | Complications (haematoma)(Major+minor Haematoma combined) | 3 months | Anticoagulation (continued) (Non-stop Aspirin for 1 year) | 50 | 20.00% | Anticoagulation (cessation) (Aspirin stopped at least 5 d before surgery and resumed 3 d after) | 50 | 18.00% | RR | 1.11(0.49,2.50) | Not Significant (P-value>.05) |
| Brunetti,S., 2013 | Low Quality | Complications (haematoma)(Major+minor Haematoma combined) | 3 months | Anticoagulation (continued) (Non-stop Aspirin for 1 year) | 50 | 20.00% | No anticoagulation (Patients did not take aspirin) | 50 | 16.00% | RR | 1.25(0.54,2.90) | Not Significant (P-value>.05) |

## PREOPERATIVE ANTIBIOTICS

Limited evidence supports that there is no benefit for routine use of prophylactic antibiotics prior to carpal tunnel release because there is no demonstrated reduction in postoperative surgical site infection.

### Strength of Recommendation: Limited Evidence ★★☆☆

Description: Evidence from one or more "Low" quality studies with consistent findings **or** evidence from a single "Moderate" quality study recommending for or against the intervention or diagnostic test or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.

### Rationale

There were two low quality studies (Harness, Tosti) which evaluated the use of prophylactic antibiotics in carpal tunnel release. Neither study showed a statistically significant difference between the groups receiving prophylactic antibiotics and those not receiving antibiotics. There is insufficient evidence to support the routine use of prophylactic antibiotics to prevent surgical site infections in carpal tunnel release.

### Risks and Harms of Implementing this Recommendation

Routine use of prophylactic antibiotics is not without consequence. Financial cost, anaphylaxis, development of antibiotic resistance, and changes in microbiome population are all factors

### Future Research

Future research should consider reporting on the associated cost, value, and quality of life as they relate to antibiotics. Future research should also focus on the efficacy of preoperative antibiotic treatment in diabetics and/or other immunocompromised populations.

## *STUDY QUALITY TABLE OF PREOPERATIVE ANTIBIOTICS*

*TABLE 192. INTERVENTION QUALITY EVALUATIONS*

| Study | Design | Participant Recruitment | Allocation | Confounding Variables | Follow-Up Length | Other Bias? (If retrospective comparative, mark Yes) | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Harness,N.G., 2010 | ○ | ● | ● | ● | ● | ○ | ● | ● | ● | Include | Low Quality |
| Tosti,R., 2012 | ○ | ● | ● | ○ | ● | ● | ● | ● | ● | Include | Low Quality |

# RESULTS

## *SUMMARY OF DATA FINDINGS*

*TABLE 193: SUMMARY OF FINDINGS PICO 13 PROPHYLACTIC ANTIBIOTICS*

| | Low Quality | | Meta-Analysis |
|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **Harness,N.G., 2010** | **Tosti,R., 2012** | |
| **Complications** | | | |
| Surgical site infection | ○ | ○ | **NA** |

## *DETAILED DATA FINDINGS*

### *TABLE 194: PICO 13- PROPHYLACTIC ANTIBIOTICS: COMPLICATIONS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Harness,N.G., 2010 | Low Quality | Surgical site infection( ) | 1 month | Patients Without Prophylactic Antibiotics (No prophylactic antibiotics) | 917 | 0.65% | Patients With Prophylactic Antibiotics (Prophylactic antibiotics) | 1419 | 0.35% | RR | 1.86(0.57,6.07) | Not Significant (P-value>.05) |
| Tosti,R., 2012 | Low Quality | Surgical site infection( ) | 1 month | Patients Without Prophylactic Antibiotics ( ) | 198 | 1.01% | Patients With Prophylactic Antibiotics ( ) | 102 | 0.98% | RR | 1.03(0.09,11.23) | Not Significant (P-value>.05) |

## SUPERVISED VERSUS HOME THERAPY

Moderate evidence supports no additional benefit to routine supervised therapy over home programs in the immediate postoperative period. No evidence meeting the inclusion criteria was found comparing the potential benefit of exercise versus no exercise after surgery.

### Strength of Recommendation: Moderate Evidence ★★★☆

Description: Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention.

### Rationale

Routine post-operative therapy after carpal tunnel release was examined in 6 high quality studies. From these, two studies (Hochberg 2001 and Jerosch-Herold 2012) addressed interventions not relevant to current core practices of postoperative rehabilitation. The remaining four studies (Alves 2011, Fagan 2004, Pomerance 2007, and Provinciali 2000) addressed the need for supervised therapy in addition to a home program in the early postoperative period, the early use of laser, or the role of sensory reeducation in the later stages of recovery.

One high quality study (Alves 2011) evaluated the use of laser administered to the carpal tunnel in 10 daily consecutive sessions at a 3J dosage and found no difference in pain/symptom reoccurrence in comparison to placebo.

Two moderate quality studies (Pomerance 2007 and Provinciali 2000) compared in-clinic or therapist supervised exercise programs in addition to a home program to a home program alone. The studies were somewhat limited by an incomplete description of who delivered home programs, exercise/education content and dosage, and treatment progression. Pomerance (2007) compared a two week program directed by a therapist combined with a home program alone and found no additional benefit in terms of grip or pinch strength in comparison to the home program alone. Provinciali (2000) compared one hour sessions over 10 consecutive days of in-clinic physiotherapy comprising a multimodal program with a home program that was progressed in terms of strength/endurance. No benefit was found in outcome when measured by a CTS-specific patient reported instrument.

### Risks and Harms of Implementing this Recommendation

There is no known harm to implementing this recommendation.

### Future Research

More trials comparing different approaches are needed. These studies should include validated measures of patient-reported outcomes, impairment, adherence and costs. Better description of the characteristics of the exercise and education content, provider and delivery are needed. Studies that address how to identify subsets that need different approaches (treatment-based prediction rules) or targeting of interventions based on different surgical approaches, patient presentations or individual circumstances are also needed.

## ***STUDY QUALITY TABLE OF POST-OPERATIVE THERAPY***

*TABLE 195. INTERVENTION QUALITY EVALUATIONS*

| Study | Random Sequence Generation | Allocation Concealment | Blinding | Incomplete Outcome Data | Selective Reporting | Other Bias | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | ◑ | ◑ | ◑ | ● | ◑ | ◑ | ● | ● | ● | Include | Moderate Quality |
| Fagan,D.J., 2004 | ● | ◑ | ● | ● | ◑ | ◑ | ● | ● | ● | Include | High Quality |
| Jerosch-Herold,C., 2012 | ● | ● | ○ | ● | ◑ | ○ | ● | ● | ● | Include | Moderate Quality |
| Pomerance,J., 2007 | ● | ◑ | ● | ● | ◑ | ● | ● | ● | ● | Include | High Quality |
| Provinciali,L., 2000 | ◑ | ● | ◑ | ● | ◑ | ◑ | ● | ● | ● | Include | Moderate Quality |

# RESULTS

## *SUMMARY OF DATA FINDINGS*

### *TABLE 196: SUMMARY OF FINDINGS PICO 14 POST-OP THERAPY (EARLY FOLLOW-UP (< 1 MONTH))*

**Favors treatment 1** 🟢
**Favors treatment 2** ●
**Not significant** ○

| | High Quality | | Moderate Quality | | |
|---|---|---|---|---|---|
| **Outcomes** | **Fagan,D.J., 2004** | **Pomerance,J., 2007** | **Alves,M.P.T., 2011** | **Provinciali,L., 2000** | **Meta-Analysis** |
| **Complications** | | | | | |
| **Symptom occurrence (pillar pain)** | | | ○ | | **NA** |
| **Symptom occurrence (scar pain)** | | | ○ | | **NA** |
| **Function** | | | | | |
| **Grip Strength** | | ○ | | | **NA** |
| **Pinch Strength** | | ○ | | | **NA** |
| **Questionnaire (General/Undefined)** | | | | | |
| Boston CT score-walking with numbness | | | | ○ | **NA** |
| Functional sensibility (locognosia test) | | | | | **NA** |
| Functional sensibility (Shape-Texture Identification (STI) test)) | | | | | |
| 0 days | | | | | **NA** |
| 28 days | | | | | **NA** |
| Functional sensibility (Weinstein Enhanced Sensory Test (WEST)) | | | | | |
| 0 days | | | | | **NA** |
| 28 days | | | | | **NA** |
| Moberg pick-up test | | | | | |
| 0 days | | | | | **NA** |
| 28 days | | | | | **NA** |
| **Two-point discrimination** | | | | | |
| Functional sensibility (static two point discrimination (2PD)) | | | | | |
| 0 days | | | | | **NA** |
| 28 days | | | | | **NA** |
| 56 days | | | | | **NA** |
| **Other** | | | | | |
| **Median nerve swelling** | ○ | | | | **NA** |
| **Questionnaire (General/undefined)** | | | | | |
| Boston CT score-duration of episode | | | | ○ | **NA** |
| **Questionnaire (DASH)** | | | | | **NA** |
| **Pain** | | | | | |
| **Questionnaire (General/undefined)** | | | | | |
| Boston CT score-daytime pain | | | | ○ | **NA** |
| Boston CT score-recurrence of pain | | | | ○ | **NA** |
| Boston CT score-severity of pain | | | | ○ | **NA** |
| Boston CT score-waking with pain | | | | ○ | **NA** |
| VAS, 0-10 | | | | | |
| 0 days | | | | | **NA** |
| 3 days | | | | | **NA** |
| **Questionnaire/Scale (VAS-pain)** | ○ | | | | **NA** |
| **Symptom recurrence (palmar pain)** | | | ○ | | **NA** |
| **Quality Of Life** | | | | | |
| **Return to Work** | | ○ | | | **NA** |
| **Symptoms** | | | | | |
| **Questionnaire (General/undefined)** | | | | | |
| Boston CT score-numbness | | | | ○ | **NA** |
| Boston CT score-severity of numbness | | | | ○ | **NA** |
| Boston CT score-tingling sensation | | | | ○ | **NA** |
| Boston CT score-weakness | | | | ○ | **NA** |
| **Symptom recurrence (Night time pain)** | | | ○ | | **NA** |
| **Symptom recurrence (numbness)** | | | ○ | | **NA** |

*TABLE 197: SUMMARY OF FINDINGS PICO 14 POST-OP THERAPY (LATE FOLLOW-UP (> 1 MONTH))*

| | **High Quality** | **Moderate Quality** | | | **Meta-Analysis** |
|---|---|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **Pomerance,J., 2007** | **Alves,M.P.T., 2011** | **Jerosch-Herold,C., 2012** | **Provinciali,L., 2000** | |
| **Complications** | | | | | |
| **Symptom occurrence (pillar pain)** | | | | | |
| 60 days | | ○ | | | **NA** |
| 90 days | | ○ | | | **NA** |
| 180 days | | ○ | | | **NA** |
| **Symptom occurrence (scar pain)** | | | | | |
| 60 days | | ○ | | | **NA** |
| 90 days | | ○ | | | **NA** |
| 180 days | | ○ | | | **NA** |
| **Function** | | | | | |
| **Grip strength** | ○ | | | | **NA** |
| **Pinch Strength** | ○ | | | | **NA** |
| **Questionnaire (General/Undefined)** | | | | | |
| Boston CT score-walking with numbness | | | | ○ | **NA** |
| Functional sensibility (locognosia test) | | | ○ | | **NA** |
| Functional sensibility (Shape-Texture Identification (STI) test)) | | | | | **NA** |
| 17.5 months | | | ○ | | |
| 18.5 months | | | 🟢 | | |
| 19.5 months | | | 🟢 | | |
| Functional sensibility (Weinstein Enhanced Sensory Test (WEST)) | | | | | **NA** |
| 17.5 months | | | ○ | | |
| 18.5 months | | | 🟢 | | |
| 19.5 months | | | ○ | | |
| Moberg pick-up test | | | | | **NA** |
| 17.5 months | | | ○ | | |
| 18.5 months | | | 🟢 | | |
| 19.5 months | | | 🟢 | | |
| **Two-point discrimination** | | | | | **NA** |
| 17.5 months | | | ○ | | |
| 18.5 months | | | 🟢 | | |
| 19.5 months | | | ○ | | |
| **Other** | | | | | |
| **Questionnaire (General/Undefined)** | | | | | |
| Boston CT score-duration of episode | | | | ○ | **NA** |
| **Questionnaire (DASH)** | | | ○ | | **NA** |
| **Pain** | | | | | |
| **Questionnaire (General/Undefined)** | | | | | |
| Boston CT score-daytime pain | | | | ○ | **NA** |
| Boston CT score-recurrence of pain | | | | ○ | **NA** |
| Boston CT score-severity of pain | | | | ○ | **NA** |
| Boston CT score-waking with pain | | | | ○ | **NA** |
| **Symptom recurrence (palmar pain)** | | | | | |
| 60 days | | ○ | | | **NA** |
| 90 days | | ○ | | | **NA** |
| 180 days | | ○ | | | **NA** |
| **Quality Of Life** | | | | | |
| **Return to Work** | ○ | | | | **NA** |
| **Symptoms** | | | | | |
| **Questionnaire (General/Undefined)** | | | | | |
| Boston CT score-numbness | | | | ○ | **NA** |
| Boston CT score-severity of numbness | | | | ○ | **NA** |
| Boston CT score-tingling sensation | | | | ○ | **NA** |
| Boston CT score-weakness | | | | ○ | **NA** |
| **Symptom recurrence (night time pain)** | | ○ | | | **NA** |
| **Symptom recurrence (numbness)** | | 🟢 | | | **NA** |

## *DETAILED DATA FINDINGS*

### *TABLE 198: PICO 14- POST-OP THERAPY: COMPLICATIONS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom occurrence (pillar pain)( ) | 1 month | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 27.59% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 20.69% | RR | 1.33(0.53,3.36) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom occurrence (pillar pain)( ) | 2 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 13.79% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 24.14% | RR | 0.57(0.19,1.74) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom occurrence (pillar pain)( ) | 3 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 13.79% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 20.69% | RR | 0.67(0.21,2.12) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom occurrence (pillar pain)( ) | 5.9 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 3.45% | RD | -0.03(-0.10,0.03) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom occurrence (scar pain)( ) | 1 month | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 31.03% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 55.17% | RR | 0.56(0.30,1.06) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom occurrence (scar pain)( ) | 2 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 10.34% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 20.69% | RR | 0.50(0.14,1.81) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom occurrence (scar pain)( ) | 3 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 3.45% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 10.34% | RR | 0.33(0.04,3.02) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom occurrence (scar pain)( ) | 5.9 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 3.45% | RD | -0.03(-0.10,0.03) | Not Significant (P-value>.05) |

*TABLE 199: PICO 14- POST-OP THERAPY: FUNCTION*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pomerance,J., 2007 | High Quality | Grip strength(Kilograms) | 2 weeks | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 19.1(10.60) | No therapy (No therapist-directed program (received instructions)) | 77 | 19.8(10.00) | Mean Difference | -0.7(-4.00,2.601817) | Not Significant (P-value>.05) |
| Pomerance,J., 2007 | High Quality | Grip strength(Kilograms) | 1 month | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 24(9.00) | No therapy (No therapist-directed program (received instructions)) | 77 | 23.8(9.90) | Mean Difference | 0.2(-2.83,3.225294) | Not Significant (P-value>.05) |
| Pomerance,J., 2007 | High Quality | Grip strength(Kilograms) | 1.4 months | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 24.8(9.20) | No therapy (No therapist-directed program (received instructions)) | 77 | 24.7(9.00) | Mean Difference | 0.1(-2.81,3.014672) | Not Significant (P-value>.05) |
| Pomerance,J., 2007 | High Quality | Grip strength(Kilograms) | 3 months | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 26(8.90) | No therapy (No therapist-directed program (received instructions)) | 77 | 26.6(8.80) | Mean Difference | -0.6(-3.43,2.234069) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pomerance,J., 2007 | High Quality | Grip strength(Kilograms) | 5.9 months | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 26.2(10.00) | No therapy (No therapist-directed program (received instructions)) | 77 | 26.6(9.90) | Mean Difference | -0.4(-3.59,2.786263) | Not Significant (P-value>.05) |
| Pomerance,J., 2007 | High Quality | Pinch Strength(Kilograms) | 2 weeks | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 4.1(2.30) | No therapy (No therapist-directed program (received instructions)) | 77 | 4.8(2.20) | Mean Difference | -0.7(-1.42,0.021010) | Not Significant (P-value>.05) |
| Pomerance,J., 2007 | High Quality | Pinch Strength(Kilograms) | 1 month | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 5.6(2.00) | No therapy (No therapist-directed program (received instructions)) | 77 | 5.6(2.20) | Mean Difference | 0(-0.67,0.672287) | Not Significant (P-value>.05) |
| Pomerance,J., 2007 | High Quality | Pinch Strength(Kilograms) | 1.4 months | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 6.9(2.50) | No therapy (No therapist-directed program (received instructions)) | 77 | 7(2.40) | Mean Difference | -0.1(-0.89,0.685032) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pomerance,J., 2007 | High Quality | Pinch Strength(Kilograms) | 3 months | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 7.5(2.30) | No therapy (No therapist-directed program (received instructions)) | 77 | 7.7(2.50) | Mean Difference | -0.2(-0.97,0.568246) | Not Significant (P-value>.05) |
| Pomerance,J., 2007 | High Quality | Pinch Strength(Kilograms) | 5.9 months | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 7.6(2.30) | No therapy (No therapist-directed program (received instructions)) | 77 | 7.8(2.30) | Mean Difference | -0.2(-0.94,0.536415) | Not Significant (P-value>.05) |
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (General/undefined)(Functional sensibility (locognosia test)) | 17.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 16 | 41(12.94) | No further treatment (No further treatment) | 15 | 42.8(8.14) | Mean Difference | -1.8(-9.36,5.761265) | Not Significant (P-value>.05) |
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (General/undefined)(Functional sensibility (Shape-Texture Identification (STI) test)) | 17.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 16 | 3.38(1.69) | No further treatment (No further treatment) | 15 | 2.67(1.99) | Mean Difference | 0.71(-0.59,2.013824) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (General/undefined)(Functional sensibility (Weinstein Enhanced Sensory Test (WEST))) | 17.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 16 | 2.53(0.94) | No further treatment (No further treatment) | 15 | 2.37(0.40) | Mean Difference | 0.16(-0.34,0.663119) | Not Significant (P-value>.05) |
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (General/undefined)(Moberg pick-up test) | 17.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 16 | 3.72(0.57) | No further treatment (No further treatment) | 15 | 3.88(0.53) | Mean Difference | -0.16(-0.55,0.227232) | Not Significant (P-value>.05) |
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (General/undefined)(Functional sensibility (locognosia test)) | 18.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 13 | 48.85(6.91) | No further treatment (No further treatment) | 13 | 43.15(8.05) | Mean Difference | 5.7(-0.07,11.46711) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (General/undefined)(Functional sensibility (Shape-Texture Identification (STI) test))) | 18.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 13 | 4.92(1.38) | No further treatment (No further treatment) | 13 | 3.31(1.93) | Mean Difference | 1.61(0.32,2.899767) | **4-week sensory relearning home program (Post-op 4-week sensory relearning home program) (P-value<.05)** |
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (General/undefined)(Functional sensibility (Weinstein Enhanced Sensory Test (WEST))) | 18.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 13 | 3.08(0.64) | No further treatment (No further treatment) | 13 | 2.54(0.52) | Mean Difference | 0.54(0.09,0.988269) | **4-week sensory relearning home program (Post-op 4-week sensory relearning home program) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (General/undefined)(Moberg pick-up test) | 18.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 13 | 3.36(0.22) | No further treatment (No further treatment) | 13 | 3.97(0.37) | Mean Difference | -0.61(-0.84,-0.37599) | **4-week sensory relearning home program (Post-op 4-week sensory relearning home program) (P-value<.05)** |
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (General/undefined)(Functional sensibility (locognosia test)) | 19.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 11 | 49.46(5.05) | No further treatment (No further treatment) | 13 | 43.39(11.08) | Mean Difference | 6.07(-0.65,12.79196) | Not Significant (P-value>.05) |
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (General/undefined)(Functional sensibility (Shape-Texture Identification (STI) test)) | 19.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 11 | 5.09(1.30) | No further treatment (No further treatment) | 13 | 3.15(1.91) | Mean Difference | 1.94(0.65,3.231607) | **4-week sensory relearning home program (Post-op 4-week sensory relearning home program) (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (General/undefined)(Functional sensibility (Weinstein Enhanced Sensory Test (WEST))) | 19.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 11 | 2.95(0.65) | No further treatment (No further treatment) | 13 | 2.58(0.67) | Mean Difference | 0.37(-0.16,0.899344) | Not Significant (P-value>.05) |
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (General/undefined)(Moberg pick-up test) | 19.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 11 | 3.33(0.37) | No further treatment (No further treatment) | 13 | 3.68(0.49) | Mean Difference | -0.35(-0.69,-0.00538) | **4-week sensory relearning home program (Post-op 4-week sensory relearning home program) (P-value<.05)** |
| Jerosch-Herold,C., 2012 | Moderate Quality | Two-point discrimination (2PD)(Functional sensibility (static two point discrimination (2PD))) | 17.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 16 | 5.19(3.24) | No further treatment (No further treatment) | 15 | 6.3(3.38) | Mean Difference | -1.11(-3.44,1.223739) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jerosch-Herold,C., 2012 | Moderate Quality | Two-point discrimination (2PD)(Functional sensibility (static two point discrimination (2PD))) | 18.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 13 | 3.42(1.38) | No further treatment (No further treatment) | 13 | 5.81(2.89) | Mean Difference | -2.39(-4.13,-0.64905) | **4-week sensory relearning home program (Post-op 4-week sensory relearning home program) (P-value<.05)** |
| Jerosch-Herold,C., 2012 | Moderate Quality | Two-point discrimination (2PD)(Functional sensibility (static two point discrimination (2PD))) | 19.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 11 | 4.18(1.74) | No further treatment (No further treatment) | 13 | 6.35(4.09) | Mean Difference | -2.17(-4.62,0.279618) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali, L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-walking with numbness) | NA | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 3.84(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 3.8(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali, L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-walking with numbness) | 1 month | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali, L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-walking with numbness) | 3 months | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |

*TABLE 200: PICO 14- POST-OP THERAPY: OTHER*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fagan,D.J., 2004 | High Quality | Median nerve swelling(Swelling: volume of operated hand) | Peri-Op | Elevation device (Post-op day-case-4 hour Home elevation device+Bradford Sling with high elevation) | 21 | 370(78.00) | Simple sling (Post-op day-case-4 hour Crepe sling held with low elevation (below 90 degrees)) | 22 | 363(68.00) | Mean Difference | 7(-36.82,50.82237) | Not Significant (P-value>.05) |
| Fagan,D.J., 2004 | High Quality | Median nerve swelling(Swelling: volume of operated hand) | 5 Days | Elevation device (Post-op day-case-4 hour Home elevation device+Bradford Sling with high elevation) | 21 | 380(77.00) | Simple sling (Post-op day-case-4 hour Crepe sling held with low elevation (below 90 degrees)) | 22 | 376(67.00) | Mean Difference | 4(-39.23,47.22583) | Not Significant (P-value>.05) |
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (DASH)(DASH addresses symptoms as well as function) | 17.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 16 | 38.94(22.29) | No further treatment (No further treatment) | 15 | 47(19.88) | Mean Difference | -8.06(-22.91,6.789555) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (DASH)(DASH addresses symptoms as well as function) | 18.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 13 | 38.7(23.38) | No further treatment (No further treatment) | 13 | 46.28(18.90) | Mean Difference | -7.58(-23.92,8.762888) | Not Significant (P-value>.05) |
| Jerosch-Herold,C., 2012 | Moderate Quality | Questionnaire (DASH)(DASH addresses symptoms as well as function) | 19.5 months | 4-week sensory relearning home program (Post-op 4-week sensory relearning home program) | 11 | 32.28(23.10) | No further treatment (No further treatment) | 13 | 45.14(23.86) | Mean Difference | -12.86(-31.69,5.970518) | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-duration of episode) | NA | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 2.7(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 3.02(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-duration of episode) | 1 month | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 2.04(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 2.02(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-duration of episode) | 3 months | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |

*TABLE 201: PICO 14- POST-OP THERAPY: PAIN*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fagan,D.J., 2004 | High Quality | Questionnaire/Scale (VAS-pain)( ) | 5 Days | Elevation device (Post-op day-case-4 hour Home elevation device+Bradford Sling with high elevation) | 21 | 2.2(1.30) | Simple sling (Post-op day-case-4 hour Crepe sling held with low elevation (below 90 degrees)) | 22 | 2.7(1.50) | Mean Difference | -0.5(-1.34,0.337883) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom recurrence (pain)(Palmar pain) | 1 month | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 27.59% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 37.93% | RR | 0.73(0.34,1.54) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom recurrence (pain)(Palmar pain) | 2 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 3.45% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 20.69% | RR | 0.17(0.02,1.30) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom recurrence (pain)(Palmar pain) | 3 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 3.45% | RD | -0.03(-0.10,0.03) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom recurrence (pain)(Palmar pain) | 5.9 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 3.45% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 3.45% | RR | 1.00(0.07,15.24) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-daytime pain) | NA | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 2.66(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 2.72(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-recurrence of pain) | NA | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 2.82(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 2.9(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-severity of pain) | NA | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 2.98(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 2.9(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-waking with pain) | NA | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 2.9(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 3.04(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-daytime pain) | 1 month | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1.64(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1.5(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-recurrence of pain) | 1 month | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1.78(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1.62(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-severity of pain) | 1 month | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1.1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1.08(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-waking with pain) | 1 month | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1.12(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1.18(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-daytime pain) | 3 months | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-recurrence of pain) | 3 months | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-severity of pain) | 3 months | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-waking with pain) | 3 months | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |

*TABLE 202: PICO 14- POST-OP THERAPY: QUALITY OF LIFE*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pomerance,J., 2007 | High Quality | Return to Work(after each interval, same number of patients included from previous interval (# is # not returning to work)) | NR | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 30.14% | No therapy (No therapist-directed program (received instructions)) | 77 | 27.27% | RR | 1.11(0.67,1.83) | Not Significant (P-value>.05) |
| Pomerance,J., 2007 | High Quality | Return to Work(after each interval, same number of patients included from previous interval (# is # not returning to work)) | 1.4 months | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 15.07% | No therapy (No therapist-directed program (received instructions)) | 77 | 16.88% | RR | 0.89(0.43,1.86) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pomerance,J., 2007 | High Quality | Return to Work(after each interval, same number of patients included from previous interval (# is # not returning to work)) | 1.8 months | Home therapy exercises (Post-op 2 week therapist-directed program) | 73 | 2.74% | No therapy (No therapist-directed program (received instructions)) | 77 | 6.49% | RR | 0.42(0.08,2.11) | Not Significant (P-value>.05) |

*TABLE 203: PICO 14- POST-OP THERAPY: SYMPTOMS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom recurrence (general) (Nighttime pain) | 1 month | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | RD | 0.00(0.00,0.00) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom recurrence (general)(Nighttime pain) | 2 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | RD | 0.00(0.00,0.00) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom recurrence (general)(Nighttime pain) | 3 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | RD | 0.00(0.00,0.00) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom recurrence (general)(Nighttime pain) | 5.9 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | RD | 0.00(0.00,0.00) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom recurrence (numbness)(May not completely be a recurrence for all patients) | 1 month | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 10.34% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 27.59% | RR | 0.38(0.11,1.27) | Not Significant (P-value>.05) |

| **Reference Title** | **Quality** | **Outcome Details** | **Duration** | **Treatment 1 (Details)** | **Group 1 N** | **Mean1/P 1 (SD1)** | **Treatment 2 (Details)** | **Group 2 N** | **Mean2/P 2 (SD2)** | **Effect Measure** | **Result (95% CI)** | **Favored Treatment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom recurrence (numbness)(May not completely be a recurrence for all patients) | 2 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 20.69% | RD | -0.21(-0.35,-0.06) | **Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).)**<br>**Significant (P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom recurrence (numbness)(May not completely be a recurrence for all patients) | 3 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 10.34% | RD | -0.10(-0.21,0.01) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alves,M.P.T., 2011 | Moderate Quality | Symptom recurrence (numbness)(May not completely be a recurrence for all patients) | 5.9 months | Low-level laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 0.00% | Placebo laser therapy (The treatment was performed in 10 daily, consecutive sessions, with an interval of two days (weekend), using a total of three Joules, at three points of the carpal tunnel (in the topography of the pisiform bone, in the middle of the carpal tunnel and at the distal limit of the carpal tunnel).) | 29 | 6.90% | RD | -0.07(-0.16,0.02) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-numbness) | NA | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 3.02(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 2.78(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-severity of numbness) | NA | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 3.68(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 3.62(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-tingling sensation) | NA | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 3.5(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 3.38(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-weakness) | NA | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 3.96(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 3.9(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-numbness) | 1 month | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1.02(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1.08(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-severity of numbness) | 1 month | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1.12(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-tingling sensation) | 1 month | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1.04(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-weakness) | 1 month | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1.12(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-numbness) | 3 months | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-severity of numbness) | 3 months | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-tingling sensation) | 3 months | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Provinciali,L., 2000 | Moderate Quality | Questionnaire (General/undefined)(Boston CT score-weakness) | 3 months | Rehabilitation program (Post-op 10 day 1-hour sessions of physiotherapy 12 days after surgery (multimodal rehabilitative treatment)) | 50 | 1(.) | Progressive home exercise program (Post-op non-splinting progressive home exercise program designed to gradually increase strength and endurance) | 50 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |

## POSTOPERATIVE IMMOBILIZATION

Strong evidence supports no benefit to routine postoperative immobilization after carpal tunnel release.

**Strength of Recommendation: Strong Evidence** ★★★★

Description: Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention.

### Rationale

There were two high quality studies (Bury et al, Finsen et al) and four moderate quality studies (Cebesay et al, Cook et al, Huemer et al, Martins et al) that evaluated post-operative splinting in comparison to no splinting. These studies did not identify any clear benefit to immediate post-operative splinting.

One high quality study (Bury et al) showed no short or long-term difference in regards to grip strength, pinch strength, and range of motion between patients splinted for 2 weeks post-operatively and patients who had no splinting. A second high quality study (Finsen et al) also showed no difference in grip strength and pinch at 1.4 and 5.9 months between the splinted and unsplinted groups.

A moderate strength study (Cook et al) did show a statistically significant improvement in grip and pinch strength at 2 weeks and 4 weeks in patients who were not splinted and allowed to begin early range of motion exercises compared with patients splinted for 2 weeks. A treatment effect of allowing early range of motion exercises may have contributed to the increase in the improvement in motion in the short term. At three months after surgery, there was no difference between the splinted and unsplinted groups in regards to grip and pinch strength.

One moderate strength study (Martins et al) did show a short-term benefit to post-operative splinting in regards to 2-point discrimination at 2 weeks in patients that were splinted, but this effect was not present at the 3 month follow-up.

One high quality study (Ritting et al) showed no difference in wound complications between patients who removed a bulky, post-operative dressing at 48-72 hours and patients who kept their dressing on for 2 weeks. At two weeks follow-up, the group who removed their dressing early had better grip and 3-point pinch strength, however, there was no difference in 3-point pinch strength between the groups at week follow up six and 12 weeks after surgery. Of note, the patients randomized to early dressing removal had better grip strength pre-operatively, compared to the group randomized to maintaining the dressing for 2 weeks, which may have accounted for the differences observed.

### Risks and Harms of Implementing This Recommendation

There are no known harms associated with implementing this recommendation.

### Future Research

Future research should focus on determining if there is a benefit to beginning early range of motion exercises and when a patient may return to unrestricted activities.

## *STUDY QUALITY TABLE OF POST-OPERATIVE IMMOBILIZATION*

*TABLE 204. INTERVENTION QUALITY EVALUATIONS*

| Study | Random Sequence Generation | Allocation Concealment | Blinding | Incomplete Outcome Data | Selective Reporting | Other Bias | Is there a large magnitude of effect? | Influence of All Plausible Residual Confounding | Dose-Response Gradient | Inclusion | Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bury,T.F., 1995 | ● | ◑ | ◑ | ● | ● | ◑ | ● | ● | ● | Include | High Quality |
| Cebesoy,O., 2007 | ◑ | ◑ | ● | ● | ◑ | ◑ | ● | ● | ● | Include | Moderate Quality |
| Cook,A.C., 1995 | ◑ | ◑ | ● | ● | ◑ | ◑ | ● | ● | ● | Include | Moderate Quality |
| Finsen,V., 1999 | ● | ◑ | ● | ● | ◑ | ◑ | ● | ● | ● | Include | High Quality |
| Huemer,G.M., 2007 | ◑ | ◑ | ● | ● | ◑ | ◑ | ● | ● | ● | Include | Moderate Quality |
| Martins,R.S., 2006 | ◑ | ◑ | ◑ | ● | ◑ | ◑ | ● | ● | ● | Include | Moderate Quality |
| Ritting,A.W., 2012 | ● | ◑ | ● | ● | ◑ | ◑ | ● | ● | ● | Include | High Quality |

# RESULTS

## *SUMMARY OF DATA FINDINGS*

### *TABLE 205: SUMMARY OF FINDINGS PICO 15 POST-OP IMMOBILIZATION (EARLY FOLLOW-UP (< 1 MONTH))*

| | High Quality | | Moderate Quality | | | |
|---|---|---|---|---|---|---|
| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○<br>**Outcomes** | **Bury,T.F., 1995** | **Ritting,A.W., 2012** | **Cebesoy,O., 2007** | **Cook,A.C., 1995** | **Martins,R.S., 2006** | **Meta-Analysis** |
| **Complications** | | | | | | |
| **Symptom occurrence (pillar pain)** | | | | ○ | | **NA** |
| **Symptom occurrence (scar tenderness)** | | | | ○ | | **NA** |
| **Function** | | | | | | |
| **Durkan's results** | | | | | ○ | **NA** |
| **Grip strength** | | | | | | |
| 0 days | | 🟢 | | | | **NA** |
| 14 days | | ○ | | ● | | **NA** |
| 30 days | | | | ● | | **NA** |
| **Phalen's test score** | | | | | ○ | **NA** |
| **Pinch Strength** | | | | ● | | **NA** |
| **Pinch Strength (three-point pinch)** | | | | | | |
| 0 days | | ○ | | | | **NA** |
| 14 days | | 🟢 | | | | **NA** |
| **Questionnaire (General/Undefined)** | | | | | | |
| DI, discrimination index (equivalent to pre-op - post-op 2PD) | | | | | ○ | **NA** |
| Functional Status Scale | | | ○ | | | **NA** |
| **Range of motion** | | | | | | |
| Average wrist range of motion in flexionextension (degrees) | ○ | | | | | **NA** |
| ROM-degrees (extension) | | | | | | |
| 0 days | | 🟢 | | | | **NA** |
| 14 days | | ○ | | | | **NA** |
| ROM-degrees (flexion) | | ○ | | | | **NA** |
| ROM-degrees (supination) | | ○ | | | | **NA** |
| **Tinel's Sign/Test** | | | | | ○ | **NA** |
| **Two-point discrimination** | | | | | 🟢 | **NA** |
| **Other** | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | |
| Levine-Katz score-Mean difference between both groups | | ○ | | | | **NA** |
| **Pain** | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | |
| Subjective pain (10 point scale) | | | | ● | | **NA** |
| **Quality Of Life** | | | | | | |
| **Return to normal activities** | | | | ● | | **NA** |
| **Return to work** | | | | ● | | **NA** |
| **Symptoms** | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | |
| SSI, symptom severity index (equivalent to pre-op - post-op SSS) | | | | | ○ | **NA** |
| Symptom intensity index (equivalent to preop - postop SIS) | | | | | ○ | **NA** |
| Symptom Intensity Scale (SIS) | | | | | ○ | **NA** |
| Symptom severity scale | | | ○ | | | **NA** |
| **Questionnaire (Levine-SSS)** | | | | | ○ | **NA** |

*TABLE 206: SUMMARY OF FINDINGS PICO 15 POST-OP IMMOBILIZATION (LATE FOLLOW-UP (> 1 MONTH))*

| **Favors treatment 1** 🟢<br>**Favors treatment 2** ●<br>**Not significant** ○ | **High Quality** | | | **Moderate Quality** | | | **Meta-Analysis** |
|---|---|---|---|---|---|---|---|
| **Outcomes** | **Bury,T.F., 1995** | **Finsen,V., 1999** | **Ritting,A.W., 2012** | **Cebesoy,O., 2007** | **Cook,A.C., 1995** | **Huemer,G.M., 2007** | |
| **Complications** | | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | | |
| Subjective patient score | ○ | | | | | | **NA** |
| **Symptom occurrence (scar pain)** | | ○ | | | | | **NA** |
| **Function** | | | | | | | |
| **Grip Strength** | ○ | ○ | 🟢 | | | ○ | **NA** |
| **Lifting** | | | | | | | |
| Pick-up test (mean) | | | | | | ○ | **NA** |
| **NCS (DML)** | | | | | | ○ | **NA** |
| **Pinch Strength** | ○ | ○ | | | ○ | | **NA** |
| **Pinch Strength (three-point pinch)** | | | ○ | | | | **NA** |
| **Questionnaire (General/Undefined)** | | | | | | | |
| Functional Status Scale | | | | ○ | | | **NA** |
| **Range of motion** | | | | | | | |
| ROM-degrees (extension) | | | ○ | | | | **NA** |
| ROM-degrees (flexion) | | | ○ | | | | **NA** |
| ROM-degrees (supination) | | | ○ | | | | **NA** |
| **Two-point discrimination** | | | | | | ○ | **NA** |
| **Other** | | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | | |
| Levine-Katz score-Mean difference between both groups | | | ○ | | | | **NA** |
| **Pain** | | | | | | | |
| **Hypothenar pain** | | ○ | | | | | **NA** |
| **Questionnaire (General/Undefined)** | | | | | | | |
| Subjective pain (10 point scale) | | | | | ○ | | **NA** |
| **Questionnaire/Scale (VAS-pain)** | | | | | | ○ | **NA** |
| **Thenar Atrophy** | | ○ | | | | | **NA** |
| **Symptoms** | | | | | | | |
| **Questionnaire (General/Undefined)** | | | | | | | |
| Symptom severity scale | | | | ● | | | **NA** |

## *DETAILED DATA FINDINGS*

### *TABLE 207: PICO 15 PART 1- POST-OP IMMOBILIZATION: COMPLICATIONS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bury,T.F., 1995 | High Quality | Questionnaire (General/undefined)(subjective patient score) | 5.9 months | Splint (Bulky dressing and splint in a 0-degree or neutral wrist position for 2 weeks) | 26 | 8.1(.) | Bulky dress (Bulky dressing for 2 weeks) | 17 | 8(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Finsen,V., 1999 | High Quality | Symptom occurrence (scar pain)(Scar discomfort/pain) | 1.4 months | Splint (Bulky dressing removed at day 2 and well-padded plaster of Paris splint with the wrist in slight dorsiflexion for 4 weeks) | 36 | 44.44% | Bulky bandage (Bulky dressing removed at day 2 and light dressings for 4 weeks) | 45 | 46.67% | RR | 0.95(0.59,1.54) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finsen,V., 1999 | High Quality | Symptom occurrence (scar pain)(Scar discomfort/pain) | 5.9 months | Splint (Bulky dressing removed at day 2 and well-padded plaster of Paris splint with the wrist in slight dorsiflexion for 4 weeks) | 37 | 16.22% | Bulky bandage (Bulky dressing removed at day 2 and light dressings for 4 weeks) | 44 | 13.64% | RR | 1.19(0.42,3.38) | Not Significant (P-value>.05) |
| Cook,A.C., 1995 | Moderate Quality | Symptom occurrence (pillar pain)( ) | 1 month | Splint (Splint for 2 weeks) | 25 | 48.00% | No splint (exercises) (Range-of-motion exercises for 2 weeks) | 25 | 20.00% | RR | 2.40(0.99,5.81) | Not Significant (P-value>.05) |
| Cook,A.C., 1995 | Moderate Quality | Symptom occurrence (scar tenderness)( ) | 1 month | Splint (Splint for 2 weeks) | 25 | 56.00% | No splint (exercises) (Range-of-motion exercises for 2 weeks) | 25 | 32.00% | RR | 1.75(0.90,3.42) | Not Significant (P-value>.05) |

*TABLE 208: PICO 15 PART 1- POST-OP IMMOBILIZATION: FUNCTION*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bury,T.F., 1995 | High Quality | Grip strength(Kilograms) | 5.9 months | Splint (Bulky dressing and splint in a 0-degree or neutral wrist position for 2 weeks) | 26 | 26.1(.) | Bulky dress (Bulky dressing for 2 weeks) | 17 | 29.4(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Bury,T.F., 1995 | High Quality | Pinch Strength(Kilograms) | 5.9 months | Splint (Bulky dressing and splint in a 0-degree or neutral wrist position for 2 weeks) | 26 | 3.9(.) | Bulky dress (Bulky dressing for 2 weeks) | 17 | 3.8(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Bury,T.F., 1995 | High Quality | Range of motion(Average wrist range of motion in flexionextension (degrees)) | Post-Op | Splint (Bulky dressing and splint in a 0-degree or neutral wrist position for 2 weeks) | 26 | 131.5(.) | Bulky dress (Bulky dressing for 2 weeks) | 17 | 129(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Finsen,V., 1999 | High Quality | Grip strength(Units not reported) | 1.4 months | Splint (Bulky dressing removed at day 2 and well-padded plaster of Paris splint with the wrist in slight dorsiflexion for 4 weeks) | 36 | . % | Bulky bandage (Bulky dressing removed at day 2 and light dressings for 4 weeks) | 45 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Finsen,V., 1999 | High Quality | Grip strength(Units not reported) | 5.9 months | Splint (Bulky dressing removed at day 2 and well-padded plaster of Paris splint with the wrist in slight dorsiflexion for 4 weeks) | 37 | . % | Bulky bandage (Bulky dressing removed at day 2 and light dressings for 4 weeks) | 44 | . % | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finsen,V., 1999 | High Quality | Pinch strength(Key pinch strength (units not reported)) | 1.4 months | Splint (Bulky dressing removed at day 2 and well-padded plaster of Paris splint with the wrist in slight dorsiflexion for 4 weeks) | 36 | . % | Bulky bandage (Bulky dressing removed at day 2 and light dressings for 4 weeks) | 45 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Finsen,V., 1999 | High Quality | Pinch strength(Key pinch strength (units not reported)) | 5.9 months | Splint (Bulky dressing removed at day 2 and well-padded plaster of Paris splint with the wrist in slight dorsiflexion for 4 weeks) | 37 | . % | Bulky bandage (Bulky dressing removed at day 2 and light dressings for 4 weeks) | 44 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Ritting,A.W., 2012 | High Quality | Grip strength(Kilograms) | Peri-Op | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 45 | 22.3(11.60) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 49 | 16.6(6.80) | Mean Difference | 5.7(1.81,9.587473) | **Bulky dressing removed at 48-72 hours with placement of an adhesive strip (P-value<.05)** |
| Ritting,A.W., 2012 | High Quality | Grip strength(Kilograms) | 2 weeks | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 45 | 13.9(9.90) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 49 | 10.3(7.90) | Mean Difference | 3.6(-0.04,7.241421) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ritting,A.W., 2012 | High Quality | Grip strength(Kilograms) | 2.8 months | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 30 | 24.2(13.90) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 36 | 8.2(7.70) | Mean Difference | 16(10.43,21.57387) | **Bulky dressing removed at 48-72 hours with placement of an adhesive strip**<br>**(P-value<.05)** |
| Ritting,A.W., 2012 | High Quality | Pinch Strength (three-point pinch)(Units not reported) | Peri-Op | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 45 | 5.8(3.10) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 49 | 5(2.10) | Mean Difference | 0.8(-0.28,1.879879) | Not Significant (P-value>.05) |
| Ritting,A.W., 2012 | High Quality | Pinch Strength (three-point pinch)(Units not reported) | 2 weeks | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 45 | 4.9(2.10) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 49 | 3.9(1.90) | Mean Difference | 1(0.19,1.812096) | **Bulky dressing removed at 48-72 hours with placement of an adhesive strip**<br>**(P-value<.05)** |
| Ritting,A.W., 2012 | High Quality | Pinch Strength (three-point pinch)(Units not reported) | 2.8 months | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 30 | 6.4(2.80) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 36 | 5.3(1.90) | Mean Difference | 1.1(-0.08,2.278628) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ritting,A.W., 2012 | High Quality | Range of motion(RoM-degrees (extension)) | Peri-Op | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 45 | 70(10.00) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 49 | 61(11.00) | Mean Difference | 9(4.75,13.24538) | **Bulky dressing removed at 48-72 hours with placement of an adhesive strip (P-value<.05)** |
| Ritting,A.W., 2012 | High Quality | Range of motion(RoM-degrees (flexion)) | Peri-Op | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 45 | 59(12.00) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 49 | 60(13.00) | Mean Difference | -1(-6.05,4.053980) | Not Significant (P-value>.05) |
| Ritting,A.W., 2012 | High Quality | Range of motion(RoM-degrees (supination)) | Peri-Op | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 45 | 74(11.00) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 49 | 74(8.00) | Mean Difference | 0(-3.92,3.917554) | Not Significant (P-value>.05) |
| Ritting,A.W., 2012 | High Quality | Range of motion(RoM-degrees (extension)) | 2 weeks | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 45 | 65(10.00) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 49 | 61(10.00) | Mean Difference | 4(-0.05,8.046836) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ritting,A.W., 2012 | High Quality | Range of motion(RoM-degrees (flexion)) | 2 weeks | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 45 | 55(11.00) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 49 | 56(14.00) | Mean Difference | -1(-6.07,4.069125) | Not Significant (P-value>.05) |
| Ritting,A.W., 2012 | High Quality | Range of motion(RoM-degrees (supination)) | 2 weeks | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 45 | 72(9.00) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 49 | 75(9.00) | Mean Difference | -3(-6.64,0.642153) | Not Significant (P-value>.05) |
| Ritting,A.W., 2012 | High Quality | Range of motion(RoM-degrees (extension)) | 2.8 months | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 30 | 66(10.00) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 36 | 65(8.00) | Mean Difference | 1(-3.43,5.431122) | Not Significant (P-value>.05) |
| Ritting,A.W., 2012 | High Quality | Range of motion(RoM-degrees (flexion)) | 2.8 months | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 30 | 60(12.00) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 36 | 62(13.00) | Mean Difference | -2(-8.04,4.039359) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ritting,A.W., 2012 | High Quality | Range of motion(RoM-degrees (supination)) | 2.8 months | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 30 | 71(13.00) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 36 | 74(11.00) | Mean Difference | -3(-8.88,2.878184) | Not Significant (P-value>.05) |
| Cebesoy,O., 2007 | Moderate Quality | Questionnaire (General/undefined) (functional status scale.) | 1 month | Splint (Splint at day 10 followed by exercises at 3 weeks) | 20 | 13.5(.) | Bulky dressing (Immediate exercise followed by bulky bandage at day 10) | 20 | 12.9(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Cebesoy,O., 2007 | Moderate Quality | Questionnaire (General/undefined) (functional status scale.) | 3 months | Splint (Splint at day 10 followed by exercises at 3 weeks) | 20 | 10.65(.) | Bulky dressing (Immediate exercise followed by bulky bandage at day 10) | 20 | 10.26(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Cook,A.C., 1995 | Moderate Quality | Grip strength(Kilograms) | 2 weeks | Splint (Splint for 2 weeks) | 25 | 10(.) | No splint (exercises) (Range-of-motion exercises for 2 weeks) | 25 | 15(.) | Author Reported | NA | **No splint (exercises) (Range-of-motion exercises for 2 weeks)**<br>**(P-value<.05)** |
| Cook,A.C., 1995 | Moderate Quality | Grip strength(Kilograms) | 1 month | Splint (Splint for 2 weeks) | 25 | 14(.) | No splint (exercises) (Range-of-motion exercises for 2 weeks) | 25 | 18(.) | Author Reported | NA | **No splint (exercises) (Range-of-motion exercises for 2 weeks)**<br>**(P-value<.05)** |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cook,A.C., 1995 | Moderate Quality | Pinch Strength(Kilograms) | 2 weeks | Splint (Splint for 2 weeks) | 25 | 4(.) | No splint (exercises) (Range-of-motion exercises for 2 weeks) | 25 | 6(.) | Author Reported | NA | **No splint (exercises) (Range-of-motion exercises for 2 weeks)**<br>**(P-value<.05)** |
| Cook,A.C., 1995 | Moderate Quality | Pinch Strength(Kilograms) | 1 month | Splint (Splint for 2 weeks) | 25 | 5(.) | No splint (exercises) (Range-of-motion exercises for 2 weeks) | 25 | 7(.) | Author Reported | NA | **No splint (exercises) (Range-of-motion exercises for 2 weeks)**<br>**(P-value<.05)** |
| Cook,A.C., 1995 | Moderate Quality | Pinch Strength(Kilograms) | 3 months | Splint (Splint for 2 weeks) | 25 | . % | No splint (exercises) (Range-of-motion exercises for 2 weeks) | 25 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Huemer,G.M., 2007 | Moderate Quality | Grip strength(Kilograms) | 3 months | Splinted (Bulky dressing with volar splint for 2 days) | 25 | 44(.) | Non-splinted (Light bandage for 2 days) | 25 | 40(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Huemer,G.M., 2007 | Moderate Quality | Lifting(Pick-up test (mean)) | 3 months | Splinted (Bulky dressing with volar splint for 2 days) | 25 | 19(.) | Non-splinted (Light bandage for 2 days) | 25 | 17(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Huemer,G.M., 2007 | Moderate Quality | NCS (DML)(Distal motor latency (ms) (improvement)) | 3 months | Splinted (Bulky dressing with volar splint for 2 days) | 25 | 2.47(.) | Non-splinted (Light bandage for 2 days) | 25 | 2.48(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Huemer,G.M., 2007 | Moderate Quality | Two-point discrimination(Millimeters) | 3 months | Splinted (Bulky dressing with volar splint for 2 days) | 25 | 6(.) | Non-splinted (Light bandage for 2 days) | 25 | 6(.) | Author Reported | NA | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Martins,R.S., 2006 | Moderate Quality | Durkan's results(+durken's test) | 2 weeks | Splint (Neutral-position wrist splint continuously for two weeks) | 26 | 96.15% | No splint (No wrist immobilization) | 26 | 100.00% | RR | .(.,.) | Not Significant (P-value>.05) |
| Martins,R.S., 2006 | Moderate Quality | Phalen's test score(# positive) | 2 weeks | Splint (Neutral-position wrist splint continuously for two weeks) | 26 | 92.31% | No splint (No wrist immobilization) | 26 | 96.15% | RR | 0.96(0.84,1.10) | Not Significant (P-value>.05) |
| Martins,R.S., 2006 | Moderate Quality | Questionnaire (General/undefined)(DI, discrimination index (equivalent to pre-op - post-op 2PD)) | 2 weeks | Splint (Neutral-position wrist splint continuously for two weeks) | 26 | 0.27(0.27) | No splint (No wrist immobilization) | 26 | 0.29(0.28) | Mean Difference | -0.02(-0.17,0.129516) | Not Significant (P-value>.05) |
| Martins,R.S., 2006 | Moderate Quality | Tinel's Sign/Test(# positive) | 2 weeks | Splint (Neutral-position wrist splint continuously for two weeks) | 26 | 80.77% | No splint (No wrist immobilization) | 26 | 88.46% | RR | 0.91(0.72,1.15) | Not Significant (P-value>.05) |
| Martins,R.S., 2006 | Moderate Quality | Two-point discrimination(Millimeters) | 2 weeks | Splint (Neutral-position wrist splint continuously for two weeks) | 26 | 3.69(1.19) | No splint (No wrist immobilization) | 26 | 5.12(2.53) | Mean Difference | -1.43(-2.50,-0.35529) | **Splint (Neutral-position wrist splint continuously for two weeks)**<br>**(P-value<.05)** |

*TABLE 209: PICO 15 PART 1- POST-OP IMMOBILIZATION: OTHER*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ritting,A.W., 2012 | High Quality | Questionnaire (General/undefined)(Levine-Katz score-Mean difference between both groups) | Peri-Op | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 45 | 34(34.23) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 49 | 38(28.57) | Mean Difference | -4(-16.81,8.81) | Not Significant (P-value>.05) |
| Ritting,A.W., 2012 | High Quality | Questionnaire (General/undefined)(Levine-Katz score-Mean difference between both groups) | 2 weeks | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 45 | 19(20.54) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 49 | 20(25.00) | Mean Difference | -1(-10.22,8.22) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ritting,A.W., 2012 | High Quality | Questionnaire (General/undefined)(Levine-Katz score-Mean difference between both groups) | 2.8 months | Bulky dressing removed at 48-72 hours with placement of an adhesive strip (Bulky dressing removed at 48-72 hours with placement of an adhesive strip) | 30 | 16(13.97) | Bulky dressing removed at 2 weeks (Bulky dressing removed at 2 weeks) | 36 | 17(18.37) | Mean Difference | -1(-8.81,6.81) | Not Significant (P-value>.05) |

*TABLE 210: PICO 15 PART 1- POST-OP IMMOBILIZATION: PAIN*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finsen,V., 1999 | High Quality | Hypothenar pain( ) | 1.4 months | Splint (Bulky dressing removed at day 2 and well-padded plaster of Paris splint with the wrist in slight dorsiflexion for 4 weeks) | 36 | 13.89% | Bulky bandage (Bulky dressing removed at day 2 and light dressings for 4 weeks) | 45 | 11.11% | RR | 1.25(0.39,3.99) | Not Significant (P-value>.05) |
| Finsen,V., 1999 | High Quality | Hypothenar pain( ) | 5.9 months | Splint (Bulky dressing removed at day 2 and well-padded plaster of Paris splint with the wrist in slight dorsiflexion for 4 weeks) | 37 | 8.11% | Bulky bandage (Bulky dressing removed at day 2 and light dressings for 4 weeks) | 44 | 2.27% | RR | 3.57(0.39,32.87) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Finsen,V., 1999 | High Quality | Thenar Atrophy(Thenar pain) | 1.4 months | Splint (Bulky dressing removed at day 2 and well-padded plaster of Paris splint with the wrist in slight dorsiflexion for 4 weeks) | 36 | 5.56% | Bulky bandage (Bulky dressing removed at day 2 and light dressings for 4 weeks) | 45 | 2.22% | RR | 2.50(0.24,26.48) | Not Significant (P-value>.05) |
| Finsen,V., 1999 | High Quality | Thenar Atrophy(Thenar pain) | 5.9 months | Splint (Bulky dressing removed at day 2 and well-padded plaster of Paris splint with the wrist in slight dorsiflexion for 4 weeks) | 37 | 2.70% | Bulky bandage (Bulky dressing removed at day 2 and light dressings for 4 weeks) | 44 | 2.27% | RR | 1.19(0.08,18.36) | Not Significant (P-value>.05) |

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group 1 N | Mean1/P 1 (SD1) | Treatment 2 (Details) | Group 2 N | Mean2/P 2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cook,A.C., 1995 | Moderate Quality | Questionnaire (General/undefined)(Subjective pain (10 point scale)) | 2 weeks | Splint (Splint for 2 weeks) | 25 | 2.4(.) | No splint (exercises) (Range-of-motion exercises for 2 weeks) | 25 | 0.9(.) | Author Reported | NA | **No splint (exercises) (Range-of-motion exercises for 2 weeks)**<br>**(P-value<.05)** |
| Cook,A.C., 1995 | Moderate Quality | Questionnaire (General/undefined)(Subjective pain (10 point scale)) | 1 month | Splint (Splint for 2 weeks) | 25 | 1.5(.) | No splint (exercises) (Range-of-motion exercises for 2 weeks) | 25 | 0.5(.) | Author Reported | NA | **No splint (exercises) (Range-of-motion exercises for 2 weeks)**<br>**(P-value<.05)** |
| Cook,A.C., 1995 | Moderate Quality | Questionnaire (General/undefined)(Subjective pain (10 point scale)) | 5.9 months | Splint (Splint for 2 weeks) | 25 | . % | No splint (exercises) (Range-of-motion exercises for 2 weeks) | 25 | . % | Author Reported | NA | Not Significant (P-value>.05) |
| Huemer,G.M., 2007 | Moderate Quality | Questionnaire/Scale (VAS-pain)( ) | 3 months | Splinted (Bulky dressing with volar splint for 2 days) | 25 | 1(.) | Non-splinted (Light bandage for 2 days) | 25 | 1(.) | Author Reported | NA | Not Significant (P-value>.05) |

*TABLE 211: PICO 15 PART 1- POST-OP IMMOBILIZATION: QUALITY OF LIFE*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cook,A.C., 1995 | Moderate Quality | Return to Normal Activities( ) | Post-Op | Splint (Splint for 2 weeks) | 25 | 12(.) | No splint (exercises) (Range-of-motion exercises for 2 weeks) | 25 | 6(.) | Author Reported | NA | **No splint (exercises) (Range-of-motion exercises for 2 weeks)**<br>**(P-value<.05)** |
| Cook,A.C., 1995 | Moderate Quality | Return to Work(Full duty work) | Post-Op | Splint (Splint for 2 weeks) | 25 | 27(.) | No splint (exercises) (Range-of-motion exercises for 2 weeks) | 25 | 17(.) | Author Reported | NA | **No splint (exercises) (Range-of-motion exercises for 2 weeks)**<br>**(P-value<.05)** |

# *TABLE 212: PICO 15 PART 1- POST-OP IMMOBILIZATION: SYMPTOMS*

| Reference Title | Quality | Outcome Details | Duration | Treatment 1 (Details) | Group1 N | Mean1/P1 (SD1) | Treatment 2 (Details) | Group2 N | Mean2/P2 (SD2) | Effect Measure | Result (95% CI) | Favored Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cebesoy,O., 2007 | Moderate Quality | Questionnaire (General/undefined)(symptom severity scale) | 1 month | Splint (Splint at day 10 followed by exercises at 3 weeks) | 20 | 16.5(.) | Bulky dressing (Immediate exercise followed by bulky bandage at day 10) | 20 | 16.84(.) | Author Reported | NA | Not Significant (P-value>.05) |
| Cebesoy,O., 2007 | Moderate Quality | Questionnaire (General/undefined)(symptom severity scale) | 3 months | Splint (Splint at day 10 followed by exercises at 3 weeks) | 20 | 13.5(.) | Bulky dressing (Immediate exercise followed by bulky bandage at day 10) | 20 | 11.9(.) | Author Reported | NA | **Bulky dressing (Immediate exercise followed by bulky bandage at day 10)**<br>**(P-value<.05)** |
| Martins,R.S., 2006 | Moderate Quality | Questionnaire (General/undefined)(SSI, symptom severity index (equivalent to pre-op - post-op SSS)) | 2 weeks | Splint (Neutral-position wrist splint continuously for two weeks) | 26 | 0.64(0.15) | No splint (No wrist immobilization) | 26 | 0.61(0.12) | Mean Difference | 0.03(-0.04,0.103838) | Not Significant (P-value>.05) |
| Martins,R.S., 2006 | Moderate Quality | Questionnaire (General/undefined)(symptom intensity index (equivalent to preop - postop SIS)) | 2 weeks | Splint (Neutral-position wrist splint continuously for two weeks) | 26 | 0.91(0.15) | No splint (No wrist immobilization) | 26 | 0.8(0.27) | Mean Difference | 0.11(-0.01,0.228725) | Not Significant (P-value>.05) |
| Martins,R.S., 2006 | Moderate Quality | Questionnaire (General/undefined) (Symptom Intensity Scale - SIS).) | 2 weeks | Splint (Neutral-position wrist splint continuously for two weeks) | 26 | 0.77(1.31) | No splint (No wrist immobilization) | 26 | 1.54(1.96) | Mean Difference | -0.77(-1.68,0.136185) | Not Significant (P-value>.05) |
| Martins,R.S., 2006 | Moderate Quality | Questionnaire (Levine-SSS)(Symptom Severity Score) | 2 weeks | Splint (Neutral-position wrist splint continuously for two weeks) | 26 | 11.38(4.57) | No splint (No wrist immobilization) | 26 | 12.33(4.77) | Mean Difference | -0.95(-3.49,1.589222) | Not Significant (P-value>.05) |

# VII.APPENDIXES

# APPENDIX I
# WORK GROUP ROSTER

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The following participants contributed to the development of the preliminary recommendations during the introductory meeting, but did not participate in the final meeting where the evidence was reviewed and the final recommendations were developed:

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**Jay Mark Evans, MD**

**John Lubahn, MD**

**Wilson Zachary Ray, MD**

**Robert Spinner, MD**

**Grant Thomson, MD, MSc**

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# APPENDIX II

## AAOS BODIES THAT APPROVED THIS CLINICAL PRACTICE GUIDELINE

### Committee on Evidence Based Quality and Value

The committee on Evidence Based Quality and Value (EBQV) consists of twenty AAOS members who implement evidence-based quality initiatives such as clinical practice guidelines (CPGs) and appropriate use criteria (AUCs). They also oversee the dissemination of related educational materials and promote the utilization of orthopaedic value products by the Academy's leadership and its members.

### Council on Research and Quality

The Council on Research and Quality promotes ethically and scientifically sound clinical and translational research to sustain patient care in musculoskeletal disorders. The Council also serves as the primary resource for educating its members, the public, and public policy makers regarding evidenced-based medical practice, orthopaedic devices and biologics, regulatory pathways and standards development, patient safety, occupational health, technology assessment, and other related important errors.

The Council is comprised of the chairs of the committees on Biological Implants, Biomedical Engineering, Occupational Health and Workers' Compensation, Patient Safety, Research Development, U.S. Bone and Joint Decade, and chair and Appropriate Use Criteria and Clinical Practice Guideline section leaders of the Evidence Based Quality and Value committee. Also on the Council are the second vice-president, three members at large, and representatives of the Diversity Advisory Board, Women's Health Issues Advisory Board, Board of Specialty Societies (BOS), Board of Councilors (BOC), Communications Cabinet, Orthopaedic Research Society (ORS), Orthopedic Research and Education Foundation (OREF).

### Board of Directors

The 17 member Board of Directors manage the affairs of the AAOS, set policy, and oversee the Strategic Plan.

# APPENDIX III
## A Priori Pico Questions and Additional Details Regarding Pico Questions

1. For patients with symptoms consistent with CTS (median nerve involvement at the level of the wrist) what physical examination maneuvers lead to an accurate diagnosis of CTS?

    - *Additional Information regarding this PICO question and the resulting recommendation: One member of the guideline development group chose not to approve the rationale that accompanied recommendation 1C: Maneuvers.*

2. For patients with symptoms consistent with CTS (median nerve involvement at the level of the wrist) what topics should be addressed in the history interview lead to an accurate diagnosis of CTS?

3. For patients with symptoms consistent with CTS (median nerve involvement at the level of the wrist) are imaging modalities necessary to aid the diagnosis, management, and prognosis of CTS?

4. For patients with symptoms consistent with CTS (median nerve involvement at the level of the wrist) are diagnostic scales necessary to aid the diagnosis, management, and prognosis of CTS?

    - *Additional Information regarding PICO question or resulting recommendation: One member of the guideline development group chose not to approve the guideline recommendation and the rationale that accompanied this recommendation.*

5. Are there specific activities or exposures that can be correlated with the development of carpal tunnel syndrome?

6. Do any of the selected conservative treatments result in relief of symptoms and/or functional improvement while resulting in minimal complications? Or do they play a role in diagnosis or prediction of prognosis (injections)?

7. For patients with symptoms consistent with CTS, does surgical carpal tunnel release relieve symptoms and/or improve function?

8. For patients with symptoms consistent with CTS, do adjunctive/alternative surgical techniques relieve symptoms and/or improve function?

9. For patients with symptoms consistent with CTS (median nerve involvement at the level of the wrist) with bilateral involvement, does simultaneous bilateral surgical release relieve symptoms and/or improve function without negative consequence?

10. For pregnant women with symptoms consistent with CTS (median nerve involvement at the level of the wrist) are the selected conservative treatments safe and do they relive symptoms and/or improve function with minimum complications?

11. For patients undergoing surgical treatment for CTS (median nerve involvement at the level of the wrist) do patient oriented outcomes differ between various modes of anesthesia?

12. For patients undergoing surgical treatment for CTS (median nerve involvement at the level of the wrist), do various post-operative complications significantly differ between those who undergo peri-operative anticoagulation cessation only, with those who undergo continued anti-coagulation treatment.

13. For patients undergoing surgical treatment for CTS (median nerve involvement at the level of the wrist), are there significant differences in infection rates between those treated with prophylactic antibiotics and those not treated with prophylactic antibiotics peri-operatively.

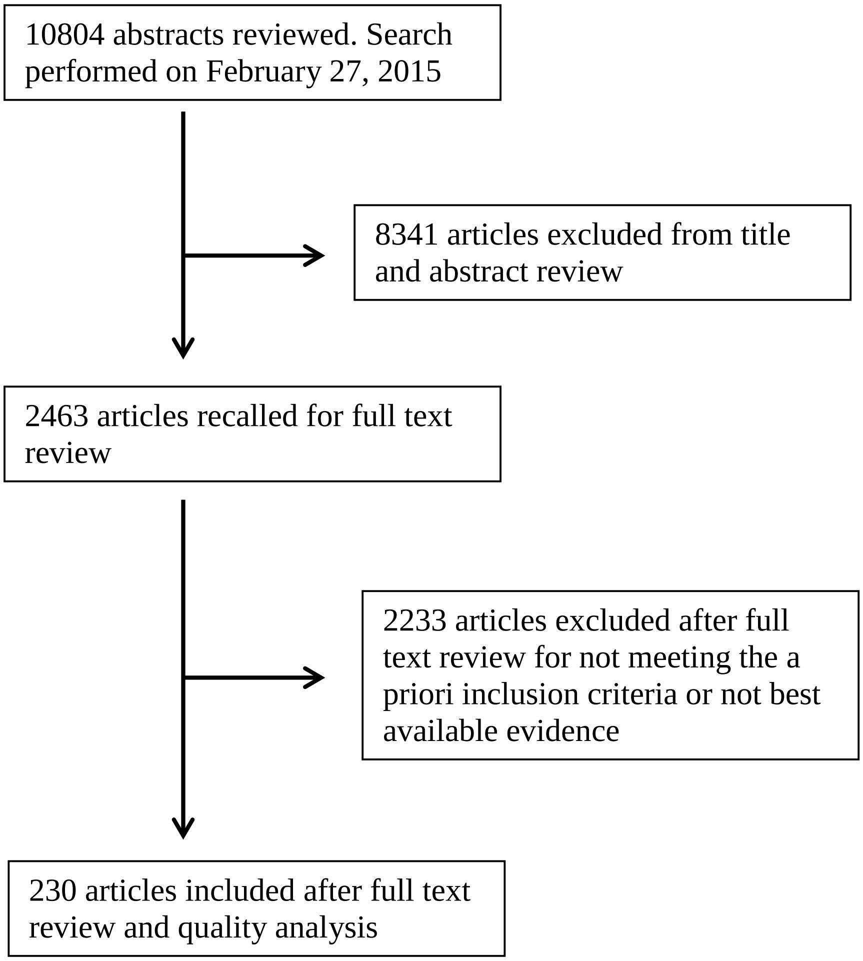
14. For patients who have been treated with a surgical intervention for CTS, is therapy indicated? If so, who, when, what (certain treatments), and how long (duration of therapy)?

15. For patients who have been treated with a surgical intervention for CTS, does post-operative immobilization result in significant differences in symptom relief and functional improvement, as compared to those who undergo early mobilization or unrestricted movement.

16. For diabetic patients who have been treated with a surgical intervention for CTS, which post-operative management modalities are safe and effective?

# APPENDIX IV

## STUDY ATTRITION FLOWCHART



# APPENDIX V
## LITERATURE SEARCH STRATEGIES

Guideline: Diagnosis and Treatment of Carpal Tunnel Syndrome
Total citations added to the database: 691 Ref IDs: 14542-15449 Date: 02/27/2015

Database: PubMed (**http://www.pubmed.gov**) Date searched: 02/27/2015
Search Results: 314De-duplicated:305Ref IDs: 14542-14855
Search Strategy
**#1**
“carpal tunnel syndrome”[mh] OR “carpal tunnel”[tw] OR (carpal[tiab] AND tunnel[tiab])

**#2**
(Median entrapment neuropathy[tw] OR Median nerve neuropathy[tw] OR “median neuropathy”[mh:noexp] OR (“nerve compression syndromes”[mh:noexp] AND “median nerve”[tw])) AND (“carpal”[tw] OR “wrist”[tw] OR “distal”[tw])

**#3**
(animals[mh] NOT humans[mh]) OR cadaver[mh] OR cadaver*[ti] OR ((comment[pt] OR editorial[pt] OR letter[pt] OR "historical article"[pt]) NOT "clinical trial"[pt]) OR addresses[pt] OR news[pt] OR "newspaper article"[pt] OR "case report"[ti] OR pmcbook

**#4**
(#1 OR #2) NOT #3

**#5**
#4 AND English[lang] AND 1966[dp]:2015[dp]

**#6**
("2014/02/27"[Date - Entrez] : "3000"[Date - Entrez])

**#7**
#5 AND #6

PubMed Search Results

| | *Search Results* | *De-duplicated** | *Ref IDs* |
|---|---|---|---|
| | 314 | 305 | 14542-14855 |

**De-duplication also removes retracted articles.*

Database: Embase (**[http://www.embase.com](http://www.embase.com)**) Date searched: 02/27/2015
Search Results: 560 De-duplicated:376Ref IDs: 14861-15415
Search Strategy

**#1**
'carpal tunnel syndrome'/exp OR 'carpal tunnel questionnaire'/exp OR 'carpal tunnel':ab,ti OR ('median neuropathy':ab,ti OR 'median entrapment':ab,ti OR 'median nerve':ab,ti AND ('carpal':ab,ti OR 'wrist':ab,ti OR 'distal':ab,ti))

**#2**
[english]/lim AND [Embase]/lim AND [1966-2015]/py

**#3**
cadaver/de OR 'in vitro study'/exp OR 'abstract report'/de OR book/de OR editorial/de OR note/de OR letter/de OR 'case report':ti

**#4**
(#1 AND #2) NOT #3

Embase Search Results

| | *Search Results* | *De-duplicated** | *Ref IDs* |
|---|---|---|---|
| | 560 | 376 | 14861-15415 |

Database: The Cochrane Library (Wiley interface) Date searched: 02/27/2015

Search Results:37De-duplicated:10Ref IDs: 15416-15449
Search Strategy

**#1**
"carpal tunnel":ti,ab,kw (Word variations have been searched)

**#2**
MeSH descriptor: [Carpal Tunnel Syndrome] explode all trees

**#3**
#1 or #2 from 1966 to 2015

Cochrane Search Results

| | *Search Results* | *De-duplicated** | *Ref IDs* |
|---|---|---|---|
| | 37 | 10 | 15416-15449 |

**Foreign language also removed.*

Database: PEDro (**http://pedro.org.au**)Date searched:  02/27/2015
Search Results: 6De-duplicated:0Ref IDs: --
Search Strategy

**Abstract & Title:** carpal tunnel
**Published since:** 1966

PEDro Search Results

| | *Search Results* | *De-duplicated** | *Ref IDs* |
|---|---|---|---|
| | 6 | 0 | -- |

**Foreign language also removed.*

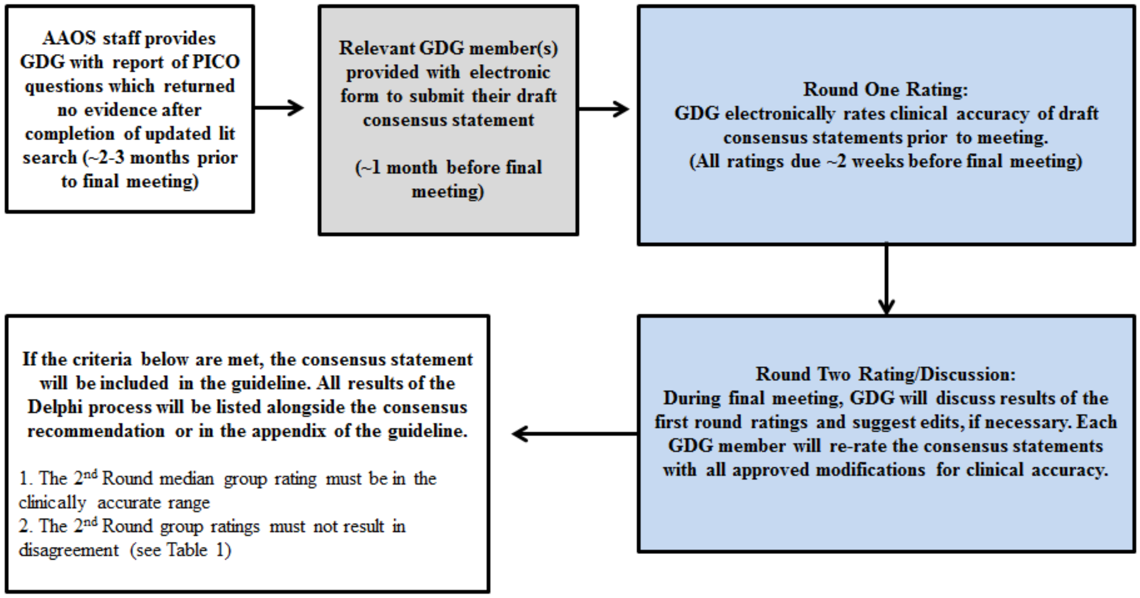
# APPENDIX VI

## COMPANION CONSENSUS STATEMENTS

For PICO questions which returned no evidence, the guideline development group is given the option to form a consensus statement. PICO questions which did not have supporting evidence can be found in Appendix III. If the guideline development group makes the decision to construct consensus statements, they participate in a modified Delphi method designed to help target the most clinically applicable consensus statement (see Companion Consensus Statement Protocol). All consensus statements will be published in a separate document in an effort to clearly distinguish between the evidence-based recommendations in this document and the complimentary consensus statements. All companion consensus statements can be found on the AAOS website (www.aaos.org). Although expert opinion is a form of evidence, it is also important to avoid liberal use in a guideline since research shows that expert opinion can be incorrect.

Sometimes guideline development group members change their views. At any time during the discussion of the consensus statements, any member of the guideline development group can make a motion to withdraw a statement. Appendix III of the guideline will list all PICO questions, including those that returned no evidence/have consensus statements.

## COMPANION CONSENSUS STATEMENT PROTOCOL



**AAOS staff provides GDG with report of PICO questions which returned no evidence after completion of updated lit search (~2-3 months prior to final meeting)**

**Relevant GDG member(s) provided with electronic form to submit their draft consensus statement**

**(~1 month before final meeting)**

**Round One Rating:**
**GDG electronically rates clinical accuracy of draft consensus statements prior to meeting.**
**(All ratings due ~2 weeks before final meeting)**

**Round Two Rating/Discussion:**
**During final meeting, GDG will discuss results of the first round ratings and suggest edits, if necessary. Each GDG member will re-rate the consensus statements with all approved modifications for clinical accuracy.**

**If the criteria below are met, the consensus statement will be included in the guideline. All results of the Delphi process will be listed alongside the consensus recommendation or in the appendix of the guideline.**

1. The 2nd Round median group rating must be in the clinically accurate range
2. The 2nd Round group ratings must not result in disagreement (see Table 1)

# APPENDIX VII

## PARTICIPATING PEER REVIEW ORGANIZATIONS

Peer review of the guideline is completed by interested external organizations. The AAOS solicits reviewers for each guideline. They consist of experts in the topic area and represent professional societies other than AAOS. Review organizations are nominated by the guideline development group at the introductory meeting. For this guideline, AAOS contacted 18 organizations with content expertise to review a draft of the clinical practice guideline during the peer review period from September 8th, 2015 to October 8th, 2015. Eleven individuals provided comments via the electronic structured peer review form, representing seven professional medical organizations (listed below).

Participating Societies

American Academy of Physical Medicine and Rehabilitation (AAPM&R)

American Society of Plastic Surgeons (ASPS)

American Association for Hand Surgery (AAHS)

American Society of Hand Therapists (ASHT)

American Academy of Neurology (AAN)

American Association of Neuromuscular and Elctrodiagnostic Medicine (AANEM)

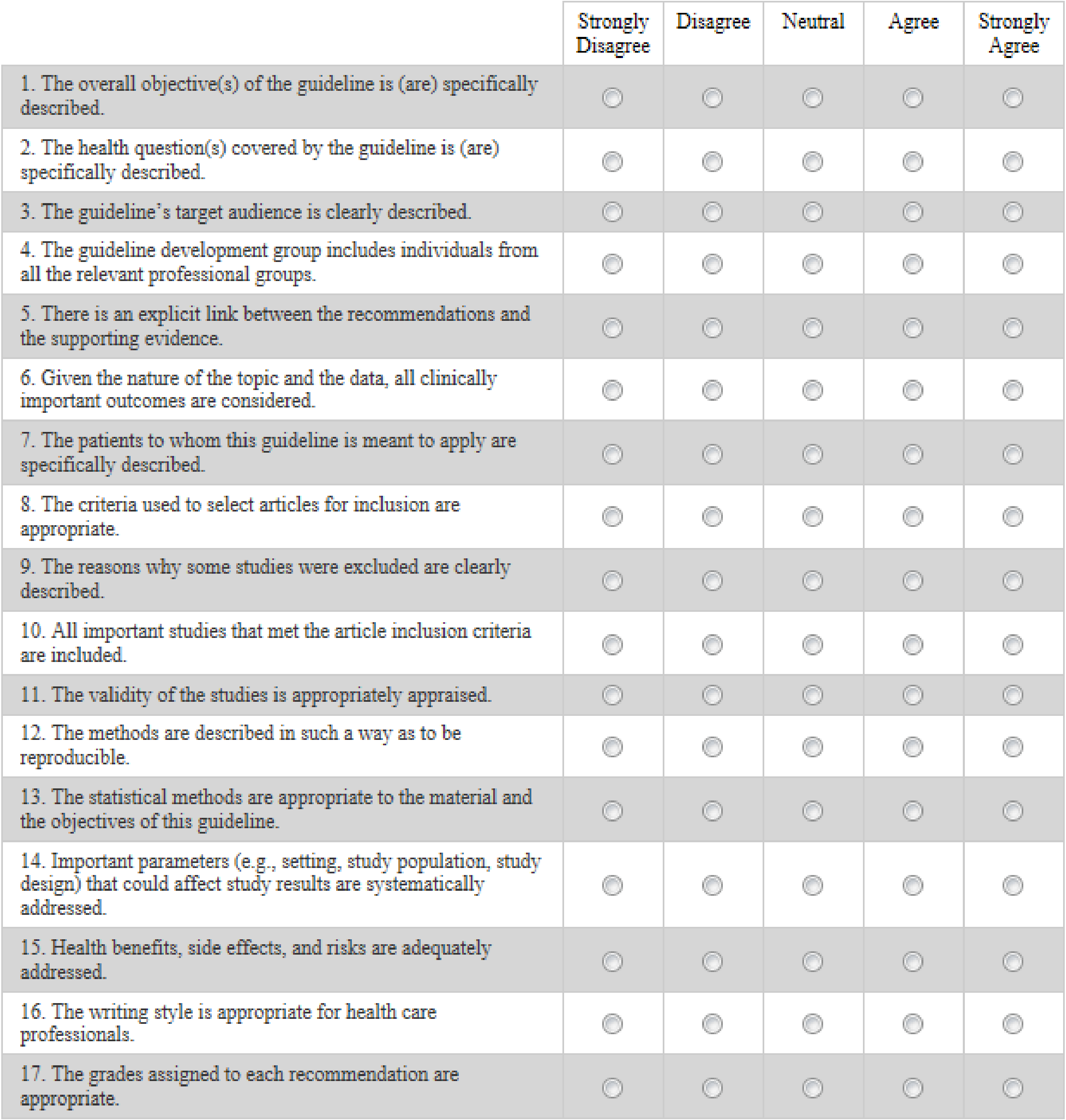
American Society for Surgery of the Hand (ASSH)

Peer review comments will be available on www.aaos.org/guidelinepeerreview.

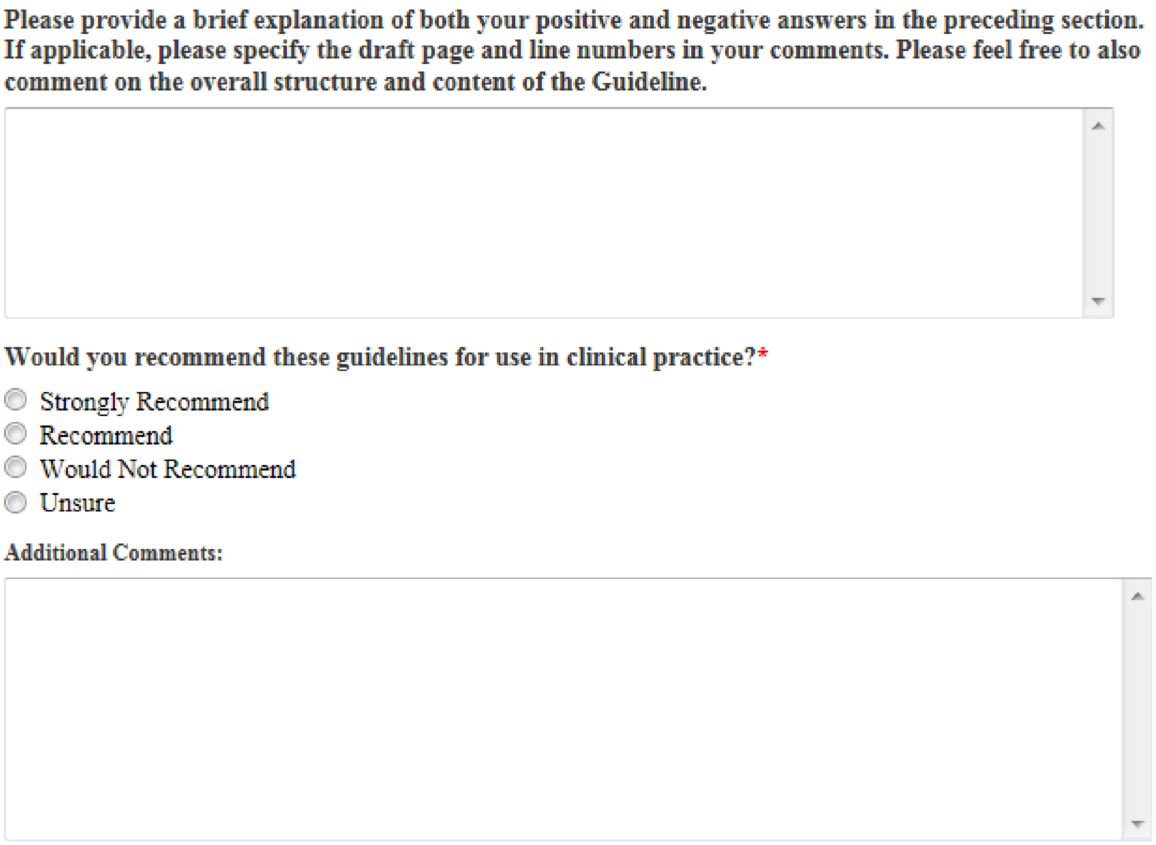
**Participation in the AAOS guideline peer review process does not constitute an endorsement nor does it imply that the reviewer supports this document.**

## STRUCTURED PEER REVIEW FORM

Peer reviewers are asked to read and review the draft of the clinical practice guideline with a particular focus on their area of expertise. Their responses to the answers below are used to assess the validity, clarity, and accuracy of the interpretation of the evidence.



| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| 1. The overall objective(s) of the guideline is (are) specifically described. | ○ | ○ | ○ | ○ | ○ |
| 2. The health question(s) covered by the guideline is (are) specifically described. | ○ | ○ | ○ | ○ | ○ |
| 3. The guideline's target audience is clearly described. | ○ | ○ | ○ | ○ | ○ |
| 4. The guideline development group includes individuals from all the relevant professional groups. | ○ | ○ | ○ | ○ | ○ |
| 5. There is an explicit link between the recommendations and the supporting evidence. | ○ | ○ | ○ | ○ | ○ |
| 6. Given the nature of the topic and the data, all clinically important outcomes are considered. | ○ | ○ | ○ | ○ | ○ |
| 7. The patients to whom this guideline is meant to apply are specifically described. | ○ | ○ | ○ | ○ | ○ |
| 8. The criteria used to select articles for inclusion are appropriate. | ○ | ○ | ○ | ○ | ○ |
| 9. The reasons why some studies were excluded are clearly described. | ○ | ○ | ○ | ○ | ○ |
| 10. All important studies that met the article inclusion criteria are included. | ○ | ○ | ○ | ○ | ○ |
| 11. The validity of the studies is appropriately appraised. | ○ | ○ | ○ | ○ | ○ |
| 12. The methods are described in such a way as to be reproducible. | ○ | ○ | ○ | ○ | ○ |
| 13. The statistical methods are appropriate to the material and the objectives of this guideline. | ○ | ○ | ○ | ○ | ○ |
| 14. Important parameters (e.g., setting, study population, study design) that could affect study results are systematically addressed. | ○ | ○ | ○ | ○ | ○ |
| 15. Health benefits, side effects, and risks are adequately addressed. | ○ | ○ | ○ | ○ | ○ |
| 16. The writing style is appropriate for health care professionals. | ○ | ○ | ○ | ○ | ○ |
| 17. The grades assigned to each recommendation are appropriate. | ○ | ○ | ○ | ○ | ○ |



**Please provide a brief explanation of both your positive and negative answers in the preceding section. If applicable, please specify the draft page and line numbers in your comments. Please feel free to also comment on the overall structure and content of the Guideline.**

**Would you recommend these guidelines for use in clinical practice?***

○ Strongly Recommend
○ Recommend
○ Would Not Recommend
○ Unsure

**Additional Comments:**

To view an example of the structured peer review form, please select the following link: Structured Peer Review Form

# APPENDIX VIII

## INTERPRETING THE FOREST PLOTS

We use descriptive diagrams known as forest plots to present data from studies comparing the differences in outcomes between two treatment groups when a meta-analysis has been performed (combining results of multiple studies into a single estimate of overall effect). The overall effect is shown at the bottom of the graph as a diamond to illustrate the confidence intervals. The standardized mean difference or odds ratio are measures used to depict differences in outcomes between treatment groups. The horizontal line running through each point represents the 95% confidence interval for that point estimate. The solid vertical line represents “no effect” and is where the standardized mean difference = 0 or odds ratio = 1.

# APPENDIX IX

## CONFLICT OF INTEREST

Prior to the development of this guideline, guideline development group members disclose conflicts of interest (COI). They disclose COIs in writing to the American Academy of Orthopaedic Surgeons via a private on-line reporting database and also verbally at the recommendation approval meeting.

**Brent Graham, MD, Work Group Chair:** Journal of Bone and Joint Surgery - American: Editorial or governing board; Publishing royalties, financial or material support (Submitted on: 05/06/2015)

**Allan E Peljovich, MD, Work Group Vice-Chair:** AAOS: Board or committee member; American Society for Surgery of the Hand: Board or committee member (Submitted on: 10/01/2015)

**Robert Afra, MD:** (This individual reported nothing to disclose); Submitted on: 05/07/2015

**Mickey S Cho, MD:** American Society for Surgery of the Hand: Board or committee member (Submitted on: 05/07/2015)

**Robert Gray, MD:** American Society for Surgery of the Hand: Board or committee member; Skeletal Dynamics: Paid presenter or speaker (Submitted on: 04/23/2015)

**Andrew Gurman, MD:** I am a member of the Board of Trustees of the American Medical Association, which is the publisher of JAMA and Archives of Surgery: Editorial or governing board; I am the Speaker of the House of Delegates and a member of the Board of Trustees of the American Medical Association: Board or committee member (Submitted on 04/29/2015)

**Joy C MacDermid, PhD:** American Association for Hand Surgery: Board or committee member; Journal of Orthopaedic and Sports Physical Therapy Journal of Hand Therapy Open Orthopedics: Editorial or governing board; SLACK Incorporated: Publishing royalties, financial or material support (Submitted on: 05/13/2015)

**Gary Mlady, MD:** (This individual reported nothing to disclose); Submitted on: 04/14/2015

**Atul T Patel, MD:** Allergan: Paid presenter or speaker; Research support; Isen: Research support; Merz: Research support; Pfizer: Research support (Submitted on: 04/29/2015)

**David Rempel, MD:** American College of Occupational and Environmental Medicine: Board or committee member; Applied Ergonomics: Editorial or governing board; Human Factors: Editorial or governing board; Occupational and Environmental Medicine/Lange: Publishing royalties, financial or material support (Submitted on: 04/29/2015)

**Tamara D Rozental, MD:** AAOS: Board or committee member; American Society for Surgery of the Hand: Board or committee member; Journal of Hand Surgery - American: Editorial or governing board (Submitted on: 04/02/2015)

**Mohammad Kian Salajegheh, MD:** (This individual reported nothing to disclose); Submitted on: 05/04/2015

**John Michael Stephenson, MD:** American Society for Surgery of the Hand: Board or committee member; Journal of Hand Surgery - American: Editorial or governing board

(Submitted on: 10/06/2015)

**Michael Warren Keith, MD, Work Group Oversight Chair:** AAOS: Board or committee member; Neuros: Unpaid consultant (Submitted on: 04/02/2015)

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**J Mark Evans, MD:** American Society for Surgery of the Hand: Board or committee member; Journal of Urgent Care Medicine, Editorial board (wife): Editorial or governing board (Submitted on: 10/04/2015)

**John D Lubahn, MD:** Auxillium - Xiaflex: Research support (Submitted on: 10/14/2015)

**Wilson Ray, MD:** DePuy, A Johnson & Johnson Company: Paid consultant; LDR Holding: Stock or stock Options; Ulrich: Paid consultant (Submitted on: 05/01/2015)

**Robert Jay Spinner, MD:** American Association for Hand Surgery: Board or committee member; American Society for Peripheral Nerve: Board or committee member; Clinical Anatomy: Editorial or governing board; J Surgical Orthopedic Advances: Editorial or governing board; Mayo Clinic Proceedings: Editorial or governing board; Mayo Medical Ventures: Paid consultant; Neurosurgery: Editorial or governing board; Saunders/Mosby-Elsevier: Publishing royalties, financial or material support; World Neurosurgery: Editorial or governing board (Submitted on: 10/04/2015)

**Grant Thomson, MD, MSc:** American Association of Plastic Surgeons: Board or committee member; Smith & Nephew: Research support; Springer: Editorial or governing board (Submitted on: 05/06/2015)

## AAOS Staff

**William Shaffer:** (This individual reported nothing to disclose); Submitted on: 10/09/2015

**Deborah Cummins, PhD:** (This individual reported nothing to disclose); Submitted on: 10/07/2015

**Jayson Murray, MA:** (This individual reported nothing to disclose); Submitted on: 05/19/2015

**Mukarram Mohiuddin:** (This individual reported nothing to disclose); Submitted on: 10/13/2015

**Kyle Mullen:** No disclosure available

**Anne Woznica:** (This individual reported nothing to disclose); Submitted on: 10/01/2015

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**Yasseline Martinez:** (This individual reported nothing to disclose); Submitted on: 04/02/2015

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# APPENDIX X

## BIBLIOGRAPHIES

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Ziswiler,H.R., Reichenbach,S., Vogelin,E., Bachmann,L.M., Villiger,P.M., Juni,P. Diagnostic value of sonography in patients with suspected carpal tunnel syndrome: a prospective study. *Arthritis Rheum.* 2005/1; 1: 304-311

Zyluk,A., Strychar,J. A comparison of two limited open techniques for carpal tunnel release. *J Hand Surg Br* 2006/10; 5: 466-472

## EXCLUDED STUDIES

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Abbas,M.A.; Afifi,A.A.; Zhang,Z.W.; Kraus,J.F. | 1998 | Meta-analysis of published studies of work-related carpal tunnel syndrome | Int.J Occup.Environ.Health | meta-analysis |
| Abbas,M.F.; Faris,R.H.; Harber,P.I.; Mishriky,A.M.; El-Shahaly,H.A.; Waheeb,Y.H.; Kraus,J.F. | 2001 | Worksite and personal factors associated with carpal tunnel syndrome in an Egyptian electronics assembly factory | Int.J Occup.Environ.Health | very low quality |
| Abbotts,J.; McIntosh,H. | 2013 | Can wrist splints or steroid injections reduce the need for decompression surgery in carpal tunnel syndrome? (Structured abstract) | Health Technology Assessment Database | Narrative review |
| Abbruzzese,M.; Loeb,C.; Ratto,S.; Sacco,G. | 1977 | A comparative electrophysiological and histological study of sensory conduction velocity and Meissner corpuscles of the median nerve in pneumatic tool workers | Eur.Neurol. | review; not exclusive to CTS |
| Abdulrazzaq,Y.M.; Nan,Z.; Xin,G.K. | 2003 | Acupuncture in the management of pain | Emirates Medical Journal | Background article |
| Aberg,M.; Ljungberg,C.; Edin,E.; Millqvist,H.; Nordh,E.; Theorin,A.; Terenghi,G.; Wiberg,M. | 2009 | Clinical evaluation of a resorbable wrap-around implant as an alternative to nerve repair: a prospective, assessor-blinded, randomised clinical study of sensory, motor and functional recovery after peripheral nerve repair | J Plast.Reconstr.Aesthet.Surg | Does not address question of interest |
| Abichandani,S.; Shaikh,S.; Nadiger,R. | 2013 | Carpal tunnel syndrome - an occupational hazard facing dentistry | Int.Dent.J | literature review |
| Ablove,R.H.; Ablove,T.S. | 2009 | Prevalence of carpal tunnel syndrome in pregnant women | WMJ | narrative review |
| Abu-Ali,M.; Purswell,J.L.; Schlegel,R.E. | 1996 | Psychophysically determined work-cycle parameters for repetitive hand gripping | International Journal of Industrial Ergonomics | review; recommendations |
| Acharya,A.D.; Auchincloss,J.M. | 2005 | Return to functional hand use and work following open carpal tunnel surgery | J Hand Surg Br | |
| Adams,B.D. | 1994 | Endoscopic Carpal Tunnel Release | J Am Acad Orthop Surg | Background article |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Adams,J.; Wood,V.E. | 1981 | Tendon transfers for irreparable nerve damage in the hand | Orthop.Clin.North Am. | Background article |
| Adams,M.L.; Franklin,G.M.; Barnhart,S. | 1994 | Outcome of carpal tunnel surgery in Washington State workers' compensation | Am J Ind.Med | medical records review; insufficient data |
| Adamson,J.E.; Srouji,S.J.; Horton,C.E.; Mladick,R.A. | 1971 | The acute carpal tunnel syndrome | Plast.Reconstr.Surg | case reports |
| Afifi,M.; Santello,M.; Johnston,J.A. | 2012 | Effects of carpal tunnel syndrome on adaptation of multi-digit forces to object texture | Clin Neurophysiol. | +Does not answer a question of interest |
| Agabegi,S.S.; Freiberg,R.A.; Plunkett,J.M.; Stern,P.J. | 2007 | Thumb abduction strength measurement in carpal tunnel syndrome | J Hand Surg Am | insufficient data; very low study design |
| Agarwal,V.; Singh,R.; Sachdev,A.; Wiclaff; Shekhar,S.; Goel,D. | 2005 | A prospective study of the long-term efficacy of local methyl prednisolone acetate injection in the management of mild carpal tunnel syndrome | Rheumatology (Oxford) | Very Low Quality |
| Agarwal,V.; Singh,R.; Sachdev,A.; Wiclaff; Shekhar,S.; Goel,D. | 2007 | Long term efficacy of local methyl prednisolone acetate injection in the management of carpal tunnel syndrome | Indian Journal of Rheumatology | Very Low Quality |
| Agee,J.M.; McCarroll,H.R.; North,E.R. | 1994 | Endoscopic carpal tunnel release using the single proximal incision technique | Hand Clin | Background article |
| Agee,J.M.; Peimer,C.A.; Pyrek,J.D.; Walsh,W.E. | 1995 | Endoscopic carpal tunnel release: a prospective study of complications and surgical experience | J Hand Surg Am | very low quality |
| Ahan,U.; Arne,Z.M.; Bajrovi,F.; Zorman,P. | 2002 | Surgical technique to reduce scar discomfort after carpal tunnel surgery | Journal of Hand Surgery | duplicate of PM:12239671 |
| Ahcan,U.; Arnez,Z.M.; Bajrovic,F.; Zorman,P. | 2002 | Surgical technique to reduce scar discomfort after carpal tunnel surgery | J Hand Surg Am | very low quality |
| Ahmed,M.S.; Ali,R.; Mojaddidi,M.; Thomsen,N.; Dahlin,L.; Jeziorska,M.; Malik,R. | 2010 | Carpal tunnel syndrome in patients with diabetes is associated with increased expression of VEGF and its receptors | Diabet.Med. | summary report; abstract |
| Ahn,D.S. | 2001 | Hand elevation: a new test for carpal tunnel syndrome | Ann.Plast.Surg | insufficient data; very low study design |
| Aiache,A.E. | 1978 | An early sign of carpal tunnel syndrome | Plast.Reconstr.Surg | case report |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Aird,J.; Cady,R.; Nagi,H.; Kullar,S.; MacDermid,J.C. | 2006 | The impact of wrist extension provocation on current perception thresholds in patients with carpal tunnel syndrome: a pilot study | J Hand Ther | &lt;10 patients in CTS group; very low study design |
| Ajeena,I.M.; Al-Saad,R.H.; Al-Mudhafar,A.; Hadi,N.R.; Al-Aridhy,S.H. | 2013 | Ultrasonic assessment of females with carpal tunnel syndrome proved by nerve conduction study | Neural Plast. | insufficient data; very low study design |
| Akcar,N.; Ozkan,S.; Mehmetoglu,O.; Calisir,C.; Adapinar,B. | 2010 | Value of power Doppler and gray-scale US in the diagnosis of carpal tunnel syndrome: contribution of cross-sectional area just before the tunnel inlet as compared with the cross-sectional area at the tunnel | Korean J Radiol. | insufficient data; very low study design |
| Akkus,S.; Kutluhan,S.; Akhan,G.; Tunc,E.; Ozturk,M.; Koyuncuoglu,H.R. | 2002 | Does fibromyalgia affect the outcomes of local steroid treatment in patients with carpal tunnel syndrome? | Rheumatol.Int. | Does not answer a question of interest; no assessment of risk factors |
| Aktas,I.; Sunter,G.; Uluc,K.; Isak,B.; Tanridag,T.; Akyuz,G.; Us,O. | 2012 | Does the provocation maneuvers increase the sensitivity of sensory nerve conduction studies in diagnosis of carpal tunnel syndrome? | Turkiye Fiziksel Tip ve Rehabilitasyon Dergisi | insufficient data; no true reference standard |
| al Qattan,M.M.; Manktelow,R.T.; Bowen,C.V. | 1994 | Pregnancy-induced carpal tunnel syndrome requiring surgical release longer than 2 years after delivery | Obstet.Gynecol. | no comparison group; very low study design |
| Al-Benna,S.; Nano,P.G.; El-Enin,H. | 2012 | Extended open-carpal tunnel release in renal dialysis patients | Saudi J Kidney Dis Transpl. | Retrospective case series |
| Alderson,M.; McGall,D. | 1999 | The Alderson-McGall hand function questionnaire for patients with Carpal Tunnel syndrome: a pilot evaluation of a future outcome measure | J Hand Ther | Does not address question of interest |
| Alderson,M.K.; Petajan,J.H. | 1987 | Relative refractory period: A measure to detect early neuropathy in alcoholics | Muscle Nerve | Not relevant to CTS |
| Aldridge,J.W.; Bruno,R.J.; Strauch,R.J.; Rosenwasser,M.P. | 2001 | Nerve entrapment in athletes | Clin.Sports Med. | background |
| Aleman,L.; Berna,J.D.; Reus,M.; Martinez,F.; | 2008 | Reproducibility of sonographic measurements of the median nerve | J Ultrasound Med | +Does not answer a question of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Domenech-Ratto,G.; Campos,M. | | | | |
| Alexanian,R.; Fraschini,G.; Smith,L. | 1984 | Amyloidosis in multiple myeloma or without apparent cause | Arch Intern.Med | not relevant to CTS; bio-study |
| Alfonso,M.I.; Dzwierzynski,W. | 1998 | Hoffman-Tinel sign: The realities | Phys.Med.Rehabil.Clin.N.Am. | Background Information; case reports |
| Aljahlan,M.; Lee,K.-C.; Toth,E. | 1999 | Limited joint mobility in diabetes. Diabetic cheiroarthropathy may be a clue to more serious complications | Postgrad.Med. | Background Information |
| Aljure,J.; Eltorai,I.; Bradley,W.E.; Lin,J.E.; Johnson,B. | 1985 | Carpal tunnel syndrome in paraplegic patients | | Not relevant,does not answer the PICO question |
| Allen,C.W.,Jr. | 1993 | Weight of evidence links obesity, fitness to carpal tunnel syndrome. Companies implementing wellness programs experience a reduction in CTS incidence | Occup.Health Saf | Background Information |
| Allmann,K.H.; Horch,R.; Uhl,M.; Gufler,H.; Altehoefer,C.; Stark,G.B.; Langer,M. | 1997 | MR imaging of the carpal tunnel | Eur.J Radiol. | insufficient data; very low study design |
| Almeyda,J.R.; Thorne,N.; Russell,B. | 1969 | Myxoedema--carpal tunnel syndrome | Br J Dermatol. | notes |
| Al-Qattan,M.M. | 2010 | Variations in the course of the thenar motor branch of the median nerve and their relationship to the hypertrophic muscle overlying the transverse carpal ligament | J Hand Surg Am | very low quality |
| Altinok,M.T.; Baysal,O.; Karakas,H.M.; Firat,A.K. | 2004 | Sonographic evaluation of the carpal tunnel after provocative exercises | J Ultrasound Med | +not best available evidence |
| Altinok,T.; Baysal,O.; Karakas,H.M.; Sigirci,A.; Alkan,A.; Kayhan,A.; Yologlu,S. | 2004 | Ultrasonographic assessment of mild and moderate idiopathic carpal tunnel syndrome | Clin Radiol. | insufficient data; very low study design |
| Amadio,P.C. | 2003 | Management of nerve compression syndrome in musicians | Hand Clin. | Background Information; review |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Amadio,P.C. | 2003 | What's new in hand surgery | Journal of Bone and Joint Surgery - Series A | background |
| Amayyreh,I.; Almutaseb,N. | 2011 | Grip strength as a predictor for the severity of carpal tunnel syndrome in female patients | Jordan Medical Journal | insufficient data; very low study design |
| Amick III,B.C.; Habeck,R.V.; Ossmann,J.; Fossel,A.H.; Keller,R.; Katz,J.N. | 2004 | Predictors of Successful Work Role Functioning after Carpal Tunnel Release Surgery | J.Occup.Environ.Med. | Does not addess question of interest |
| Amirfeyz,R.; Clark,D.; Parsons,B.; Melotti,R.; Bhatia,R.; Leslie,I.; Bannister,G. | 2011 | Clinical tests for carpal tunnel syndrome in contemporary practice | Arch Orthop Trauma Surg | insufficient data; very low study design |
| Amirfeyz,R.; Gozzard,C.; Leslie,I.J. | 2005 | Hand elevation test for assessment of carpal tunnel syndrome | J Hand Surg Br | +not best available evidence |
| Amirfeyz,R.; Mehendale,S.; Tyrrell,S.; Bhatia,R.; Leslie,I.; Bannister,G. | 2010 | Katz and Stirrat hand diagram revisited | Hand Surg | insufficient data; very low study design |
| Amirjani,N.; Ashworth,N.L.; Olson,J.L.; Morhart,M.; Chan,K.M. | 2011 | Discriminative validity and test-retest reliability of the Dellon-modified Moberg pick-up test in carpal tunnel syndrome patients | J Peripher.Nerv.Syst. | insufficient data; very low study design |
| Amirjani,N.; Ashworth,N.L.; Olson,J.L.; Morhart,M.; Chan,K.M. | 2011 | Validity and reliability of the Purdue Pegboard Test in carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
| Ammer,K.; Mayr,H.; Thur,H. | 1993 | Self-administered diagram for diagnosing carpal tunnel syndrome | European Journal of Physical Medicine and Rehabilitation | Not best evidence for hand diagram |
| Andary,M.T.; Fankhauser,M.J.; Ritson,J.L.; Spiegel,N.; Hulce,V.; Yosef,M.; Stanton,D.F. | 1996 | Comparison of sensory mid-palm studies to other techniques in carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Andersen,J.H.; Thomsen,J.F.; Overgaard,E.; Lassen,C.F.; Brandt,L.P.; Vilstrup,I.; Kryger,A.I.; Mikkelsen,S. | 2003 | Computer use and carpal tunnel syndrome: a 1-year follow-up study |  | Does not answer a question of interest; no diagnosis of CTS |
| Andersen,K. | 1985 | Surface recording of orthodromic sensory nerve action potentials in | Muscle Nerve | only normal subjects used |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| | | median and ulnar nerves in normal subjects | | |
| Anderson,L.P. | 1986 | Carpal tunnel syndrome | Orthop Nurs. | background |
| Andreu,J.L.; Ly-Pen,D.; Millan,I.; de,Blas G.; Sanchez-Olaso,A. | 2014 | Local injection versus surgery in carpal tunnel syndrome: Neurophysiologic outcomes of a randomized clinical trial | Clin.Neurophysiol. | Duplicate study (duplicate to AAOS ID 137) |
| Andrew,C.Y.H.; Hua,L.K.; Kiong,P.B.; Dennis,K. | 2005 | Carpal tunnel syndrome - Splinting or surgery? A systematic review | Singapore General Hospital Proceedings | Systematic review |
| Angelis,M.V.; Pierfelice,F.; Giovanni,P.; Staniscia,T.; Uncini,A. | 2009 | Efficacy of a soft hand brace and a wrist splint for carpal tunnel syndrome: a randomized controlled study | Acta Neurol.Scand. | Duplicate article (duplicate with AAOS ID 455) |
| Ansari,N.N.; Adelmanesh,F.; Naghdi,S.; Mousavi,S. | 2009 | The relationship between symptoms, clinical tests and nerve conduction study findings in carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | insufficient data; not best evidence |
| Aoki,T.; Oshige,T.; Matsuyama,A.; Oki,H.; Kinoshita,S.; Yamashita,Y.; Takahashi,H.; Hayashida,Y.; Sakai,A.; Hisaoka,M.; Korogi,Y. | 2014 | High-resolution MRI predicts steroid injection response in carpal tunnel syndrome patients | Eur.Radiol. | Very Low Quality |
| Aoki,T.; Oshige,T.; Matsuyama,A.; Oki,H.; Kinoshita,S.; Yamashita,Y.; Takahashi,H.; Hayashida,Y.; Sakai,A.; Hisaoka,M.; Korogi,Y. | 2013 | High-resolution MRI predicts steroid injection response in carpal tunnel syndrome patients | Eur.Radiol. | Duplicate article (duplicate with AAOS ID 1637) |
| Apfelberg,D.B.; Maser,M.R.; Lash,H.; Kaye,R.L.; Britton,M.C.; Bobrove,A. | 1978 | Rheumatoid hand deformities: pathophysiology and treatment | West J Med | Background article |
| Appleby,M.A.; Neville-Smith,M.; Parrott,M.W. | 2009 | Functional outcomes post carpal tunnel release: a modified replication of a previous study | J Hand Ther | +Does not answer a question of interest; not best available evidence |
| Araki,S.; Murata,K.; Aono,H. | 1986 | Subclinical cervico-spino-bulbar effects of lead: A study of short-latency somatosensory evoked potentials in | Am.J.Ind.Med. | Not relevant to CTS |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| | | workers exposed to lead, zinc, and copper | | |
| Arendt-Nielsen,L.; Gregersen,H.; Toft,E.; Bjerring,P. | 1991 | Involvement of thin afferents in carpal tunnel syndrome: evaluated quantitatively by argon laser stimulation | Muscle Nerve | Does not answer a question of interest |
| Argyriou,A.A.; Karanasios,P.; Makridou,A.; Makris,N. | 2009 | The significance of second lumbrical-interosseous latency comparison in the diagnosis of carpal tunnel syndrome | Acta Neurol Scand. | insufficient data; very low study design |
| Argyriou,A.A.; Polychronopoulos,P.; Moutopulou,E.; Aplada,M.; Chroni,E. | 2006 | The significance of intact sympathetic skin responses in carpal tunnel syndrome | Eur.J Neurol | insufficient data; very low study design |
| Ariyan,S.; Watson,H.K. | 1977 | The palmar approach for the visualization and release of the carpal tunnel. An analysis of 429 cases | Plast.Reconstr.Surg | Retrospective case series |
| Arminio,J.A. | 1986 | Etiology of carpal: tunnel syndrome | Del Med J | background |
| Armstong,A.P.; Flynn,J.R.; Davies,D.M. | 1997 | Endoscopic carpal tunnel release. A review of 208 consecutive cases | Journal of Hand Surgery | Retrospective case series |
| Armstrong,M.B.; Villalobos,R.E. | 1997 | Surgical treatment of carpal tunnel syndrome | Phys.Med.Rehabil.Clin.N.Am. | Background article |
| Armstrong,T.; Devor,W.; Borschel,L.; Contreras,R. | 2004 | Intracarpal steroid injection is safe and effective for short-term management of carpal tunnel syndrome | Muscle Nerve | Does not meet inclusion criteria (follow-up&lt;1 month) |
| Armstrong,T.J.; Castelli,W.A.; Evans,F.G.; Diaz-Perez,R. | 1984 | Some histological changes in carpal tunnel contents and their biomechanical implications | J Occup.Med | cadaver study |
| Armstrong,T.J.; Chaffin,D.B. | 1979 | Carpal tunnel syndrome and selected personal attributes | J Occup.Med | no comparison group; very low study design |
| Armstrong,T.J.; Chaffin,D.B. | 1979 | Some biomechanical aspects of the carpal tunnel | J Biomech. | biomechanical study |
| Arner,M.; Hagberg,L.; Rosen,B. | 1994 | Sensory disturbances after two-portal endoscopic carpal tunnel release: a preliminary report | J Hand Surg Am | Retrospective case series |
| Arnold,W.D.; Elsheikh,B.H. | 2013 | Entrapment neuropathies | Neurol.Clin. | background |

| **Authors** | **Year** | **Article Title** | **Periodical** | **Reason for Exclusion** |
|---|---|---|---|---|
| Arons,J.A.; Collins,N.; Arons,M.S. | 1999 | Results of treatment of carpal tunnel syndrome with associated hourglass deformity of the median nerve | J Hand Surg Am | +Does not answer a question of interest |
| Aroori,S.; Spence,R.A. | 2008 | Carpal tunnel syndrome | Ulster Med J | background |
| Ashe,M. | 2004 | Carpal tunnel syndrome in the pharmacy | Can.Pharm.J. | Background article |
| Ashraf,A.; Daghaghzadeh,A.; Naseri,M.; Nasiri,A.; Fakheri,M. | 2013 | A study of interpolation method in diagnosis of carpal tunnel syndrome | Ann.Indian Acad Neurol | insufficient data; very low study design |
| Ashraf,A.R.; Jali,R.; Moghtaderi,A.R.; Yazdani,A.H. | 2009 | The diagnostic value of ultrasonography in patients with electrophysiologicaly confirmed carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Ashworth,N. | 2005 | Carpal tunnel syndrome | Clin Evid. | background |
| Ashworth,N. | 2007 | Carpal tunnel syndrome | Am Fam Physician | background |
| Ashworth,N.L. | 2011 | Carpal tunnel syndrome | Clin Evid.(Online) | systematic review |
| Ashworth,N.L. | 2010 | Carpal tunnel syndrome | Clin Evid.(Online) | systematic review |
| Ashworth,N.L. | 2007 | Carpal tunnel syndrome | Clin Evid.(Online) | systematic review |
| Ashworth,N.L.; Bland,J.D. | 2013 | Effectiveness of second corticosteroid injections for carpal tunnel syndrome | Muscle Nerve | Incorrect patient population (2nd treatment) |
| Aslam,U.; Afzal,S.; Syed,S. | 2012 | Hyperventilation provokes symptoms of carpal tunnel syndrome | Hand Surg | +Does not answer a question of interest |
| Aszmann,O.C.; Dellon,A.L. | 1998 | Relationship between cutaneous pressure threshold and two-point discrimination | J Reconstr.Microsurg. | &lt;10 patients per group |
| Aszmann,O.C.; Kress,K.M.; Dellon,A.L. | 2000 | Results of decompression of peripheral nerves in diabetics: a prospective, blinded study | Plast.Reconstr.Surg | Does not address question of interest |
| Aszmann,O.C.; Lee,Dellon A. | 2001 | Decompression of multiple peripheral nerves in the treatment of diabetic neuropathy: A prospective, blinded study | Acta Chirurgica Austriaca | Incorrect patient population (&lt;10 patients/group) |
| Atcheson,S.G. | 1999 | Erratum: Carpal Tunnel syndrome: Is it work-related (Hospital Practice (March 15) (52)) | Hosp.Pract. | abstract correction; no text |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Atcheson,S.G.; Ward,J.R.; Lowe,W. | 1998 | Concurrent medical disease in work-related carpal tunnel syndrome | Arch Intern.Med | +not best available evidence |
| Athar,P.; Jilani,A.; Nguyen,T.T. | 2013 | Comparison of ring versus disposable disk electrodes in recording antidromic sensory median nerve conduction study for diagnosis of carpal tunnel syndrome | J Clin Neurophysiol. | insufficient data; very low study design |
| Atherton,W.G.; Faraj,A.A.; Riddick,A.C.; Davis,T.R. | 1999 | Follow-up after carpal tunnel decompression - general practitioner surgery or hand clinic? A randomized prospective study | J Hand Surg Br | Insufficient data |
| Atisook,R.; Benjapibal,M.; Sunsaneevithayakul,P.; Roongpisuthipong,A. | 1995 | Carpal tunnel syndrome during pregnancy: prevalence and blood level of pyridoxine | J Med Assoc Thai. | Does not address question of interest |
| Atroshi,I.; Breidenbach,W.C.; McCabe,S.J. | 1997 | Assessment of the carpal tunnel outcome instrument in patients with nerve-compression symptoms | J Hand Surg Am | +insufficient data; does not answer question of interest |
| Atroshi,I.; Gummesson,C. | 2009 | Non-surgical treatment in carpal tunnel syndrome | The Lancet | Commentary |
| Atroshi,I.; Gummesson,C.; Johnsson,R.; McCabe,S.J.; Ornstein,E. | 2003 | Severe carpal tunnel syndrome potentially needing surgical treatment in a general population | J Hand Surg Am | +Does not answer a question of interest; very low study design |
| Atroshi,I.; Gummesson,C.; McCabe,S.J.; Ornstein,E. | 2007 | The SF-6D health utility index in carpal tunnel syndrome | J Hand Surg Eur.Vol. | +Does not answer a question of interest |
| Atroshi,I.; Gummesson,C.; Ornstein,E.; Johnsson,R.; Ranstam,J. | 2007 | Carpal tunnel syndrome and keyboard use at work: a population-based study | Arthritis Rheum. | Not relevant, prevalence study |
| Atroshi,I.; Johnsson,R. | 1996 | Evaluation of portable nerve conduction testing in the diagnosis of carpal tunnel syndrome | J Hand Surg Am | insufficient data; very low study design |
| Atroshi,I.; Johnsson,R.; Nouhan,R.; Crain,G.; McCabe,S.J. | 1997 | Use of outcome instruments to compare workers' compensation and non-workers' compensation carpal tunnel syndrome | J Hand Surg Am | +Does not answer a question of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Atroshi,I.; Johnsson,R.; Ornstein,E. | 1997 | Endoscopic carpal tunnel release: prospective assessment of 255 consecutive cases | J Hand Surg Br | Insufficient data (results not stratified by anaesthetic type)) |
| Atroshi,I.; Lyren,P.E.; Gummesson,C. | 2009 | The 6-item CTS symptoms scale: a brief outcomes measure for carpal tunnel syndrome | Qual.Life Res. | Insufficient data (no post-op findings) |
| Atroshi,I.; Lyren,P.E.; Ornstein,E.; Gummesson,C. | 2011 | The six-item CTS symptoms scale and palmar pain scale in carpal tunnel syndrome | J Hand Surg Am | very low quality |
| Atterbury,M.R.; Limke,J.C.; Lemasters,G.K.; Li,Y.; Forrester,C.; Stinson,R.; Applegate,H. | 1996 | Nested case-control study of hand and wrist work-related musculoskeletal disorders in carpenters | Am J Ind.Med | not exclusive to CTS |
| Aulicino,P.L. | 1990 | Neurovascular injuries in the hands of athletes | Hand Clin. | Background information |
| Aurora,S.K.; Ahmad,B.K.; Aurora,T.K. | 1998 | Silent period abnormalities in carpal tunnel syndrome | Muscle Nerve | +Does not answer a question of interest; very low study design |
| Austad,W.R. | 1968 | The carpal tunnel syndrome | Med Times | background |
| Awada,A.A.; Bashi,S.A.; Aljumah,M.A.; Heffernan,L.P. | 2000 | Carpal Tunnel Syndrome in type 2 diabetic patients | Neurosciences (Riyadh.) | Not relevant, prevalence study |
| Aydin,G.; Keles,I.; Ozbudak,Demir S.; Baysal,A.I. | 2004 | Sensitivity of median sensory nerve conduction tests in digital branches for the diagnosis of carpal tunnel syndrome | Am J Phys Med Rehabil. | insufficient data; very low study design |
| Aydin,K.; Cokluk,C.; Piskin,A.; Kocabicak,E. | 2007 | Ultrasonographically checking the sectioning of the transverse carpal ligament during carpal tunnel surgery with limited uni skin incisions | Turk Neurosurg. | Does not address question of interest |
| Ayeni,O.; Thoma,A.; Haines,T.; Sprague,S. | 2005 | Analysis of reporting return to work in studies comparing open with endoscopic carpal tunnel release: A review of randomized controlled trials | Can J Plast.Surg | systematic review |
| AygÃ¼l,R.; Ulvi,H.; Karatay,S.; Deniz,O.; Varoglu,A.O. | 2005 | Determination of sensitive electrophysiologic parameters at follow-up of different steroid treatments of carpal tunnel syndrome | Journal of clinical neurophysiology : official.publication.of the American Electroencephalographic.Society | Duplicate article (duplicate with AAOS ID 676) |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Aygul,R.; Ulvi,H.; Kotan,D.; Kuyucu,M.; Demir,R. | 2009 | Sensitivities of conventional and new electrophysiological techniques in carpal tunnel syndrome and their relationship to body mass index | J Brachial.Plex.Peripher.Nerve Inj. | this is more of a diagnostic study of NCS parameters, but for diagnostic it would be very low quality due to spectrum bias. for BMI this would be not best available evidence |
| Ayhan-Ardic,F.F.; Erdem,H.R. | 2000 | Long-term clinical and electrophysiological results of local steroid injection in patients with carpal tunnel syndrome | Funct.Neurol | Very Low Quality |
| Ayhan-Ardic,F.F.; Erdem,H.R.; Karaoglan,B.; Yorgancioglu,Z.R.; Ayhan,O. | 1997 | Short term results of local steroid injection in carpal tunnel syndrome | Turkish Journal of Medical Sciences | Very Low Quality |
| Azadeh,H.; Dehghani,M.; Zarezadeh,A. | 2010 | Incidence of trapezius myofascial trigger points in patients with the possible carpal tunnel syndrome | J Res.Med Sci | +Does not answer a question of interest |
| Azami,A.; Maleki,N.; Anari,H.; Iranparvar,Alamdari M.; Kalantarhormozi,M.; Tavosi,Z. | 2014 | The diagnostic value of ultrasound compared with nerve conduction velocity in carpal tunnel syndrome | International Journal of Rheumatic Diseases | insufficient data; very low study design |
| Azmy,R.M.; Labib,A.A.; Elkholy,S.H. | 2013 | Axonal degeneration of the ulnar nerve secondary to carpal tunnel syndrome: Fact or fiction? | Neural Regeneration Research | +Does not answer a question of interest |
| Babu,S.R.; Britton,J.M. | 1994 | The role of steroid injection in the management of carpal tunnel syndrome | Journal of Orthopaedic Rheumatology | Very Low Quality |
| Backhouse,K.M.; Kay,A. | 1969 | Carpal-tunnel syndrome | | letter |
| Badalamente,M.; Coffelt,L.; Elfar,J.; Gaston,G.; Hammert,W.; Huang,J.; Lattanza,L.; MacDermid,J.; Merrell,G.; Netscher,D.; Panthaki,Z.; Rafijah,G.; Trczinski,D.; Graham,B. | 2013 | Measurement scales in clinical research of the upper extremity, part 2: Outcome measures in studies of the hand/wrist and shoulder/elbow | Journal of Hand Surgery | background information |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Badarny,S.; Rawashdeh,H.; Meer,J.; Abed,S.; Habib,G. | 2011 | Repeated electrophysiologic studies in patients with carpal tunnel syndrome following local corticosteroid injection using a novel approach | Isr.Med Assoc J | Very Low Quality |
| Bader,A.M. | 1999 | Neurologic and neuromuscular disease in the obstetric patient | Problems in Anesthesia | Background article |
| Bagatur,A.E.; Zorer,G. | 2001 | The carpal tunnel syndrome is a bilateral disorder | J Bone Joint Surg Br | all confirmed CTS cases; no comparison groups |
| Baguneid,M.S.; Sochart,D.H.; Dunlop,D.; Kenny,N.W. | 1997 | Carpal tunnel decompression under local anaesthetic and tourniquet control | J Hand Surg Br | Survey study |
| Bahou,Y.G. | 2002 | Carpal tunnel syndrome: a series observed at Jordan University Hospital (JUH), June 1999-December 2000 | Clin Neurol Neurosurg. | records review |
| Bahrami,M.H.; Rayegani,S.M.; Fereidouni,M.; Baghbani,M. | 2005 | Prevalence and severity of carpal tunnel syndrome (CTS) during pregnancy | Electromyogr.Clin Neurophysiol. | Does not address question of interest |
| Bak,L.; Bak,S.; Gaster,P.; Mathiesen,F.; Ellemann,K.; Bertheussen,K.; Zeeberg,I. | 1997 | MR imaging of the wrist in carpal tunnel syndrome | Acta Radiol. | insufficient data |
| Baker,E.L.; Ehrenberg,R.L. | 1990 | Preventing the work-related carpal tunnel syndrome: physician reporting and diagnostic criteria | Ann.Intern.Med | review |
| Baker,N.A.; Livengood,H.M. | 2014 | Symptom severity and conservative treatment for carpal tunnel syndrome in association with eventual carpal tunnel release | J Hand Surg Am | Does not address question of interest |
| Baker,R.H.; Gill,K.; Davey,P.A. | 2008 | A simple way to reduce neurovascular complications in open carpal tunnel decompression | Plast.Reconstr.Surg | Narrative review |
| Bakhsh,H.; Ibrahim,I.; Khan,W.; Smitham,P.; Goddard,N. | 2012 | Assessment of validity, reliability, responsiveness and bias of three commonly used patient-reported outcome measures in carpal tunnel syndrome | Ortop.Traumatol.Rehabil. | very low quality |
| Balakrishnan,C.; Mussman,J.L.; Balakrishnan,A.; Khalil,A.J. | 2009 | Acute carpal tunnel syndrome from burns of the hand and wrist | Can J Plast.Surg | case report |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Balci,K.; Utku,U. | 2007 | Carpal tunnel syndrome and metabolic syndrome | Acta Neurol Scand. | all CTS cases; no comparison group |
| Ball,C.; Pearse,M.; Kennedy,D.; Hall,A.; Nanchahal,J. | 2011 | Validation of a one-stop carpal tunnel clinic including nerve conduction studies and hand therapy | Ann.R Coll Surg Engl. | very low quality |
| Bande,S.; De,Smet L.; Fabry,G. | 1994 | The results of carpal tunnel release: open versus endoscopic technique | J Hand Surg Br | very low quality |
| Bandinelli,F.; Kaloudi,O.; Candelieri,A.; Conforti,M.L.; Casale,R.; Cammarata,S.; Grassiri,G.; Miniati,I.; Melchiorre,D.; Matucci-Cerinic,M. | 2010 | Early detection of median nerve syndrome at the carpal tunnel with high-resolution 18 MHz ultrasonography in systemic sclerosis patients | Clin Exp.Rheumatol. | Does not answer a question of interest; no CTS develpment |
| Banerjee,T.; Meagher,J.N. | 1974 | Carpal desmotomy: a technical note | N.C Med J | Background article |
| Banta,C.A. | 1994 | A prospective, nonrandomized study of iontophoresis, wrist splinting, and antiinflammatory medication in the treatment of early-mild carpal tunnel syndrome | J Occup.Med | Very Low Quality |
| Barbosa,R.I.; da Silva Rodrigues,E.K.; Tamanini,G.; Marcolino,A.M.; Elui,V.M.; de Jesus Guirro,R.R.; Mazzer,N.; de Cassia Registro,Fonseca M. | 2012 | Effectiveness of low-level laser therapy for patients with carpal tunnel syndrome: design of a randomized single-blinded controlled trial | BMC Musculoskelet.Disord. | Review |
| Barcenilla,A.; March,L.; Chen,J.; Sambrook,P. | 2011 | Carpal tunnel syndrome and its relationship to occupation: A meta-analysis | Internal Medicine Journal | meta-analysis |
| Barcenilla,A.; March,L.M.; Chen,J.S.; Sambrook,P.N. | 2012 | Carpal tunnel syndrome and its relationship to occupation: a meta-analysis | Rheumatology (Oxford) | meta-analysis |
| Barnes,D.E. | 1992 | MRI's role uncertain in carpal tunnel syndrome | Diagn.Imaging (San.Franc.) | Commentary/review |
| Barnes,L.; Rodnan,G.P.; Medsger,T.A.; Short,D. | 1979 | Eosinophilic fasciitis. A pathologic study of twenty cases | Am J Pathol. | Not relevant to CTS |
| Barnhart,S.; Daniell,W. | 1988 | Occupational medicine: carpal tunnel syndrome-a cumulative trauma disorder | West J Med | Background Information |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Barnhart,S.; Demers,P.A.; Miller,M.; Longstreth,W.T.,Jr.; Rosenstock,L. | 1991 | Carpal tunnel syndrome among ski manufacturing workers | Scand.J Work Environ.Health | Not relevant, prevalence study |
| Barrer,S.J. | 1991 | Gaining the upper hand on carpal tunnel syndrome | Occup.Health Saf | background |
| Bartkowiak,Z.; Zgorzalewicz-Stachowiak,M.; Nowicka,A. | 2011 | The effectiveness of particular physiotherapy techniques in the treatment of carpal tunnel syndrome - Application of low-level laser therapy based on a review of the literature | Fizjoterapia | literature review |
| Bastian,F.O. | 1974 | Amyloidosis and the carpal tunnel syndrome | Am J Clin Pathol. | biopsy study |
| Batteson,R.; Hammond,A.; Burke,F.; Sinha,S. | 2008 | The de Quervain's screening tool: validity and reliability of a measure to support clinical diagnosis and management | Musculoskeletal Care | not exclusive to CTS |
| Batur Caglayan,H.Z.; Nazliel,B.; Irkec,C. | 2013 | Nerve conduction velocities in hyperlipidemic patients | Neuroendocrinology Letters | not relevant; CTS patients excluded |
| Bauer,M.E. | 1985 | Carpal tunnel syndrome. An occupational risk to the dental hygienist | Dent.Hyg.(Chic.) | Background Information |
| Bayrak,A.O.; Tilki,H.E.; Coskun,M. | 2007 | Sympathetic skin response and axon count in carpal tunnel syndrome | J Clin Neurophysiol. | insufficient data; very low study design |
| Bayrak,I.K.; Bayrak,A.O.; Tilki,H.E.; Nural,M.S.; Sunter,T. | 2007 | Ultrasonography in carpal tunnel syndrome: comparison with electrophysiological stage and motor unit number estimate | Muscle Nerve | insufficient data; very low study design |
| Bear-Lehman,J. | 1997 | Upper extremity cumulative trauma disorder and return to work assessment | Work | Background Information |
| Beck,J.D.; Jones,R.B.; Malone,W.J.; Heimbach,J.L.; Ebbitt,T.; Klena,J.C. | 2013 | Magnetic resonance imaging after endoscopic carpal tunnel release | J Hand Surg Am | Not relevant |
| Becker,S.J.; Makanji,H.S.; Ring,D. | 2014 | Changes in treatment plan for carpal tunnel syndrome based on electrodiagnostic test results | J Hand Surg Eur.Vol. | Does not answer a question of interest |
| Becker,S.J.; Makanji,H.S.; Ring,D. | 2012 | Expected and actual improvement of symptoms with carpal tunnel release | J Hand Surg Am | very low quality |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Becton,J.L. | 1969 | Carpal tunnel syndrome--diagnosis and management | J Med Assoc Ga | background |
| Beekman,R.; Visser,L.H. | 2004 | High-resolution sonography of the peripheral nervous system -- a review of the literature | Eur.J Neurol | literature review |
| Beekman,R.; Visser,L.H. | 2003 | Sonography in the diagnosis of carpal tunnel syndrome: a critical review of the literature | Muscle Nerve | literature review |
| Beer,T.C.; Memon,N. | 1976 | Letter: Carpal tunnel syndrome and tennis elbow | Br Med J | letter |
| Bekkelund,S.I.; Torbergsen,T.; Rom,A.K.; Mellgren,S.I. | 2001 | Increased risk of median nerve dysfunction in floor cleaners: a controlled clinical and neurophysiological study | Scand.J Plast.Reconstr.Surg Hand Surg | Not relevant, CTS diagnosis not made |
| Bell,D.S.H.; Clements,Jr | 1983 | Reversal of the carpal tunnel syndrome after change of insulin injection sites |  | Case report |
| Bell-Krotoski,J. | 1994 | 'Pocket filaments' and specifications for the Semmes-Weinstein monofilaments | Star | review; background information |
| Belsole,R.J.; Greeley,J.M. | 1988 | Surgeon's acute carpal tunnel syndrome: an occupational hazard? | J Fla Med Assoc | case report |
| Beltran,J.; Rosenberg,Z.S. | 1994 | Diagnosis of compressive and entrapment neuropathies of the upper extremity: Value of MR imaging | Am.J.Roentgenol. | Background Information |
| Bendler,E.M.; Greenspun,B.; Yu,J.; Erdman,W.J. | 1977 | The bilaterality of carpal tunnel syndrome | Arch Phys Med Rehabil. | records review |
| Benson,L.S.; Bare,A.A.; Nagle,D.J.; Harder,V.S.; Williams,C.S.; Visotsky,J.L. | 2006 | Complications of endoscopic and open carpal tunnel release |  | systematic review |
| Berger,M.; Vermeulen,M.; Koelman,J.H.; van Schaik,I.N.; Roos,Y.B. | 2013 | The long-term follow-up of treatment with corticosteroid injections in patients with carpal tunnel syndrome. When are multiple injections indicated? | J Hand Surg Eur.Vol. | Very Low Quality |
| Berger,M.R.; Froimson,A.I. | 1979 | Hands that hurt: carpal tunnel syndrome | Am J Nurs. | not relevant |
| Bergfield,T.G.; Aulicino,P.L.; DePuy,T.E. | 1983 | The carpal tunnel syndrome | Orthop.Rev. | background |

| **Authors** | **Year** | **Article Title** | **Periodical** | **Reason for Exclusion** |
|---|---|---|---|---|
| Bernaards,C.M.; Ariens,G.A.; Hildebrandt,V.H. | 2006 | The (cost-)effectiveness of a lifestyle physical activity intervention in addition to a work style intervention on the recovery from neck and upper limb symptoms in computer workers | BMC Musculoskelet.Disord. | Not relevant |
| Bernard,J.M.; Macaire,P. | 1997 | Dose-range effects of clonidine added to lidocaine for brachial plexus block | | Insufficient data (Mean scores to relevant outcomes not reported) |
| Bernard,M.L. | 1979 | Carpal tunnel syndrome: identification and control | Occup.Health Nurs. | background |
| Bernstein,R.A. | 1994 | Endoscopic carpal tunnel release | Conn.Med | Narrative review |
| Bessette,L.; Keller,R.B.; Lew,R.A.; Simmons,B.P.; Fossel,A.H.; Mooney,N.; Katz,J.N. | 1997 | Prognostic value of a hand symptom diagram in surgery for carpal tunnel syndrome | J Rheumatol. | very low strength of evidence |
| Bessette,L.; Sangha,O.; Kuntz,K.M.; Keller,R.B.; Lew,R.A.; Fossel,A.H.; Katz,J.N. | 1998 | Comparative responsiveness of generic versus disease-specific and weighted versus unweighted health status measures in carpal tunnel syndrome | Med Care | +Does not answer a question of interest |
| Bhala,R.P.; Thoppil,E. | 1981 | Early detection of carpal tunnel syndrome by sensory nerve conduction | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Bhatia,R.; Field,J.; Grote,J.; Huma,H. | 2000 | Does splintage help pain after carpal tunnel release? | J Hand Surg Br | Insufficient data (conference poster) |
| Bhattacharya,R.; Birdsall,P.D.; Finn,P.; Stothard,J. | 2004 | A randomized controlled trial of knifelight and open carpal tunnel release | J Hand Surg Br | Does not meet inclusion criteria (invasive follow-up&lt;3 month) |
| Bialosky,J.E.; Bishop,M.D.; Price,D.D.; Robinson,M.E.; Vincent,K.R.; George,S.Z. | 2009 | A randomized sham-controlled trial of a neurodynamic technique in the treatment of carpal tunnel syndrome | J Orthop Sports Phys Ther | Manuscript |
| Bialosky,J.E.; Bishop,M.D.; Robinson,M.E.; Price,D.D.; George,S.Z. | 2011 | Heightened pain sensitivity in individuals with signs and symptoms of carpal tunnel syndrome and the relationship to clinical outcomes following a manual therapy intervention | Man.Ther | Manuscript |
| Bianchi,S.; Martinoli,C.; Abdelwahab,I.F. | 1999 | High-frequency ultrasound examination of the wrist and hand | Skeletal Radiol. | Background Information |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Bianchi,S.; Montet,X.; Martinoli,C.; Bonvin,F.; Fasel,J. | 2004 | High-resolution sonography of compressive neuropathies of the wrist | J.Clin.Ultrasound | Background Information; review |
| Bidwai,A.S.; Benjamin-Laing,H.E.; Shaw,D.A.; Iqbal,S.; Jones,W.A.; Brown,D.J. | 2013 | Patient satisfaction with tourniquet application and local anaesthesia infiltration in carpal tunnel decompression and the relationship with overall satisfaction | J Plast.Surg Hand Surg | Very low quality |
| Bienek,T.; Kusz,D.; Cielinski,L. | 2006 | Peripheral nerve compression neuropathy after fractures of the distal radius | J Hand Surg Br | insufficient data; no comparison group |
| Bigat,Z.; Boztug,N.; Hadimioglu,N.; Cete,N.; Coskunfirat,N.; Ertok,E. | 2006 | Does dexamethasone improve the quality of intravenous regional anesthesia and analgesia? A randomized, controlled clinical study | Anesth.Analg. | Deemed clinically irrelevant |
| Bigat,Z.; Karsli,B.; Boztug,N.; Cete,N.; Ertok,E. | 2005 | Comparison of the effect of low-dose ropivacaine and lidocaine in intravenous regional anaesthesia: A randomised, double-blind clinical study | Clinical Drug Investigation | Deemed clinically irrelevant |
| Biondi,R. | 1997 | Practice standards, guidelines and options for Carpal Tunnel Syndrome: Usefulness and limitations | Europa Medicophysica | systematic review |
| Birkbeck,M.Q.; Beer,T.C. | 1975 | Occupation in relation to the carpal tunnel syndrome | Rheumatol.Rehabil. | +not best available evidence; confounding comorbidities |
| Bischoff,C.; Isenberg,C.; Conrad,B. | 1991 | Lack of hyperlipidemia in carpal tunnel syndrome | Eur.Neurol | insufficient data; very low study design |
| Biyani,A.; Downes,E.M. | 1993 | An open twin incision technique of carpal tunnel decompression with reduced incidence of scar tenderness | J Hand Surg Br | very low quality |
| Blair,S.J. | 1988 | Avoiding complications of surgery for nerve compression syndromes | Orthop Clin North Am | Background article |
| Blanc,P.D.; Faucett,J.; Kennedy,J.J.; Cisternas,M.; Yelin,E. | 1996 | Self-reported carpal tunnel syndrome: predictors of work disability from the National Health Interview Survey Occupational Health Supplement | Am J Ind.Med | very low quality |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Bland,J.D. | 2001 | Do nerve conduction studies predict the outcome of carpal tunnel decompression? | Muscle Nerve | Retrospective case series |
| Bland,J.D. | 2000 | A neurophysiological grading scale for carpal tunnel syndrome | Muscle Nerve | report |
| Bland,J.D.P.; Rudolfer,S.M. | 2014 | Ultrasound imaging of the median nerve as a prognostic factor for carpal tunnel decompression | Muscle Nerve | Very low strength |
| Bleecker,M.L. | 1986 | Vibration perception thresholds in entrapment and toxic neuropathies | J Occup.Med | review; background information |
| Bleecker,M.L.; Agnew,J. | 1987 | New techniques for the diagnosis of carpal tunnel syndrome | Scand.J Work Environ.Health | Background Information |
| Bloem,J.J.; Pradjarahardja,M.C.; Vuursteen,P.J. | 1986 | The post-carpal tunnel syndrome. Causes and prevention | Neth.J Surg | Retrospective case series |
| Blumberg,A.; Burgi,W. | 1987 | Behavior of beta 2-microglobulin in patients with chronic renal failure undergoing hemodialysis, hemodiafiltration and continuous ambulatory peritoneal dialysis (CAPD) | Clin Nephrol. | Not relevant to CTS |
| Bodavula,V.K.; Burke,F.D.; Dubin,N.H.; Bradley,M.J.; Wilgis,E.F. | 2007 | A prospective, longitudinal outcome study of patients with carpal tunnel surgery and the relationship of body mass index | Hand (N.Y) | +Does not answer a question of interest |
| Boden,B.P.; Kozin,S.H.; Berlet,A.C. | 1995 | Wrist arthroscopy | Am.J.Orthop. | Background article |
| Bodofsky,E.B. | 2003 | A mathematical model for peripheral nerve conduction velocity | Electromyogr.Clin Neurophysiol. | +Does not answer a question of interest; not best available evidence |
| Bodofsky,E.B.; Campellone,J.V.; Wu,K.D.; Greenberg,W.M. | 2004 | Age and the severity of carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Bodofsky,E.B.; Greenberg,W.M.; Wu,K.D. | 2001 | Median nerve compression at the wrist: is it ever unilateral? | Electromyogr.Clin Neurophysiol. | Does not answer a question of interest; insufficient data |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Bodofsky,E.B.; Wu,K.D.; Campellone,J.V.; Greenberg,W.M.; Tomaio,A.C. | 2005 | A sensitive new median-ulnar technique for diagnosing mild Carpal Tunnel Syndrome | Electromyogr.Clin Neurophysiol. | +not best available evidence; very low study design |
| Boeckstyns,M.E.; Sorensen,A.I. | 1999 | Does endoscopic carpal tunnel release have a higher rate of complications than open carpal tunnel release? An analysis of published series | J Hand Surg Br | Systematic review |
| Boggins-Magill,M.K. | 1994 | Carpal tunnel release: scoping out the carpal tunnel | Todays.OR Nurse | Background article |
| Bogner,R.H.; Banga,A.K. | 1994 | Iontophoresis and phonophoresis | U.S.Pharmacist | Background information |
| Boland,R.A.; Adams,R.D. | 2002 | Vascular factors in carpal tunnel syndrome | J Hand Ther | +Does not answer a question of interest |
| Bonebrake,A.R. | 1994 | A treatment for carpal tunnel syndrome: results of follow-up study | J Manipulative Physiol Ther | Letter |
| Bonebrake,A.R.; Fernandez,J.E.; Marley,R.J.; Dahalan,J.B.; Kilmer,K.J. | 1990 | A treatment for carpal tunnel syndrome: evaluation of objective and subjective measures | J Manipulative Physiol Ther | +not best available evidence |
| Bonel,H.M.; Heuck,A.; Frei,K.A.; Herrmann,K.; Scheidler,J.; Srivastav,S.; Reiser,M. | 2001 | Carpal tunnel syndrome: assessment by turbo spin echo, spin echo, and magnetization transfer imaging applied in a low-field MR system | J Comput.Assist.Tomogr. | insufficient data; very low study design |
| Bonfiglioli,R.; Botter,A.; Calabrese,M.; Mussoni,P.; Violante,F.S.; Merletti,R. | 2012 | Surface electromyography features in manual workers affected by carpal tunnel syndrome | Muscle Nerve | +Does not answer a question of interest |
| Boninger,M.L.; Cooper,R.A.; Baldwin,M.A.; Shimada,S.D.; Koontz,A. | 1999 | Wheelchair pushrim kinetics: body weight and median nerve function | Arch Phys Med Rehabil. | biomechanical case series |
| Boogaarts,H.D.; Verbeek,A.L.; Bartels,R.H. | 2010 | Surgery for carpal tunnel syndrome under antiplatelet therapy | Clin Neurol Neurosurg. | |
| Boonyapisit,K.; Katirji,B.; Shapiro,B.E.; Preston,D.C. | 2002 | Lumbrical and interossei recording in severe carpal tunnel syndrome | Muscle Nerve | no comparison group; very low study design |
| Booth-Jones,A.D.; Lemasters,G.K.; Succop,P.; Atterbury,M.R.; Bhattacharya,A. | 1998 | Reliability of questionnaire information measuring musculoskeletal symptoms and work histories | Am.Ind.Hyg.Assoc.J. | not exclusive to CTS; does not answer a question of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Bora,Jr; Osterman,A.L.; Zielinski,C.J. | 1984 | Osteotomy of the distal radius with a biplanar iliac bone graft for malunion | Bull.Hosp.Jt.Dis.Orthop.Inst. | Incorrect patient population (does not include CTS patients) |
| Borg,K.; Lindblom,U. | 1988 | Diagnostic value of quantitative sensory testing (QST) in carpal tunnel syndrome | Acta Neurol Scand. | insufficient data; very low study design |
| Borg,K.; Lindblom,U. | 1986 | Increase of vibration threshold during wrist flexion in patients with carpal tunnel syndrome | | not best available evidence; very low study design |
| Borg,K.; Lindblom,U. | 1984 | Provoked changes in vibratory perception threshold versus stationary impairment of sensibility in carpal tunnel syndrom | Acta Neurol.Scand. | +not best available evidence |
| Borgman,M.F. | 1978 | Carpal tunnel syndrome | Nurse Pract. | background |
| Borisch,N.; Haussmann,P. | 2003 | Neurophysiological recovery after open carpal tunnel decompression: comparison of simple decompression and decompression with epineurotomy | J Hand Surg Br | No patient oriented outcomes or clinical outcomes of interest reported. |
| Boshes,B.; Brumlik,J.; Blonsky,E.R. | 1968 | Clinical neurology | Prog.Neurol Psychiatry | book chapter |
| Bostrom,L.; Gothe,C.J.; Hansson,S.; Lugnegard,H.; Nilsson,B.Y. | 1994 | Surgical treatment of carpal tunnel syndrome in patients exposed to vibration from handheld tools | Scand.J Plast.Reconstr.Surg Hand Surg | the outcome is successful response after CTS surgery |
| Bouaziz,H.; Kinirons,B.P.; Macalou,D.; Heck,M.; Dap,F.; Benhamou,D.; Laxenaire,M.C. | 2000 | Sufentanil does not prolong the duration of analgesia in a mepivacaine brachial plexus block: a dose response study | Anesth.Analg. | Deemed clinically irrelevant |
| Bourke,H.E.; Read,J.; Kampa,R.; Hearnden,A.; Davey,P.A. | 2011 | Clinic-based nerve conduction studies reduce time to surgery and are cost effective: a comparison with formal electrophysiological testing | Ann.R Coll Surg Engl. | +Does not answer a question of interest |
| Bovenzi,M. | 1994 | Hand-arm vibration syndrome and dose-response relation for vibration induced white finger among quarry drillers and stonecarvers. Italian Study Group on Physical Hazards in the Stone Industry | Occup.Environ.Med | Not exclusive to CTS; not sufficient number of CTS diagnoses |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Bovenzi,M.; Della,Vedova A.; Nataletti,P.; Alessandrini,B.; Poian,T. | 2005 | Work-related disorders of the upper limb in female workers using orbital sanders | Int.Arch Occup.Environ.Health | very low quality |
| Bovenzi,M.; Giannini,F.; Rossi,S. | 2000 | Vibration-induced multifocal neuropathy in forestry workers: electrophysiological findings in relation to vibration exposure and finger circulation | Int.Arch Occup.Environ.Health | &lt;10 patients per group; not exclusive to CTS |
| Bovenzi,M.; Zadini,A.; Franzinelli,A.; Borgogni,F. | 1991 | Occupational musculoskeletal disorders in the neck and upper limbs of forestry workers exposed to hand-arm vibration |  | Not relevant, prevalence study |
| Bowens,B.A. | 1981 | Carpal tunnel syndrome | J Neurosurg.Nurs. | background |
| Bowie,E.A.; Brimer,K.M.; Kidder,M.S.; Wallis,M.L.; Darr,N.S.; Halle,J.S.; Greathouse,D.G. | 2000 | Median and ulnar nerve conduction studies in young adult violinists | Medical Problems of Performing Artists | Not relevant, CTS diagnosis not made |
| Boya,H.; Ozcan,O.; Oztekin,H.H. | 2008 | Long-term complications of open carpal tunnel release | Muscle Nerve | Retrospective case series |
| Boyer,K.; Wies,J.; Turkelson,C.M. | 2009 | Effects of bias on the results of diagnostic studies of carpal tunnel syndrome | J Hand Surg Am | systematic review |
| Boyer,M.I. | 2008 | Corticosteroid injection for carpal tunnel syndrome | J Hand Surg Am | Narrative review |
| Braddom,R.L.; Johnson,E.W.; Trzebiatowski,G. | 1974 | Curriculum objectives in rehabilitation medicine: Results of a survey | Arch Phys Med Rehabil. | not relevant |
| Brahme,S.K.; Hodler,J.; Braun,R.M.; Sebrechts,C.; Jackson,W.; Resnick,D. | 1997 | Dynamic MR imaging of carpal tunnel syndrome | Skeletal Radiol. | insufficient data; very low study design |
| Braithwaite,B.D.; Robinson,G.J.; Burge,P.D. | 1993 | Haemostasis during carpal tunnel release under local anaesthesia: a controlled comparison of a tourniquet and adrenaline infiltration | J Hand Surg Br | Very low quality |
| Brannegan,R.; Bartt,R. | 2007 | Second lumbrical muscle recordings improve localization in severe carpal tunnel syndrome | Arch Phys Med Rehabil. | no comparison group or reference standard |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Brantingham,J.W.; Cassa,T.K.; Bonnefin,D.; Pribicevic,M.; Robb,A.; Pollard,H.; Tong,V.; Korporaal,C. | 2013 | Manipulative and multimodal therapy for upper extremity and temporomandibular disorders: a systematic review | J Manipulative Physiol Ther | systematic review |
| Braun,R.M.; Davidson,K.; Doehr,S. | 1989 | Provocative testing in the diagnosis of dynamic carpal tunnel syndrome | J Hand Surg Am | +Does not answer a question of interest |
| Braun,R.M.; Jackson,W.J. | 1994 | Electrical studies as a prognostic factor in the surgical treatment of carpal tunnel syndrome | J Hand Surg Am | very low quality |
| Bravaccio,F.; Trabucco,M.; Ammendola,A.; Cantore,R. | 1990 | Carpal tunnel syndrome: a clinical electrophysiological study of 84 cases | Neurophysiol.Clin | all CTS cases; no comparison group |
| Breuer,B.; Sperber,K.; Wallenstein,S.; Kiprovski,K.; Calapa,A.; Snow,B.; Pappagallo,M. | 2006 | Clinically significant placebo analgesic response in a pilot trial of botulinum B in patients with hand pain and carpal tunnel syndrome | Pain Med | Very Low Quality |
| Brezinova,V. | 1988 | Cutaneomuscular reflex in a peripheral nerve lesion | Electromyogr.Clin.Neurophysiol. | insufficient data; very low study design |
| Brick,J.E.; Brick,J.F.; Elnicki,D.M. | 1991 | Musculoskeletal disorders. When are they caused by hormone imbalance? | Postgrad.Med | review; background information |
| Bridges,M.J.; Robertson,D.C.; Chuck,A.J. | 2011 | Predicting the result of nerve conduction tests in carpal tunnel syndrome using a questionnaire | Hand Surg | insufficient data; does not answer question of interest |
| Briemberg,H.R. | 2007 | Neuromuscular diseases in pregnancy | Semin.Neurol. | background |
| Bril,V.; Fuglsang-Frederiksen,A. | 1984 | Number of potential reversals (turns) and amplitude of the pattern of electrical activity of the abductor pollicis brevis muscle in patients with neurogenic diseases | Acta Neurol Scand. | not exclusive to CTS; very low study design |
| Brismar,T. | 1985 | Changes in electrical threshold in human peripheral neuropathy | J Neurol Sci | &lt;10 patients per group |
| Brismar,T.; Ekenvall,L. | 1992 | Nerve conduction in the hands of vibration exposed workers | Electroencephalogr.Clin Neurophysiol. | Not relevant |
| Britz,G.W.; Haynor,D.R.; Kuntz,C.; Goodkin,R.; Gitter,A.; Kliot,M. | 1995 | Carpal tunnel syndrome: correlation of magnetic resonance imaging, clinical, electrodiagnostic, and intraoperative findings |  | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Bromberg,M.B.; Albers,J.W. | 1993 | Patterns of sensory nerve conduction abnormalities in demyelinating and axonal peripheral nerve disorders | Muscle Nerve | Not relevant to CTS |
| Bronson,J.; Beck,J.; Gillet,J. | 1997 | Provocative motor nerve conduction testing in presumptive carpal tunnel syndrome unconfirmed by traditional electrodiagnostic testing | J Hand Surg Am | +Does not answer a question of interest; very low study design |
| Brown,F.E.; Morgan,G.J.,Jr.; Taylor,T.; O'Connor,G.T. | 1984 | Coexistence of muscle anomalies and rheumatoid arthritis in patients with carpal tunnel syndrome | Clin Exp.Rheumatol. | case reports |
| Brown,M.G.; Keyser,B.; Rothenberg,E.S. | 1992 | Endoscopic carpal tunnel release | J Hand Surg Am | very low quality |
| Brown,M.G.; Rothenberg,E.S.; Keyser,B.; Woloszyn,T.T.; Wolford,A. | 1993 | Results of 1236 endoscopic carpal tunnel release procedures using the Brown technique | Contemp Orthop | no control group |
| Brown,M.J.; Baringer,J.R. | 1994 | Differentiating the diabetic neuropathies | Hosp.Pract. | Case reports |
| Brown,R.A.; Gelberman,R.H.; Seiler,J.G.,III; Abrahamsson,S.O.; Weiland,A.J.; Urbaniak,J.R.; Schoenfeld,D.A.; Furcolo,D. | 1993 | Carpal tunnel release. A prospective, randomized assessment of open and endoscopic methods | J Bone Joint Surg Am | Does not meet inclusion criteria (invasive follow-up&lt;3 month) |
| Brown,W.F.; Feasby,T.E. | 1974 | Estimates of functional motor axon loss in diabetics | J.Neurol.Sci. | not exclusive to CTS; does not answer a question of interest |
| Brown,W.F.; Ferguson,G.G.; Jones,M.W.; Yates,S.K. | 1976 | The location of conduction abnormalities in human entrapment neuropathies | Can J Neurol Sci | +Does not answer a question of interest; insufficient data |
| Browne,D.L.; McCrae,F.C.; Shaw,K.M. | 2001 | Musculoskeletal disease in diabetes | Practical Diabetes International | review |
| Browne,E.Z.,Jr.; Snyder,C.C. | 1975 | Carpal tunnel syndrome caused by hand injuries | Plast.Reconstr.Surg | insufficient data; no comparison group |
| Brumfield,Jr | 1983 | Carpal tunnel syndrome in rheumatoid arthritis | Orthop.Rev. | Retrospective case series |
| Bruner,J.M. | 1973 | Surgical exposure of flexor tendons in the hand | Ann.R Coll Surg Engl. | Commentary |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Bruser,P.; Richter,M.; Larkin,G.; Lefering,R. | 1999 | The operative treatment of carpal tunnel syndrome and its relevance to endoscopic release | European Journal of Plastic Surgery | Does not meet inclusion criteria (invasive follow-up&lt;3 month) |
| Bruske,J.; Bednarski,M.; Grzelec,H.; Zyluk,A. | 2002 | The usefulness of the Phalen test and the Hoffmann-Tinel sign in the diagnosis of carpal tunnel syndrome | Acta Orthop Belg. | insufficient data; very low study design |
| Bryar,G.E. | 1984 | Multiple nerve entrapments associated with carpal tunnel syndrome. A four year prospective study of 97 surgically treated patients | Int.Angiol. | Does not address question of interest |
| Buchan,S.; Amirfeyz,R. | 2013 | Cochrane corner: ergonomic positioning or equipment for treating carpal tunnel syndrome | J Hand Surg Eur.Vol. | systematic review |
| Buchberger,W.; Judmaier,W.; Birbamer,G.; Lener,M.; Schmidauer,C. | 1992 | Carpal tunnel syndrome: diagnosis with high-resolution sonography | AJR Am J Roentgenol. | insufficient data; very low study design |
| Buchberger,W.; Schon,G.; Strasser,K.; Jungwirth,W. | 1991 | High-resolution ultrasonography of the carpal tunnel | J Ultrasound Med | insufficient data; very low study design |
| Buch-Jaeger,N.; Foucher,G. | 1994 | Correlation of clinical signs with nerve conduction tests in the diagnosis of carpal tunnel syndrome | J Hand Surg Br | not best available evidence |
| Buchthal,F.; Rosenfalck,A. | 1971 | Sensory conduction from digit to palm and from palm to wrist in the carpal tunnel syndrome | J Neurol Neurosurg.Psychiatry | very low study design; &lt;10 patients per group |
| Buchthal,F.; Rosenfalck,A.; Trojaborg,W. | 1974 | Electrophysiological findings in entrapment of the median nerve at wrist and elbow | J Neurol Neurosurg.Psychiatry | no comparison of modalities; very low study design |
| Buckle,P.W. | 1997 | Work factors and upper limb disorders | Br.Med.J. | clinical review |
| Bulut,H.T.; Yildirim,A.; Ekmekci,B.; Gunbey,H.P. | 2014 | The diagnostic and grading value of diffusion tensor imaging in patients with carpal tunnel syndrome | Acad Radiol | case control; CTS and healthy |
| Burg,E.W.; Bathala,L.; Visser,L.H. | 2013 | Difference in normal values of median nerve cross sectional area between Dutch and Indian subjects | Muscle Nerve | only healthy study subjects |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Burke,D.T.; Burke,M.A.; Bell,R.; Stewart,G.W.; Mehdi,R.S.; Kim,H.J. | 1999 | Subjective swelling: a new sign for carpal tunnel syndrome | Am J Phys Med Rehabil. | not best available evidence |
| Burke,F.D.; Ellis,J.; McKenna,H.; Bradley,M.J. | 2003 | Primary care management of carpal tunnel syndrome | Postgrad.Med J | Background artcle |
| Burke,F.D.; Hasham,S. | 2005 | The management of carpal tunnel syndrome | Minerva Ortopedica e Traumatologica | background |
| Burke,F.D.; Wilgis,E.F.; Dubin,N.H.; Bradley,M.J.; Sinha,S. | 2006 | Relationship between the duration and severity of symptoms and the outcome of carpal tunnel surgery | J Hand Surg Am | Does not address question of interest |
| Burke,J.; Buchberger,D.J.; Carey-Loghmani,M.T.; Dougherty,P.E.; Greco,D.S.; Dishman,J.D. | 2007 | A pilot study comparing two manual therapy interventions for carpal tunnel syndrome | J Manipulative Physiol Ther | deemed clinically irrelevant |
| Burnet,S.; McNeil,J. | 2001 | Musculoskeletal disorders in diabetes mellitus | Medicine Today | Background Information |
| Burnham,R.S.; Burnham,T.R. | 2009 | Effect of hand warming on electrodiagnostic testing results and diagnosis in patients with suspected carpal tunnel syndrome | Arch Phys Med Rehabil. | +Does not answer a question of interest |
| Burt,S. | 1991 | Carpal tunnel syndrome among employees at a window hardware manufacturing plant. Health hazard evaluation series | AAOHN J | evaluation narrative |
| Burton,N.C.; MacDonald,L.; Estill,C.F. | 1998 | Ergonomic assessment of trimming jobs at a shoe manufacturing plant | Applied Occupational and Environmental Hygiene | not exclusive to CTS |
| Busch,M.; Schwenzky,A.; Franke,S.; Stein,G.; Wolf,G. | 2012 | Advanced glycation end products and beta(2)-microglobulin as predictors of carpal tunnel syndrome in hemodialysis patients | Blood Purif. | Not relevant, predictors of CTS in hemodialysis patients |
| Butterfield,P.G. | 1997 | Clinical and employment outcomes of carpal tunnel syndrome in oregon workers' compensation recipients | Journal of Occupational Rehabilitation | all CTS cases; no comparison group |
| Byers,C.M.; DeLisa,J.A.; Frankel,D.L.; Kraft,G.H. | 1984 | Pyridoxine metabolism in carpal tunnel syndrome with and without peripheral neuropathy | Arch Phys Med Rehabil. | &lt;10 patients per group |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Caccia,M.R.; Galimberti,V.; Valla,P.L.; Salvaggio,A.; Dezuanni,E.; Mangoni,A. | 1993 | Peripheral autonomic involvement in the carpal tunnel syndrome | Acta Neurol Scand. | insufficient data; very low study design |
| Caetano,M.R. | 2003 | Axonal degeneration in association with carpal tunnel syndrome | Arq Neuropsiquiatr. | insufficient data; very low study design |
| Cai,D.F. | 2010 | Warm-needling plus Tuina relaxing for the treatment of carpal tunnel syndrome | J Tradit.Chin Med | Very Low Quality |
| Caliandro,P.; Giannini,F.; Pazzaglia,C.; Aprile,I.; Minciotti,I.; Granata,G.; Tonali,P.; Padua,L. | 2010 | A new clinical scale to grade the impairment of median nerve in carpal tunnel syndrome | Clin Neurophysiol. | insufficient data; no comparison group |
| Cambi,V.; Nizzoli,M.; Paganelli,E.; David,S.; Bono,F. | 1986 | Danger of an unnecessarily prolonged dialysis session: carpal tunnel syndrome | Artif.Organs | not best available evidence; very low study design |
| Candelise,L.; Cantisani,T.A.; Celani,M.G.; Incorvaia,B.; Righetti,E.; Salinas,R.; Schoenhuber,R.; Altissimi,M.; Azzara,A.; Pecorelli,F.; Luchetti,R.; Padua,L.; Perticoni,G.; Ricci,S. | 2004 | Carpal tunnel syndrome: One flew over the surgeon's nest. The Cochrane Neurological Network | Journal of Orthopaedics and Traumatology | literature review |
| Cannon,L.J.; Bernacki,E.J.; Walter,S.D. | 1981 | Personal and occupational factors associated with carpal tunnel syndrome | J Occup.Med | very low quality |
| Cantatore,F.P.; Dell'Accio,F.; Lapadula,G. | 1997 | Carpal tunnel syndrome: a review | Clin Rheumatol. | background |
| Capasso,M.; Manzoli,C.; Uncini,A. | 2009 | Management of extreme carpal tunnel syndrome: evidence from a long-term follow-up study | Muscle Nerve | Retrospective case series |
| Capone,L.; Pentore,R.; Lunazzi,C.; Schonhuber,R. | 1998 | Pitfalls in using the ring finger test alone for the diagnosis of carpal tunnel syndrome | Ital.J Neurol Sci | no comparison group; very low study design |
| Cappellari,M.; Cavallaro,T.; Ferrarini,M.; Cabrini,I.; Taioli,F.; Ferrari,S.; Merlini,G.; Obici,L.; Briani,C.; Fabrizi,G.M. | 2011 | Variable presentations of TTR-related familial amyloid polyneuropathy in seventeen patients | J Peripher.Nerv.Syst. | Not relevant to CTS |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Carneiro,R.S. | 1999 | Carpal tunnel syndrome: the cause dictates the treatment | Cleve.Clin J Med | Background article |
| Carragee,E.J.; Hentz,V.R. | 1988 | Repetitive trauma and nerve compression | Orthop Clin North Am | background |
| Carroll,G.J. | 1987 | Comparison of median and radial nerve sensory latencies in the electrophysiological diagnosis of carpal tunnel syndrome | Electroencephalogr.Clin Neurophysiol. | insufficient data; no comparison of modalities |
| Carroll,M.P.; Montero,C. | 1980 | Rare anomalous muscle cause of carpal tunnel syndrome | Orthop.Rev. | case report |
| Carroll,R.E.; Hurst,L.C. | 1982 | The relationship of thoracic outlet syndrome and carpal tunnel syndrome | Clin Orthop Relat Res. | +Does not answer a question of interest |
| Carter,R.; Aspy,C.B.; Mold,J. | 2002 | The effectiveness of magnet therapy for treatment of wrist pain attributed to carpal tunnel syndrome | J Fam Pract. | Does not meet inclusion criteria (conservative treatment follow-up at &lt;1 month) |
| Carter,T.; Jordan,R.; Cummins,C. | 2000 | Electrodiagnostic techniques in the pre-surgical assessment of patients with carpal tunnel syndrome (Structured abstract) | Health Technology Assessment Database | background info |
| Cartwright,M.S.; Hobson-Webb,L.D.; Boon,A.J.; Alter,K.E.; Hunt,C.H.; Flores,V.H.; Werner,R.A.; Shook,S.J.; Thomas,T.D.; Primack,S.J.; Walker,F.O. | 2012 | Evidence-based guideline: neuromuscular ultrasound for the diagnosis of carpal tunnel syndrome | Muscle Nerve | systematic review |
| Cartwright,M.S.; Walker,F.O.; Newman,J.C.; Arcury,T.A.; Mora,D.C.; Chen,H.; Quandt,S.A. | 2014 | Muscle Intrusion as a Potential Cause of Carpal Tunnel Syndrome | Muscle Nerve | very low strength |
| Cartwright,M.S.; White,D.L.; Demar,S.; Wiesler,E.R.; Sarlikiotis,T.; Chloros,G.D.; Yoon,J.S.; Won,S.J.; Molnar,J.A.; Defranzo,A.J.; Walker,F.O. | 2011 | Median nerve changes following steroid injection for carpal tunnel syndrome | Muscle Nerve | Very Low Quality |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Casale,R.; Damiani,C.; Maestri,R.; Wells,C.D. | 2013 | Pain and electrophysiological parameters are improved by combined 830-1064 high-intensity LASER in symptomatic carpal tunnel syndrome versus Transcutaneous Electrical Nerve Stimulation. A randomized controlled study | Eur.J Phys Rehabil.Med | Does not meet inclusion criteria (follow-up &lt;1 month) |
| Case,W.S. | 1995 | Carpal tunnel syndrome: Relief for a common wrist problem | Physician and Sportsmedicine | background |
| Casey,E.B.; Le Quesne,P.M. | 1972 | Digital nerve action potentials in healthy subjects, and in carpal tunnel and diabetic patients | J Neurol Neurosurg.Psychiatry | no comparison of modalities; very low study design |
| Cassvan,A.; Ralescu,S.; Shapiro,E.; Moshkovski,F.G.; Weiss,J. | 1988 | Median and radial sensory latencies to digit I as compared with other screening tests in carpal tunnel syndrome | Am J Phys Med Rehabil. | no reference standard; very low study design |
| Cassvan,A.; Rosenberg,A.; Rivera,L.F. | 1986 | Ulnar nerve involvement in carpal tunnel syndrome | Arch Phys Med Rehabil. | +Does not answer a question of interest |
| Castillo,T.N.; Yao,J. | 2010 | Comparison of longitudinal open incision and two-incision techniques for carpal tunnel release | J Hand Surg Am | very low quality |
| Cederlund,R.I.; Dahlin,L.B.; Thomsen,N.O. | 2012 | Activity limitations before and after surgical carpal tunnel release among patients with and without diabetes | J Rehabil.Med | Does not address question of interest |
| Celik,B.; Guven,Z. | 2008 | Review of different electrodiagnostic studies in mild carpal tunnel syndrome | Neurosurgery Quarterly | no true comparison; does not answer a question of interest |
| Cerimagic,D.; Bilic,E. | 2010 | Carpal tunnel syndrome reverse Phalen's versus Phalen's maneuver | Translational Neuroscience | review; background information |
| Cevik,M.U.; Altun,Y.; Uzar,E.; Acar,A.; Yucel,Y.; Arikanoglu,A.; Varol,S.; Sariyildiz,M.A.; Tahtasiz,M.; Tasdemir,N. | 2012 | Diagnostic value of F-wave inversion in patients with early carpal tunnel syndrome | Neurosci.Lett. | insufficient data; very low study design |
| Cha,J.G.; Han,J.K.; Im,S.B.; Kang,S.J. | 2013 | Median nerve T2 assessment in the wrist joints: Preliminary study in | J.Magn.Reson.Imaging | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| | | patients with carpal tunnel syndrome and healthy volunteers | | |
| Chacko,J.P.; Chand,R.P.; Bulusu,S.; Tharakan,J.J. | 2000 | Clinical profile of Carpal Tunnel Syndrome in Oman | Neurosciences (Riyadh.) | Does not answer a question of interest; no assessment of risk factors |
| Chalidis,B.E.; Dimitriou,C.G. | 2013 | One portal simultaneous bilateral endoscopic carpal tunnel release under local anaesthesia. Do the results justify the effort? | Int.Orthop | Very low quality |
| Champion,D. | 1969 | Gouty tenosynovitis and the carpal tunnel syndrome | Med J Aust. | case reports |
| Chan,K.-Y.; George,J.; Goh,K.-J.; Ahmad,T.S. | 2011 | Ultrasonography in the evaluation of carpal tunnel syndrome: Diagnostic criteria and comparison with nerve conduction studies | Neurology Asia | insufficient data; very low study design |
| Chan,L.; Turner,J.A.; Comstock,B.A.; Levenson,L.M.; Hollingworth,W.; Heagerty,P.J.; Kliot,M.; Jarvik,J.G. | 2007 | The relationship between electrodiagnostic findings and patient symptoms and function in carpal tunnel syndrome | Arch Phys Med Rehabil. | +not best available evidence |
| Chan,Z.H.; Balakrishnan,V.; McDonald,A. | 2013 | Short versus long-acting local anaesthetic in open carpal tunnel release: which provides better preemptive analgesia in the first 24 hours? | Hand Surg | Deemed clinically irrelevant |
| Chandra,P.S.; Singh,P.K.; Goyal,V.; Chauhan,A.K.; Thakkur,N.; Tripathi,M. | 2013 | Early versus delayed endoscopic surgery for carpal tunnel syndrome: prospective randomized study | World Neurosurg. | Comparison is for timing of surgery and not comparing different CTR tecjniques. Does not answer question of interest. |
| Chang,C.W.; Lee,W.J.; Liao,Y.C.; Chang,M.H. | 2013 | Which nerve conduction parameters can predict spontaneous electromyographic activity in carpal tunnel syndrome? | Clin Neurophysiol. | insufficient data; healthy controls used for comparison |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Chang,C.W.; Lien,I.N. | 1991 | Comparison of sensory nerve conduction in the palmar cutaneous branch and first digital branch of the median nerve: a new diagnostic method for carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
| Chang,C.W.; Wang,Y.C.; Chang,K.F. | 2008 | A practical electrophysiological guide for non-surgical and surgical treatment of carpal tunnel syndrome | J Hand Surg Eur.Vol. | very low quality |
| Chang,M. | 1998 | Oral drugs of choice in carpal tunnel syndrome [abstract] | Muscle Nerve | Abstract/conference poster |
| Chang,M.H.; Chiang,H.T.; Ger,L.P.; Yang,D.A.; Lo,Y.K. | 2000 | The cause of slowed forearm median conduction velocity in carpal tunnel syndrome | Clin Neurophysiol. | insufficient data; very low study design |
| Chang,M.H.; Lee,Y.C.; Hsieh,P.F. | 2008 | The role of forearm mixed nerve conduction study in the evaluation of proximal conduction slowing in carpal tunnel syndrome | Clin Neurophysiol. | insufficient data; very low study design |
| Chang,M.H.; Lee,Y.C.; Hsieh,P.F. | 2008 | The real role of forearm mixed nerve conduction velocity in the assessment of proximal forearm conduction slowing in carpal tunnel syndrome | J Clin Neurophysiol. | insufficient data; very low study design |
| Chang,M.H.; Liao,Y.C.; Lee,Y.C.; Hsieh,P.F.; Liu,L.H. | 2009 | Electrodiagnosis of carpal tunnel syndrome: which transcarpal conduction technique is best? | J Clin Neurophysiol. | insufficient data; very low study design |
| Chang,M.H.; Liu,L.H.; Lee,Y.C.; Wei,S.J.; Chiang,H.L.; Hsieh,P.F. | 2006 | Comparison of sensitivity of transcarpal median motor conduction velocity and conventional conduction techniques in electrodiagnosis of carpal tunnel syndrome | Clin Neurophysiol. | insufficient data; very low study design |
| Chang,M.H.; Wei,S.J.; Chiang,H.L.; Wang,H.M.; Hsieh,P.F.; Huang,S.Y. | 2002 | Comparison of motor conduction techniques in the diagnosis of carpal tunnel syndrome | | insufficient data; no comparison group |
| Chang,M.H.; Wei,S.J.; Chiang,H.L.; Wang,H.M.; Hsieh,P.F.; Huang,S.Y. | 2002 | Does direct measurement of forearm mixed nerve conduction velocity reflect actual nerve conduction velocity through the carpal tunnel? | Clin Neurophysiol. | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Changulani,M.; Okonkwo,U.; Keswani,T.; Kalairajah,Y. | 2008 | Outcome evaluation measures for wrist and hand: which one to choose? | Int.Orthop | systematic review |
| Chapell,R.; Coates,V.; Turkelson,C. | 2003 | Poor outcome for neural surgery (epineurotomy or neurolysis) for carpal tunnel syndrome compared with carpal tunnel release alone: a meta-analysis of global outcomes | Plast.Reconstr.Surg | Meta-analysis |
| Chaplin,E.; Kasdan,M.L. | 1985 | Carpal tunnel syndrome and routine blood chemistries | Plast.Reconstr.Surg | +Does not answer a question of interest |
| Chari,R.; Hamed,A.; Packer,G. | 2004 | Single versus double incision technique in carpal tunnel decompression. A randomised controlled trial | The Journal of Bone and Joint Surgery | Abstract/conference poster |
| Chassin,S.L.; Little,J.W.; DeLisa,J.A. | 1987 | Compound nerve action potentials from the median and ulnar nerves | Arch Phys Med Rehabil. | only healthy study subjects |
| Chaudhuri,K.R.; Davidson,A.R.; Morris,I.M. | 1989 | Limited joint mobility and carpal tunnel syndrome in insulin-dependent diabetes | Br J Rheumatol. | insufficient data; very low study design |
| Chauhan,A.; Bowlin,T.C.; Mih,A.D.; Merrell,G.A. | 2012 | Patient-reported outcomes after acute carpal tunnel release in patients with distal radius open reduction internal fixation | Hand (N.Y) | very low quality |
| Checkosky,C.M.; Bolanowski,S.J.; Cohen,J.C. | 1996 | Assessment of vibrotactile sensitivity in patients with carpal tunnel syndrome | J Occup.Environ.Med | insufficient data; very low study design |
| Chell,J.; Stevens,A.; Davis,T.R. | 1999 | Work practices and histopathological changes in the tenosynovium and flexor retinaculum in carpal tunnel syndrome in women | J Bone Joint Surg Br | cadavers used as reference; biopsies |
| Chen,C.H.; Wu,T.; Sun,J.S.; Lin,W.H.; Chen,C.Y. | 2012 | Unusual causes of carpal tunnel syndrome: space occupying lesions | J Hand Surg Eur.Vol. | retrospective chart review; no comparison group |
| Chen,C.K.; Chung,C.B.; Yeh,L.; Pan,H.B.; Yang,C.F.; Lai,P.H.; Liang,H.L.; Resnick,D. | 2000 | Carpal tunnel syndrome caused by tophaceous gout: CT and MR imaging features in 20 patients | AJR Am J Roentgenol. | retrospective records review; no comparison group |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Chen,G.S. | 1990 | The effect of acupuncture treatment on Carpal Tunnel Syndrome | American Journal of Acupuncture | incorrect patient population (post-op vs. pre-op patients not stratified) |
| Chen,H.T.; Chen,H.C.; Wei,F.C. | 1999 | Endoscopic carpal tunnel release | Changgeng Yi Xue Za Zhi | Very Low Quality |
| Chen,L.; Duan,X.; Huang,X.; Lv,J.; Peng,K.; Xiang,Z. | 2014 | Effectiveness and safety of endoscopic versus open carpal tunnel decompression | Arch Orthop Trauma Surg | Meta-analysis |
| Chen,S.F.; Lu,C.H.; Huang,C.R.; Chuang,Y.C.; Tsai,N.W.; Chang,C.C.; Chang,W.N. | 2011 | Ultrasonographic median nerve cross-section areas measured by 8-point "inching test" for idiopathic carpal tunnel syndrome: a correlation of nerve conduction study severity and duration of clinical symptoms | BMC Med Imaging | insufficient data; very low study design |
| Cheng,C.J.; Mackinnon-Patterson,B.; Beck,J.L.; Mackinnon,S.E. | 2008 | Scratch collapse test for evaluation of carpal and cubital tunnel syndrome | J Hand Surg Am | insufficient data; very low study design |
| Cherington,M. | 1974 | Proximal pain in carpal tunnel syndrome | Arch Surg | insufficient data; summary document |
| Cherniack,M.G.; Let,R.; Gerr,F.; Brammer,A.; Pace,P. | 1990 | Detailed clinical assessment of neurological function in symptomatic shipyard workers | Br.J.Ind.Med. | +Does not answer a question of interest; not best available evidence |
| Cherniack,M.G.; Moalli,D.; Viscolli,C. | 1996 | A comparison of traditional electrodiagnostic studies, electroneurometry, and vibrometry in the diagnosis of carpal tunnel syndrome | J Hand Surg Am | insufficient data; very low study design |
| Chia,J.; Pho,R.W.H. | 1997 | Surgical release of carpal tunnel syndrome under local anaesthesia | Journal of Orthopaedic Surgery | Retrospective case series |
| Chiang,H.C.; Ko,Y.C.; Chen,S.S.; Yu,H.S.; Wu,T.N.; Chang,P.Y. | 1993 | Prevalence of shoulder and upper-limb disorders among workers in the fish-processing industry | Scand.J Work Environ.Health | Prevalence study; not best evidence |
| Chidgey,L.K. | 1992 | Chronic wrist pain | Orthop.Clin.North Am. | background |
| Chin,S.H.; Tom,L.K.; Thomson,J.G. | 2011 | Does the severity of bilateral carpal tunnel syndrome influence the timing of staged bilateral release? | Ann.Plast.Surg | Retrospective case series |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Chin,Y.H.; Lim,K.H.; Poh,B.K.; Koh,D. | 2005 | Carpal tunnel syndrome: splinting or surgery? A systematic review (Provisional abstract) | Singapore General Hospital Proceedings | systematic review |
| Chiotis,K.; Dimisianos,N.; Rigopoulou,A.; Chrysanthopoulou,A.; Chroni,E. | 2013 | Role of anthropometric characteristics in idiopathic carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data; very low study design |
| Chmielewska,D.; Skeczek-Urbaniak,A.; Kubacki,J.; Blaszczak,E.; Kwasna,K. | 2013 | Effectiveness of carpal tunnel syndrome rehabilitation after endoscopic versus open surgical release | Ortop.Traumatol.Rehabil. | |
| Cho,D.S.; Cho,M.J. | 1989 | The electrodiagnosis of the carpal tunnel syndrome | S.D J Med | review; background information |
| Chow,J.C. | 1993 | The Chow technique of endoscopic release of the carpal ligament for carpal tunnel syndrome: four years of clinical results | | Retrospective case series |
| Chow,J.C. | 1989 | Endoscopic release of the carpal ligament: a new technique for carpal tunnel syndrome | | Does not address question of interest |
| Chow,J.C.Y.; Papachristos,A.A. | 2006 | Endoscopic carpal tunnel release: Chow technique | Techniques in Orthopaedics | Background article |
| Christensen,J.E.; Peter,P.J.; Nielsen,V.K.; Mai,J. | 1998 | Prevalence of carpal tunnel syndrome among individuals with Down syndrome | Am J Ment.Retard. | Not relevant, prevalence study |
| Chroni,E.; Paschalis,C.; Arvaniti,C.; Zotou,K.; Nikolakopoulou,A.; Papapetropoulos,T. | 2001 | Carpal tunnel syndrome and hand configuration | Muscle Nerve | insufficient data; very low study design |
| Chrysopoulo,M.T.; Greenberg,J.A.; Kleinman,W.B. | 2006 | The hypothenar fat pad transposition flap: a modified surgical technique | Tech.Hand Up Extrem.Surg | Background information |
| Chuang,Y.-M.; Chiou,H.-J. | 2001 | Sonography in the evaluation of carpal tunnel syndrome | Acta Neurologica Taiwanica | case report |
| Chung,B.; Morris,S.F. | 2013 | Factors influencing prioritization for carpal tunnel syndrome consultation | Can J Plast.Surg | +Does not answer a question of interest |
| Chung,K.C. | 2006 | Current status of outcomes research in carpal tunnel surgery | Hand (N.Y) | review |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Chung,K.C.; Pillsbury,M.S.; Walters,M.R.; Hayward,R.A. | 1998 | Reliability and validity testing of the Michigan Hand Outcomes Questionnaire | J Hand Surg Am | +Does not answer a question of interest |
| Chung,M.S.; Gong,H.S.; Baek,G.H. | 1999 | Prevalence of Raynaud's phenomenon in patients with idiopathic carpal tunnel syndrome | J Bone Joint Surg Br | +Does not answer a question of interest |
| Ciftdemir,M.; Copuroglu,C.; Ozcan,M.; Cavdar,L. | 2013 | Carpal tunnel syndrome in manual tea harvesters | Eklem.Hastalik.Cerrahisi. | all CTS cases; no comparison group |
| Cimmino,M.A.; Bountis,C.; Silvestri,E.; Garlaschi,G.; Accardo,S. | 2000 | An appraisal of magnetic resonance imaging of the wrist in rheumatoid arthritis | Semin.Arthritis Rheum. | Not relevant to CTS |
| Cioni,R.; Passero,S.; Paradiso,C.; Giannini,F.; Battistini,N.; Rushworth,G. | 1989 | Diagnostic specificity of sensory and motor nerve conduction variables in early detection of carpal tunnel syndrome | J Neurol | insufficient data; very low study design |
| Citron,N.D.; Bendall,S.P. | 1997 | Local symptoms after open carpal tunnel release. A randomized prospective trial of two incisions | J Hand Surg Br | Insufficient data (missing N at each follow-up time point) |
| Claes,F.; Bernsen,H.; Meulstee,J.; Verhagen,W.I. | 2012 | Carpal tunnel syndrome diagnosed by general practitioners: an observational study | Neurol Sci | +Does not answer a question of interest |
| Clayburgh,R.H.; Beckenbaugh,R.D.; Dobyns,J.H. | 1987 | Carpal tunnel release in patients with diffuse peripheral neuropathy | J Hand Surg Am | Retrospective case series |
| Clayton,M.L.; Linscheid,R.L. | 1988 | Carpal tunnel surgery: should the incision be above or below the wrist? |  | Background article |
| Clifford,J.C.; Israels,H. | 1994 | Provocative exercise maneuver: its effect on nerve conduction studies in patients with carpal tunnel syndrome | Arch Phys Med Rehabil. | Does not answer a question of interest |
| Clinchot,D.M. | 1997 | Motor conduction studies and needle electromyography in carpal tunnel syndrome | Phys.Med.Rehabil.Clin.N.Am. | Background Information |
| Cobb,T.K.; Dalley,B.K.; Posteraro,R.H.; Lewis,R.C. | 1992 | The carpal tunnel as a compartment. An anatomic perspective | Orthop Rev. | cadaver study |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Cocito,D.; Ciaramitaro,P.; Tavella,A.; Poglio,F.; Paolasso,I.; Bergamasco,B.; Isoardo,G. | 2005 | The occurrence of carpal tunnel syndrome in chronic inflammatory demyelinating polyneuropathy | Clin Neurophysiol. | letter to the editor |
| Cocito,D.; Tavella,A.; Ciaramitaro,P.; Costa,P.; Poglio,F.; Paolasso,I.; Duranda,E.; Cossa,F.M.; Bergamasco,B. | 2006 | A further critical evaluation of requests for electrodiagnostic examinations | Neurol Sci | +Does not answer a question of interest |
| Cohen,M.S.; Garfin,S.R. | 1997 | Nerve compression syndromes: Finding the cause of upper-extremity symptoms | | Background Information |
| Cokluk,C.; Aydin,K.; Iyigun,O.; Rakunt,C.; Celik,F. | 2006 | The changes of the sectional surface area of the median nerve compartment in hands with symptomatic carpal tunnel syndrome and normal hands | Turkish Neurosurgery | insufficient data; very low study design |
| Colak,A.; Kutlay,M.; Pekkafali,Z.; Saracoglu,M.; Demircan,N.; Simsek,H.; Akin,O.N.; Kibici,K. | 2007 | Use of sonography in carpal tunnel syndrome surgery. A prospective study | Neurol Med Chir (Tokyo) | for rec 7, this would not be best available evidence. if used as a diagnostic study of ultra-sound, quality would be very low due to the use of health controls |
| Coldham,F.; Lewis,J.; Lee,H. | 2006 | The reliability of one vs. three grip trials in symptomatic and asymptomatic subjects | J Hand Ther | +Does not answer a question of interest |
| Comi,G.; Lozza,L.; Galardi,G.; Ghilardi,M.F.; Medaglini,S.; Canal,N. | 1985 | Presence of carpal tunnel syndrome in diabetics: effect of age, sex, diabetes duration and polyneuropathy | Acta Diabetol.Lat. | Not relevant, not a CTS correlational study |
| Concannon,M.J.; Brownfield,M.L.; Puckett,C.L. | 2000 | The incidence of recurrence after endoscopic carpal tunnel release | Plast.Reconstr.Surg | very low strength of evidence |
| Concannon,M.J.; Gainor,B.; Petroski,G.F.; Puckett,C.L. | 1997 | The predictive value of electrodiagnostic studies in carpal tunnel syndrome | Plast.Reconstr.Surg | insufficient data; very low study design |
| Conforti,G.; Capone,L.; Corra,S. | 2014 | Intradermal therapy (mesotherapy) for the treatment of acute pain in carpal tunnel syndrome: a preliminary study | Korean J Pain | Very Low Quality |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Conington,K.A.; Fields,K.; Nashelsky,J. | 2002 | What is the best diagnostic approach to paresthesias of the hand? | J.Fam.Pract. | letter |
| Conlon,C.F.; Krause,N.; Rempel,D.M. | 2009 | A randomized controlled trial evaluating an alternative mouse or forearm support on change in median and ulnar nerve motor latency at the wrist | Am.J.Ind.Med. | +not best available evidence; no diagnosis of CTS |
| Conlon,C.F.; Rempel,D.M. | 2005 | Upper extremity mononeuropathy among engineers | J.Occup.Environ.Med. | no diagnosis of CTS; no unexposed group |
| Conolly,W.B. | 1978 | Pitfalls in carpal tunnel decompression | Aust.N.Z.J Surg | Does not address question of interest |
| Conrad,J.C.; Osborn,J.B.; Conrad,K.J.; Jetzer,T.C. | 1990 | Peripheral nerve dysfunction in practicing dental hygienists | J Dent.Hyg. | insufficient data; no diagnosis of CTS |
| Conway,R.R. | 1999 | Needle EMG is often unnecessary | Muscle Nerve | background information; commentary |
| Cook,T.M.; Rosecrance,J.C.; Brokman,S.J.; Rulon,A.S.; Wise,C.A. | 1991 | Reliability of a digital electroneurometer for the determination of motor latency of the median nerve | J Occup.Rehabil. | insufficient data; very low study design |
| Cooney,W.P. | 1995 | The future of arthroscopic surgery in the hand and wrist | Hand Clin. | Editorial |
| Cooper,C.; Baker,P.D. | 1996 | Upper limb disorders | Occup.Med. | background |
| Copeland,D.A.; Stoukides,C.A. | 1994 | Pyridoxine in carpal tunnel syndrome | Ann.Pharmacother. | Narrative review |
| Corbin,D.E. | 2000 | Carpal tunnel syndrome recovery | Occup.Health Saf | background |
| Cornwall,M.W.; Nelson,C. | 1984 | Median nerve F-wave conduction in healthy subjects | Phys.Ther. | only healthy study subjects |
| Corradi,M.; Paganelli,E.; Pavesi,G. | 1989 | Carpal tunnel syndrome in long-term hemodialyzed patients | J Reconstr.Microsurg. | insufficient data; no comparison group |
| Cosgrove,J.L. | 2000 | Magnetic resonance imaging in the a literature review | J Clin Neuromuscul.Dis | lit review |
| Cosgrove,J.L.; Chase,P.M.; Mast,N.J. | 2002 | Thenar motor syndrome: median mononeuropathy of the hand | Am J Phys Med Rehabil. | Does not answer a question of interest; no comparison group |
| Costa,V.V.; Oliveira,S.B.; Fernandes,Mdo C.; Saraiva,R.Ã? | 2011 | Incidence of regional pain syndrome after carpal tunnel release. Is there a | Rev.Bras.Anestesiol. | Duplicate study (duplicate with AAOS ID 302) |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| | | correlation with the anesthetic technique? | | |
| Courts,R.B. | 1995 | Splinting for symptoms of carpal tunnel syndrome during pregnancy | J Hand Ther | Very low quality |
| Cracchiolo,A.,III; Marmor,L. | 1968 | Peripheral entrapment neuropathies | | Incorrect patient population (not exclusive to CTS patients) |
| Cracchiolo,III A.; Namerow,N.S.; Campion,D.S. | 1977 | Peripheral nerve entrapments | West.J.Med. | background |
| Cramer,H.; Lauche,R.; Langhorst,J.; Dobos,G. | 2013 | Yoga for rheumatic diseases: a systematic review | Rheumatology (Oxford) | Systematic reveiw |
| Crawford,J.O.; Laiou,E. | 2007 | Conservative treatment of work-related upper limb disorders: a review | Occup.Med (Lond) | Systematic review |
| Crispin,J.C.; Alcocer-Varela,J. | 2003 | Rheumatologic manifestations of diabetes mellitus | Am.J.Med. | review |
| Cruz,Martinez A.; Perez Conde,M.C.; Ferrer,M.T. | 1980 | Effect of ischaemia on sensory evoked potentials. 2. Study in patients with diabetes mellitus, alcoholism, chronic renal failure, carpal tunnel syndrome and hyperparathyroidism | Electromyogr.Clin Neurophysiol. | +Does not answer a question of interest; very low study design |
| Cuevas-Trisan,R.L.; Ojeda-Rodriguez,A.G. | 2006 | Relation of wrist angles to median nerve conduction studies | Bol.Asoc.Med P R | &lt;10 patients per group |
| Cullum,D.E.; Molloy,C.J. | 1994 | Occupation and the carpal tunnel syndrome | Med J Aust. | Background Information |
| Cullum,D.E.; Molloy,C.J. | 1994 | Corrigenda: Occupation and the carpal tunnel syndrome (Medical Journal of Australia (1994) 161 (552-554)) | Med.J.Aust. | Background Information; review |
| da Costa,V.V.; de Oliveira,S.B.; Fernandes,Mdo C.; Saraiva,R.A. | 2011 | Incidence of regional pain syndrome after carpal tunnel release. Is there a correlation with the anesthetic technique? | Rev.Bras.Anestesiol. | Deemed clinically irrelevant |
| Dahlin,L.B. | 1991 | Aspects on pathophysiology of nerve entrapments and nerve compression injuries | Neurosurg.Clin N.Am | Background Information |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Dahlin,L.B.; Lekholm,C.; Kardum,P.; Holmberg,J. | 2002 | Coverage of the median nerve with free and pedicled flaps for the treatment of recurrent severe carpal tunnel syndrome | Scand.J Plast.Reconstr.Surg Hand Surg | Incorrect patient population (prior surgical intervention prior to study) |
| Dahlin,L.B.; Salo,M.; Thomsen,N.; Stutz,N. | 2010 | Carpal tunnel syndrome and treatment of recurrent symptoms | Scand.J Plast.Reconstr.Surg Hand Surg | background |
| Dakowicz,A.; Latosiewicz,R. | 2005 | The value of iontophoresis combined with ultrasound in patients with the carpal tunnel syndrome | Rocz.Akad.Med Bialymst. | Very Low Quality |
| Dale,A.M.; Agboola,F.; Yun,A.; Zeringue,A.; Al-Lozi,M.T.; Evanoff,B. | 2014 | Comparison of Automated Versus Traditional Nerve Conduction Study Methods for Median Nerve Testing in a General Worker Population | PM R | insufficient data; not best evidence |
| Dale,A.M.; Gardner,B.T.; Zeringue,A.; Werner,R.; Franzblau,A.; Evanoff,B. | 2014 | The effectiveness of post-offer pre-placement nerve conduction screening for carpal tunnel syndrome | J Occup Environ Med | not best evidence |
| Dale,A.M.; Harris-Adamson,C.; Rempel,D.; Gerr,F.; Hegmann,K.; Silverstein,B.; Burt,S.; Garg,A.; Kapellusch,J.; Merlino,L.; Thiese,M.S.; Eisen,E.A.; Evanoff,B. | 2013 | Prevalence and incidence of carpal tunnel syndrome in US working populations: pooled analysis of six prospective studies | Scand.J Work Environ.Health | pooled data and varying methods, designs, and data types |
| Dale,W.A.; Lewis,M.R. | 1975 | Management of thoracic outlet syndrome | Ann.Surg | Incorrect patient population (does not include CTS patients) |
| Dammers,H.J.; Veering,M.M. | 2001 | Two injections with steroids close to the carpal tunnel are a greater help in CTS than one injection: 76.5% and 50% success | Journal of the Peripheral Nervous System : JPNS. | Abstract/conference poster |
| Dammers,J.W.; Veering,M.M.; Vermeulen,M. | 1999 | Injection with methylprednisolone proximal to the carpal tunnel: randomised double blind trial | | Very Low Quality |
| Dammers,J.W.; Veering,M.M.; Vermeulen,M. | 2000 | Methylprednisolone injection improved symptoms for 1 year in patients with the carpal tunnel syndrome | Evidence-Based Medicine | Insufficient data |
| Dan,N.G. | 1976 | Entrapment syndromes | Med J Aust. | background |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Dandy,D.J. | 1992 | The present state of arthroscopy | Minimally Invasive Therapy | Background article |
| Daniell,W.E.; Fulton-Kehoe,D.; Franklin,G.M. | 2009 | Work-related carpal tunnel syndrome in Washington State workers' compensation: utilization of surgery and the duration of lost work | Am J Ind.Med | Does not answer a question of interest; not best available evidence |
| Danner,R. | 1990 | Referral diagnosis versus electroneurophysiological finding. Two years electroneuromyographic consultation in a rehabilitation clinic | Electromyogr.Clin Neurophysiol. | no comparison of modalities; not CTS exclusive |
| Danoff,J.R.; Birman,M.V.; Rosenwasser,M.P. | 2014 | Transfer of the flexor carpi radialis to the abductor pollicis brevis tendon for the restoration of tip-pinch in severe carpal tunnel syndrome | J Hand Surg Eur.Vol. | Retrospective case series |
| D'Arcy,C.A.; McGee,S. | 2000 | The rational clinical examination. Does this patient have carpal tunnel syndrome? |  | systematic review |
| D'Arcy,C.A.; McGee,S. | 2000 | Clinical diagnosis of carpal tunnel syndrome |  | letters to the editor |
| D'Arcy,C.A.; McGee,S. | 2001 | Review: Hand symptom diagrams, weak thumb abduction, and hypalgesia are helpful in diagnosing carpal tunnel syndrome | Evidence-Based Medicine | literature review |
| Davis,L.; Wellman,H.; Punnett,L. | 2001 | Surveillance of work-related carpal tunnel syndrome in Massachusetts, 1992-1997: a report from the Massachusetts Sentinel Event Notification System for Occupational Risks (SENSOR) | Am J Ind.Med | review of case reports |
| Davis,P.T.; Hulbert,J.R. | 1998 | Carpal tunnel syndrome: conservative and nonconservative treatment. A chiropractic physician's perspective | J Manipulative Physiol Ther | systematic review |
| Davison,P.G.; Cobb,T.; Lalonde,D.H. | 2013 | The patient's perspective on carpal tunnel surgery related to the type of anesthesia: a prospective cohort study | Hand (N.Y) | Deemed clinically irrelevant |
| Davne,A. | 1982 | Practical considerations in the treatment of carpal tunnel syndrome | J Med Soc.N.J | Retrospective case series |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Daw,E.; Ogbonna,B. | 1984 | Recurrent Bell's palsy, carpal tunnel syndrome and meralgia in pregnancy | J.Obstet.Gynaecol. | Case report |
| Dawson,W.J. | 1999 | Carpal tunnel syndrome in instrumentalists: A review of 15 years' clinical experience | Medical Problems of Performing Artists | all CTS cases; no comparison group |
| Dayan,A.D.; Urich,H.; Gardner-Thorpe,C. | 1971 | Peripheral neuropathy and myeloma | J Neurol Sci | case reports |
| de Campos,C.C.; Manzano,G.M.; Leopoldino,J.F.; Nobrega,J.A.; Sanudo,A.; de Araujo,Peres C.; Castelo,A. | 2004 | The relationship between symptoms and electrophysiological detected compression of the median nerve at the wrist | Acta Neurol Scand. | not best available evidence |
| de la Llave-Rincon AI; Fernandez-de-las-Penas,C.; Fernandez-Carnero,J.; Padua,L.; Arendt-Nielsen,L.; Pareja,J.A. | 2009 | Bilateral hand/wrist heat and cold hyperalgesia, but not hypoesthesia, in unilateral carpal tunnel syndrome | Exp.Brain Res. | insufficient data; very low study design |
| de la Llave-Rincon AI; Fernandez-de-las-Penas,C.; Laguarta-Val,S.; Alonso-Blanco,C.; Martinez-Perez,A.; Arendt-Nielsen,L.; Pareja,J.A. | 2011 | Increased pain sensitivity is not associated with electrodiagnostic findings in women with carpal tunnel syndrome | Clin J Pain | insufficient data; very low study design |
| de Moraes,V.Y.; Godin,K.; Dos Santos,J.B.; Faloppa,F.; Bhandari,M.; Belloti,J.C. | 2013 | Influence of compensation status on time off work after carpal tunnel release and rotator cuff surgery: a meta-analysis | Patient Saf Surg | meta-analysis |
| De,Lean J. | 1988 | Transcarpal median sensory conduction: detection of latent abnormalities in mild carpal tunnel syndrome | Can J Neurol Sci | insufficient data; very low study design |
| De,Smet L.; De,Kesel R.; Degreef,I.; Debeer,P. | 2007 | Responsiveness of the Dutch version of the DASH as an outcome measure for carpal tunnel syndrome | J Hand Surg Eur.Vol. | the pupose of this article is to study the responsiveness of the DASH. we could use results as a case series, this would be not best available evidence |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| De,Smet L.; Vandeputte,G. | 2002 | Pedicled fat flap coverage of the median nerve after failed carpal tunnel decompression | J Hand Surg Br | Retrospective case series/Incorrect patient population (existing invasive intervention prior to study) |
| Dehghani,M.; Zarezadeh,A.; Shemshaki,H.; Moezi,M.; Nourbakhsh,M. | 2013 | Hour glass constriction in advanced carpal tunnel syndrome | Int.J Prev.Med | Not in English |
| Dejaco,C.; Stradner,M.; Zauner,D.; Seel,W.; Simmet,N.E.; Klammer,A.; Brickmann,K.; Gretler,J.; Moazedi-Furst,F.; Thonhofer,R.; Husic,R.; Hermann,J.; Quasthoff,S. | 2012 | Ultrasound for diagnosis of carpal tunnel syndrome - Comparison of different methods to determine median nerve volume and value of power Doppler sonography | Arthritis Rheum. | abstract; summary document |
| Dekel,S.; Papaioannou,T.; Rushworth,G.; Coates,R. | 1980 | Idiopathic carpal tunnel syndrome caused by carpal stenosis | Br Med J | Not relevant,does not answer the PICO question |
| Delaere,O.; Bouffioux,N.; Hoang,P. | 2000 | Endoscopic treatment of the carpal tunnel syndrome: review of the recent literature | Acta Chir Belg. | Narrative review |
| de-la-Llave-Rincon AI; Puentedura,E.J.; Fernandez-de-las-Penas,C. | 2012 | New advances in the mechanisms and etiology of carpal tunnel syndrome | Discov.Med | Narrative review |
| Delgrosso,I.; Boillat,M.A. | 1991 | Carpal tunnel syndrome: role of occupation | Int.Arch Occup.Environ.Health | insufficient data; no comparison group |
| Dellon,A.L. | 1999 | Current guidelines for management of peripheral nerve problems using quantitative sensory testing | Journal of Orthopaedic Surgery | review; background information |
| Dellon,A.L. | 1993 | Clinical assessment of peripheral nerve injuries | Current Orthopaedics | background |
| Demir,H.; Kirnap,M.; Utas,C.; Ersoy,A.O.; Ozugul,Y.; Aksu,M. | 1998 | Carpal tunnel syndrome in hemodialysis patients | European Journal of Physical Medicine and Rehabilitation | Not relevant,does not answer the PICO question |
| Demirci,S.; Sonel,B. | 2004 | Comparison of sensory conduction techniques in the diagnosis of mild | Rheumatol.Int. | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| | | idiopathic carpal tunnel syndrome: which finger, which test? | | |
| Denbeigh,K.; Slot,T.R.; Dumas,G.A. | 2013 | Wrist postures and forces in tree planters during three tree unloading conditions | | Does not answer a question of interest; not relevant to CTS |
| Deniz,O.; Aygul,R.; Kotan,D.; Ozdemir,G.; Odabas,F.O.; Kaya,M.D.; Ulvi,H. | 2012 | The effect of local corticosteroid injection on F-wave conduction velocity and sympathetic skin response in carpal tunnel syndrome | Rheumatol.Int. | Very Low Quality |
| Derchi,L.E.; Martinoli,C. | 1998 | High resolution US of peripheral nerves | Journal d'Echographie et de Medecine par Ultrasons | Commentary/review |
| Deryani,E.; Aki,S.; Muslumanoglu,L.; Rozanes,I. | 2003 | MR imaging and electrophysiological evaluation in carpal tunnel syndrome | Yonsei Med J | insufficient data; very low study design |
| Descatha,A.; Dale,A.M.; Franzblau,A.; Coomes,J.; Evanoff,B. | 2010 | Diagnostic strategies using physical examination are minimally useful in defining carpal tunnel syndrome in population-based research studies | Occup.Environ.Med | +not best available evidence |
| Descatha,A.; Dale,A.M.; Franzblau,A.; Evanoff,B. | 2013 | Natural history and predictors of long-term pain and function among workers with hand symptoms | Arch Phys Med Rehabil. | the outcome is not CTS, but rather how baseline CTS predicts future funcional limitation |
| Descatha,A.; Huard,L.; Aubert,F.; Barbato,B.; Gorand,O.; Chastang,J.F. | 2012 | Meta-analysis on the performance of sonography for the diagnosis of carpal tunnel syndrome | Semin.Arthritis Rheum. | meta-analysis |
| Desjacques,P.; Egloff-Baer,S.; Roth,G. | 1980 | Lumbrical muscles and the carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | doesn't answer question of interest |
| Deutinger,M.; Girsch,W.; Burggasser,G.; Windisch,A.; Mayr,N.; Freilinger,G. | 1993 | Clinical and electroneurographic evaluation of sensory/motor-differentiated nerve repair in the hand | J.Neurosurg. | Retrospective case series |
| Devany,A.J.; Musonda,P.; Blake,J.C. | 2010 | A retrospective insight into the roles of nerve conduction studies and symptom severity questionnaire scores in patients with carpal tunnel syndrome | Rheumatology (Oxford). | insufficient data |
| Devathasan,G.; Teo,W.L.; Mylvaganam,A. | 1986 | Methylcobalamin (CH(3)-B(12); Methycobal) in chronic diabetic | Clin.Trials J. | Incorrect patient population |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| | | neuropathy. A double-blind clinical and electrophysiological study | | |
| Dheerendra,S.K.; Ibrahim,I.W.; Khan,W.S.; Smitham,P.; Goddard,N.J. | 2011 | Measurement of skin capacitance: A novel method of diagnosing autonomic dysfunction in carpal tunnel syndrome level 3 evidence | Journal of Hand Surgery | summary document |
| Dhond,R.P.; Ruzich,E.; Witzel,T.; Maeda,Y.; Malatesta,C.; Morse,L.R.; Audette,J.; Hamalainen,M.; Kettner,N.; Napadow,V. | 2012 | Spatio-temporal mapping cortical neuroplasticity in carpal tunnel syndrome | | insufficient data; very low study design |
| Di,Guglielmo G.; Torrieri,F.; Repaci,M.; Uncini,A. | 1997 | Conduction block and segmental velocities in carpal tunnel syndrome | Electroencephalogr.Clin Neurophysiol. | insufficient data; very low study design |
| Diabalova,V. | 1995 | Our experience with reoperations for the diagnosis of the Carpal Tunel Syndrome | Acta Chir.Plast. | Retrospective case series |
| Diamond,M.R. | 1989 | Carpal tunnel syndrome: A review | Chiropractic Sports Medicine | review |
| Diaz,J.H. | 2001 | Carpal tunnel syndrome in female nurse anesthetists versus operating room nurses: prevalence, laterality, and impact of handedness | Anesth.Analg. | Not relevant, prevalence study |
| Dick,E.A.; Burnett,C.; Gedroyc,W.M.W. | 2008 | MRI of the wrist | | review; background information |
| Dick,F.D.; Graveling,R.A.; Munro,W.; Walker-Bone,K. | 2011 | Workplace management of upper limb disorders: a systematic review | Occup.Med (Lond) | systematic review |
| Dickson,D.R.; Boddice,T.; Collier,A.M. | 2013 | A comparison of the functional difficulties in staged and simultaneous open carpal tunnel decompression | J Hand Surg Eur.Vol. | Does not meet inclusion criteria (follow-up&lt;3 month minimum) |
| Dieleman,J.P.; Kerklaan,J.; Huygen,F.J.; Bouma,P.A.; Sturkenboom,M.C. | 2008 | Incidence rates and treatment of neuropathic pain conditions in the general population | | Does not address question of interest |
| Dillon,J.P.; Laing,A.; Hussain,M.; Macey,A. | 2008 | Improved tolerability of open carpal tunnel release under local anaesthetic: a patient satisfaction survey | Arch Orthop Trauma Surg | Very low quality |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Dimitrova,A.; Lou,J.S.; Andrea,S.; Luo,Y.; Murchison,C.; Oken,B. | 2014 | Local effects of acupuncture on the median and ulnar nerves in patients with carpal tunnel syndrome (CTS): Study design and preliminary results | J.Altern.Complement.Med. | Conference poster |
| Ditmars,D.M.,Jr.; Houin,H.P. | 1986 | Carpal tunnel syndrome | Hand Clin | background |
| Dlabal,K. | 1989 | A new technique of operation for opposition of the thumb in thenar muscle paralysis | Acta Chir.Plast. | Incorrect patient population (not exclusive to CTS patients) |
| Dlabalova,V. | 1995 | Our long-term experience and results of surgical management of the carpal tunnel syndrome | Acta Chir Plast. | Background article |
| Dodds,S.D.; Trumble,T.E. | 2006 | Management of complications related to carpal tunnel release | Techniques in Orthopaedics | Background article |
| Doesburg,M.H.; Henderson,J.; Yoshii,Y.; -Mink-van-der-Molen-AB; Cha,S.S.; An,K.N.; Amadio,P.C. | 2012 | Median nerve deformation in differential finger motions: ultrasonographic comparison of carpal tunnel syndrome patients and healthy controls | Journal of orthopaedic research : official.publication.of the Orthopaedic Research Society | duplicate |
| Dogan,S.K.; Ay,S.; Evcik,D.; Baser,O. | 2011 | Adaptation of Turkish version of the questionnaire Quick Disability of the Arm, Shoulder, and Hand (Quick DASH) in patients with carpal tunnel syndrome | Clin.Rheumatol. | +Does not answer a question of interest |
| Dolhanty,Dorothy | 1986 | Effectiveness of Splinting for Carpal Tunnel Syndrome |  | Very low quality |
| Doll,D.C.; Weiss,R.B. | 1977 | Unusual presentations of multiple myeloma | Postgrad.Med | Not relevant to CTS; case reports |
| Domanasiewicz,A.; Koszewicz,M.; Jablecki,J. | 2009 | Comparison of the diagnostic value of ultrasonography and neurography in carpal tunnel syndrome | Neurol Neurochir.Pol. | insufficient data; very low study design |
| Donahue; Raynor; Rutkove | 1998 | Erratum: Forearm velocity in Carpal Tunnel syndrome: When is slow too slow? (Archives of Physical Medicine and Rehabilitation (1998) 79 (181-183)) | Arch.Phys.Med.Rehabil. | abstract; no text |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Donaldson,C.C.; Nelson,D.V.; Skubick,D.L.; Clasby,R.G. | 1998 | Potential contributions of neck muscle dysfunctions to initiation and maintenance of carpal tunnel syndrome | Appl Psychophysiol.Biofeedback | biomechanical review |
| Dorin,D.; Mann,R.J. | 1984 | Carpal tunnel syndrome associated with abnormal palmaris longus muscle | South Med J | case report |
| Dorwart,B.B. | 1984 | Carpal tunnel syndrome: a review | Semin.Arthritis Rheum. | review |
| Doyle,J.J.; Parry,G.J. | 1995 | Entrapment neuropathies | Current Opinion in Orthopaedics | Not relevant to CTS |
| Doyle,J.R.; Carroll,R.E. | 1968 | The carpal tunnel syndrome. A review of 100 patients treated surgically | Calif.Med | Retrospective case series |
| Dray,G.J.; Jablon,M. | 1987 | Clinical and radiologic features of primary osteoarthritis of the hand | Hand Clin | Background Information |
| Driskell,J.A.; Wesley,R.L.; Hess,I.E. | 1985 | Effectiveness of pyridoxine hydrochloride treatment on carpal tunnel syndrome patients | Fed.Proc. | Conference abstract/poster |
| Drosos,G.I.; Ververidis,A.; Stavropoulos,N.I.; Mavropoulos,R.; Tripsianis,G.; Kazakos,K. | 2013 | Silicone ring tourniquet versus pneumatic cuff tourniquet in carpal tunnel release: a randomized comparative study | J Orthop Traumatol. | Does not meet inclusion criteria (invasive follow-up&lt;3 month) |
| Dubert,T.; Racasan,O. | 2006 | A reliable technique for avoiding the median nerve during carpal tunnel injections | Joint Bone Spine | Does not address question of interest |
| Duche,R.; Trabelsi,A. | 2010 | The Canaletto(R) implant for reconstructing transverse carpal ligament in carpal tunnel surgery. Surgical technique and cohort prospective study about 400 Canaletto cases versus 400 cases with open carpal tunnel surgery | Chir Main | very low quality |
| Duckworth,A.D.; Jenkins,P.J.; Roddam,P.; Watts,A.C.; Ring,D.; McEachan,J.E. | 2013 | Pain and carpal tunnel syndrome | J Hand Surg Am | +Does not answer a question of interest |
| Duman,I.; Aydemir,K.; Ozgul,A.; Kalyon,T.A. | 2008 | Assessment of the efficacy of gabapentin in carpal tunnel syndrome | J Clin Rheumatol. | Very Low Quality |
| Dunbar,A.H.; Bauman,B.B. | 1996 | Soft tissue disorders: Women in the work force | Orthopaedic Physical Therapy Clinics of North America | Background Information |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Duncan,I.; Sullivan,P.; Lomas,F. | 1999 | Sonography in the diagnosis of carpal tunnel syndrome | AJR Am J Roentgenol. | insufficient data; very low study design |
| Duncan,K.H.; Lewis,R.C.,Jr.; Foreman,K.A.; Nordyke,M.D. | 1987 | Treatment of carpal tunnel syndrome by members of the American Society for Surgery of the Hand: results of a questionnaire | J Hand Surg Am | Irrelevant |
| Dunnan,J.B.; Waylonis,G.W. | 1991 | Wrist flexion as an adjunct to the diagnosis of carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data; very low study design |
| Dunne,C.A.; Thompson,P.W.; Cole,J.; Dunning,J.; Martyn,C.N.; Coggon,D.; Cooper,C. | 1996 | Carpal tunnel syndrome: evaluation of a new method of assessing median nerve conduction at the wrist | Ann.Rheum.Dis | insufficient data; limited control group |
| Durakoglugil,M.E.; Cicek,Y.; Kocaman,S.A.; Sabri,Balik M.; Kirbas,S.; Cetin,M.; Erdogan,T.; Canga,A. | 2013 | Increased pulse wave velocity and carotid intima-media thickness in patients with carpal tunnel syndrome | Muscle Nerve | Does not answer a question of interest |
| Durkan,J.A. | 1994 | The carpal-compression test. An instrumented device for diagnosing carpal tunnel syndrome | Orthop Rev. | insufficient data; very low study design |
| Durkan,J.A. | 1991 | A new diagnostic test for carpal tunnel syndrome | J Bone Joint Surg Am | insufficient data; very low study design |
| Duymus,M.; Orman,G.; Ozben,S.; Huseyinoglu,N.; Ulasli,A.M. | 2014 | The association between bifid median nerve and carpal tunnel syndrome: Is it really a risk factor? | Turkish Journal of Rheumatology | prevalence study; low design |
| Dyck,P.J.; Kratz,K.M.; Lehman,K.A.; Karnes,J.L.; Melton III,L.J.; O'Brien,P.C.; Litchy,W.J.; Windebank,A.J.; Smith,B.E.; Low,P.A.; Service,F.J.; Rizza,R.A.; Zimmerman,B.R. | 1991 | The Rochester Diabetic Neuropathy Study: Design, criteria for types of neuropathy, selection bias, and reproducibility of neuropathic tests | | Does not answer a question of interest; not relevant to CTS |
| Dyer,G.S.M.; Simmons,B.P. | 2010 | Therapy: Surgery or nonsurgical therapy for carpal tunnel syndrome? | Nature Reviews Rheumatology | Narrative review |
| Dyro,F.M. | 1977 | Carpal tunnel syndrome after brachial plexus lesions | Electroencephalogr.Clin.Neurophysiol. | summary report; commentary |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Eason,S.Y.; Belsole,R.J.; Greene,T.L. | 1985 | Carpal tunnel release: analysis of suboptimal results | J Hand Surg Br | Retrospective case series |
| Eaton,R.G. | 1993 | Predictors identified for outcome of carpal tunnel syndrome | Am.Fam.Physician | Commentary/review |
| Ebrahimzadeh,M.H.; Mashhadinejad,H.; Moradi,A.; Kachooei,A.R. | 2013 | Carpal tunnel release in diabetic and non-diabetic patients | Arch Bone Jt.Surg | Does not address question of interest |
| Edgington,E. | 1983 | Carpal tunnel syndrome - an occupational risk | Can Dent.Hyg. | Commentary/review |
| Edwards,A. | 2002 | Phalen's test with carpal compression: testing in diabetics for the diagnosis of carpal tunnel syndrome | | not best available evidence |
| Edwards,A.J.; Sill,B.J.; MacFarlane,I. | 1984 | Carpal tunnel syndrome due to dystrophic calcification | Aust.N.Z.J Surg | case report |
| Edwards,K.S. | 1990 | Square wrists and carpal tunnel syndrome | Ohio Med | Commentary |
| Eisen,A.; Schomer,D.; Melmed,C. | 1977 | The application of F-wave measurements in the differentiation of proximal and distal upper limb entrapments | | insufficient data; very low study design |
| Ekenvall,L.; Nilsson,B.Y.; Gustavsson,P. | 1986 | Temperature and vibration thresholds in vibration syndrome | Br J Ind.Med | not exclusive to CTS; no controls |
| Ekim,A.; Armagan,O.; Tascioglu,F.; Oner,C.; Colak,M. | 2007 | Effect of low level laser therapy in rheumatoid arthritis patients with carpal tunnel syndrome | Swiss Med Wkly. | Very low quality |
| Eklund,G. | 1975 | A new electrodiagnostic procedure for measuring sensory nerve conduction across the carpal tunnel | Ups.J Med Sci | insufficient data; very low study design |
| Ekman-Ordeberg,G.; Salgeback,S.; Ordeberg,G. | 1987 | Carpal tunnel syndrome in pregnancy. A prospective study | Acta Obstet.Gynecol.Scand. | Very low quality |
| El Miedany,Y.M.; Aty,S.A.; Ashour,S. | 2004 | Ultrasonography versus nerve conduction study in patients with carpal tunnel syndrome: substantive or complementary tests? | Rheumatology (Oxford) | insufficient data; very low study design |
| Elfar,J.C.; Yaseen,Z.; Stern,P.J.; Kiefhaber,T.R. | 2010 | Individual finger sensibility in carpal tunnel syndrome | J Hand Surg Am | +Does not answer a question of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| El-Habashy,H.R.; Ahmed,A.F. | 2010 | Second Lumbrical versus abductor pollicis brevis muscle's latency in carpal tunnel syndrome diagnosis | Egyptian Journal of Neurology, Psychiatry and Neurosurgery | insufficient data; very low study design |
| El-Hajj,T.; Tohme,R.; Sawaya,R. | 2010 | Changes in electrophysiological parameters after surgery for the carpal tunnel syndrome | J Clin Neurophysiol. | very low quality |
| Elkowitz,S.J.; Dubin,N.H.; Richards,B.E.; Wilgis,E.F. | 2005 | Clinical utility of portable versus traditional electrodiagnostic testing for diagnosing, evaluating, and treating carpal tunnel syndrome | Am J Orthop (Belle.Mead NJ) | +insufficient data; not best evidence |
| Elliott,J.M. | 2007 | Ultrasound evaluation of patients with carpal tunnel syndrome before and after endoscopic release of the transverse carpal ligament | Clin.Radiol. | Narrative review |
| Elliott,R.; Burkett,B. | 2013 | Massage therapy as an effective treatment for carpal tunnel syndrome | J Bodyw.Mov Ther | Very Low Quality |
| Ellis,H. | 2008 | The carpal tunnel |  | background info |
| Ellis,J.; Folkers,K.; Watanabe,T.; Kaji,M.; Saji,S.; Caldwell,J.W.; Temple,C.A.; Wood,F.S. | 1979 | Clinical results of a cross-over treatment with pyridoxine and placebo of the carpal tunnel syndrome | Am J Clin Nutr. | Case report |
| Ellis,J.M. | 1987 | Treatment of carpal tunnel syndrome with vitamin B6 | South Med J | Insufficient data (missing methods & results) |
| Ellis,J.M.; Azuma,J.; Watanabe,T.; Fokers,K.; Lowell,J.R.; Hurst,G.A.; Ho,Ahn C.; Shuford,E.H.,Jr.; Ulrich,R.F. | 1977 | Survey and new data on treatment with pyridoxine of patients having a clinical syndrome including the carpal tunnel and other defects | Res.Commun.Chem.Pathol.Pharmacol. | Incorrect patient population (intervention not exclusive to CTS patients) |
| Ellis,J.M.; Folkers,K.; Levy,M.; Shizukuishi,S.; Lewandowski,J.; Nishii,S.; Schubert,H.A.; Ulrich,R. | 1982 | Response of vitamin B-6 deficiency and the carpal tunnel syndrome to pyridoxine | Proc.Natl.Acad Sci U.S.A | Incorrect patient population (&lt;10 patients) |
| Ellis,J.M.; Kishi,T.; Azuma,J.; Folkers,K. | 1976 | Therapy of the carpal tunnel syndrome with vitamin B(6) | IRCS Medical Science | Very Low Quality |
| Ellis,J.R.C.; Mcnally,E.G.; Scott,P.M. | 2002 | Ultrasound of peripheral nerves | Imaging | Background Information |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| El-Shahaly,H.A.; el-Sherif,A.K. | 1991 | Is the benign joint hypermobility syndrome benign? | Clin Rheumatol. | Does not answer a question of interest; not CTS exclusive |
| Elstraete,A.C.; Pastureau,F.; Lebrun,T.; Mehdaoui,H. | 2001 | Neostigmine added to lidocaine axillary plexus block for postoperative analgesia | Eur.J.Anaesthesiol. | Deemed clinically irrelevant |
| Emad,M.R.; Najafi,S.H.; Sepehrian,M.H. | 2010 | The effect of provocative tests on electrodiagnosis criteria in clinical carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Emad,M.R.; Najafi,S.H.; Sepehrian,M.H. | 2009 | The effect of provocative tests on electrodiagnosis criteria in clinical carpal tunnel syndrome | J Electromyogr.Kinesiol. | insufficient data; very low study design |
| Embury,S.P. | 1980 | The carpal tunnel syndrome in family practice | Nebr.Med J | background |
| Entin,M.A. | 1968 | Carpal tunnel syndrome and its variants | Surg Clin North Am | background |
| Erdemoglu,A.K. | 2009 | The efficacy and safety of gabapentin in carpal tunnel patients: open label trial | Neurol India | Insufficient data |
| Erdmann,M.W. | 1994 | Endoscopic carpal tunnel decompression | J Hand Surg Br | Very low strength |
| Erhard,L.; Ozalp,T.; Citron,N.; Foucher,G. | 1999 | Carpal tunnel release by the Agee endoscopic technique. Results at 4 year follow-up | J Hand Surg Br | very low quality |
| Erselcan,T.; Topalkara,K.; Nacitarhan,V.; Akyuz,A.; Dogan,D. | 2001 | Carpal tunnel syndrome leads to significant bone loss in metacarpal bones | J Bone Miner.Metab | Does not answer a question of interest; very low study design |
| Ersoz,M. | 2003 | Nerve conduction tests in patients with fibromyalgia: comparison with normal controls | Rheumatol.Int. | &lt;10 patients in CTS group; not CTS exclusive |
| Escobar,P.L.; Goka,R.S. | 1985 | Carpal tunnel syndrome. Palmar sensory latencies to 3rd digit and wrist | Orthop.Rev. | insufficient data; very low study design |
| Eskandary,H.; Shahabi,M.; Asadi,A.R. | 2002 | Evaluation of carpal tunnel syndrome by laser Doppler flowmetry | Iranian Journal of Medical Sciences | no comparison group; very low study design |
| Eslamian,F.; Bahrami,A.; Aghamohammadzadeh,N.; Niafar,M.; Salekzamani,Y.; Behkamrad,K. | 2011 | Electrophysiologic changes in patients with untreated primary hypothyroidism | J Clin Neurophysiol. | insufficient data; not exclusive to CTS |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| EstÃ¨be,J.P.; Gentili,M.E.; Langlois,G.; Mouilleron,P.; Bernard,F.; Ecoffey,C. | 2003 | Lidocaine priming reduces tourniquet pain during intravenous regional anesthesia: A preliminary study | Reg.Anesth.Pain Med. | Deemed clinically irrelevant |
| Estebe,J.P.; Gentili,M.E.; Langlois,G.; Mouilleron,P.; Bernard,F.; Ecoffey,C. | 2003 | Lidocaine priming reduces tourniquet pain during intravenous regional anesthesia: A preliminary study | Reg Anesth.Pain Med | Duplicate study (duplicate with AAOS ID 14055) |
| Ettema,A.M.; Amadio,P.C.; Cha,S.S.; Harrington,J.R.; Harris,A.M.; Offord,K.P. | 2006 | Surgery versus conservative therapy in carpal tunnel syndrome in people aged 70 years and older | Plast.Reconstr.Surg | the study stratifies does a good job stratifiying by symptom severity, but the stratification results in less than 10 patients per group for each severity level. |
| Faber,W.J. | 1990 | Carpal tunnel syndrome (CTS): An alternative view and treatment approach | Journal of Neurological and Orthopaedic Medicine and Surgery | Background article |
| Fagarasanu,M.; Kumar,S. | 2003 | Carpal tunnel syndrome due to keyboarding and mouse tasks: A review | International Journal of Industrial Ergonomics | literature review/background |
| Faithfull,D.K.; Moir,D.H.; Ireland,J. | 1986 | The micropathology of the typical carpal tunnel syndrome | J Hand Surg Br | +Does not answer a question of interest |
| Falck,B.; Aarnio,P. | 1983 | Left-sided carpal tunnel syndrome in butchers | Scand.J Work Environ.Health | Not relevant, prevalence study |
| Falkenburg,S.A. | 1987 | Choosing hand splints to aid carpal tunnel syndrome recovery | Occup.Health Saf | Background article |
| Fansa,M.R.; Helal,B. | 1976 | Carpal tunnel syndrome. Surgical treatment | Nurs.Mirror Midwives J | Background article |
| Faour-Martin,O.; Martin-Ferrero,M.A.; Almaraz-Gomez,A.; Vega-Castrillo,A. | 2012 | The long-term post-operative electromyographic evaluation of patients who have undergone carpal tunnel decompression | J Bone Joint Surg Br | Retrospective case series |
| Faour-Martin,O.; Martin-Ferrero,M.A.; Vega,Castrillo A.; Almaraz-Gomez,A.; Valverde-Garcia,J.A.; Amigo,Linares L.; Red-Gallego,M.A. | 2013 | Long-term effects of preserving or splitting the carpal ligament in carpal tunnel operation | J Plast.Surg Hand Surg | Narrative review (analysis of prior study) |

| **Authors** | **Year** | **Article Title** | **Periodical** | **Reason for Exclusion** |
|---|---|---|---|---|
| Farhat,S.M.; Kahn,E.A.; Child,M.A. | 1974 | The carpal tunnel syndrome | Surg Neurol | background |
| Farkkila,M.; Pyykko,I.; Jantti,V.; Aatola,S.; Starck,J.; Korhonen,O. | 1988 | Forestry workers exposed to vibration: a neurological study | Br J Ind.Med | Not relevant, prevalence study |
| Farouk,S.; Aly,A. | 2010 | Quality of lidocaine analgesia with and without midazolam for intravenous regional anesthesia | Journal of Anesthesia | Deemed clinically irrelevant |
| Feathers,D.J.; Rollings,K.; Hedge,A. | 2013 | Alternative computer mouse designs: performance, posture, and subjective evaluations for college students aged 18-25 | Work | Does not answer a question of interest; no diagnosis of CTS |
| Feffer,H.L. | 1975 | Regional use of steroids in the management of lumbar intervertebral disc disease | Orthop.Clin.North Am. | Background information |
| Feierstein,M.S. | 1988 | The performance and usefulness of nerve conduction studies in the orthopedic office | Orthop Clin North Am | review; background information |
| Feldman,R.G.; Goldman,R.; Keyserling,W.M. | 1983 | Classical syndromes in occupational medicine. Peripheral nerve entrapment syndromes and ergonomic factors | Am J Ind.Med | Background Information |
| Feldman,R.G.; Goldman; R.; Keyserling,W.M. | 1983 | Peripheral nerve entrapment syndromes and ergonomic factors | Am.J.Ind.Med. | Background Information |
| Feldman,R.G.; Travers,P.H.; Chirico-Post,J.; Keyserling,W.M. | 1987 | Risk assessment in electronic assembly workers: carpal tunnel syndrome | J Hand Surg Am | Does not answer a question of interest; no diagnosis of CTS |
| Feldon,P.; Terrono,A.L. | 2006 | Carpal tunnel syndrome in rheumatoid arthritis | Techniques in Orthopaedics | Background Information |
| Felsenthal,G. | 1978 | Comparison of evoked potentials in the same hand in normal subjects and in patients with carpal tunnel syndrome | Am J Phys Med | insufficient data; very low study design |
| Felsenthal,G.; McIvor,M.E. | 1984 | Reappraisal of the electroneurographic and electromyographic diagnosis of diabetic peripheral neuropathy | Am J Phys Med | Does not answer a question of interest; not CTS exclusive |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Felsenthal,G.; Spindler,H. | 1979 | Palmar conduction time of median and ulnar nerves of normal subjects and patients with carpal tunnel syndrome | Am J Phys Med | insufficient data; very low study design |
| Fernandes,C.H.; Nakachima,L.R.; Hirakawa,C.K.; Gomes Dos Santos,J.B.; Faloppa,F. | 2014 | Carpal tunnel release using the Paine retinaculotome inserted through a palmar incision | Hand (N.Y) | Background article |
| Fernandez,E.; Pallini,R.; Lauretti,L.; Scogna,A.; La,Marca F. | 1997 | Carpal tunnel syndrome | Surg Neurol | background |
| Fernandez-de-las-Penas,C.; Cleland,J.A.; Ortega-Santiago,R.; de-la-Llave-Rincon AI; Martinez-Perez,A.; Pareja,J.A. | 2010 | Central sensitization does not identify patients with carpal tunnel syndrome who are likely to achieve short-term success with physical therapy | Exp.Brain Res. | all CTS cases; no comparison group |
| Fernandez-de-las-Penas,C.; Madeleine,P.; Martinez-Perez,A.; Arendt-Nielsen,L.; Jimenez-Garcia,R.; Pareja,J.A. | 2010 | Pressure pain sensitivity topographical maps reveal bilateral hyperalgesia of the hands in patients with unilateral carpal tunnel syndrome | Arthritis Care Res.(Hoboken.) | +Does not answer a question of interest; very low study design |
| Fernandez-de-las-Penas,C.; Perez-de-Heredia-Torres,M.; Martinez-Piedrola,R.; de la Llave-Rincon AI; Cleland,J.A. | 2009 | Bilateral deficits in fine motor control and pinch grip force in patients with unilateral carpal tunnel syndrome | Exp.Brain Res. | insufficient data; very low study design |
| Fernndez-De-Las-Peas,C.; De La Llave-Rincn,A.I.; Fernndez-Carnero,J.; Cuadrado,M.L.; Arendt-Nielsen,L.; Pareja,J.A. | 2009 | Bilateral widespread mechanical pain sensitivity in carpal tunnel syndrome: Evidence of central processing in unilateral neuropathy |  | insufficient data; very low study design |
| Ferrara,M.A.; Marcelis,S. | 1997 | Continuing education: Ultrasound examination of the wrist | J.Belge Radiol. | Background Information |
| Ferry,S.; Hannaford,P.; Warskyj,M.; Lewis,M.; Croft,P. | 2000 | Carpal tunnel syndrome: a nested case-control study of risk factors in women | Am J Epidemiol. | very low quality |
| Ferry,S.; Pritchard,T.; Keenan,J.; Croft,P.; Silman,A.J. | 1998 | Is delayed nerve conduction associated with increased self-reported disability in individuals with hand symptoms? A population based study | J Rheumatol. | +Does not answer a question of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Fertl,E.; Wober,C.; Zeitlhofer,J. | 1998 | The serial use of two provocative tests in the clinical diagnosis of carpal tunel syndrome | Acta Neurol Scand. | insufficient data; very low study design |
| Feuerstein,M.; Burrell,L.M.; Miller,V.I.; Lincoln,A.; Huang,G.D.; Berger,R. | 1999 | Clinical management of carpal tunnel syndrome: a 12-year review of outcomes | Am J Ind.Med | systematic review |
| Feuerstein,M.; Carosella,A.M.; Burrell,L.M.; Marshall,L.; DeCaro,J. | 1997 | Occupational upper extremity symptoms in sign language interpreters: Prevalence and correlates of pain, function, and work disability | Journal of Occupational Rehabilitation | Not relevant, prevalence study |
| Field,T.; Diego,M.; Cullen,C.; Hartshorn,K.; Gruskin,A.; Hernandez-Reif,M.; Sunshine,W. | 2004 | Carpal tunnel syndrome symptoms are lessened following massage therapy | Journal of Bodywork and Movement Therapies | Incorrect patient population (&lt;10 patients/group) |
| Filius,A.; Korstanje,J.W.; Selles,R.W.; Hovius,S.E.; Slijper,H.P. | 2013 | Dynamic sonographic measurements at the carpal tunnel inlet: reliability and reference values in healthy wrists | Muscle Nerve | only healthy study subjects |
| Finestone,H.M.; Woodbury,G.M.; Collavini,T.; Marchuk,Y.; Maryniak,O. | 1996 | Severe carpal tunnel syndrome: clinical and electrodiagnostic outcome of surgical and conservative treatment | Muscle Nerve | Retrospective case series |
| Finger,D.; Vogel,P. | 1998 | Carpal tunnel syndrome | Arthritis Rheum. | background |
| Finkel,M.L. | 1985 | The effects of repeated mechanical trauma in the meat industry | Am J Ind.Med | Background Information |
| Finsen,V.; Russwurm,H. | 2001 | Neurophysiology not required before surgery for typical carpal tunnel syndrome | J Hand Surg Br | not best available evidence |
| Fisher,D.L.; Andres,R.O.; Airth,D.; Smith,S.S. | 1993 | Repetitive motion disorders: The design of optimal rate-rest profiles | Hum.Factors | Does not address question of interest |
| Fisher,T.F. | 1998 | Preventing upper extremity cumulative trauma disorders: An approach to employee wellness | AAOHN J. | Background info |
| Fissette,J.; Onkelinx,A.; Fandi,N. | 1981 | Carpal and Guyon tunnel syndrome in burns at the wrist | J Hand Surg Am | &lt;10 patients per group; no comparison group |
| Fitz,W.R.; Mysiw,W.J.; Johnson,E.W. | 1990 | First lumbrical latency and amplitude. Control values and findings in carpal tunnel syndrome | Am J Phys Med Rehabil. | +Does not answer a question of interest; no comparison of modalities |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Flak,M.; Durmala,J.; Czernicki,K.; Dobosiewicz,K. | 2006 | Double crush syndrome evaluation in the median nerve in clinical, radiological and electrophysiological examination | Stud.Health Technol.Inform. | Does not answer a question of interest; very low study design |
| Flaschka,G.; Eder,H.; Mullegger,G.; Gindl,H.K. | 1991 | Follow-up results of surgery for carpal tunnel syndrome in local anesthesia | Zentralbl.Neurochir. | does not answer a question of interest; no comparison group |
| Fleck,H.; Feldman,M.E. | 1982 | Compression syndromes at wrist. Precise diagnostic procedures | N.Y State J Med | background |
| Fleming,A.; Dodman,S.; Crown,J.M.; Corbett,M. | 1976 | Extra-articular features in early rheumatoid disease | Br Med J | +not exclusive to CTS; not best available evidence |
| Fletcher,S.J.; Hulgur,M.D.; Varma,S.; Lawrence,E.; Boome,R.S.; Oswal,S. | 2011 | Use of a temporary forearm tourniquet for intravenous regional anaesthesia: A randomised controlled trial | Eur.J.Anaesthesiol. | Incorrect patient population (not exclusive to CTS patients) |
| Flinn,S.R.; Pease,W.S.; Freimer,M.L. | 2012 | Score reliability and construct validity of the Flinn Performance Screening Tool for adults with symptoms of carpal tunnel syndrome | Am J Occup.Ther | insufficient data |
| Flondell,M.; Hofer,M.; Bjork,J.; Atroshi,I. | 2010 | Local steroid injection for moderately severe idiopathic carpal tunnel syndrome: protocol of a randomized double-blind placebo-controlled trial (NCT 00806871) | BMC Musculoskelet.Disord. | Study protocol/insufficient data |
| Florack,T.M.; Miller,R.J.; Pellegrini,V.D.; Burton,R.I.; Dunn,M.G. | 1992 | The prevalence of carpal tunnel syndrome in patients with basal joint arthritis of the thumb | J Hand Surg Am | no comparison group; not best available evidence |
| Flores,L.P.; Cavalcante,T.F.; Neto,O.R.; Alcantara,F.S. | 2009 | Quantitative analysis of the variation in angles of the carpal arch after open and endoscopic carpal tunnel release. Clinical article | J Neurosurg. | no patient oriented outcomes |
| Fodor,J.,III; Malott,J.C.; Merhar,G.L. | 1987 | Carpal tunnel syndrome: the role of radiography | Radiol.Technol. | Background Information |
| Folkers,K.; Ellis,J. | 1990 | Successful therapy with vitamin B6 and vitamin B2 of the carpal tunnel syndrome and need for determination of | Ann.N.Y Acad Sci | Narrative review |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| | | the RDAs for vitamins B6 and B2 for disease states | | |
| Folkers,K.; Saji,S.; Kaji,M.; Ellis,J. | 1977 | Biochemical evidence for a deficiency of vitamin B(6) in the carpal tunnel syndrome | Acta Pharm.Suec. | Background article |
| Folkers,K.; Willis,R.; Takamura,K. | 1981 | Biochemical correlations of a deficiency of vitamin B(6), the carpal tunnel syndrome and the Chinese restaurant syndrome | IRCS Medical Science | Does not answer a question of interest; very low study design |
| Follmar,K.E.; Chetelat,M.D.; Lifchez,S.D. | 2012 | Outcome of endoscopic carpal tunnel release in patients with chronic nonhand pain compared with those without chronic pain | J Hand Surg Am | very low quality |
| Foresti,C.; Quadri,S.; Rasella,M.; Tironi,F.; Viscardi,M.; Ubiali,E. | 1996 | Carpal tunnel syndrome: which electrodiagnostic path should we follow? A prospective study of 100 consecutive patients | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Forward,D.P.; Singh,A.K.; Lawrence,T.M.; Sithole,J.S.; Davis,T.R.; Oni,J.A. | 2006 | Preservation of the ulnar bursa within the carpal tunnel: does it improve the outcome of carpal tunnel surgery? A randomized, controlled trial | J Bone Joint Surg Am | Does not meet inclusion criteria (invasive follow-up&lt;3 month) |
| Foster,R.J. | 1984 | Wrist pain. How to identify the cause and treat it | Postgrad.Med | background |
| Foulkes,G.D.; Atkinson,R.E.; Beuchel,C.; Doyle,J.R.; Singer,D.I. | 1994 | Outcome following epineurotomy in carpal tunnel syndrome: a prospective, randomized clinical trial | J Hand Surg Am | Not 10 patients in each group at any follow up. |
| Fowler,J.R.; Gaughan,J.P.; Ilyas,A.M. | 2011 | The sensitivity and specificity of ultrasound for the diagnosis of carpal tunnel syndrome: a meta-analysis | Clin Orthop Relat Res. | meta-analysis |
| Franklin,G.M.; Haug,J.; Heyer,N.; Checkoway,H.; Peck,N. | 1991 | Occupational carpal tunnel syndrome in Washington State, 1984-1988 | Am J Public Health | all CTS patients; no comparison group |
| Franzblau,A.; Rock,C.L.; Werner,R.A.; Albers,J.W.; Kelly,M.P.; Johnston,E.C. | 1996 | The relationship of vitamin B6 status to median nerve function and carpal tunnel syndrome among active industrial workers | J Occup.Environ.Med | Not relevant, not a risk study |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Franzblau,A.; Werner,R.; Valle,J.; Johnston,E. | 1993 | Workplace surveillance for carpal tunnel syndrome: A comparison of methods | J Occup.Rehabil. | not best available evidence; very low study design |
| Freiberg,A. | 2006 | The now popular and 'fashionable' carpal tunnel syndrome - revisited | Can J Plast.Surg | editorial |
| Freilich,A.M.; Chhabra,A.B. | 2007 | Diagnosis and pathophysiology of carpal tunnel syndrome | Current Opinion in Orthopaedics | background |
| Freshwater,M.F.; Arons,M.S. | 1978 | The effect of various adjuncts on the surgical treatment of carpal tunnel syndrome secondary to chronic tenosynovitis | Plast.Reconstr.Surg | was relevant to rec 8 because the treatment group gets neurolysis, but they also get concomitant corticosteroids. would be unable to tell if the neurolysis or steroids cause the effect. |
| Frost,P.; Andersen,J.H.; Nielsen,V.K. | 1998 | Occurrence of carpal tunnel syndrome among slaughterhouse workers | Scand.J Work Environ.Health | very low study design; not best evidence |
| Fry,H.J.H. | 1989 | Overuse syndromes in instrumental musicians | Semin.Neurol. | Background Information |
| Fuchs,P.C.; Nathan,P.A.; Myers,L.D. | 1991 | Synovial histology in carpal tunnel syndrome | J Hand Surg Am | cadavers included in study |
| Fuhr,J.E.; Farrow,A.; Nelson,H.S.,Jr. | 1989 | Vitamin B6 levels in patients with carpal tunnel syndrome | Arch Surg | +Does not answer a question of interest |
| Fung,B.K.; Chan,K.Y.; Lam,L.Y.; Cheung,S.Y.; Choy,N.K.; Chu,K.W.; Chung,L.Y.; Liu,W.W.; Tai,K.C.; Yung,S.Y.; Yip,S.L. | 2007 | Study of wrist posture, loading and repetitive motion as risk factors for developing carpal tunnel syndrome | Hand Surg | very low quality |
| Futami,T.; Kubodera,D.; Tsumamoto,Y. | 1989 | Subcutaneous division of the transverse carpal ligament by the use of a teflon tube and an arthroscopy | Journal of the Western Pacific Orthopaedic Association | Retrospective case series |
| Galea,L.A.; Mercieca,A.; Sciberras,C.; Gatt,R.; Schembri,M. | 2006 | Evaluation of sympathetic vasomotor fibres in carpal tunnel syndrome using continuous wave Doppler ultrasonography | J Hand Surg Br | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Ganeriwal,A.A.; Biswas,D.A.; Srivastava,T.K. | 2013 | The effects of working hours on nerve conduction test in computer operators | Malaysian Orthopaedic Journal | not best available evidence; no diagnosis of CTS |
| Gangopadhyay,S.; Chakrabarty,S.; Sarkar,K.; Dev,S.; Das,T.; Banerjee,S. | 2014 | An ergonomics study on the evaluation of carpal tunnel syndrome among Chikan embroidery workers of West Bengal, India | Int J Occup Environ Health | no diagnosis of CTS; regression model for wrist/forearm pain |
| Gannon,C.; Baratz,K.; Baratz,M.E. | 2007 | The Synovial Flap in Recurrent and Failed Carpal Tunnel Surgery | Operative Techniques in Orthopaedics | Retrospective case series |
| Gannon,C.R.; Harlan,J.; Baratz,M.E. | 2011 | Safe limited-open carpal tunnel release in the presence of aberrant anatomy | Hand (N.Y) | Retrospective case series |
| Ganske,J.G. | 1986 | Enlarged median nerve of macrodactyly associated with carpal tunnel syndrome | Iowa Med | case report |
| Garcia,Mas R.; Veja,J.; Golano,P. | 2006 | Non-endoscopic double-incision approach for median nerve decompression in idiopathic carpal tunnel syndrome. A comparative study of 155 hands | The Journal of Bone and Joint Surgery | Insufficient data |
| Garfinkel,M. | 2006 | Yoga as a complementary therapy | Geriatrics and Aging | Background article |
| Garg,A.; Hegmann,K.T.; Wertsch,J.J.; Kapellusch,J.; Thiese,M.S.; Bloswick,D.; Merryweather,A.; Sesek,R.; Deckow-Schaefer,G.; Foster,J.; Wood,E.; Kendall,R.; Sheng,X.; Holubkov,R. | 2012 | The WISTAH hand study: a prospective cohort study of distal upper extremity musculoskeletal disorders | BMC Musculoskelet.Disord. | insufficient data |
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| Gebhard,R.E.; Al-Samsam,T.; Greger,J.; Khan,A.; Chelly,J.E. | 2002 | Distal nerve blocks at the wrist for outpatient carpal tunnel surgery offer intraoperative cardiovascular stability and reduce discharge time | Anesth.Analg. | Very low quality |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Geere,J.; Chester,R.; Kale,S.; Jerosch-Herold,C. | 2007 | Power grip, pinch grip, manual muscle testing or thenar atrophy - which should be assessed as a motor outcome after carpal tunnel decompression? A systematic review | BMC Musculoskelet.Disord. | systematic review |
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| Gelberman,R.H.; Rydevik,B.L.; Pess,G.M.; Szabo,R.M.; Lundborg,G. | 1988 | Carpal tunnel syndrome. A scientific basis for clinical care | Orthop Clin North Am | Narrative review |
| Gellman,H.; Chandler,D.R.; Petrasek,J.; Sie,I.; Adkins,R.; Waters,R.L. | 1988 | Carpal tunnel syndrome in paraplegic patients | J Bone Joint Surg Am | &lt;10 patients per group |
| Gellman,H.; Gelberman,R.H.; Tan,A.M.; Botte,M.J. | 1986 | Carpal tunnel syndrome. An evaluation of the provocative diagnostic tests | J Bone Joint Surg Am | insufficient data; very low study design |
| Gelmers,H.J. | 1981 | Primary carpal tunnel stenosis as a cause of entrapment of the median nerve | Acta Neurochir.(Wien.) | insufficient data; baseline patients with CTS |
| Gelmers,H.J. | 1979 | The significance of Tinel's sign in the diagnosis of carpal tunnel syndrome | Acta Neurochir.(Wien.) | insufficient data; very low study design |
| Gentili,M.; Bernard,J.-M.; Bonnet,F. | 1999 | Adding clonidine to lidocaine for intravenous regional anesthesia prevents tourniquet pain | Anesth.Analg. | Insufficient data (data reported in medians) |
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| Geronimo,G.; Caccese,A.F.; Caruso,L.; Soldati,A.; Passaretti,U. | 2009 | Treatment of carpal tunnel syndrome with alpha-lipoic acid | Eur.Rev.Med.Pharmacol.Sci. | Duplicate article (duplicate with AAOS ID 445) |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Gerwatowski,L.J.; McFall,D.B.; Stach,D.J. | 1992 | Carpal tunnel syndrome. Risk factors and preventive strategies for the dental hygienist | J Dent.Hyg. | literature review; background information |
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| Ghasemi-Esfe,A.R.; Khalilzadeh,O.; Vaziri-Bozorg,S.M.; Jajroudi,M.; Shakiba,M.; Mazloumi,M.; Rahmani,M. | 2011 | Color and power Doppler US for diagnosing carpal tunnel syndrome and determining its severity: a quantitative image processing method |  | insufficient data; very low study design |
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| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Gibbs,K.E.; Rand,W.; Ruby,L.K. | 1996 | Open vs endoscopic carpal tunnel release |  | very low quality |
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| Ginanneschi,F.; Dominici,F.; Milani,P.; Biasella,A.; Rossi,A. | 2007 | Evidence of altered motor axon properties of the ulnar nerve in carpal tunnel syndrome | Clin Neurophysiol. | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Ginanneschi,F.; Filippou,G.; Bonifazi,M.; Frediani,B.; Rossi,A. | 2013 | Effects of Local Corticosteroid Injection on Electrical Properties of Abeta-Fibers in Carpal Tunnel Syndrome | J Mol.Neurosci. | Very Low Quality |
| Ginanneschi,F.; Filippou,G.; Bonifazi,M.; Frediani,B.; Rossi,A. | 2014 | Effects of local corticosteroid injection on electrical properties of A(beta)-fibers in carpal tunnel syndrome | J.Mol.Neurosci. | Very low quality |
| Ginanneschi,F.; Milani,P.; Filippou,G.; Mondelli,M.; Frediani,B.; Melcangi,R.C.; Rossi,A. | 2012 | Evidences for antinociceptive effect of 17-alpha-hydroxyprogesterone caproate in carpal tunnel syndrome | J Mol.Neurosci. | Incorrect patient population (&lt;10 patients/group) |
| Ginanneschi,F.; Milani,P.; Mondelli,M.; Dominici,F.; Biasella,A.; Rossi,A. | 2008 | Ulnar sensory nerve impairment at the wrist in carpal tunnel syndrome | Muscle Nerve | +Does not answer a question of interest |
| Ginanneschi,F.; Mondelli,M.; Dominici,F.; Rossi,A. | 2006 | Changes in motor axon recruitment in the median nerve in mild carpal tunnel syndrome | Clin Neurophysiol. | insufficient data; very low study design |
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| Glynn,A.; Strunk,S.; Reidy,D.; Hynes,D.E. | 2005 | Carpal tunnel release using local anaesthetic and a forearm tourniquet | Ir.Med J | Retrospective case series |
| Gnatz,S.M. | 1999 | The role of needle electromyography in the evaluation of patients with carpal tunnel syndrome: Needle EMG is important | Muscle Nerve | background information; commentary |
| Gnatz,S.M.; Conway,R.R. | 1999 | The role of needle electromyography in the evaluation of patients with carpal tunnel syndrome | Muscle Nerve | Commentary/review |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Goddard,D.H.; Barnes,C.G.; Berry,H.; Evans,S. | 1983 | Measurement of nerve conduction--a comparison of orthodromic and antidromic methods | Clin Rheumatol. | insufficient data; very low study design |
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| Goldfarb,A.R.; Saadeh,P.B.; Sander,H.W. | 2005 | Effect of amplifier gain setting on distal motor latency in normal subjects and CTS patients | Clin Neurophysiol. | insufficient data; very low study design |
| Golding,D.; Wilson,P. | 1989 | Rheumatism and the menopause | | Background Information |
| Golding,D.N. | 1990 | Vibration white finger associated with carpal tunnel syndrome | Journal of Orthopaedic Rheumatology | case report |
| Golding,D.N.; Rose,D.M.; Selvarajah,K. | 1986 | Clinical tests for carpal tunnel syndrome: an evaluation | Br J Rheumatol. | not best available evidence |
| Goldman,A.B.; Bansal,M. | 1996 | Amyloidosis and silicone synovitis: Updated classification, updated pathophysiology, and synovial articular abnormalities | Radiol.Clin.North Am. | Background Information |
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| Goloborod'ko,S.A. | 2004 | Provocative test for carpal tunnel syndrome | J Hand Ther | insufficient data; very low study design |
| Gomes,I.; Becker,J.; Ehlers,J.A.; Kapczinski,F.; Nora,D.B. | 2004 | Seasonal distribution and demographical characteristics of carpal tunnel syndrome in 1039 patients | Arq Neuropsiquiatr. | all CTS cases; no comparison group |
| Gominak,S.; Cros,D.; Shahani,B. | 1990 | Magnetic stimulation F-responses | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Gong,H.S.; Oh,J.H.; Kim,W.S.; Kim,S.H.; Rhee,S.H.; Baek,G.H. | 2011 | The effect of dividing muscles superficial to the transverse carpal ligament on carpal tunnel release outcomes | J Hand Surg Am | very low quality |
| Gonzalez del,Pino J.; Delgado-Martinez,A.D.; Gonzalez,Gonzalez,I; Lovic,A. | 1997 | Value of the carpal compression test in the diagnosis of carpal tunnel syndrome | J Hand Surg Br | insufficient data; very low study design |
| Gonzalez,M.H.; Bylak,J. | 2001 | Steroid injection and splinting in the treatment of carpal tunnel syndrome |  | Very Low Quality |
| Goodman,C.M.; Steadman,A.K.; Meade,R.A.; Bodenheimer,C.; Thornby,J.; Netscher,D.T. | 2001 | Comparison of carpal canal pressure in paraplegic and nonparaplegic subjects: clinical implications | Plast.Reconstr.Surg | &lt;10 patients per group; very low study design |
| Goodyear-Smith,F.; Arroll,B. | 2004 | What can family physicians offer patients with carpal tunnel syndrome other than surgery? A systematic review of nonsurgical management | Ann.Fam Med | Systematic review |
| Gordon,C.; Bowyer,B.L.; Johnson,E.W. | 1987 | Electrodiagnostic characteristics of acute carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data; no comparison group |
| Gordon,T.; Amirjani,N.; Edwards,D.C.; Chan,K.M. | 2010 | Brief post-surgical electrical stimulation accelerates axon regeneration and muscle reinnervation without affecting the functional measures in carpal tunnel syndrome patients | Exp.Neurol | Very low strength |
| Gorsche,R.G.; Wiley,J.P.; Brant,R.; Renger,R.F.; Sasyniuk,T.M.; Burke,N. | 2002 | Comparison of outcomes of untreated carpal tunnel syndrome and asymptomatic controls in meat packers | Occup.Med (Lond) | +Does not answer a question of interest |
| Gossett,J.G.; Chance,P.F. | 1998 | Is there a familial carpal tunnel syndrome? An evaluation and literature review | Muscle Nerve | literature review |
| Gould,J.S.; Wissinger,H.A. | 1978 | Carpal tunnel syndrome in pregnancy | South Med J | Does not address question of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Gousheh,J.; Iranpour,A. | 2005 | Association between carpel tunnel syndrome and arteriovenous fistula in hemodialysis patients | Plast.Reconstr.Surg | very low study design |
| Goyal,V.; Bhatia,M.; Padma,M.V.; Jain,S.; Maheshwari,M.C. | 2001 | Electrophysiological evaluation of 140 hands with carpal tunnel syndrome | J Assoc Physicians India | insufficient data; no comparison of modalities |
| Graeber,M.C.; Lucas,A.B. | 2000 | Management of pregnancy related carpal tunnel syndrome | J Miss.State Med Assoc | Case reports |
| Graham,B. | 2009 | Nonsurgical treatment of carpal tunnel syndrome | J Hand Surg Am | Background article |
| Graham,B.; Dvali,L.; Regehr,G.; Wright,J.G. | 2006 | Variations in diagnostic criteria for carpal tunnel syndrome among Ontario specialists | Am J Ind.Med | Does not answer a question of interest |
| Graham,B.; Regehr,G.; Naglie,G.; Wright,J.G. | 2006 | Development and validation of diagnostic criteria for carpal tunnel syndrome | J Hand Surg Am | case series; expert panel |
| Graham,B.; Regehr,G.; Wright,J.G. | 2003 | Delphi as a method to establish consensus for diagnostic criteria | J Clin Epidemiol. | background |
| Graham,B.A. | 2003 | Two weeks of prednisolone was as effective as four weeks in improving carpal tunnel syndrome symptoms | J Bone Joint Surg Am | Review |
| Graham,J.G. | 1982 | Neurological complications of pregnancy and anaesthesia | Clin Obstet.Gynaecol. | Background article |
| Graham,R.A. | 1983 | Carpal tunnel syndrome. A statistical analysis of 214 cases | | Retrospective case series |
| Grant,A.J.; Buckels,J.A.; Neuberger,J. | 1998 | Symptomatic carpal tunnel syndrome after orthotopic liver transplantation: a retrospective analysis | | no comparison group; very low study design |
| Grant,G.A.; Goodkin,R.; Maravilla,K.R.; Kliot,M. | 2004 | MR neurography: Diagnostic utility in the surgical treatment of peripheral nerve disorders | Neuroimaging Clin.N.Am. | review; background information |
| Grant,K.A.; Congleton,J.J.; Koppa,R.J.; Lessard,C.S.; Huchingson,R.D. | 1992 | Use of motor nerve conduction testing and vibration sensitivity testing as screening tools for carpal tunnel syndrome in industry | J Hand Surg Am | insufficient data; very low study design |
| Gray,R.G.; Gottlieb,N.L. | 1977 | Hand flexor tenosynovitis in rheumatoid arthritis. Prevalence, | Arthritis Rheum. | Not relevant to CTS |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| | | distribution, and associated rheumatic features | | |
| Gray,R.G.; Gottlieb,N.L. | 1976 | Rheumatic disorders associated with diabetes mellitus: literature review | Semin.Arthritis Rheum. | literature review |
| Gray,R.G.; Poppo,M.J.; Gottlieb,N.L. | 1979 | Primary familial bilateral carpal tunnel syndrome | Ann.Intern.Med | Not relevant |
| Grayzel,E.F.; Finegan,A.M.; Ponchak,R.E. | 1997 | The value of in-house physical therapy | J.Occup.Environ.Med. | Incorrect patient population (&lt;10 patients/CTS group) |
| Green,T.P.; Tolonen,E.U.; Clarke,M.R.; Pathak,P.; Newey,M.L.; Kershaw,C.J.; Kallio,M.A. | 2012 | The relationship of pre- and postoperative median and ulnar nerve conduction measures to a self-administered questionnaire in carpal tunnel syndrome | Neurophysiol.Clin | very low quality |
| Greenan,T.; Zlatkin,M.B. | 1990 | Magnetic resonance imaging of the wrist | Seminars in Ultrasound CT and MRI | Background Information |
| Greenhouse,A.H. | 1981 | The carpal tunnel syndrome in neurologic practice | Nebr.Med J | background |
| Greenspan,J. | 1988 | Carpal tunnel syndrome. A common but treatable cause of wrist pain | Postgrad.Med | Background article |
| Greenwald,D.; Blum,L.C.,III; Adams,D.; Mercantonio,C.; Moffit,M.; Cooper,B. | 2006 | Effective surgical treatment of cubital tunnel syndrome based on provocative clinical testing without electrodiagnostics | Plast.Reconstr.Surg | Not relevant to CTS |
| Grieve,E.F. | 1993 | A study of wrist pain in industry - Theories of causation | Clin.Rehabil. | Not relevant to CTS |
| Gross,A.S.; Louis,D.S.; Carr,K.A.; Weiss,S.A. | 1995 | Carpal tunnel syndrome: a clinicopathologic study | J Occup.Environ.Med | bio-study/ biopsy |
| Grossman,R.S. | 1991 | CTS | Dent.Off | background |
| Grossman,R.S. | 1990 | CTS | | background |
| Groves,R.J.; Goldner,J.L. | 1975 | Restoration of strong opposition after median nerve or brachial plexus paralysis | Journal of Bone and Joint Surgery - Series A | Does not address question of interest |
| Grundberg,A.B. | 1983 | Carpal tunnel decompression in spite of normal electromyography | J Hand Surg Am | Does not address question of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Grundberg,A.B. | 1979 | Atypical carpal tunnel syndrome | J Iowa Med Soc. | case report |
| Grunwald,T.; Corsbie-Massay,C. | 2006 | Surgical Multimedia Academic, Research and Training (S.M.A.R.T.) tool: a comparative analysis of cognitive efficiency for two multimedia learning interfaces that teach the pre-procedural processes for carpal tunnel release | Stud.Health Technol.Inform. | background info |
| Guan,J.; Ji,F.; Chen,W.; Chu,H.; Lu,Z. | 2011 | Sonographic and electrophysiological detection in patients with carpal tunnel syndrome | Neurol Res. | insufficient comparison data; very low study design |
| Gulabi,D.; Cecen,G.; Guclu,B.; Cecen,A. | 2014 | Carpal tunnel release in patients with diabetes result in poorer outcome in long-term study | Eur.J Orthop Surg Traumatol. | very low quality |
| Gulati,A.; Whitaker,I.S.; Jaggard,M.; Arch,B.N.; Hopkinson-Woolley,J. | 2005 | Carpal tunnel decompression. The impact of tourniquet, anaesthesia type, and operating team on patient satisfaction scores | Br J Plast.Surg | Retrospective case series |
| Guldmann,R.; Pourtales,M.C.; Liverneaux,P. | 2010 | Is it possible to use robots for carpal tunnel release? | J Orthop Sci | Case report |
| Gunetti,R.; Bonicalzi,V.; Riolo,C.; Pagni,C.A. | 2000 | Peri- and postoperative pain valutation in carpal tunnel release of median nerve compression | J Neurosurg.Sci | Very low quality |
| Gunnarsson,L.G.; Amilon,A.; Hellstrand,P.; Leissner,P.; Philipson,L. | 1997 | The diagnosis of carpal tunnel syndrome. Sensitivity and specificity of some clinical and electrophysiological tests | J Hand Surg Br | not best available evidence |
| Gupta,A.; Bjornsson,A.; Sjoberg,F.; Bengtsson,M. | 1993 | Lack of peripheral analgesic effect of low-dose morphine during intravenous regional anesthesia | Reg Anesth. | Deemed clinically irrelevant |
| Gupta,A.; Rawal,N.; Magnuson,A.; Alnehill,H.; Pettersson,K. | 2011 | Patient controlled regional analgesia after carpal tunnel release: a double-blind study using distal perineural catheters | J Hand Surg Eur.Vol. | Does not address question of interest |

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|---|---|---|---|---|
| Gupta,S.; Tewari,A.K.; Nair,V.; Gupta,A. | 2013 | Reliability of motor parameters for follow-up after local steroid injection in carpal tunnel syndrome | J Neurosci.Rural Pract. | Not in English |
| Gura,Taylor S. | 2002 | Yoga for stress reduction and injury prevention at work | Work | Cross-sectional study/background information |
| Gursoy,A.E.; Kolukisa,M.; Yildiz,G.B.; Kocaman,G.; Celebi,A.; Kocer,A. | 2013 | Relationship between electrodiagnostic severity and neuropathic pain assessed by the LANSS pain scale in carpal tunnel syndrome | Neuropsychiatr.Dis Treat. | insufficient data; very low study design |
| Gursoy,A.E.; Kolukisa,M.; Yildiz,G.B.; Kocaman,G.; Celebi,A.; Kocer,A. | 2012 | Relationship between electrodiagnostic severity and neuropathic pain assessed by the LANSS pain scale in carpal tunnel syndrome | Neuropsychiatric Disease and Treatment | +Does not answer a question of interest |
| Gutmann,L. | 1977 | Median--ulnar nerve communications and carpal tunnel syndrome | J Neurol Neurosurg.Psychiatry | insufficient data; no comparison group |
| Gutmann,L.; Nance,C. | 2010 | The illusion of severe carpal tunnel syndrome (CTS) | Muscle Nerve | case report |
| Haase,J. | 2007 | Carpal tunnel syndrome--a comprehensive review | Adv.Tech.Stand.Neurosurg. | background |
| Hagberg,M.; Morgenstern,H.; Kelsh,M. | 1992 | Impact of occupations and job tasks on the prevalence of carpal tunnel syndrome | Scand.J Work Environ.Health | systematic review |
| Hagebeuk,E.E.; de Weerd,A.W. | 2004 | Clinical and electrophysiological follow-up after local steroid injection in the carpal tunnel syndrome | Clin Neurophysiol. | Very Low Quality |
| Haghighat,A.; Khosrawi,S.; Kelishadi,A.; Sajadieh,S.; Badrian,H. | 2012 | Prevalence of clinical findings of carpal tunnel syndrome in Isfahanian dentists | Adv.Biomed Res. | Prevalence study; no comparison group |
| Hale,M.S.; Ruderman,J.E. | 1973 | Carpal tunnel syndrome associated with rubella immunization | Am J Phys Med | case report |
| Hales,T.R.; Bertsche,P.K. | 1992 | Management of upper extremity cumulative trauma disorders | AAOHN J. | background |
| Hall,S.; Luthra,H.S. | 1983 | Rheumatologic manifestations of amyloid disease | Minn.Med | background information |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Hallett,M. | 1985 | Electrophysiologic approaches to the diagnosis of entrapment neuropathies | Neurol Clin | Background Information |
| Halperin,J.J.; Volkman,D.J.; Luft,B.J.; Dattwyler,R.J. | 1989 | Carpal tunnel syndrome in Lyme borreliosis | Muscle Nerve | Not relevant,does not answer the PICO question |
| Hamamoto Filho,P.T.; Leite,F.V.; Ruiz,T.; Resende,L.A. | 2009 | A systematic review of anti-inflammatories for mild to moderate carpal tunnel syndrome | J Clin Neuromuscul.Dis | systematic review |
| Hamann,C.; Werner,R.A.; Franzblau,A.; Rodgers,P.A.; Siew,C.; Gruninger,S. | 2001 | Prevalence of carpal tunnel syndrome and median mononeuropathy among dentists | J Am Dent.Assoc | Not relevant, prevalence study |
| Hammer,H.B.; Hovden,I.A.; Haavardsholm,E.A.; Kvien,T.K. | 2006 | Ultrasonography shows increased cross-sectional area of the median nerve in patients with arthritis and carpal tunnel syndrome | Rheumatology (Oxford) | +not best available evidence; not CTS exclusive |
| Hampel,G.A. | 1992 | Hand-arm vibration isolation materials: A range of performance evaluation | Applied Occupational and Environmental Hygiene | Background Information |
| Hankin,F.M.; Louis,D.S. | 1988 | Symptomatic relief following carpal tunnel decompression with normal electroneuromyographic studies | | letter |
| Hankins,C.L. | 2008 | A 12-year experience using the brown two-portal endoscopic procedure of transverse carpal ligament release in 14,722 patients: Defining a new paradigm in the treatment of carpal tunnel syndrome (Plastic and Reconstructive Surgery (2007) 120, (1911)) | Plast.Reconstr.Surg. | Insufficient data |
| Hankins,C.L.; Brown,M.G.; Lopez,R.A.; Lee,A.K.; Dang,J.; Harper,R.D. | 2007 | A 12-year experience using the Brown two-portal endoscopic procedure of transverse carpal ligament release in 14,722 patients: defining a new paradigm in the treatment of carpal tunnel syndrome | Plast.Reconstr.Surg | Retrospective case series |
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| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Hansen,T.B.; Dalsgaard,J.; Meldgaard,A.; Larsen,K. | 2009 | A prospective study of prognostic factors for duration of sick leave after endoscopic carpal tunnel release | BMC Musculoskelet.Disord. | very low quality |
| Hansen,T.B.; Kirkeby,L.; Fisker,H.; Larsen,K. | 2009 | Randomised controlled study of two different techniques of skin suture in endoscopic release of carpal tunnel | Scand.J Plast.Reconstr.Surg Hand Surg | Insufficient data |
| Hanssen,A.D.; Amadio,P.C.; DeSilva,S.P.; Ilstrup,D.M. | 1989 | Deep postoperative wound infection after carpal tunnel release | J Hand Surg Am | Insufficient data (antibiotic prophylaxis not stratified) |
| Hansson,S. | 1995 | Segmental median nerve conduction measurements discriminate carpal tunnel syndrome from diabetic polyneuropathy | Muscle Nerve | Does not answer a question of interest; no assessment of risk factors |
| Hansson,S.; Nilsson,B.Y. | 1995 | Median sensory nerve conduction block during wrist flexion in the carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | no comparison of modalities; very low study design |
| Harber,P.; Pena,L.; Bland,G.; Beck,J. | 1992 | Upper extremity symptoms in supermarket workers | Am.J.Ind.Med. | Not relevant, CTS diagnosis not made |
| Harle,J.-R.; Aubert,J.-P.; Andrac,L.; Disdier,P.; Weiller-Merli,C.; Pellissier,J.-F.; Magalon,G. | 1991 | Carpal tunnel syndrome with scar-sarcoidosis of median nerve | European Journal of Internal Medicine | case report |
| Harrell,L.E.; Massey,E.W. | 1983 | Hand weakness in the elderly | J.Am.Geriatr.Soc. | background |
| Harris,C.M.; Tanner,E.; Goldstein,M.N.; Pettee,D.S. | 1979 | The surgical treatment of the carpal-tunnel syndrome correlated with preoperative nerve-conduction studies | J Bone Joint Surg Am | insufficient data; not best evidence |
| Harris-Adamson,C.; Eisen,E.A.; Dale,A.M.; Evanoff,B.; Hegmann,K.T.; Thiese,M.S.; Kapellusch,J.M.; Garg,A.; Burt,S.; Bao,S.; Silverstein,B.; Gerr,F.; Merlino,L.; Rempel,D. | 2013 | Personal and workplace psychosocial risk factors for carpal tunnel syndrome: a pooled study cohort | Occup.Environ.Med | pooled data and varying methods, designs, and data types |
| Harris-Adamson,C.; Eisen,E.A.; Kapellusch,J.; Garg,A.; Hegmann,K.T.; Thiese,M.S.; Dale,A.M.; Evanoff,B.; Burt,S.; | 2014 | Biomechanical risk factors for carpal tunnel syndrome: A pooled study of 2474 workers | Occup.Environ.Med. | pooled data and varying methods, designs, and data types |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
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| Harris-Adamson,C.; Eisen,E.A.; Kapellusch,J.; Garg,A.; Hegmann,K.T.; Thiese,M.S.; Dale,A.M.; Evanoff,B.; Burt,S.; Bao,S.; Silverstein,B.; Merlino,L.; Gerr,F.; Rempel,D. | 2015 | Biomechanical risk factors for carpal tunnel syndrome: a pooled study of 2474 workers | Occup Environ Med | duplicate of AAOS ID 15187 |
| Harrison,M.J. | 1978 | Lack of evidence of generalised sensory neuropathy in patients with carpal tunnel syndrome | J Neurol Neurosurg.Psychiatry | no comparison of modalities; very low study design |
| Harter,B.T.,Jr.; McKiernan,J.E.,Jr.; Kirzinger,S.S.; Archer,F.W.; Peters,C.K.; Harter,K.C. | 1993 | Carpal tunnel syndrome: surgical and nonsurgical treatment | J Hand Surg Am | Retrospective comparative. Very Low Quality. Comparison groups not relevant for any questions of interest. |
| Harwin,S.F.; Stern,R.E. | 1980 | Carpal tunnel syndrome caused by an anomolous muscle belly | Orthop.Rev. | case report |
| Hashempur,M.H.; Homayouni,K.; Ashraf,A.; Salehi,A.; Taghizadeh,M.; Heydari,M. | 2014 | Effect of Linum usitatissimum L. (linseed) oil on mild and moderate carpal tunnel syndrome: a randomized, double-blind, placebo-controlled clinical trial | Daru | Lack of dosage standardization |
| Hassanpour,S.E.; Gousheh,J. | 2006 | Mycobacterium tuberculosis-induced carpal tunnel syndrome: management and follow-up evaluation | J Hand Surg Am | Retrospective case series |
| Hayashig,M.; Makoto,M.; Kato,H. | 2013 | Carpal tunnel syndrome associated with underlying Kienbock's disease | J Hand Surg Eur.Vol. | letter/summary document |
| Heathfield,K. | 1973 | Neurological complications of the rheumatic diseases | Rheumatol.Rehabil. | review |
| Hedge,A.; Powers,J.R. | 1995 | Wrist postures while keyboarding: effects of a negative slope keyboard | | Does not answer a question of interest; no comparison group |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| | | system and full motion forearm supports | | |
| Heidarian,A.; Abbasi,H.; Hasanzadeh,Hoseinabadi M.; Hajialibeyg,A.; Kalantar Motamedi,S.M.; Seifirad,S. | 2013 | Comparison of Knifelight Surgery versus Conventional Open Surgery in the Treatment of Carpal Tunnel Syndrome | Iran Red Crescent Med J | Does not meet inclusion criteria (invasive follow-up&lt;3 month) |
| Helm,R.H.; Vaziri,S. | 2003 | Evaluation of carpal tunnel release using the Knifelight instrument | J Hand Surg Br | Does not meet inclusion criteria (invasive follow-up&lt;3 month) |
| Helm,R.H.; Vaziri,S. | 2003 | Evaluation of carpal tunnel release using the Knifelight(registered trademark) instrument | Journal of Hand Surgery | duplicate of PM:12809659 |
| Helwig,A.L. | 2000 | Treating carpal tunnel syndrome | J Fam Pract. | Insufficient data |
| Hennessey,W.J.; Kuhlman,K.A. | 1997 | The anatomy, symptoms, and signs of carpal tunnel syndrome | Phys.Med.Rehabil.Clin.N.Am. | background |
| Henry,S.L.; Hubbard,B.A.; Concannon,M.J. | 2008 | Splinting after carpal tunnel release: current practice, scientific evidence, and trends | Plast.Reconstr.Surg | survey |
| Hentz,V.R. | 1977 | Common hand problems | Surg Clin North Am | background |
| Herbison,G.J.; Teng,C.; Martin,J.H.; Ditunno,J.F.,Jr. | 1973 | Carpal tunnel syndrome in rheumatoid arthritis | Am J Phys Med | insufficient data; very low study design |
| Herman,G.E.; Schork,M.A.; Shyr,Y.; Elfont,E.A.; Arbit,S. | 1995 | Histologists, microtomy, chronic repetitive trauma, and techniques to avoid injury: I. A statistical evaluation of the job functions performed by histologists | Journal of Histotechnology | not exclusive to CTS; very low study design |
| Herrick,R.T.; Herrick,S.K. | 1987 | Thermography in the detection of carpal tunnel syndrome and other compressive neuropathies | J Hand Surg Am | not exclusive to CTS; confounded design |
| Herrmann,D.N.; Logigian,E.L. | 2002 | Electrodiagnostic approach to the patient with suspected mononeuropathy of the upper extremity | Neurol.Clin. | background information; commentary |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Herskovitz,S.; Berger,A.R.; Lipton,R.B. | 1995 | Low-dose, short-term oral prednisone in the treatment of carpal tunnel syndrome | | Incorrect patient population (&lt;10 patients/group) |
| Heybeli,N.; Kutluhan,S.; Demirci,S.; Kerman,M.; Mumcu,E.F. | 2002 | Assessment of outcome of carpal tunnel syndrome: a comparison of electrophysiological findings and a self-administered Boston questionnaire | J Hand Surg Br | Does not answer any question of interest. |
| Heywood,J.T.; Morley,J.W. | 1992 | Texture discrimination in carpal tunnel syndrome | | +Does not answer a question of interest |
| Higgs,P.E.; Young,V.L. | 1996 | Cumulative trauma disorders | Clin.Plast.Surg. | background |
| Hiltunen,J.; Kirveskari,E.; Numminen,J.; Lindfors,N.; Goransson,H.; Hari,R. | 2012 | Pre- and post-operative diffusion tensor imaging of the median nerve in carpal tunnel syndrome | Eur.Radiol. | insufficient data; very low study design |
| Hirasawa,Y.; Ogura,T. | 2000 | Carpal tunnel syndrome in patients on long-term haemodialysis | Scand.J Plast.Reconstr.Surg Hand Surg | inadequate presentation of the effect of haemodialysis length on CTS to permit use for this pico question |
| Hirooka,T.; Hashizume,H.; Senda,M.; Nagoshi,M.; Inoue,H.; Nagashima,H. | 1999 | Adequacy and long-term prognosis of endoscopic carpal tunnel release | Acta Med Okayama | very low quality |
| Hobby,J.L.; Venkatesh,R.; Motkur,P. | 2005 | The effect of age and gender upon symptoms and surgical outcomes in carpal tunnel syndrome | J Hand Surg Br | Does not address question of interest |
| Hobson-Webb,L.D.; Massey,J.M.; Juel,V.C.; Sanders,D.B. | 2008 | The ultrasonographic wrist-to-forearm median nerve area ratio in carpal tunnel syndrome | Clin Neurophysiol. | insufficient data; very low study design |
| Hochberg,J. | 2001 | A randomized prospective study to assess the efficacy of two cold-therapy treatments following carpal tunnel release | J Hand Ther | deemed clinically irrelevant |
| Hoffman,D.E. | 1975 | Carpal tunnel syndrome. Importance of sensory nerve conduction studies in diagnosis | | case report |
| Hoffman,J.; Hoffman,P.L. | 1985 | Staple gun carpal tunnel syndrome | J Occup.Med | case report |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Holmgren,H.; Rabow,L. | 1987 | Internal neurolysis or ligament division only in carpal tunnel syndrome. II. A 3 year follow-up with an evaluation of various neurophysiological parameters for diagnosis | Acta Neurochir.(Wien.) | |
| Holmgren-Larsson,H.; Leszniewski,W.; Linden,U.; Rabow,L.; Thorling,J. | 1985 | Internal neurolysis or ligament division only in carpal tunnel syndrome--results of a randomized study | Acta Neurochir.(Wien.) | No outcomes of interest. |
| Holt,J.B.; Van Heest,A.E.; Shah,A.S. | 2013 | Hand disorders in children with mucopolysaccharide storage diseases | Journal of Hand Surgery | Background Information |
| Holtzhausen,T. | 1985 | Carpal tunnel syndrome: a "new" occupational hazard for the oral hygienist | J Dent.Assoc S.Afr. | Background Information |
| Homan,M.M.; Franzblau,A.; Werner,R.A.; Albers,J.W.; Armstrong,T.J.; Bromberg,M.B. | 1999 | Agreement between symptom surveys, physical examination procedures and electrodiagnostic findings for the carpal tunnel syndrome | Scand.J Work Environ.Health | +not best available evidence |
| Horiguchi,G.; Aoki,T.; Ito,H. | 2011 | Characteristics of the electrophysiological activity of muscles attached to the transverse carpal ligament in carpal tunnel syndrome | J Nippon Med Sch | insufficient data; very low study design |
| Horiuchi,Y. | 1991 | Entrapment neuropathy | Asian Medical Journal | background |
| Horng,Y.S.; Chang,H.C.; Lin,K.E.; Guo,Y.L.; Liu,D.H.; Wang,J.D. | 2012 | Accuracy of ultrasonography and magnetic resonance imaging in diagnosing carpal tunnel syndrome using rest and grasp positions of the hands | J Hand Surg Am | insufficient data; very low study design |
| Hough,A.D.; Moore,A.P.; Jones,M.P. | 2007 | Reduced longitudinal excursion of the median nerve in carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data; very low study design |
| Howard,F.M. | 1986 | Compression neuropathies in the anterior forearm | Hand Clin | Narrative review |
| Hsieh,Y.-H.; Shih,J.-T.; Lee,H.-M.; Ho,Y.-J. | 2010 | Ultrasonography of median nerve mobility in the diagnosis of carpal tunnel syndrome | Formosan Journal of Musculoskeletal Disorders | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Hsu,H.Y.; Kuo,L.C.; Jou,I.M.; Chen,S.M.; Chiu,H.Y.; Su,F.C. | 2013 | Establishment of a proper manual tactile test for hands with sensory deficits | Arch Phys Med Rehabil. | insufficient data; very low study design |
| Hsu,H.Y.; Kuo,L.C.; Kuo,Y.L.; Chiu,H.Y.; Jou,I.M.; Wu,P.T.; Su,F.C. | 2013 | Feasibility of a novel functional sensibility test as an assisted examination for determining precision pinch performance in patients with carpal tunnel syndrome | PLoS One | insufficient data; very low study design |
| Hsu,H.Y.; Kuo,Y.L.; Jou,I.M.; Su,F.C.; Chiu,H.Y.; Kuo,L.C. | 2013 | Diagnosis From Functional Perspectives: Usefulness of a Manual Tactile Test for Predicting Precision Pinch Performance and Disease Severity in Subjects With Carpal Tunnel Syndrome | Arch Phys Med Rehabil. | insufficient data; very low study design |
| Hughes,Jr; Baratz,M. | 2006 | Limited open carpal tunnel syndrome using the safeguard system | Techniques in Orthopaedics | Narrative review |
| Hughes,R.A. | 2003 | Treating nerves: from anecdote to systematic review | J R Soc.Med | systematic review |
| Hui,A.C.; Wong,S.M.; Wong,K.S.; Li,E.; Kay,R.; Yung,P.; Hung,L.K.; Yu,L.M. | 2001 | Oral steroid in the treatment of carpal tunnel syndrome | Ann.Rheum.Dis | background |
| Huisstede,B.M. | 2010 | Carpal tunnel syndrome. Part I: effectiveness of nonsurgical treatments -- a systematic review |  | systematic review |
| Huisstede,B.M.; Randsdorp,M.S.; Coert,J.H.; Glerum,S.; van,Middelkoop M.; Koes,B.W. | 2010 | Carpal tunnel syndrome. Part II: effectiveness of surgical treatments--a systematic review | Arch Phys Med Rehabil. | systematic review |
| Hunderfund,A.N.; Boon,A.J.; Mandrekar,J.N.; Sorenson,E.J. | 2011 | Sonography in carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
| Hunt,K.J.; Hung,S.K.; Boddy,K.; Ernst,E. | 2009 | Chiropractic manipulation for carpal tunnel syndrome: a systematic review (Provisional abstract) | Hand Therapy | systematic review |
| Hunter,J. | 2001 | Physical symptoms and signs and chronic pain | Clin J Pain | literature review |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Hunter,J.M. | 1991 | Recurrent carpal tunnel syndrome, epineural fibrous fixation, and traction neuropathy | Hand Clin | Background article |
| Huntley,D.E.; Shannon,S.A. | 1988 | Carpal tunnel syndrome: a review of the literature | Dent.Hyg.(Chic.) | literature review |
| Huracek,J.; Heising,T.; Wanner,M.; Troeger,H. | 2001 | Recovery after carpal tunnel syndrome operation: the influence of the opposite hand, if operated on in the same session | Arch Orthop Trauma Surg | Very low quality |
| Hurst,L.C.; Weissberg,D.; Carroll,R.E. | 1985 | The relationship of the double crush to carpal tunnel syndrome (an analysis of 1,000 cases of carpal tunnel syndrome) | J Hand Surg Br | insufficient data; very low study design |
| Husain,A.; Omar,S.A.; Habib,S.S.; Al-Drees,A.M.; Hammad,D. | 2009 | F-ratio, a surrogate marker of carpal tunnel syndrome | Neurosciences (Riyadh.) | insufficient data; very low study design |
| Huskisson,E.C. | 1974 | Arthritis as a sign of another disease | Curr.Med Res.Opin. | not relevant |
| Hutchinson,D.T.; Wang,A.A. | 2010 | Releasing the tourniquet in carpal tunnel surgery | Hand (N.Y) | Very low quality |
| Hybbinette,C.H.; Mannerfelt,L. | 1975 | The carpal tunnel syndrome. A retrospective study of 400 operated patients | Acta Orthop Scand. | Retrospective case series |
| Iannicelli,E.; Chianta,G.A.; Salvini,V.; Almberger,M.; Monacelli,G.; Passariello,R. | 2000 | Evaluation of bifid median nerve with sonography and MR imaging | J Ultrasound Med | &lt;10 patients per group |
| Ibrahim,I.; Khan,W.S.; Dheerendra,S.; Smitham,P.; Goddard,N. | 2012 | A novel method of diagnosing autonomic dysfunction in carpal tunnel syndrome: measuring skin capacitance | Ortop.Traumatol.Rehabil. | insufficient data; very low study design |
| Ibrahim,T.; Majid,I.; Clarke,M.; Kershaw,C.J. | 2009 | Outcome of carpal tunnel decompression: the influence of age, gender, and occupation | Int.Orthop | very low quality |
| Idler,R.S. | 1996 | Persistence of symptoms after surgical release of compressive neuropathies and subsequent management | Orthop.Clin.North Am. | Background article |
| Idler,R.S.; Strickland,J.W.; Creighton,J.J.,Jr. | 1990 | Flexor carpi radialis tunnel syndrome | Indiana Med | background |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Ilbay,K.; Ubeyli,E.D.; Ilbay,G.; Budak,F. | 2010 | Recurrent neural networks for diagnosis of carpal tunnel syndrome using electrophysiologic findings | J Med Syst. | not best available evidence; retrospective data review |
| Ilkhani,M.; Jahanbakhsh,S.M.; Eghtesadi-Araghi,P.; Moayyeri,A. | 2005 | Accuracy of somatosensory evoked potentials in diagnosis of mild idiopathic carpal tunnel syndrome | Clin Neurol Neurosurg. | insufficient data; very low study design |
| Imaeda,T.; Uchiyama,S.; Toh,S.; Wada,T.; Okinaga,S.; Sawaizumi,T.; Nishida,J.; Kusunose,K.; Omokawa,S. | 2007 | Validation of the Japanese Society for Surgery of the Hand version of the Carpal Tunnel Syndrome Instrument | J Orthop Sci | +Does not answer a question of interest |
| Imai,H.; Tajima,T.; Natsuma,Y. | 1989 | Interpretation of cutaneous pressure threshold (Semmes-Weinstein monofilament measurement) following median nerve repair and sensory reeducation in the adult | | Does not address question of interest |
| Imai,T.; Matsumoto,H.; Minami,R. | 1990 | Asymptomatic ulnar neuropathy in carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data; very low study design |
| Imaoka,H.; Yorifuji,S.; Takahashi,M.; Nakamura,Y.; Kitaguchi,M.; Tarui,S. | 1992 | Improved inching method for the diagnosis and prognosis of carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
| Impelmans,B.E.; Miles,J.; Burke,F.D. | 2001 | The use of free fat grafts in recalcitrant carpal tunnel: A retrospective study | European Journal of Plastic Surgery | Incorrect patient population (patients received previous invasive treatment) |
| Impink,B.G.; Gagnon,D.; Collinger,J.L.; Boninger,M.L. | 2010 | Repeatability of ultrasonographic median nerve measures | Muscle Nerve | +Does not answer a question of interest |
| Incebiyik,S.; Boyaci,A.; Tutoglu,A. | 2014 | Short-term effectiveness of short-wave diathermy treatment on pain, clinical symptoms, and hand function in patients with mild or moderate idiopathic carpal tunnel syndrome | J Back Musculoskelet.Rehabil | Does not meet inclusion criteria (follow-up&lt;1 month) |
| Incoll,I.W.; Bateman,E.; Myers,A. | 2004 | Endoscopic vs. open carpal tunnel release | The Journal of Bone and Joint Surgery | Insufficient data |
| Ingram,D.A.; Davis,G.R.; Swash,M. | 1987 | The double collision technique: A new method for measurement of the motor | Electroencephalogr.Clin.Neurophysiol. | only healthy study subjects |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| | | nerve refractory period distribution in man | | |
| Ingram,D.A.; Davis,G.R.; Swash,M. | 1987 | Motor nerve conduction velocity distributions in man: Results of a new computer-based collision technique | Electroencephalogr.Clin.Neurophysiol. | only healthy study subjects |
| Inukai,T.; Uchida,K.; Kubota,C.; Takamura,T.; Nakajima,H.; Baba,H. | 2013 | Second lumbrical-interossei nerve test predicts clinical severity and surgical outcome of carpal tunnel syndrome | J Clin Neurosci. | +Does not answer a question of interest |
| Inukai,T.; Uchida,K.; Kubota,C.; Takamura,T.; Nakajima,H.; Baba,H. | 2013 | Additional method for diagnosis of carpal tunnel syndrome: value of the second lumbrical-interossei test (2L-INT) | Hand Surg | insufficient data |
| Iob,I.; Battaggia,C.; Rossetto,L.; Ermani,M. | 2000 | The carpal tunnel syndrome. Anatomo-clinical correlations | Neurochirurgie | Retrospective case series; clinical review |
| Ionescu,D.; Ionescu,A. | 1984 | Results of microsurgical suture in 200 nerves | Acta Chir.Plast. | Retrospective case series |
| Ireland,D.C. | 1986 | The hand. Part one | Aust.Fam Physician | background |
| Irvine,J.; Chong,S.L.; Amirjani,N.; Chan,K.M. | 2004 | Double-blind randomized controlled trial of low-level laser therapy in carpal tunnel syndrome | Muscle Nerve | Incorrect patient population (&lt;10 patients/group) |
| Isernhagen,S. | 2000 | Grip related upper extremity cumulative trauma: New information | Work | Background Information; review |
| Ishikawa,K.; Kondo,M.; Vainio,K.; Patiala,H.; Lehtimaki,M.; Raunio,P. | 1987 | Atrophy of the thumb web space in rheumatoid arthritis: clinical and electrodiagnostic studies | Arch Orthop Trauma Surg | Not relevant to CTS |
| Isik,C.; Uslu,M.; Inanmaz,M.E.; Karabekmez,F.E.; Kose,K.C. | 2013 | The effects of diabetes on symptoms of carpal tunnel syndrome treated with mini-open surgery | Acta Orthop Belg. | Does not address question of interest |
| Isik,H.S.; Bostanci,U. | 2011 | Experience of Carpal Tunnel Syndrome that operated using a limited uni skin incision | Turk Neurosurg. | Retrospective case series |
| Isoardo,G.; Stella,M.; Cocito,D.; Risso,D.; Migliaretti,G.; Cauda,F.; Palmitessa,A.; Faccani,G.; Ciaramitaro,P. | 2012 | Neuropathic pain in post-burn hypertrophic scars: a psychophysical and neurophysiological study | Muscle Nerve | &lt;10 patients per group; insufficient data |

| **Authors** | **Year** | **Article Title** | **Periodical** | **Reason for Exclusion** |
|---|---|---|---|---|
| Isolani,L.; Bonfiglioli,R.; Raffi,G.B.; Violante,F.S. | 2002 | Different case definitions to describe the prevalence of occupational carpal tunnel syndrome in meat industry workers | Int.Arch Occup.Environ.Health | Not relevant, prevalence study |
| Itsubo,T.; Uchiyama,S.; Momose,T.; Yasutomi,T.; Imaeda,T.; Kato,H. | 2009 | Electrophysiological responsiveness and quality of life (QuickDASH, CTSI) evaluation of surgically treated carpal tunnel syndrome | J Orthop Sci | Retrospective case series |
| Ivie,C.S.; Viscomi,C.M.; Adams,D.C.; Friend,A.F.; Murphy,T.R.; Parker,C. | 2011 | Clonidine as an adjunct to intravenous regional anesthesia: A randomized, double-blind, placebo-controlled dose ranging study | J Anaesthesiol.Clin Pharmacol. | Deemed clinically irrelevant |
| Iwatsuki,K.; Nishikawa,K.; Chaki,M.; Sato,A.; Morita,A.; Hirata,H. | 2014 | Comparative responsiveness of the Hand 20 and the DASH-JSSH questionnaires to clinical changes after carpal tunnel release | J Hand Surg Eur.Vol. | |
| Jaberzadeh,S.; Zoghi,M. | 2013 | Mechanosensitivity of the median nerve in patients with chronic carpal tunnel syndrome | J Bodyw.Mov Ther | +Does not answer a question of interest |
| Jablecki,C.K.; Andary,M.T.; Ball,R.D.; Cherington,M.; Fisher,M.A.; Phillips,L.H.; So,Y.T.; Tulloch,J.W.; Turk,M.A.; Wiechers,D.O.; Wilbourn,A.J.; Williams,F.H.; Ysla,R.G.; Rosenberg,J.H.; Alter,M.; Daube,J.R.; Franklin,G.; Frishberg,B.M.; Greenberg,M.K. | 1993 | Practice parameter for electrodiagnostic studies in carpal tunnel syndrome: Summary statement | Muscle Nerve | summary document |
| Jablecki,C.K.; Andary,M.T.; Floeter,M.K.; Miller,R.G.; Quartly,C.A.; Vennix,M.J.; Wilson,J.R. | 2002 | Practice parameter: Electrodiagnostic studies in carpal tunnel syndrome. Report of the American Association of Electrodiagnostic Medicine, American Academy of Neurology, and the American Academy of Physical Medicine and Rehabilitation | | summary document |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Jablecki,C.K.; Andary,M.T.; So,Y.T.; Wilkins,D.E.; Williams,F.H. | 1993 | Literature review of the usefulness of nerve conduction studies and electromyography for the evaluation of patients with carpal tunnel syndrome | Muscle Nerve | review |
| Jablecki,C.K.; Andary,M.T.; So,Y.T.; Wilkins,D.E.; Williams,F.H.; Ball,R.D.; Cherington,M.; Fisher,M.A.; Phillips II,L.H.; Tulloch,J.W.; Turk,M.A.; Wiechers,D.O.; Wilbourn,A.J.; Ysla,R.G. | 1999 | Literature review of the usefulness of nerve conduction studies and needle electromyography for the evaluation of patients with carpal tunnel syndrome | Muscle Nerve | literature review |
| Jackson,D.A.; Clifford,J.C. | 1989 | Electrodiagnosis of mild carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data; very low study design |
| Jacobson,M.D.; Plancher,K.D.; Kleinman,W.B. | 1996 | Vitamin B6 (pyridoxine) therapy for carpal tunnel syndrome | Hand Clin | Narrative review |
| Jakab,E.; Ganos,D.; Cook,F.W. | 1991 | Transverse carpal ligament reconstruction in surgery for carpal tunnel syndrome: a new technique | J Hand Surg Am | Case series. Very Low Quality. |
| Jamal,G.A.; Carmichael,H. | 1990 | The effect of (gamma)-linolenic acid on human diabetic peripheral neuropathy: A double-blind placebo-controlled trial | Diabet.Med. | Incorrect patient population (Not inclusive of CTS patients) |
| Janssen,R.G.; Schwartz,D.A.; Velleman,P.F. | 2009 | A randomized controlled study of contrast baths on patients with carpal tunnel syndrome | J Hand Ther | Insufficient data |
| Janz,C.; Hammersen,S.; Brock,M. | 2001 | Carpal tunnel syndrome: A review of endoscopic release of the transverse carpal ligament compared with open carpal tunnel release | Neurosurgery Quarterly | Narrative review |
| Jarvik,J.G.; Comstock,B.A.; Heagerty,P.J.; Haynor,D.R.; Fulton-Kehoe,D.; Kliot,M.; Franklin,G.M. | 2008 | Magnetic resonance imaging compared with electrodiagnostic studies in patients with suspected carpal tunnel syndrome: predicting symptoms, function, and surgical benefit at 1 year | J Neurosurg. | Does not specify what kind of surgery or nonsurgical treatment is given. |
| Jazayeri,S.M.; Azizi,S.; Moghtaderi,A.R. | 2009 | Autologous blood injection in carpal tunnel syndrome (CTS) | Electromyogr.Clin Neurophysiol. | Very Low Quality |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Jeffrey,S.L.; Belcher,H.J. | 2002 | Use of Arnica to relieve pain after carpal-tunnel release surgery | Altern.Ther Health Med | Not relevant |
| Jeng,O.J.; Radwin,R.G.; Rodriquez,A.A. | 1994 | Functional psychomotor deficits associated with carpal tunnel syndrome | | +Does not answer a question of interest |
| Jenkins,P.J.; Duckworth,A.D.; Watts,A.C.; McEachan,J.E. | 2012 | The outcome of carpal tunnel decompression in patients with diabetes mellitus | J Bone Joint Surg Br | Does not address question of interest |
| Jenkins,P.J.; Duckworth,A.D.; Watts,A.C.; McEachan,J.E. | 2012 | Corticosteroid injection for carpal tunnel syndrome: a 5-year survivorship analysis | Hand (N.Y) | does not answer the question. it is a survival analysis of time to reintervention for patients who get steroid treatment. it could be used as a case series, but would be very low quality evidence |
| Jensen,M.P.; Gammaitoni,A.R.; Olaleye,D.O.; Oleka,N.; Nalamachu,S.R.; Galer,B.S. | 2006 | The pain quality assessment scale: assessment of pain quality in carpal tunnel syndrome | J Pain | +Does not answer a question of interest |
| Jeong,D.H.; Kim,C.H. | 2014 | The quantitative relationship between physical examinations and the nerve conduction of the carpal tunnel syndrome in patients with and without a diabetic polyneuropathy | Ann Rehabil Med | >10 patients per group; only 9 non-CTS hands |
| Jeong,J.S.; Yoon,J.S.; Kim,S.J.; Park,B.K.; Won,S.J.; Cho,J.M.; Byun,C.W. | 2011 | Usefulness of ultrasonography to predict response to injection therapy in carpal tunnel syndrome | Ann.Rehabil.Med | Very Low Quality |
| Jerosch,Herold C.; Carvalho-Leite,J.C.; Song,F. | 2006 | A systematic review of outcomes assessed in randomized controlled trials of surgical interventions for carpal tunnel syndrome using the International Classification of Functioning, Disability and Health (ICF) as a reference tool | | systematic review |

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|---|---|---|---|---|
| Jerosch-Herold,C.; Leite,J.C.; Song,F. | 2006 | A systematic review of outcomes assessed in randomized controlled trials of surgical interventions for carpal tunnel syndrome using the International Classification of Functioning, Disability and Health (ICF) as a reference tool | BMC Musculoskelet.Disord. | systematic review |
| Jerosch-Herold,C.; Shepstone,L.; Wilson,E.C.; Dyer,T.; Blake,J. | 2014 | Clinical course, costs and predictive factors for response to treatment in carpal tunnel syndrome: the PALMS study protocol | BMC Musculoskelet.Disord. | +Does not answer a question of interest |
| Jesensek,Papez B.; Palfy,M.; Mertik,M.; Turk,Z. | 2009 | Infrared thermography based on artificial intelligence as a screening method for carpal tunnel syndrome diagnosis | J Int.Med Res. | insufficient data; very low study design |
| Jetzer,T.; Dellon,L.A.; Mitterhauser,M.D. | 1995 | The use of PSSD testing in comparison to vibrotactile testing of vibration exposed workers | Cent.Eur.J Public Health | +not best available evidence; very low study design |
| Jetzer,T.; Haydon,P.; Reynolds,D. | 2003 | Effective intervention with ergonomics, antivibration gloves, and medical surveillance to minimize hand-arm vibration hazards in the workplace | J Occup.Environ.Med | Does not answer a question of interest; not CTS exclusive |
| Jetzer,T.C. | 1991 | Use of vibration testing in the early evaluation of workers with carpal tunnel syndrome | J Occup.Med | +Does not answer a question of interest |
| Jhattu,H.; Klaassen,S.; Ying,C.; Ali,Hussain M. | 2012 | Acute carpal tunnel syndrome in trauma | European Journal of Plastic Surgery | systematic review |
| Jhee,W.H.; Oryshkevich,R.S.; Wilcox,R. | 1986 | Severe carpal tunnel syndrome with sparing of sensory fibers | Orthop Rev. | case reports |
| Jimenez,D.F.; Gibbs,S.R.; Clapper,A.T. | 1998 | Endoscopic treatment of carpal tunnel syndrome: a critical review | J Neurosurg. | systematic review |
| Jimenez,D.F.; Gibbs,S.R.; Clapper,A.T. | 1997 | Endoscopic treatment of carpal tunnel syndrome: a critical review | Neurosurg.Focus | Narrative review |
| Jimenez,J.; Carson,G. | 1970 | The carpal tunnel syndrome | Appl Ther | background |
| Jitpraphai,C.; Prachathomrong,P.; Chira-Adisai,W. | 1994 | Subclinical carpal tunnel syndrome in hospital staff | J Med Assoc Thai. | insufficient data; no comparison group |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Johnson,D.S. | 2003 | Low-level laser therapy in the treatment of carpal tunnel syndrome | Athletic Therapy Today | Background article |
| Johnson,E.W. | 1995 | Should immediate surgery be done for carpal tunnel syndrome?--no! | Muscle Nerve | opinion |
| Johnson,E.W.; Gatens,T.; Poindexter,D.; Bowers,D. | 1983 | Wrist dimensions: correlation with median sensory latencies | Arch Phys Med Rehabil. | insufficient data; summary of trend evaluation |
| Johnson,E.W.; Kukla,R.D.; Wongsam,P.E.; Piedmont,A. | 1981 | Sensory latencies to the ring finger: normal values and relation to carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data; very low study design |
| Johnson,E.W.; Sipski,M.; Lammertse,T. | 1987 | Median and radial sensory latencies to digit I: normal values and usefulness in carpal tunnel syndrome | Arch Phys Med Rehabil. | only healthy study subjects |
| Johnson,E.W.; Terebuh,B.M. | 1997 | Sensory and mixed nerve conduction studies in carpal tunnel syndrome | Phys.Med.Rehabil.Clin.N.Am. | Background Information |
| Johnson,J.; Kilgore,E.; Newmeyer,W. | 1985 | Tumorous lesions of the hand | J Hand Surg Am | +Does not answer a question of interest |
| Johnson,R. | 1987 | Relieving your patient's peripheral neuropathy | Current Therapeutics | background |
| Johnston,V. | 1997 | When pain brings no gain: Repetition, force, pressure: Culprits in work-related pain | Laboratory Medicine | Background Information |
| Joist,A.; Joosten,U.; Wetterkamp,D.; Neuber,M.; Probst,A.; Rieger,H. | 1999 | Anterior interosseous nerve compression after supracondylar fracture of the humerus: a metaanalysis | J Neurosurg. | Not relevant to CTS |
| Jones,K.G. | 1978 | Carpal tunnel syndrome | J Ark.Med Soc. | background |
| Jones,S.M.; Stuart,P.R.; Stothard,J. | 1997 | Open carpal tunnel release. Does a vascularized hypothenar fat pad reduce wound tenderness? | J Hand Surg Br | Very low quality |
| Jordan,R.; Carter,T.; Cummins,C. | 2002 | A systematic review of the utility of electrodiagnostic testing in carpal tunnel syndrome | Br J Gen.Pract. | systematic review |
| Jordan,S.E.; Greider,J.L.,Jr. | 1987 | Autonomic activity in the carpal tunnel syndrome | Orthop Rev. | insufficient data; very low study design |

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| Joseph,A.W.; Shoemaker,A.H.; Germain-Lee,E.L. | 2011 | Increased prevalence of carpal tunnel syndrome in albright hereditary osteodystrophy | J Clin Endocrinol.Metab | Does not answer a question of interest; prevalence study |
| Joshi,A.G.; Gargate,A.R. | 2013 | Diagnostic utility of F waves in clinically diagnosed patients of carpal tunnel syndrome | Indian J.Physiol.Pharmacol. | insufficient data; very low study design |
| Joshy,S.; Thomas,B.; Ghosh,S.; Haidar,S.G.; Deshmukh,S.C. | 2007 | Patient satisfaction following carpal-tunnel decompression: a comparison of patients with and without osteoarthritis of the wrist | Int.Orthop | |
| Journee,H.L.; De Jonge,A.B. | 1995 | Design of a myo-seismic transducer for non-invasive transcutaneous vectorial recording of locally fast muscle-fibre micro-contractions | Electromyogr.Clin.Neurophysiol. | review; background information |
| Journee,H.L.; De Jonge,A.B. | 1993 | Ultrasound myography: Application in nerve conduction velocity assessment and muscle cooling | Ultrasound Med.Biol. | only healthy study subjects |
| Kabiraj,M.M.; al-Rajeh,S.; al-Tahan,A.R.; Abdulijabbar,M.; al-Bunyan,M. | 1999 | Motor terminal latency index in carpal tunnel syndrome | East Mediterr.Health J | insufficient data; very low study design |
| Kabiraj,M.M.U.; Al,Rajeh S.; Al Tahan,A.R.; Abduljabbar,M.; Al,Bunyan M.; Daif,A.K.; Awada,A. | 1998 | Carpel tunnel syndrome: A clinico-electrophysiological study | Medical Science Research | records review; does not answer a question of interest |
| Kachel,H.G.; Altmeyer,P.; Kuhn,K.W. | 1984 | Deposition of nonamyloid material in connective tissue in uraemia | Blood Purif. | Not relevant |
| Kamanli,A.; Bezgincan,M.; Kaya,A. | 2011 | Comparison of local steroid injection into carpal tunnel via proximal and distal approach in patients with carpal tunnel syndrome | Bratisl.Lek.Listy | Incorrect patient population (&lt;10 patients/group) |
| Kamil,Oge H.; Basaran,Demirkazik F.; Nurlu,G.; Inci,S.; Erbengi,A. | 1994 | Carpal tunnel cross sectional area measurement in carpal tunnel syndrome | Turkish Neurosurgery | &lt;10 patients per group |
| Kanatani,T.; Fujioka,H.; Kurosaka,M.; Nagura,I.; Sumi,M. | 2013 | Delayed electrophysiological recovery after carpal tunnel release for advanced carpal tunnel syndrome: a two-year follow-up study | J Clin Neurophysiol. | Retrospective case series |

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| Kang,H.J.; Koh,I.H.; Lee,W.Y.; Choi,Y.R.; Hahn,S.B. | 2012 | Does carpal tunnel release provide long-term relief in patients with hemodialysis-associated carpal tunnel syndrome? | Clin Orthop Relat Res. | Does not address question of interest |
| Kang,S.; Kwon,H.K.; Kim,K.H.; Yun,H.S. | 2012 | Ultrasonography of median nerve and electrophysiologic severity in carpal tunnel syndrome | Ann.Rehabil.Med | insufficient data; very low study design |
| Kang,Y.K.; Kim,D.H.; Lee,S.H.; Hwang,M.; Han,M.S. | 2003 | Tenelectrodes: a new stimulator for inching technique in the diagnosis of carpal tunnel syndrome | Yonsei Med J | insufficient data; very low study design |
| Kantarci,F.; Ustabasioglu,F.E.; Delil,S.; Olgun,D.C.; Korkmazer,B.; Dikici,A.S.; Tutar,O.; Nalbantoglu,M.; Uzun,N.; Mihmanli,I. | 2014 | Median nerve stiffness measurement by shear wave elastography: a potential sonographic method in the diagnosis of carpal tunnel syndrome | Eur.Radiol. | insufficient data; very low study design |
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| Kaplan,P.; Sahgal,V. | 1978 | Residual latency: new applications of an old technique | Arch Phys Med Rehabil. | &lt;10 patients per group; very low study design |
| Kaplan,S.J.; Glickel,S.Z.; Eaton,R.G. | 1990 | Predictive factors in the non-surgical treatment of carpal tunnel syndrome | J Hand Surg Br | Very Low Quality |
| Karabay,N.; Kayalar,M.; Ada,S. | 2013 | Sonographic assessment of transverse carpal ligament after open surgical release of the carpal tunnel | Acta Orthop Traumatol.Turc. | Does not address question of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| -Karada?-Ã?; Tok,F.; Akarsu,S.; Tekin,L.; Balaban,B. | 2012 | Triamcinolone acetonide vs procaine hydrochloride injection in the management of carpal tunnel syndrome: randomized placebo-controlled study | Journal of rehabilitation medicine : official.journal of the UEMS.European Board of Physical and Rehabilitation Medicine | Duplicate study (duplicate with AAOS ID 236) |
| -Karada?-O; Tok,F.; -Ula?-UH; -Odaba?i-Z | 2011 | The effectiveness of triamcinolone acetonide vs. procaine hydrochloride injection in the management of carpal tunnel syndrome: a double-blind randomized clinical trial | American journal of physical medicine & rehabilitation / Association of Academic Physiatrists | Duplicate study (duplicate with AAOSID 313) |
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| Karadas,O.; Omac,O.K.; Tok,F.; Ozgul,A.; Odabasi,Z. | 2012 | Effects of steroid with repetitive procaine HCl injection in the management of carpal tunnel syndrome: an ultrasonographic study | J Neurol Sci | Very Low Quality |
| Kasdan,M.L.; Millender,L.H. | 1996 | Occupational soft-tissue and tendon disorders | Orthop.Clin.North Am. | Background Information |
| Kasdan,M.L.; Wolens,D.; Leis,V.M.; Kasdan,A.S.; Stallings,S.P. | 1994 | Carpal tunnel syndrome not always work related | J Ky.Med Assoc | medical records review; insufficient data |
| Kasius,K.M.; Claes,F.; Meulstee,J.; Weinstein,H.C.; Verhagen,W.I. | 2014 | Comparison of peak versus onset latency measurements in electrodiagnostic tests for carpal tunnel syndrome | J Clin Neurophysiol | all CTS confirmed; comparing digits |
| Kasius,K.M.; Claes,F.; Verhagen,W.I.; Meulstee,J. | 2012 | The segmental palmar test in diagnosing carpal tunnel syndrome reassessed | Clin Neurophysiol. | insufficient data; very low study design |
| Kasius,K.M.; Claes,F.; Verhagen,W.I.; Meulstee,J. | 2012 | Ultrasonography in severe carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
| Kastlunger,M.; Miyamoto,H.; Jaschke,W.; Klauser,A. | 2013 | Elasticity of the median nerve in carpal tunnel syndrome: Sonoelastography findings | Skeletal Radiol. | summary document |
| Katims,J.J.; Rouvelas,P.; Sadler,B.T.; Weseley,S.A. | 1989 | Current perception threshold. Reproducibility and comparison with | ASAIO Trans | insufficient data; not best evidence for CPT |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| | | nerve conduction in evaluation of carpal tunnel syndrome | | |
| Katirji,B.; Preston,D.C. | 2003 | Vibration-induced median neuropathy | | case report |
| Katz,J.N.; Gelberman,R.H.; Wright,E.A.; Lew,R.A.; Liang,M.H. | 1994 | Responsiveness of self-reported and objective measures of disease severity in carpal tunnel syndrome | Med Care | the study measures the responsiveness of the the outcome instrument, without showing how outcomes differ between treatment groups. |
| Katz,J.N.; Keller,R.B.; Simmons,B.P.; Rogers,W.D.; Bessette,L.; Fossel,A.H.; Mooney,N.A. | 1998 | Maine Carpal Tunnel Study: outcomes of operative and nonoperative therapy for carpal tunnel syndrome in a community-based cohort | J Hand Surg Am | Very low strength |
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| Katz,J.N.; Simmons,B.P. | 2002 | Carpal tunnel syndrome | N.Engl.J.Med. | background |
| Katz,R.T. | 1994 | Carpal tunnel syndrome: a practical review | Am Fam Physician | background |
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| Kayamori,R. | 1987 | Electrophysiological study of chronic intractable shoulder pain | Nihon Seikeigeka Gakkai Zasshi | Not relevant,does not answer the PICO question |
| Kaye,J.J.; Reynolds,J.M. | 2007 | Carpal tunnel syndrome: using self-report measures of disease to predict treatment response | Am J Orthop (Belle.Mead NJ) | +Does not answer a question of interest/not best available evidence |
| Kaymak,B.; Ozcakar,L.; Cetin,A.; Candan,Cetin M.; Akinci,A.; Hascelik,Z. | 2008 | A comparison of the benefits of sonography and electrophysiologic measurements as predictors of symptom severity and functional status in patients with carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data; very low study design |

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| Keberle,M.; Jenett,M.; Kenn,W.; Reiners,K.; Peter,M.; Haerten,R.; Hahn,D. | 2000 | Technical advances in ultrasound and MR imaging of carpal tunnel syndrome | Eur.Radiol. | &lt;10 patients per group; very low study design |
| Keiner,D.; Gaab,M.R.; Schroeder,H.W.; Oertel,J. | 2009 | Long-term follow-up of dual-portal endoscopic release of the transverse ligament in carpal tunnel syndrome: an analysis of 94 cases | | very low quality |
| Keith,M.W.; Masear,V.; Chung,K.C.; Amadio,P.C.; Andary,M.; Barth,R.W.; Maupin,K.; Graham,B.; Watters,W.C.,III; Turkelson,C.M.; Haralson,R.H.,III; Wies,J.L.; McGowan,R. | 2010 | American Academy of Orthopaedic Surgeons clinical practice guideline on the treatment of carpal tunnel syndrome | J Bone Joint Surg Am | recommendations |
| Keith,M.W.; Masear,V.; Chung,K.C.; Maupin,K.; Andary,M.; Amadio,P.C.; Watters,W.C.,III; Goldberg,M.J.; Haralson,R.H.,III; Turkelson,C.M.; Wies,J.L.; McGowan,R. | 2009 | American Academy of Orthopaedic Surgeons Clinical Practice Guideline on diagnosis of carpal tunnel syndrome | J Bone Joint Surg Am | summary of recommendations |
| Kele,H.; Verheggen,R.; Bittermann,H.J.; Reimers,C.D. | 2003 | The potential value of ultrasonography in the evaluation of carpal tunnel syndrome | | insufficient data; very low study design |
| Keles,I.; Karagulle Kendi,A.T.; Aydin,G.; Zog,S.G.; Orkun,S. | 2005 | Diagnostic precision of ultrasonography in patients with carpal tunnel syndrome | Am J Phys Med Rehabil. | insufficient data; very low study design |
| Kemble,F. | 1968 | Electrodiagnosis of the carpal tunnel syndrome | J Neurol Neurosurg.Psychiatry | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Kemble,F. | 1968 | Clinical manifestations related to electro-physiological measurements in the carpal tunnel syndrome |  | all CTS cases; no comparison group |
| Kerametti n,A.; Cengiz,C.; Nilgun,C.; Ayhan,B. | 2006 | Microsurgical open mini uniskin incision technique in the surgical treatment of carpal tunnel syndrome | Neurol India | very low quality |
| Kern,B.C.; Brock,M.; Rudolph,K.H.; Logemann,H. | 1993 | The recurrent carpal tunnel syndrome | Zentralbl.Neurochir. | Incorrect patient population (previous invasive treatment) |
| Kerr,C.D.; Gittins,M.E.; Sybert,D.R. | 1994 | Endoscopic versus open carpal tunnel release: clinical results |  |  |
| Kerrigan,J.J.; Bertoni,J.M.; Jaeger,S.H. | 1988 | Ganglion cysts and carpal tunnel syndrome | J Hand Surg Am | case reports. no control groups |
| Kessler,F.B. | 1986 | Complications of the management of carpal tunnel syndrome | Hand Clin | background |
| Kessler,M.; Netter,P.; Azoulay,E.; Mayeux,D.; Pere,P.; Gaucher,A. | 1992 | Dialysis-associated arthropathy: a multicentre survey of 171 patients receiving haemodialysis for over 10 years. The Co-operative Group on Dialysis-associated Arthropathy | Br J Rheumatol. | Not relevant |
| Ketchum,L.D. | 2004 | A comparison of flexor tenosynovectomy, open carpal tunnel release, and open carpal tunnel release with flexor tenosynovectomy in the treatment of carpal tunnel syndrome | Plast.Reconstr.Surg | Very Low Quality |
| Keyserling,W.M.; Armstrong,T.J.; Punnett,L. | 1991 | Ergonomic job analysis: A structured approach for identifying risk factors associated with overexertion injuries and disorders | Applied Occupational and Environmental Hygiene | not exclusive to CTS; no comparisongroups |
| Khalil,C.; Hancart,C.; Le,Thuc,V; Chantelot,C.; Chechin,D.; Cotten,A. | 2008 | Diffusion tensor imaging and tractography of the median nerve in carpal tunnel syndrome: preliminary results | Eur.Radiol. | insufficient data; very low study design |
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| Khosrawi,S.; Dehghan,F. | 2013 | Determination of the median nerve residual latency values in the diagnosis of carpal tunnel syndrome in comparison with other electrodiagnostic parameters | J Res.Med Sci | insufficient data; very low study design |
| Kihlberg,S.; Hagberg,M. | 1997 | Hand-arm symptoms related to impact and nonimpact hand-held power tools | Int.Arch.Occup.Environ.Health | not exclusive to CTS; no diagnosis of CTS |
| Killough,M.K.; Crumpton,L.L. | 1996 | An investigation of cumulative trauma disorders in the construction industry | International Journal of Industrial Ergonomics | Not relevant to CTS |
| Kim,D.H.; Jang,J.E.; Park,B.K. | 2013 | Anatomical basis of ulnar approach in carpal tunnel injection | Pain Physician | Does not address question of interest |
| Kim,H.S. | 2014 | Carpal tunnel syndrome caused by tophaceous gout | Korean J Intern.Med | case report |
| Kim,H.S.; Joo,S.H.; Cho,H.K.; Kim,Y.W. | 2013 | Comparison of proximal and distal cross-sectional areas of the median nerve, carpal tunnel, and nerve/tunnel index in subjects with carpal tunnel syndrome | Arch Phys Med Rehabil. | &lt;10 patients per group; insufficient data |
| Kim,J.K.; Jeon,S.H. | 2013 | Minimal clinically important differences in the Carpal Tunnel Questionnaire after carpal tunnel release | J Hand Surg Eur.Vol. | |
| Kim,J.K.; Kim,Y.K. | 2011 | Predictors of scar pain after open carpal tunnel release | J Hand Surg Am | Does not address question of interest |
| Kim,J.K.; Yi,J.W.; Kook,S.H. | 2011 | The minimal clinical important difference of the carpal tunnel syndrome questionnaire in surgically treated patients level 1 evidence | Journal of Hand Surgery | Abstract/conference poster |
| Kim,J.M.; Kim,M.W.; Ko,Y.J. | 2013 | Correlating ultrasound findings of carpal tunnel syndrome with nerve conduction studies | Muscle Nerve | insufficient data; very low study design |
| Kim,J.Y.; Kim,J.I.; Son,J.E.; Yun,S.K. | 2004 | Prevalence of carpal tunnel syndrome in meat and fish processing plants | J Occup.Health | very low quality |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Kim,J.Y.; Yoon,J.S.; Kim,S.J.; Won,S.J.; Jeong,J.S. | 2012 | Carpal tunnel syndrome: Clinical, electrophysiological, and ultrasonographic ratio after surgery | Muscle Nerve | very low quality |
| Kim,L.Y.S. | 1983 | Palmar digital nerve stimulation to diagnose Carpal Tunnel Syndrome | Orthop.Rev. | no comparison of modalities; very low study design |
| Kim,W.K.; Kwon,S.H.; Lee,S.H.; Sunwoo,I.N. | 2000 | Asymptomatic electrophysiologic carpal tunnel syndrome in diabetics: entrapment or polyneuropathy | Yonsei Med J | insufficient data; insufficient comparisons |
| Kimura,I.; Ayyar,D.R. | 1985 | The carpal tunnel syndrome: electrophysiological aspects of 639 symptomatic extremities | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Kimura,J. | 1979 | The carpal tunnel syndrome: localization of conduction abnormalities within the distal segment of the median nerve | | no comparison of modalities; very low study design |
| Kimura,J. | 1978 | A method for determining median nerve conduction velocity across the carpal tunnel | J Neurol Sci | Does not answer a question of interest |
| Kindstrand,E. | 1992 | Antibodies to Borrelia burgdorferi in patients with carpal tunnel syndrome | Acta Neurol Scand. | insufficient data; very low study design |
| King,P.M. | 1997 | Sensory function assessment. A pilot comparison study of touch pressure threshold with texture and tactile discrimination | J Hand Ther | +Does not answer a question of interest; very low study design |
| King,T. | 1976 | Carpal tunnel syndrome. Nursing care | Nurs.Mirror Midwives J | background |
| Kinugasa,E.; Akizawa,T.; Kitaoka,T.; Koshikawa,S. | 1988 | Evaluation of beta 2-microglobulin removal with high-performance hemodiafiltration | Artif.Organs | Not relevant to CTS |
| Kipp,D.E.; Wilson,J.K. | 2001 | Carpal tunnel syndrome: A critical review | Critical Reviews in Physical and Rehabilitation Medicine | background |
| Kitsis,C.K.; Savvidou,O.; Alam,A.; Cherry,R.J. | 2002 | Carpal tunnel syndrome despite negative neurophysiological studies | Acta Orthop Belg. | very low quality |
| Kiylioglu,N.; Akyildiz,U.O.; Ozkul,A.; Akyol,A. | 2011 | Carpal tunnel syndrome and ulnar neuropathy at the wrist: comorbid disease or not? | J Clin Neurophysiol. | Does not answer a question of interest |

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| Kiylioglu,N.; Bicerol,B.; Ozkul,A.; Akyol,A. | 2009 | Natural course and treatment efficacy: one-year observation in diabetic and idiopathic carpal tunnel syndrome | J Clin Neurophysiol. | |
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| Klauser,A.S.; Halpern,E.J.; Faschingbauer,R.; Guerra,F.; Martinoli,C.; Gabl,M.F.; Arora,R.; Bauer,T.; Sojer,M.; Loscher,W.N.; Jaschke,W.R. | 2011 | Bifid median nerve in carpal tunnel syndrome: assessment with US cross-sectional area measurement | | Does not answer a question of interest; very low study design |
| Kleindienst,A.; Hamm,B.; Hildebrandt,G.; Klug,N. | 1996 | Diagnosis and staging of carpal tunnel syndrome: comparison of magnetic resonance imaging and intra-operative findings | Acta Neurochir.(Wien.) | not best available evidence; insufficient data |
| Kleindienst,A.; Hamm,B.; Lanksch,W.R. | 1998 | Carpal tunnel syndrome: staging of median nerve compression by MR imaging | J Magn Reson.Imaging | Insufficient data |
| Ko,H.J.; Kim,Y.R.; Park,K.S.; Cho,C.S.; Kim,H.Y. | 2009 | Clinical images: Kienbock disease resulting from local corticosteroid injections | Arthritis Rheum. | Case report |
| Kobayashi,S.; Hayakawa,K.; Nakane,T.; Meir,A.; Mwaka,E.S.; Yayama,T.; Uchida,K.; Shimada,S.; Inukai,T.; Nakajima,H.; Baba,H. | 2009 | Visualization of intraneural edema using gadolinium-enhanced magnetic resonance imaging of carpal tunnel syndrome | J Orthop Sci | insufficient data; very low study design |
| Koc,F.; Yerdelen,D.; Sarica,Y.; Sertdemir,Y. | 2006 | Motor unit number estimation in cases with Carpal Tunnel Syndrome | Int.J Neurosci. | insufficient data; very low study design |
| Kocer,A.; Gozke,E.; Dortcan,N.; Us,O. | 2005 | A comparison of F waves in peripheral nerve disorders | Electromyogr.Clin Neurophysiol. | no comparison group; very low study design |
| Kocer,B.; Sucak,G.; Kuruoglu,R.; Aki,Z.; Haznedar,R.; Erdogmus,N.I. | 2009 | Clinical and electrophysiological evaluation of patients with thalidomide-induced neuropathy | Acta Neurol Belg. | Not relevant to CTS |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Kodama,M.; Tochikura,M.; Sasao,Y.; Kasahara,T.; Koyama,Y.; Aono,K.; Fujii,C.; Shimoda,N.; Kurihara,Y.; Masakado,Y. | 2014 | What is the most sensitive test for diagnosing carpal tunnel syndrome? | Tokai J Exp.Clin Med | case control; very low design |
| Kohanzadeh,S.; Herrera,F.A.; Dobke,M. | 2012 | Outcomes of open and endoscopic carpal tunnel release: a meta-analysis | Hand (N.Y) | meta-analysis |
| Komurcu,H.F.; Kilic,S.; Anlar,O. | 2014 | Relationship of age, body mass index, wrist and waist circumferences to carpal tunnel syndrome severity | Neurol.Med.Chir.(Tokyo). | study was downgraded to very low quality because it is unclear if their CTS severity scale is validated and lack of statistical adjustment for other factors (beyond BMI) that could confound results (such as comorbidities) |
| Konchalard,K.; Suputtitada,A.; Sastravaha,N. | 2011 | Vibrometry in carpal tunnel syndrome: correlations with electrodiagnositic parameters and disease severity | J Med Assoc Thai. | +Does not answer a question of interest |
| Koo,J.T.; Szabo,R.M. | 2004 | Compression neuropathies of the median nerve | Journal of the American Society for Surgery of the Hand | background |
| Koo,Y.S.; Park,H.R.; Joo,B.E.; Choi,J.Y.; Jung,K.Y.; Park,K.W.; Cho,S.C.; Kim,B.J. | 2010 | Utility of the cutaneous silent period in the evaluation of carpal tunnel syndrome | Clin Neurophysiol. | +Does not answer a question of interest/insufficient data |
| Kopell,H.P.; Goodgold,J. | 1968 | Clinical and electrodiagnostic features of carpal tunnel syndrome | Arch Phys Med Rehabil. | records review |
| Koris,M.; Gelberman,R.H.; Duncan,K.; Boublick,M.; Smith,B. | 1990 | Carpal tunnel syndrome. Evaluation of a quantitative provocational diagnostic test | Clin Orthop Relat Res. | insufficient data; very low study design |
| Korkmaz,M.; Ekici,M.A.; Cepoglu,M.C.; Ozturk,H. | 2013 | Mini transverse versus longitudinal incision in carpal tunnel syndrome | J Coll Physicians Surg Pak. | very low quality |
| Korrick,S.A.; Rest,K.M.; Davis,L.K.; Christiani,D.C. | 1994 | Use of state workers' compensation data for occupational carpal tunnel syndrome surveillance: a feasibility study in Massachusetts | Am J Ind.Med | Does not answer a question of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Korstanje,J.W.; Van,Balen R.; Scheltens-De,Boer M.; Blok,J.H.; Slijper,H.P.; Stam,H.J.; Hovius,S.E.; Selles,R.W. | 2013 | Assessment of transverse ultrasonographic parameters to optimize carpal tunnel syndrome diagnosis in a case-control study | Muscle Nerve | insufficient data; very low study design |
| Korthals,de Bos,I; Gerritsen,A.A.; Tulder,M.W.; Rutten-van-MÃ¶lken,M.P.; AdÃ¨r,H.J.; Vet,H.C.; Bouter,L.M. | 2006 | Surgery is more cost-effective than splinting for carpal tunnel syndrome in the Netherlands: results of an economic evaluation alongside a randomized controlled trial | BMC Musculoskeletal Disorders | Extension of study. PM:12215131 already included. |
| Koskimies,K.; Farkkila,M.; Pyykko,I.; Jantti,V.; Aatola,S.; Starck,J.; Inaba,R. | 1990 | Carpal tunnel syndrome in vibration disease | Br J Ind.Med | Not relevant, prevalence study |
| Kostopoulos,D. | 2004 | Treatment of carpal tunnel syndrome: A review of the non-surgical approaches with emphasis in neural mobilization | Journal of Bodywork and Movement Therapies | background |
| Kotevoglu,N.; Gulbahce-Saglam,S. | 2005 | Ultrasound imaging in the diagnosis of carpal tunnel syndrome and its relevance to clinical evaluation | Joint Bone Spine | insufficient data; very low study design |
| Kothari,M.J.; Blakeslee,M.A.; Reichwein,R.; Simmons,Z.; Logigian,E.L. | 1998 | Electrodiagnostic studies: Are they useful in clinical practice? | Arch.Phys.Med.Rehabil. | not exclusive to CTS |
| Kothari,M.J.; Rutkove,S.B.; Caress,J.B.; Hinchey,J.; Logigian,E.L.; Preston,D.C. | 1995 | Comparison of digital sensory studies in patients with carpal tunnel syndrome | Muscle Nerve | +Does not answer a question of interest |
| Kothari,M.J.; Rutkove,S.B.; Logigian,E.L.; Shefner,J.M. | 1996 | Coexistent entrapment neuropathies in patients with amyotrophic lateral sclerosis | Arch.Phys.Med.Rehabil. | Not relevant to CTS |
| Kouyoumdjian,J.A.; de Araujo,R.G. | 2006 | Carpal tunnel syndrome and manual milking: nerve conduction studies in 43 cases | Arq Neuropsiquiatr. | not best available evidence; no comparison group |
| Kouyoumdjian,J.A.; Morita,M.D.; Rocha,P.R.; Miranda,R.C.; Gouveia,G.M. | 2000 | Body mass index and carpal tunnel syndrome | Arq Neuropsiquiatr. | not best available evidence |
| Kouyoumdjian,J.A.; Morita,M.P.; Molina,A.F. | 2002 | Usefulness of additional nerve conduction techniques in mild carpal tunnel syndrome | Arq Neuropsiquiatr. | insufficient data; not best evidence |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Kouyoumdjian,J.A.; Morita,M.P.; Rocha,P.R.; Miranda,R.C.; Gouveia,G.M. | 2000 | Wrist and palm indexes in carpal tunnel syndrome | Arq Neuropsiquiatr. | insufficient data; very low study design |
| Kouyoumdjian,J.A.; Morita,Mda P. | 1999 | Comparison of nerve conduction techniques in 95 mild carpal tunnel syndrome hands | Arq Neuropsiquiatr. | insufficient information |
| Kownacki,J.; Fellenberg,J.V.; Rosler,K.; Schneider,V.; Bettecken,T.; Moser,H.; Burgunder,J.-M. | 1996 | The 17p11.2 locus in hereditary neuropathy with liability to pressure palsies, in juvenile and familial carnal tunnel syndrome and in hereditary neuralgic amyotrophy | Eur.J.Neurol. | biopsy study; insufficient data |
| Koyuncuoglu,H.R.; Kutluhan,S.; Yesildag,A.; Oyar,O.; Guler,K.; Ozden,A. | 2005 | The value of ultrasonographic measurement in carpal tunnel syndrome in patients with negative electrodiagnostic tests | Eur.J Radiol. | insufficient data; very low study design |
| Kozakiewicz,R.T.; Bowyer,B.L. | 1997 | Quantitative testing and thermography in carpal tunnel syndrome | Phys.Med.Rehabil.Clin.N.Am. | Background Information |
| Kraft,G.H. | 1997 | Carpal tunnel syndrome in patients with peripheral neuropathy: It can be evaluated and treated | Phys.Med.Rehabil.Clin.N.Am. | Background Information; review |
| Krasteva,W. | 2001 | Anomalous hand innervation in carpal tunnel syndrome: Electromyographic studies | Acta Medica Bulgarica | +Does not answer a question of interest |
| Krieg,N.A. | 1989 | Complications after a carpal tunnel release | Plast.Surg Nurs. | case report |
| Kroemer,K.H.E. | 1989 | Cumulative trauma disorders: their recognition and ergonomics measures to avoid them | Appl.Ergon. | background |
| Kruger,V.L.; Kraft,G.H.; Deitz,J.C.; Ameis,A.; Polissar,L. | 1991 | Carpal tunnel syndrome: objective measures and splint use | Arch Phys Med Rehabil. | Retrospective case series |
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| Kummel,B.M.; Zazanis,G.A. | 1973 | Shoulder pain as the presenting complaint in carpal tunnel syndrome | Clin Orthop Relat Res. | +Does not answer a question of interest; very low study design |
| Kuntzer,T. | 1994 | Carpal tunnel syndrome in 100 patients: sensitivity, specificity of multi-neurophysiological procedures and estimation of axonal loss of motor, sensory and sympathetic median nerve fibers | J Neurol Sci | insufficient data; very low study design |
| Kurca,E.; Nosal,V.; Grofik,M.; Sivak,S.; Turcanova-Koprusakova,M.; Kucera,P. | 2008 | Single parameter wrist ultrasonography as a first-line screening examination in suspected carpal tunnel syndrome patients | Bratisl.Lek.Listy | insufficient data; very low study design |
| Kurt,S.; Kisacik,B.; Kaplan,Y.; Yildirim,B.; Etikan,I.; Karaer,H. | 2008 | Obesity and carpal tunnel syndrome: is there a causal relationship? | Eur.Neurol | Very Low Quality |
| Kuschner,S.H.; Brien,W.W.; Johnson,D.; Gellman,H. | 1991 | Complications associated with carpal tunnel release | Orthop Rev. | Narrative review |
| Kuschner,S.H.; Lane,C.S. | 1997 | Endoscopic versus open carpal tunnel release: big deal or much ado about nothing? | Am J Orthop (Belle.Mead NJ) | Narrative review |
| Kutluhan,S.; Akhan,G.; Demirci,S.; Duru,S.; Koyuncuoglu,H.R.; Ozturk,M.; Cirak,B. | 2001 | Carpal tunnel syndrome in carpet workers | Int.Arch Occup.Environ.Health | Not relevant, prevalence study |
| Kutluhan,S.; Tufekci,A.; Kilbas,S.; Erten,N.; Koyuncuoglu,H.R.; Ozturk,M. | 2009 | Manual milking: A risk factor for carpal tunnel syndrome | Biomedical Research | Not relevant, prevalence study of manual milking |
| Kwon,B.C.; Jung,K.I.; Baek,G.H. | 2008 | Comparison of sonography and electrodiagnostic testing in the diagnosis of carpal tunnel syndrome | J Hand Surg Am | insufficient data; very low study design |
| Kwon,H.K.; Hwang,M.; Yoon,D.W. | 2006 | Frequency and severity of carpal tunnel syndrome according to level of cervical radiculopathy: double crush syndrome? | Clin Neurophysiol. | +Does not answer a question of interest |

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| Kyle,R.A.; Eilers,S.G.; Linscheid,R.L.; Gaffey,T.A. | 1989 | Amyloid localized to tenosynovium at carpal tunnel release. Natural history of 124 cases | Am J Clin Pathol. | Does not answer a question of interest; biostudy not relevant to CTS |
| LaBan,M.M.; Friedman,N.A.; Zemenick,G.A. | 1986 | "Tethered" median nerve stress test in chronic carpal tunnel syndrome | Arch Phys Med Rehabil. | summary document; no comparison group or risk assessment |
| LaBan,M.M.; MacKenzie,J.R.; Zemenick,G.A. | 1989 | Anatomic observations in carpal tunnel syndrome as they relate to the tethered median nerve stress test | Arch Phys Med Rehabil. | cadaver study |
| LaBan,M.M.; Spiteri,D.J. | 1997 | History and differential diagnosis of carpal tunnel syndrome | Phys.Med.Rehabil.Clin.N.Am. | background |
| LaBan,M.M.; Zemenick,G.A.; Meerschaert,J.R. | 1975 | Neck and shoulder pain. Presenting symptoms of carpal tunnel syndrome | Mich.Med | insufficient data |
| Lagos,J.C. | 1971 | Compression neuropathy in childhood | Dev.Med Child Neurol | not relevant |
| Lahiri,A.; Liong,K.; Chia,D.; Lee,S.; Lim,A.; Biswas,A.; Lee,H.P. | 2013 | Functional compartmental space: The missing link in the pathogenesis of carpal tunnel syndrome | Computer Methods in Biomechanics and Biomedical Engineering | insufficient data; very low study design |
| LaJoie,A.S.; McCabe,S.J.; Thomas,B.; Edgell,S.E. | 2005 | Determining the sensitivity and specificity of common diagnostic tests for carpal tunnel syndrome using latent class analysis | Plast.Reconstr.Surg | +not best available evidence |
| Lakhanpal,S.; Ginsburg,W.W.; Michet,C.J.; Doyle,J.A.; Moore,S.B. | 1988 | Eosinophilic fasciitis: clinical spectrum and therapeutic response in 52 cases | Semin.Arthritis Rheum. | Does not answer a question of interest; not relevant to CTS |
| Lalumandier,J.A.; McPhee,S.D. | 2001 | Prevalence and risk factors of hand problems and carpal tunnel syndrome among dental hygienists | J Dent.Hyg. | Not relevant, prevalence study |
| Lalumandier,J.A.; McPhee,S.D.; Riddle,S.; Shulman,J.D.; Daigle,W.W. | 2000 | Carpal tunnel syndrome: effect on Army dental personnel | Mil.Med | Not relevant, prevalence study |

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| Lam,C.H.; Yeung,S.H.; Wong,T.C. | 2010 | Endoscopic carpal tunnel release: experience of surgical outcome in a Chinese population | Hong Kong Med J | Retrospective case series |
| Lam,H.S.; Cass,N.M.; Ng,K.C. | 1981 | Electromyographic monitoring of neuromuscular block | Br.J.Anaesth. | review; background information |
| Lam,N.; Thurston,A. | 1998 | Association of obesity, gender, age and occupation with carpal tunnel syndrome | Aust.N.Z.J Surg | not best available evidence |
| Lamberti,P.M.; Light,T.R. | 2002 | Carpal tunnel syndrome in children | Hand Clin | background |
| Lambird,P.A.; Hartmann,W.H. | 1969 | Hereditary amyloidosis, the flexor retinaculum, and the carpal tunnel syndrome | Am J Clin Pathol. | records review |
| Landi,A.; Luchetti,R.; Schoenhuber,R. | 1989 | Metabolic and neurophysiological correlations in carpal tunnel syndrome | Journal of the Western Pacific Orthopaedic Association | bio-study; does not answer a question of interest |
| Lang,E.; Claus,D.; Neundorfer,B.; Handwerker,H.O. | 1995 | Parameters of thick and thin nerve-fiber functions as predictors of pain in carpal tunnel syndrome | | insufficient data; very low study design |
| Lange,H. | 1999 | Carpal tunnel syndrome caused by the palmaris profundus muscle | Scand.J.Plast.Reconstr.Surg.Hand Surg. | case report |
| Lange,J. | 2013 | Carpal tunnel syndrome diagnosed using ultrasound as a first-line exam by the surgeon | J Hand Surg Eur.Vol. | insufficient data; very low study design |
| Langlois,G.; Estebe,J.P.; Gentili,M.E.; Kerdiles,L.; Mouilleron,P.; Ecoffey,C. | 2002 | The addition of tramadol to lidocaine does not reduce tourniquet and postoperative pain during iv regional anesthesia | Can J Anaesth. | Deemed clinically irrelevant |
| Lanz,U. | 1977 | Anatomical variations of the median nerve in the carpal tunnel | J Hand Surg Am | Does not address question of interest |
| Lattmann,T.; Dietrich,M.; Meier,C.; Kilgus,M.; Platz,A. | 2008 | Comparison of 2 surgical approaches for volar locking plate osteosynthesis of the distal radius | J Hand Surg Am | Incorrect patient population (not exclusive to CTS patients) |
| Laureno,R. | 1996 | Neurologic manifestations of thyroid disease | Endocrinologist | Background Information; review |

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| Lauritzen,M.; Liguori,R.; Trojaborg,W. | 1991 | Orthodromic sensory conduction along the ring finger in normal subjects and in patients with a carpal tunnel syndrome | Electroencephalogr.Clin Neurophysiol. | insufficient data; very low study design |
| Laursen,L.H.; Jepsen,J.R.; Sjogaard,G. | 2006 | Vibrotactile sense in patients with different upper limb disorders compared with a control group | Int.Arch.Occup.Environ.Health | not exclusive to CTS; very low study design |
| Lawrence,T.M.; Desai,V.V. | 2002 | Topical anaesthesia to reduce pain associated with carpal tunnel surgery | J Hand Surg Br | Deemed clinically irrelevant |
| Lax,H.; Zochodne,D.W. | 1995 | 'Causalgic' median mononeuropathies: Segmental rubror and edema | Muscle Nerve | case reports |
| Le Quesne,P.M. | 1978 | The carpal tunnel syndrome | Br J Hosp.Med | background |
| Le Quesne,P.M.; Casey,E.B. | 1974 | Recovery of conduction velocity distal to a compressive lesion | J Neurol Neurosurg.Psychiatry | Does not answer any question of interest. |
| Leach,R.E.; Odom,J.A.,Jr. | 1968 | Systemic causes of carpal tunnel syndrome | Postgrad.Med | Background Information |
| Leahy,P.M. | 1995 | Improved treatments for carpal tunnel and related syndromes | Chiropractic Sports Medicine | Background article |
| Leahy,P.M.; Mock III,L.E. | 1992 | Myofascial release technique and mechanical compromise of peripheral nerves of the upper extremity | Chiropractic Sports Medicine | Background article |
| Leblhuber,F.; Reisecker,F.; Witzmann,A. | 1986 | Carpal tunnel syndrome: neurographical parameters in different stages of median nerve compression | Acta Neurochir.(Wien.) | insufficient data; no comparison group or consistent reference standard |
| Leden,I.; Svensson,B.; Sturfelt,G.; Schersten,B. | 1980 | 'Rheumatic' hand symptoms as a clue to undiagnosed diabetes mellitus | Scand.J.Rheumatol. | preliminary report |
| Lee,C.H.; Kim,T.K.; Yoon,E.S.; Dhong,E.S. | 2005 | Postoperative morphologic analysis of carpal tunnel syndrome using high-resolution ultrasonography | Ann.Plast.Surg | Does not answer a question of interest |
| Lee,C.H.; Kim,T.K.; Yoon,E.S.; Dhong,E.S. | 2005 | Correlation of high-resolution ultrasonographic findings with the clinical symptoms and electrodiagnostic data in carpal tunnel syndrome | Ann.Plast.Surg | insufficient information |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Lee,D.; van Holsbeeck,M.T.; Janevski,P.K.; Ganos,D.L.; Ditmars,D.M.; Darian,V.B. | 1999 | Diagnosis of carpal tunnel syndrome. Ultrasound versus electromyography | Radiol.Clin North Am | cadaver study |
| Lee,Dellon A. | 2005 | Measuring peripheral nerve function: Electrodiagnostic versus neurosensory testing | Atlas of Hand Clinics | Background Information |
| Lee,H.; Jackson,T.A.; Wood,D.J. | 2002 | Carpal tunnel release through a limited skin incision under direct visualization using a new instrument, the carposcope | Plast.Reconstr.Surg | Narrative review |
| Lee,H.J.; Kwon,H.K.; Kim,D.H.; Pyun,S.B. | 2013 | Nerve conduction studies of median motor nerve and median sensory branches according to the severity of carpal tunnel syndrome | Ann.Rehabil.Med | insufficient data; very low study design |
| Lee,J.H.; An,J.H.; Lee,S.H.; Hwang,E.Y. | 2009 | Effectiveness of steroid injection in treating patients with moderate and severe degree of carpal tunnel syndrome measured by clinical and electrodiagnostic assessment | Clin J Pain | Very Low Quality |
| Lee,J.J.; Hwang,S.M.; Jang,J.S.; Lim,S.Y.; Heo,D.H.; Cho,Y.J. | 2010 | Remifentanil-propofol sedation as an ambulatory anesthesia for carpal tunnel release | J Korean Neurosurg.Soc. | Deemed clinically irrelevant |
| Lee,K.Y.; Lee,Y.J.; Koh,S.H. | 2009 | Usefulness of the median terminal latency ratio in the diagnosis of carpal tunnel syndrome | Clin Neurophysiol. | insufficient data; no comparison group |
| Lee,L.H.; Al-Maiyah,M.; Al-Bahrani,R.Z.; Bhargava,A.; Auyeung,J.; Stothard,J. | 2014 | Outcome of carpal tunnel release - Correlation with wrist and wrist-palm anthropomorphic measurements | J Hand Surg Eur.Vol. | Does not address question |
| Lee,W.J.; Liao,Y.C.; Wei,S.J.; Tsai,C.W.; Chang,M.H. | 2011 | How to make electrodiagnosis of carpal tunnel syndrome with normal distal conductions? | J Clin Neurophysiol. | insufficient data; very low study design |
| Lefebvre,J.; de,Seze S.; Lerique,J.L.; Hamonet,C.; Chaumont,P.; Bigot,B.; Dreyfus,P. | 1969 | Aetiology of the carpal tunnel syndrome | Electroencephalogr.Clin Neurophysiol. | not relevant |
| Leffler,C.T.; Gozani,S.N.; Nguyen,Z.Q.; Cros,D. | 2000 | An automated electrodiagnostic technique for detection of carpal tunnel syndrome | Neurology and Clinical Neurophysiology | insufficient data; very low study design |

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| Lehmann,H.J.; Tackmann,W. | 1974 | Neurographic analysis of trains of frequent electric stimuli in the diagnosis of peripheral nerve diseases. Investigations in the carpal tunnel syndrome | Eur.Neurol | &lt;10 patients per group; very low study design |
| Leite,J.C.; Jerosch-Herold,C.; Song,F. | 2006 | A systematic review of the psychometric properties of the Boston Carpal Tunnel Questionnaire | BMC Musculoskelet.Disord. | systematic review |
| Leklem,J.E.; Roe,D.; Smith,J.C.; Raiten,D.; Forlano,A.J.; Colby,F.; Kooss,D.H.; Curtay,J.-P.; Hawrylewicz,E.J. | 1992 | Vitamin B(6): Reservoirs, receptors, and red-cell reactions | Ann.N.Y.Acad.Sci. | Background article |
| Leonard,L.; Rangan,A.; Doyle,G.; Taylor,G. | 2003 | Carpal tunnel syndrome - is high-frequency ultrasound a useful diagnostic tool? | J Hand Surg Br | insufficient data; very low study design |
| Leonard,M.H.; Stern,J.E. | 1970 | Electromyography (EMG) in surgery of the hand | | case series; review of &lt;10 patients |
| Lesser,R.P. | 1986 | Recommended standards for short-latency somatosensory evoked potentials | J.Clin.Neurophysiol. | review; background information |
| Lester,D.K.; Helm,Jr | 1995 | The mini palm incision for carpal tunnel release | Journal of Orthopaedic Techniques | Background article |
| Levine,D.W.; Simmons,B.P.; Koris,M.J.; Daltroy,L.H.; Hohl,G.G.; Fossel,A.H.; Katz,J.N. | 1993 | A self-administered questionnaire for the assessment of severity of symptoms and functional status in carpal tunnel syndrome | J Bone Joint Surg Am | +Does not answer a question of interest |
| Lew,H.L.; Date,E.S.; Pan,S.S.; Wu,P.; Ware,P.F.; Kingery,W.S. | 2005 | Sensitivity, specificity, and variability of nerve conduction velocity measurements in carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data; very low study design |
| Lew,H.L.; Wang,L.; Robinson,L.R. | 2000 | Test-retest reliability of combined sensory index: implications for diagnosing carpal tunnel syndrome | Muscle Nerve | &lt;10 patients per group |
| Lewicky,R.T. | 1994 | Endoscopic carpal tunnel release: the guide tube technique | | |

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| Li,Z.-M. | 2005 | Gender difference in carpal tunnel compliance | Journal of Musculoskeletal Research | Does not answer a question of interest; no diagnosis of CTS |
| Lian,B.T.; Urkude,R.; Verma,K.K. | 2006 | Clinical profile, electrodiagnosis and outcome in patients with carpal tunnel syndrome: A Singapore perspective | Singapore Med.J. | Retrospective case series |
| Liang,C.L. | 1987 | CT-scanning study of cross-sectional area of the carpal tunnel in cases of carpal tunnel syndrome | Nihon Seikeigeka Gakkai Zasshi | +Does not answer a question of interest; very low study design |
| Liao,Y.Y.; Wu,C.C.; Kuo,T.T.; Chen,J.P.; Hsu,Y.W.; Yeh,C.K. | 2012 | Carpal tunnel syndrome diagnosis by a self-normalization process and ultrasound compound imaging | Med Phys | insufficient data; very low study design |
| Lichtman,D.M.; Florio,R.L.; Mack,G.R. | 1979 | Carpal tunnel release under local anesthesia: evaluation of the outpatient procedure | J Hand Surg Am | Retrospective case series |
| Lieberman,J.S.; Taylor,R.G. | 1982 | Physical medicine and rehabilitation-epitomes of progress: electrodiagnostic evaluation of carpal tunnel syndrome | West J Med | Commentary/review |
| Lifchez,S.D.; Murphy,M.S. | 2006 | Endoscopic carpal tunnel release through a single distal portal | Techniques in Orthopaedics | Background article |
| Lillehei,K.O. | 1996 | A review of the management of peripheral nerve entrapment syndromes | Neurosurgery Quarterly | background |
| Lin,C.L.; Yang,C.W.; Chiang,C.C.; Chang,C.T.; Huang,C.C. | 2001 | Long-term on-line hemodiafiltration reduces predialysis beta-2-microglobulin levels in chronic hemodialysis patients | Blood Purif. | Not relevant |
| Lin,P.; Zhang,L.; Yu,Y.B.; Xu,X.L.; Liu,J.; Li,F.; Xu,J. | 2007 | Microsurgical decompression of the median nerves for treating diabetic peripheral neuropathy in the upper limbs: A 21-month follow-up | Neural Regeneration Research | Incorrect patient population (not exclusive to CTS) |
| Linscheid,R.L.; Peterson,L.F.; Juergens,J.L. | 1967 | Carpal-tunnel syndrome associated with vasospasm | J Bone Joint Surg Am | very low quality |
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| Liss,G.M.; Armstrong,C.; Kusiak,R.A.; Gailitis,M.M. | 1992 | Use of provincial health insurance plan billing data to estimate carpal tunnel syndrome morbidity and surgery rates | Am J Ind.Med | retrospective records review; no comparison group |
| Litchman,H.M.; Triedman,M.H.; Silver,C.M.; Simon,S.D. | 1968 | The carpal tunnel syndrome. A clinical and electrodiagnostic study | Int.Surg | background |
| Liu,F.-C.; Liou,J.-T.; Tsai,Y.-F.; Li,A.H.; Day,Y.-Y.; Hui,Y.-L.; Lui,P.-W. | 2005 | Efficacy of ultrasound-guided axillary brachial plexus block: A comparative study with nerve stimulator-guided method | Chang Gung Medical Journal | Incorrect patient population (not exclusive to CTS patients) |
| Lo,Y.L.; Lim,S.H.; Fook-Chong,S.; Lum,S.Y.; Teoh,L.C.; Yong,F.C. | 2012 | Outcome prediction value of nerve conduction studies for endoscopic carpal tunnel surgery | J Clin Neuromuscul.Dis | very low quality |
| Lobardi,R.M.; Wood,M.B.; Linscheid,R.L. | 1988 | Symptomatic restrictive thumb-index flexor tenosynovitis: Incidence of musculotendinous anomalies and results of treatment | Journal of Hand Surgery | Not relevant to CTS |
| Logigian,E.L.; Busis,N.A.; Berger,A.R.; Bruyninckx,F.; Khalil,N.; Shahani,B.T.; Young,R.R. | 1987 | Lumbrical sparing in carpal tunnel syndrome: anatomic, physiologic, and diagnostic implications |  | insufficient data; very low study design |
| Logue,E.J.; Bluhm,S.; Johnson,M.C.; Mazer,R.; Halle,J.S.; Greathouse,D.G. | 2005 | Median and ulnar neuropathies in university cellists | Medical Problems of Performing Artists | Not relevant, prevalence study |
| Longstaff,L.; Milner,R.H.; O'Sullivan,S.; Fawcett,P. | 2001 | Carpal tunnel syndrome: the correlation between outcome, symptoms and nerve conduction study findings | J Hand Surg Br | Retrospective case series |
| Loong,S.C. | 1977 | The carpal tunnel syndrome: a clinical and electrophysiological study of 250 patients | Clin Exp.Neurol | insufficient data; no diagnosis of CTS |
| Loong,S.C.; Seah,C.S. | 1971 | Comparison of median and ulnar sensory nerve action potentials in the diagnosis of the carpal tunnel syndrome | J Neurol Neurosurg.Psychiatry | insufficient data; very low study design |
| Loong,S.C.; Seah,C.S. | 1973 | A sensitive diagnostic test for carpal tunnel syndrome | Neurol.India | insufficient data; no comparison group |

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| Lord,R.W.,Jr. | 2000 | How accurate are the history and physical examination in diagnosing carpal tunnel syndrome (CTS)? | J Fam Pract. | summary document |
| Loscher,W.N.; Auer-Grumbach,M.; Trinka,E.; Ladurner,G.; Hartung,H.P. | 2000 | Comparison of second lumbrical and interosseus latencies with standard measures of median nerve function across the carpal tunnel: a prospective study of 450 hands | J Neurol | insufficient data; very low study design |
| Louda,L.; Hartlova,D.; Muff,V.; Smolikova,L.; Svoboda,L. | 1994 | Impulsive vibration and exposure limit | Nagoya J Med Sci | &lt;10 patients in CTS group; not CTS exclusive |
| Louis,D.S.; Greene,T.L.; Noellert,R.C. | 1985 | Complications of carpal tunnel surgery | J Neurosurg. | Retrospective case series |
| Louis,D.S.; Hankin,F.M. | 1987 | Symptomatic relief following carpal tunnel decompression with normal electroneuromyographic studies | | not best available evidence; very low study design |
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| Lowe,W. | 2008 | Suggested variations on standard carpal tunnel syndrome assessment tests | J Bodyw.Mov Ther | background |
| Lowery,C.L. | 1995 | Sudden joint and extremity pain in pregnancy | Obstet.Gynecol.Clin.North Am. | Background article |
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| Lublin,J.C.; Rojer,D.E.; Barron,O.A. | 1998 | Carpal tunnel syndrome: A review of initial diagnosis and treatment for the ob/gyn | Primary Care Update for Ob/Gyns | background |
| Luchetti,R.; Alfarano,M.; Montagna,G.; Soragni,O. | 1996 | Short palmar incision: a new surgical approach for carpal tunnel syndrome | Chir Organi Mov | Background article |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Luchetti,R.; Schoenhuber,R.; Alfarano,M.; Deluca,S.; De,Cicco G.; Landi,A. | 1994 | Serial overnight recordings of intracarpal canal pressure in carpal tunnel syndrome patients with and without wrist splinting | J Hand Surg Br | Incorrect patients population (&lt;10 patients/group) |
| Luchetti,R.; Schoenhuber,R.; De,Cicco G.; Alfarano,M.; Deluca,S.; Landi,A. | 1989 | Carpal-tunnel pressure | Acta Orthop Scand. | &lt;10 patients per group |
| Luchetti,R.; Schoenhuber,R.; Landi,A. | 1988 | Localized nerve damage recorded intraoperatively in carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Luchetti,R.; Schoenhuber,R.; Landi,A. | 1988 | Assessment of sensory nerve conduction in carpal tunnel syndrome before, during and after operation | J Hand Surg Br | &lt;10 patients per group |
| Luchetti,R.; Schoenhuber,R.; Nathan,P. | 1998 | Correlation of segmental carpal tunnel pressures with changes in hand and wrist positions in patients with carpal tunnel syndrome and controls | J Hand Surg Br | +Does not answer a question of interest |
| Luciano,C.A.; Gilliatt,R.W.; Conwit,R.A. | 1995 | Mixed nerve action potentials in acquired demyelinating polyneuropathy | Muscle Nerve | not exclusive to CTS |
| Lue,Y.J.; Lu,Y.M.; Lin,G.T.; Liu,Y.F. | 2014 | Validation of the chinese version of the Boston carpal tunnel questionnaire | J Occup.Rehabil. | +Does not answer a question of interest; very low study design |
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| Lundborg,G.; Lie-Stenstrom,A.K.; Sollerman,C.; Stromberg,T.; Pyykko,I. | 1986 | Digital vibrogram: a new diagnostic tool for sensory testing in compression neuropathy | J Hand Surg Am | insufficient data; very low study design |
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| Luria,S.; Waitayawinyu,T.; Trumble,T.E. | 2008 | Endoscopic revision of carpal tunnel release | Plast.Reconstr.Surg | Incorrect patient population (prior invasive intervention) |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Luyendijk,W. | 1986 | The carpal tunnel syndrome. The role of a persistent median artery | Acta Neurochir.(Wien.) | Background Information |
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| Lynch,R.M.; Mohr,S.N.; Gochfeld,M. | 1997 | Prediction of tendinitis and carpal tunnel syndrome among solderers | Applied Occupational and Environmental Hygiene | Not relevant |
| Ly-Pen,D.; Andreu,J.L.; de,Blas G.; Sanchez-Olaso,A.; Millan,I. | 2005 | Surgical decompression versus local steroid injection in carpal tunnel syndrome: a one-year, prospective, randomized, open, controlled clinical trial | Arthritis Rheum. | Duplicate patient cohort and data. Extracted from PMID:24321619. |
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| Ma,H.; Kim,I. | 2012 | The diagnostic assessment of hand elevation test in carpal tunnel syndrome | J Korean Neurosurg.Soc. | insufficient data; very low study design |
| Mabie,W.C. | 2005 | Peripheral neuropathies during pregnancy | Clin.Obstet.Gynecol. | Background article |
| Macaire,P.; Choquet,O.; Jochum,D.; Travers,V.; Capdevila,X. | 2005 | Nerve blocks at the wrist for carpal tunnel release revisited: the use of sensory-nerve and motor-nerve stimulation techniques | Reg Anesth.Pain Med | Very low quality |
| Macaire,P.; Singelyn,F.; Narchi,P.; Paqueron,X. | 2008 | Ultrasound- or nerve stimulation-guided wrist blocks for carpal tunnel release: a randomized prospective comparative study | Reg Anesth.Pain Med | Insufficient data (data reported in medians and ranges) |
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| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| MacDermid,J.C.; Kramer,J.F.; Roth,J.H. | 1994 | Decision making in detecting abnormal Semmes-Weinstein monofilament thresholds in carpal tunnel syndrome | J Hand Ther | +Does not answer a question of interest |
| MacDermid,J.C.; Vincent,J.I.; Gan,B.S.; Grewal,R. | 2012 | A blinded placebo-controlled randomized trial on the use of astaxanthin as an adjunct to splinting in the treatment of carpal tunnel syndrome | Hand (N.Y) | Deemed clinically irrelevant (multimodal approach utilized) |
| MacDermid,J.C.; Wessel,J. | 2004 | Clinical diagnosis of carpal tunnel syndrome: a systematic review | J Hand Ther | systematic review |
| Macdonald,G.; Robertson,M.M.; Erickson,J.A. | 1988 | Carpal tunnel syndrome among California dental hygienists | Dent.Hyg.(Chic.) | Not relevant, prevalence study |
| MacDonald,R.I.; Lichtman,D.M.; Hanlon,J.J.; Wilson,J.N. | 1978 | Complications of surgical release for carpal tunnel syndrome | J Hand Surg Am | Retrospective case series |
| Macdonell,R.A.; Schwartz,M.S.; Swash,M. | 1990 | Carpal tunnel syndrome: which finger should be tested? An analysis of sensory conduction in digital branches of the median nerve | Muscle Nerve | insufficient data; very low study design |
| Macfarlane,G.J. | 2001 | Identification and prevention of work-related carpal-tunnel syndrome |  | commentary |
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| Mackinnon,S.E.; Dellon,A.L. | 1988 | Anatomic investigations of nerves at the wrist: I. Orientation of the motor fascicle of the median nerve in the carpal tunnel | Ann.Plast.Surg | cadaver study |
| Macleod,W.N. | 1987 | Repeater F waves: a comparison of sensitivity with sensory antidromic wrist-to-palm latency and distal motor latency in the diagnosis of carpal tunnel syndrome |  | insufficient data; very low study design |
| Maddali,Bongi S.; Signorini,M.; Bassetti,M.; Del,Rosso A.; Orlandi,M.; De,Scisciolo G. | 2013 | A manual therapy intervention improves symptoms in patients with carpal tunnel syndrome: a pilot study | Rheumatol.Int. | Very Low Quality |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Maeda,Y.; Kettner,N.; Lee,J.; Kim,J.; Cina,S.; Malatesta,C.; Gerber,J.; McManus,C.; Im,J.; Libby,A.; Mezzacappa,P.; Morse,L.R.; Park,K.; Audette,J.; Napadow,V. | 2013 | Acupuncture evoked response in contralateral somatosensory cortex reflects peripheral nerve pathology of carpal tunnel syndrome | Medical Acupuncture | insufficient data; very low study design |
| Maeda,Y.; Kettner,N.; Sheehan,J.; Kim,J.; Cina,S.; Malatesta,C.; Gerber,J.; McManus,C.; Mezzacappa,P.; Morse,L.R.; Audette,J.; Napadow,V. | 2013 | Altered brain morphometry in carpal tunnel syndrome is associated with median nerve pathology | Neuroimage Clin | +Does not answer a question of interest |
| Maeda,Y.; Kim,J.; Cina,S.; McManus,C.; Malatesta,C.; Mezzacappa,P.; Morse,L.; Gerber,J.; Ogn-Sutherland,R.; Kuttner,N.; Audette,J.; Napadow,V. | 2013 | Altered brain response to acupuncture after a course of acupuncture therapy for CTS is associated with analgesia | J.Altern.Complement.Med. | Insufficient data |
| Magee,K.R.; Kahn,E.A. | 1967 | The carpal tunnel syndrome | Mich.Med | case reports |
| Maggard,M.A.; Harness,N.G.; Chang,W.T.; Parikh,J.A.; Asch,S.M.; Nuckols,T.K. | 2010 | Indications for performing carpal tunnel surgery: clinical quality measures | Plast.Reconstr.Surg | expert panel review |
| Maghsoudipour,M.; Moghimi,S.; Dehghaan,F.; Rahimpanah,A. | 2008 | Association of occupational and non-occupational risk factors with the prevalence of work related carpal tunnel syndrome | J Occup.Rehabil. | not best evidence for work and demographic exposures |
| Magora,F.; Stern,L.; Magora,A. | 1980 | Motor nerve conduction in intravenous regional anaesthesia with bupivacaine hydrochloride | Br.J.Anaesth. | Incorrect patient population (non-CTS patients) |
| Maher,H.K. | 2007 | Carpal tunnel syndrome: an update | AAOHN J | background |
| Mahoney,J.L.; Dagum,A.B. | 1992 | Carpal tunnel syndrome | Can.Fam.Physician | background |
| Makanji,H.S.; Zhao,M.; Mudgal,C.S.; Jupiter,J.B.; Ring,D. | 2013 | Correspondence between clinical presentation and electrophysiological testing for potential carpal tunnel syndrome | J Hand Surg Eur.Vol. | not best available evidence; insufficient data |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Malchaire,J.; Piette,A.; Cock,N. | 2001 | Associations between hand-wrist musculoskeletal and sensorineural complaints and biomechanical and vibration work constraints | Ann.Occup.Hyg. | Not relevant to CTS |
| Malone,D.G.; Clark,T.B.; Wei,N. | 2010 | Ultrasound-guided percutaneous injection, hydrodissection, and fenestration for carpal tunnel syndrome: Description of a new technique | Journal of Applied Research | Retrospective case series |
| Mandawat,M.K. | 1985 | Congestive heart failure and carpal tunnel syndrome: a rare association | J Indian Med Assoc | case report |
| Mandel,S. | 1987 | Neurologic syndromes from repetitive trauma at work | Postgrad.Med | Background Information |
| Manes,H.R. | 2012 | Prevalence of carpal tunnel syndrome in motorcyclists | | Not relevant, prevalence study |
| Mangonon,M.L.; Moy,O.J.; Kelly,J.J.; Cowan,T.B.; Wheeler,D.R. | 2014 | Effects of corticosteroid injection on nerve conduction testing for the diagnosis of carpal tunnel syndrome | Am J Orthop (Belle.Mead NJ) | Very Low Quality |
| Mangus,B.C. | 1988 | Medical care for wheelchair athletes | Adapted Physical Activity Quarterly | Background Information |
| Manktelow,R.T.; Binhammer,P.; Tomat,L.R.; Bril,V.; Szalai,J.P. | 2004 | Carpal tunnel syndrome: cross-sectional and outcome study in Ontario workers | J Hand Surg Am | Not relevant |
| Margolis,W.; Kraus,J.F. | 1987 | The prevalence of carpal tunnel syndrome symptoms in female supermarket checkers | J Occup.Med | Not relevant, prevalence study |
| Mariano,E.R.; Lehr,M.K.; Loland,V.J.; Bishop,M.L. | 2013 | Choice of loco-regional anesthetic technique affects operating room efficiency for carpal tunnel release | J Anesth. | Very low quality |
| Marin,E.L.; Vernick,S.; Friedmann,L.W. | 1983 | Carpal tunnel syndrome: median nerve stress test | Arch Phys Med Rehabil. | &lt;10 patients per group; insufficient data |
| Marras,W.S.; Marklin,R.W.; Greenspan,G.J.; Lehman,K.R. | 1995 | Quantification of wrist motions during scanning | Hum.Factors | &lt;10 patients per group |
| Marsh,D.R. | 1986 | Use of a wheel aesthesiometer for testing sensibility in the hand. Results in patients with carpal tunnel syndrome | J Hand Surg Br | +Does not answer a question of interest; insufficient data |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Marshall,E.A.; Listinsky,J.J.; Ceckler,T.L.; Szumowski,J.; Bryant,R.G.; Hornak,J.P. | 1989 | Magnetic resonance imaging using a ribbonator: Hand and wrist | Magn.Reson.Med. | Background Information; review |
| Marshall,G.; Edelstein,G.; Hirshman,C.A. | 1980 | Median nerve compression following radial arterial puncture | Anesth.Analg. | case report |
| Marshall,S.; Tardif,G.; Ashworth,N. | 2007 | Local corticosteroid injection for carpal tunnel syndrome | Cochrane Database Syst.Rev. | Systematic review |
| Martin,B.I.; Levenson,L.M.; Hollingworth,W.; Kliot,M.; Heagerty,P.J.; Turner,J.A.; Jarvik,J.G. | 2005 | Randomized clinical trial of surgery versus conservative therapy for carpal tunnel syndrome [ISRCTN84286481] | BMC Musculoskelet.Disord. | Not a completed study. Methodology only. No results. |
| Martin,K.D.; Dutzmann,S.; Sobottka,S.B.; Rambow,S.; Mellerowicz,H.A.; Pinzer,T.; Schackert,G.; Krishnan,K.G. | 2013 | Retractor-Endoscopic Nerve Decompression in Carpal and Cubital Tunnel Syndromes: Outcomes in a Small Series | World Neurosurg. | very low quality |
| Martin,K.-D.; Dutzmann,S.; Sobottka,S.B.; Rambow,S.; Mellerowicz,H.A.; Pinzer,T.; Schackert,G.; Krishnan,K.G. | 2014 | Retractor-endoscopic nerve decompression in carpal and cubital tunnel syndromes: Outcomes in a small series | World Neurosurgery | Very low quality |
| Martin,S. | 1991 | Carpal tunnel syndrome: a job-related risk | Am Pharm. | Commentary/review |
| Martins,R.S.; Siqueira,M.G.; Simplicio,H.; Agapito,D.; Medeiros,M. | 2008 | Magnetic resonance imaging of idiopathic carpal tunnel syndrome: correlation with clinical findings and electrophysiological investigation | Clin Neurol Neurosurg. | insufficient information |
| Martyn,C.N.; Hughes,R.A.C. | 1997 | Epidemiology of peripheral neuropathy | Journal of Neurology Neurosurgery and Psychiatry | background |
| Marx,R.G.; Hudak,P.L.; Bombardier,C.; Graham,B.; Goldsmith,C.; Wright,J.G. | 1998 | The reliability of physical examination for carpal tunnel syndrome | J Hand Surg Br | &lt;10 patients per group |
| Masear,V.R.; Hayes,J.M.; Hyde,A.G. | 1986 | An industrial cause of carpal tunnel syndrome | J Hand Surg Am | very low study design |
| Masini,M.; Tavares-da,Silva R. | 1998 | The carpal tunnel syndrome a comparative study of conventional and endoscopic surgical treatment: analysis of 50 cases | Zentralbl.Neurochir. | Conference abstract |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Masmejean,E.H.; Chavane,H.; Chantegret,A.; Issermann,J.J.; Alnot,J.Y. | 1999 | The wrist of the formula 1 driver | Br J Sports Med | Not relevant, prevalence study |
| Massey,E.W. | 1980 | Rectal biopsy in carpal tunnel syndrome in amyloidosis | N.C Med J | case reports |
| Massey,E.W. | 1978 | Carpal tunnel syndrome in pregnancy | Obstet.Gynecol.Surv. | Narrative review |
| Massey,E.W. | 1988 | Mononeuropathies in pregnancy | Semin.Neurol. | Background article |
| Massey,E.W.; Riley,T.L. | 1981 | Nontraumatic mononeuropathies: a review | Mil.Med | review |
| Massey,E.W.; Riley,T.L.; Pleet,A.B. | 1981 | Coexistent carpal tunnel syndrome and cervical radiculopathy (double crush syndrome) | South Med J | case reports |
| Massy-Westropp,N.; Grimmer,K.; Bain,G. | 2000 | A systematic review of the clinical diagnostic tests for carpal tunnel syndrome | J Hand Surg Am | systematic review |
| Matricali,B.; Mechelse,K.; Staal,A. | 1969 | Carpal-tunnel syndrome |  | letter |
| Mattioli,S.; Baldasseroni,A.; Bovenzi,M.; Curti,S.; Cooke,R.M.; Campo,G.; Barbieri,P.G.; Ghersi,R.; Broccoli,M.; Cancellieri,M.P.; Colao,A.M.; Dell'omo,M.; Fateh-Moghadam,P.; Franceschini,F.; Fucksia,S.; Galli,P.; Gobba,F.; Lucchini,R.; Mandes,A.; Marras,T.; Sgarrella,C.; Borghesi,S.; Fierro,M.; Zanardi,F.; Mancini,G.; Violante,F.S. | 2009 | Risk factors for operated carpal tunnel syndrome: a multicenter population-based case-control study | BMC Public Health | Does not address question of interest |
| Maxwell,J.A.; Clough,C.A.; Reckling,F.W.; Kelly,C.R. | 1973 | Carpal tunnel syndrome. A review of cases treated surgically | J Kans.Med Soc. | Retrospective case series |
| May,D.C. | 2002 | Results of an OSHA ergonomic intervention program in New Hampshire | Appl Occup.Environ.Hyg. | Does not answer a question of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Mayr,H. | 1996 | Acroparaesthesiae and Carpal Tunnel Syndrome - A re-evaluation | European Journal of Physical Medicine and Rehabilitation | not best available evidence |
| McCann,V.J.; Davis,R.E. | 1978 | Carpal tunnel syndrome, diabetes and pyridoxal | Aust.N.Z.J Med | Does not answer a question of interest |
| McCarroll,J.R.; Gioe,T.J. | 1982 | Professional golfers and the price they pay | Physician and Sportsmedicine | insufficient data; no comparison group |
| McCartan,B.; Ashby,E.; Taylor,E.J.; Haddad,F.S. | 2012 | Carpal tunnel syndrome | Br J Hosp.Med (Lond) | background |
| McColl,G.J.; Dolezal,H.; Eizenberg,N. | 2000 | Common corticosteroid injections. An anatomical and evidence based review | Aust.Fam Physician | Narrative review |
| McDeavitt,J.T.; Graziani,V.; Kowalske,K.J.; Hays,R.M. | 1995 | Neuromuscular disease: Rehabilitation and electrodiagnosis. 2. Nerve disease | Arch.Phys.Med.Rehabil. | background |
| McDiarmid,M.; Oliver,M.; Ruser,J.; Gucer,P. | 2000 | Male and female rate differences in carpal tunnel syndrome injuries: personal attributes or job tasks? | Environ.Res. | Prevalence study |
| McDonough,J.W.; Gruenloh,T.J. | 1993 | A comparison of endoscopic and open carpal tunnel release | Wis.Med J | Retrospective case series |
| McGorry,R.W.; Fallentin,N.; Andersen,J.H.; Keir,P.J.; Hansen,T.B.; Pransky,G.; Lin,J.H. | 2014 | Effect of grip type, wrist motion, and resistance level on pressures within the carpal tunnel of normal wrists | J Orthop Res. | +Does not answer a question of interest |
| McGrath,M.H.; Polayes,I.M. | 1979 | Posttraumatic median neuroma: a cause of carpal tunnel syndrome | Ann.Plast.Surg | case reports |
| McLennan,H.G.; Oats,J.N.; Walstab,J.E. | 1987 | Survey of hand symptoms in pregnancy | Med J Aust. | Survey |
| McMinn,D.J. | 1985 | Carpal tunnel syndrome caused by a simple ganglion | J R Coll Surg Edinb. | case report |
| McNally,S.A.; Hales,P.F. | 2003 | Results of 1245 endoscopic carpal tunnel decompressions | Hand Surg | Retrospective case series |
| Mechelse,K.; Matricali,B. | 1970 | A study of the diseased nerve in the carpal tunnel syndrome | Electroencephalogr.Clin Neurophysiol. | not relevant |
| Mechelse,K.; Matricali,B. | 1969 | A study of the diseased nerve in carpal tunnel syndrome | Electroencephalogr.Clin Neurophysiol. | not relevant, one page full text |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Meder,M.A.; Lange,R.; Amtage,F.; Rijntjes,M. | 2012 | Proximal stimulus confirms carpal tunnel syndrome--a new test? --a clinical and electrophysiologic, multiple-blind, controlled study | J Clin Neurophysiol. | +Does not answer a question of interest; very low study design |
| Medina McKeon,J.M.; Yancosek,K.E. | 2008 | Neural gliding techniques for the treatment of carpal tunnel syndrome: a systematic review | J Sport Rehabil. | systematic review |
| Mediouni,Z.; de,Roquemaurel A.; Dumontier,C.; Becour,B.; Garrabe,H.; Roquelaure,Y.; Descatha,A. | 2014 | Is carpal tunnel syndrome related to computer exposure at work? A review and meta-analysis | J Occup.Environ.Med | meta-analysis |
| Meems,M.; Den,Oudsten B.; Meems,B.J.; Pop,V. | 2014 | Effectiveness of mechanical traction as a non-surgical treatment for carpal tunnel syndrome compared to care as usual: study protocol for a randomized controlled trial | Trials | Insufficient data |
| Meena,A.K.; Srinivasa,Rao B.; Sailaja,S.; Mallikarjuna,M.; Borgohain,R. | 2008 | Second lumbrical and interossei latency difference in Carpal Tunnel Syndrome | Clin Neurophysiol. | confounding comorbidities; very low study design |
| Megerian,J.T.; Kong,X.; Gozani,S.N. | 2007 | Utility of nerve conduction studies for carpal tunnel syndrome by family medicine, primary care, and internal medicine physicians | J Am Board Fam Med | +Does not answer a question of interest; not best available evidence |
| Melhorn,J.M. | 1994 | CTD: carpal tunnel syndrome, the facts and myths | Kans.Med | Background Information |
| Melli,G.; Chaudhry,V.; Dorman,T.; Cornblath,D.R. | 2002 | Perioperative bilateral median neuropathy | | Case report |
| Melvin,J.L.; Burnett,C.N.; Johnson,E.W. | 1969 | Median nerve conduction in pregnancy | Arch Phys Med Rehabil. | Does not address question of interest |
| Melvin,J.L.; Johnson,E.W.; Duran,R. | 1968 | Electrodiagnosis after surgery for the carpal tunnel syndrome | Arch Phys Med Rehabil. | Retrospective case series |
| Melvin,J.L.; Schuchmann,J.A.; Lanese,R.R. | 1973 | Diagnostic specificity of motor and sensory nerve conduction variables in the carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Memis,D.; Turan,A.; Karamanlioglu,B.; Pamukcu,Z.; Kurt,I. | 2004 | Adding Dexmedetomidine to Lidocaine for Intravenous Regional Anesthesia | Anesth.Analg. | Deemed clinically irrelevant |
| Mengi-Ozsarac,G. | 2008 | Erratum to "Carpal tunnel syndrome in Parkinson's disease" [Eur. J. Radiol. 67 (3) (2008) 550] (DOI:10.1016/j.ejrad.2008.02.017) | Eur.J.Radiol. | letter to the editor |
| Menon,J. | 1993 | Endoscopic carpal tunnel release: a single-portal technique | Contemp Orthop | Retrospective case series |
| Menon,J.; Etter,C. | 1993 | Endoscopic carpal tunnel release--current status | J Hand Ther | Background article |
| Menovsky,T.; Bartels,R.H.; van Lindert,E.L.; Grotenhuis,J.A. | 2004 | Skin closure in carpal tunnel surgery: a prospective comparative study between nylon, polyglactin 910 and stainless steel sutures | Hand Surg | Does not meet inclusion criteria (invasive follow-up&lt;3 month) |
| Merchut,M.P.; Kelly,M.A.; Toleikis,S.C. | 1990 | Quantitative sensory thresholds in carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Merhar,G.L.; Clark,R.A.; Schneider,H.J.; Stern,P.J. | 1986 | High-resolution computed tomography of the wrist in patients with carpal tunnel syndrome | Skeletal Radiol. | insufficient data; very low study design |
| Merolli,A.; Lo,Monaco M.; Masciangelo,M.; Del,Regno C.; Catalano,F. | 2011 | Abnormal post-operative electrophysiological findings after carpal tunnel release: One-year follow-up | Journal of Orthopaedics and Traumatology | Insufficient data |
| Merolli,A.; Luigetti,M.; Modoni,A.; Masciullo,M.; Lucia,Mereu M.; Lo,Monaco M. | 2013 | Persistence of abnormal electrophysiological findings after carpal tunnel release | J Reconstr.Microsurg. | Does not address question of interest |
| Merrick,J. | 2000 | Musculoskeletal concerns in Down syndrome | International Journal of Adolescent Medicine and Health | review; background information |
| Meservy,D.; Suruda,A.J.; Bloswick,D.; Lee,J.; Dumas,M. | 1997 | Ergonomic risk exposure and upper-extremity cumulative trauma disorders in a maquiladora medical devices manufacturing plant | J.Occup.Environ.Med. | Not relevant |
| Mesgarzadeh,M.; Schneck,C.D.; Bonakdarpour,A.; Mitra,A.; Conaway,D. | 1989 | Carpal tunnel: MR imaging. Part II. Carpal tunnel syndrome |  | summary review; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Meyerdierks,E.M. | 1991 | Upper extremity disorders commonly seen in women | N.C Med J | Background Information |
| Meyers,S.; Cros,D.; Sherry,B.; Vermeire,P. | 1989 | Liquid crystal thermography: quantitative studies of abnormalities in carpal tunnel syndrome |  | insufficient data; very low study design |
| Meys,V.; Thissen,S.; Rozeman,S.; Beekman,R. | 2011 | Prognostic factors in carpal tunnel syndrome treated with a corticosteroid injection | Muscle Nerve | Very Low Quality |
| Mhoon,J.T.; Juel,V.C.; Hobson-Webb,L.D. | 2012 | Median nerve ultrasound as a screening tool in carpal tunnel syndrome: correlation of cross-sectional area measures with electrodiagnostic abnormality | Muscle Nerve | confounded comparisons; not best available evidence |
| Michalsen,A.; Bock,S.; Ludtke,R.; Rampp,T.; Baecker,M.; Bachmann,J.; Langhorst,J.; Musial,F.; Dobos,G.J. | 2009 | Effects of traditional cupping therapy in patients with carpal tunnel syndrome: a randomized controlled trial | J Pain | Does not meet inclusion criteria (follow-up &lt;1 month) |
| Michelotti,B.; Romanowsky,D.; Hauck,R.M. | 2014 | Prospective, randomized evaluation of endoscopic versus open carpal tunnel release in bilateral carpal tunnel syndrome: an interim analysis | Ann Plast Surg | Does not address question of interest |
| Micheo,W.F.; Rodriguez,R.A.; Amy,E. | 1995 | Joint and soft-tissue injections of the upper extremity | Phys.Med.Rehabil.Clin.N.Am. | Background information |
| Michlovitz,S.; Hun,L.; Erasala,G.N.; Hengehold,D.A.; Weingand,K.W. | 2004 | Continuous low-level heat wrap therapy is effective for treating wrist pain | Arch Phys Med Rehabil. | Does not meet inclusion criteria (follow-up &lt;1 month) |
| Mick,G.; Correa-Illanes,G. | 2012 | Topical pain management with the 5% lidocaine medicated plaster--a review | Curr.Med Res.Opin. | systematic review |
| Mihalsky,S. | 1998 | Carpal tunnel syndrome: an overview | J Okla.Dent.Assoc | background |
| Millender,L.H.; Tromanhauser,S.G.; Gaynor,S. | 1996 | A team approach to reduce disability in work-related disorders | Orthop.Clin.North Am. | Background Information |
| Miller,B.K. | 1980 | How to spot - and treat - carpal tunnel syndrome - early | Nursing (Lond). | background |
| Miller,B.K.; Gregory,M. | 1983 | Carpal tunnel syndrome | AORN J | background |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Miller,R.S.; Iverson,D.C.; Fried,R.A.; Green,L.A.; Nutting,P.A. | 1994 | Carpal tunnel syndrome in primary care: a report from ASPN. Ambulatory Sentinel Practice Network | J Fam Pract. | Not relevant, prevalence study |
| Miller,R.S.; Iverson,D.C.; Fried,R.A.; Green,L.A.; Nutting,P.A. | 1994 | Carpal tunnel syndrome in primary care: A report from ASPN | J.Fam.Pract. | duplicate |
| Miller,S.A.; Freivalds,A. | 1995 | A stress-strength interference model for predicting CTD probabilities | International Journal of Industrial Ergonomics | prediction model; does not answer a question of interest |
| Miller,T.T.; Reinus,W.R. | 2010 | Nerve entrapment syndromes of the elbow, forearm, and wrist | Am.J.Roentgenol. | background |
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| Mizrak,A.; Bozgeyik,S.; Karakurum,G.; Kocamer,B.; Oner,U. | 2010 | The addition of low-dose mivacurium to lidocaine for intravenous regional anesthesia | Journal of Musculoskeletal Pain | Deemed clinically irrelevant |
| Mizrak,A.; Gul,R.; Erkutlu,I.; Alptekin,M.; Oner,U. | 2010 | Premedication with dexmedetomidine alone or together with 0.5% lidocaine for IVRA | J Surg Res. | Deemed clinically irrelevant |
| Mizrak,A.; Gul,R.; Ganidagli,S.; Karakurum,G.; Keskinkilic,G.; Oner,U. | 2011 | Dexmedetomidine premedication of outpatients under IVRA | Middle East J Anesthesiol. | Deemed clinically irrelevant |
| Mlakar,M.; Ramstrand,N.; Burger,H.; Vidmar,G. | 2013 | Effect of custom-made and prefabricated orthoses on grip strength in persons with carpal tunnel syndrome | Prosthet.Orthot.Int. | Very Low Quality |
| Mock,L.E. | 1997 | Myofascial release treatment of specific muscles of the upper extremity (Levels 3 and 4): Part 3 | Clinical Bulletin of Myofascial Therapy | Background article |
| Mody,G.N.; Anderson,G.A.; Thomas,B.P.; Pallapati,S.C.; Santoshi,J.A.; Antonisamy,B. | 2009 | Carpal tunnel syndrome in Indian patients: use of modified questionnaires for assessment | J Hand Surg Eur.Vol. | +Does not answer a question of interest |
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| Moghtaderi,A.R.; Moghtaderi,N.; Loghmani,A. | 2011 | Evaluating the effectiveness of local dexamethasone injection in pregnant women with carpal tunnel syndrome | J Res.Med Sci | Very low quality |
| Mohamed,R.E.; Amin,M.A.; Aboelsafa,A.A.; Elsayed,S.E. | 2014 | Contribution of power Doppler and gray-scale ultrasound of the median nerve in evaluation of carpal tunnel syndrome | Egyptian Journal of Radiology and Nuclear Medicine | insufficient data; very low study design |
| Mohammadi,A.; Afshar,A.; Etemadi,A.; Masoudi,S.; Baghizadeh,A. | 2010 | Diagnostic value of cross-sectional area of median nerve in grading severity of carpal tunnel syndrome | Arch Iran Med | very low study design |

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| Mohammadi,A.; Ghasemi-Rad,M.; Mladkova-Suchy,N.; Ansari,S. | 2012 | Correlation between the severity of carpal tunnel syndrome and color Doppler sonography findings | AJR Am J Roentgenol. | insufficient data; very low study design |
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| Mondelli,M.; Aretini,A. | 2015 | Low sensitivity of F-wave in the electrodiagnosis of carpal tunnel syndrome | J.Electromyogr.Kinesiol. | insufficient data; unclear reference standard |
| Mondelli,M.; Baldasseroni,A.; Aretini,A.; Ginanneschi,F.; Padua,L. | 2010 | Prevalent involvement of thenar motor fibres in vineyard workers with carpal tunnel syndrome | Clin Neurophysiol. | Does not answer a question of interest; insufficient data |

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| Mondelli,M.; Giannini,F.; Giacchi,M. | 2002 | Carpal tunnel syndrome incidence in a general population |  | all CTS cases; no comparison group |
| Mondelli,M.; Padua,L.; Giannini,F.; Bibbo,G.; Aprile,I.; Rossi,S. | 2006 | A self-administered questionnaire of ulnar neuropathy at the elbow | Neurol Sci | Not relevant to CTS |
| Mondelli,M.; Padua,L.; Reale,F. | 2004 | Carpal tunnel syndrome in elderly patients: results of surgical decompression | J Peripher.Nerv.Syst. | very low quality |
| Mondelli,M.; Padua,L.; Reale,F.; Signorini,A.M.; Romano,C. | 2004 | Outcome of surgical release among diabetics with carpal tunnel syndrome | Arch Phys Med Rehabil. | Does not address question of interest |
| Mondelli,M.; Passero,S.; Giannini,F. | 2001 | Provocative tests in different stages of carpal tunnel syndrome | Clin Neurol Neurosurg. | insufficient data; very low study design |
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| Monga,T.N.; Laidlow,D.M. | 1982 | Carpal tunnel syndrome. Measurement of sensory potentials using ring and index fingers | Am J Phys Med | insufficient data; very low study design |
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| Moon,H.I.; Kwon,H.K.; Kim,L.; Lee,H.J.; Lee,H.J. | 2014 | Ultrasonography of palm to elbow segment of median nerve in different degrees of diabetic polyneuropathy | Clin.Neurophysiol. | not CTS specific; insufficient data for diagnostic conclusions |
| Moore,A.; Wells,R.; Ranney,D. | 1991 | Quantifying exposure in occupational manual tasks with cumulative trauma disorder potential | | review; background information |
| Moore,J.S. | 1992 | Carpal tunnel syndrome | Occup.Med | Background Information |
| Moore,J.S. | 1991 | Clinical determination of work-relatedness in carpal tunnel syndrome | J Occup.Rehabil. | insufficient data; very low study design |
| Moore,J.S.; Garg,A. | 1995 | The strain index: A proposed method to analyze jobs for risk of distal upper extremity disorders | Am.Ind.Hyg.Assoc.J. | Background Information |
| Moran,E.; Naff,N.J. | 2001 | Endoscopic carpal tunnel release | Seminars in Neurosurgery | Background article |
| Morgan,M.H.; Read,A.E.; Campbell,M.J. | 1979 | Clinical and electrophysiological studies of peripheral nerve function in patients with chronic liver disease | Clin.Sci. | not exclusive to CTS; very low study design |
| Morgan,R.F.; Stuart,J.D.; Persing,J.A.; Edlich,R.F. | 1989 | Peripheral nerve compression in the upper extremity | Compr.Ther. | background |
| Morgan,S. | 1991 | Most factors contributing to CTS can be minimized, if not eliminated | Occup.Health Saf | Background article |
| Morgenlander,J.C.; Lynch,J.R.; Sanders,D.B. | 1997 | Surgical treatment of carpal tunnel syndrome in patients with peripheral neuropathy | | Retrospective case series |
| Mortier,G.; Deckers,K.; Dijs,H.; Vander Auwera,J.C. | 1988 | Comparison of the distal motor latency of the ulnar nerve in carpal tunnel syndrome with a control group | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Mosher,Jr | 2001 | Mini open carpal tunnel release | Journal of the American Society for Surgery of the Hand | Background article |
| Mossman,S.S.; Blau,J.N. | 1987 | Tinel's sign and the carpal tunnel syndrome | Br Med J (Clin Res.Ed) | +not best available evidence |

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| Muffly-Elsey,D.; Flinn-Wagner,S. | 1987 | Proposed screening tool for the detection of cumulative trauma disorders of the upper extremity | J Hand Surg Am | Not relevant to CTS |
| Muhlau,G.; Both,R.; Kunath,H. | 1984 | Carpal tunnel syndrome--course and prognosis | J Neurol | Not relevant to PICO question. |
| Muijser,H.; Hoogendijk,E.M.G.; Hooisma,J.; Twisk,D.A.M. | 1987 | Lead exposure during demolition of a steel structure coated with lead-based paints. II. Reversible changes in the conduction velocity of the motor nerves in transiently exposed workers | Scand.J.Work.Environ.Health | Not relevant to CTS |
| Muller,M.; Tsui,D.; Schnurr,R.; Biddulph-Deisroth,L.; Hard,J.; MacDermid,J.C. | 2004 | Effectiveness of hand therapy interventions in primary management of carpal tunnel syndrome: a systematic review | J Hand Ther | Systematic review |
| Muller-Felber,W.; Landgraf,R.; Reimers,C.D.; Scheuer,R.; Wagner,S.; Nusser,J.; Abendroth,A.; Illner,W.D.; Land,W. | 1993 | High incidence of carpal tunnel syndrome in diabetic patients after combined pancreas and kidney transplantation | Acta Diabetol. | no comparison group; uncontrolled confounders |
| Munirah,M.A.; Normastura,A.R.; Azizah,Y.; Aziah,D. | 2014 | Prevalence of probable carpal tunnel syndrome and its associated factors among dentists in Kelantan | International Journal of Collaborative Research on Internal Medicine and Public Health | no comparison group; prevalence study |
| Murata,K.; Araki,S.; Aono,H. | 1987 | Effects of lead, zinc and copper absorption on peripheral nerve conduction in metal workers | Int.Arch.Occup.Environ.Health | Does not answer a question of interest; no diagnosis of CTS |
| Murata,K.; Araki,S.; Okajima,F.; Saito,Y. | 1996 | Subclinical impairment in the median nerve across the carpal tunnel among female VDT operators | Int.Arch Occup.Environ.Health | insufficient data; no diagnosis of CTS |
| Murata,K.; Araki,S.; Okajima,F.; Saito,Y. | 1996 | Original Article: Subclinical impairment in the median nerve across the carnal tunnel among female VDT operators | Int.Arch.Occup.Environ.Health | Does not answer a question of interest; no diagnosis of CTS |

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| Murga,Oporto L.; Moreno,J.M.; Menendez,C.; Castilla,J.M. | 1994 | The Carpal Tunnel Syndrome. Relationship between median distal motor latency and graded results of needle electromyography | Electromyogr.Clin.Neurophysiol. | Duplicate of AAOD ID 4675 |
| Murphy,F.; Beetham,Jr; Torgerson Jr,W.R. | 1974 | Carpal tunnel syndrome caused by tophaceous gout: Report of two cases with review of the literature | Lahey Clin.Found.Bull. | n&lt;10 |
| Murtagh,J. | 1990 | The painful arm | Aust.Fam Physician | review; background information |
| Murtagh,J. | 1990 | Simple tests for carpal tunnel syndrome | Aust.Fam Physician | Background Information |
| Murthy,J.M.K.; Meena,A.K. | 1995 | Carpal tunnel syndrome - How common is the problem in South India | Neurol.India | not best available evidence; very low study design |
| Murthy,P.G.; Abzug,J.M.; Jacoby,S.M.; Culp,R.W. | 2013 | The tenosynovial flap for recalcitrant carpal tunnel syndrome | Tech.Hand Up Extrem.Surg | Does not address question of interest |
| Musluoglu,L.; Celik,M.; Tabak,H.; Forta,H. | 2004 | Clinical, electrophysiological and magnetic resonance imaging findings in carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | not best available evidence for any MRI abnormality |
| Myers,K.A. | 2000 | Utility of the clinical examination for carpal tunnel syndrome |  | literature review |
| Myles,A.B.; Casemore,V.A.; Coulthard,M. | 1973 | Management of the carpal tunnel syndrome with local corticosteroid injections | Rheumatol.Rehabil. | Very Low Quality |
| Nabhan,A.; Ishak,B.; Al-Khayat,J.; Steudel,W.I. | 2008 | Endoscopic Carpal Tunnel Release using a modified application technique of local anesthesia: safety and effectiveness | J Brachial.Plex.Peripher.Nerve Inj. | Very low quality |
| Nada,M.A.; Nawito,A.M.; Abd-Elhamid,Y.Z.; Fayed,E.N. | 2012 | Assessment of mixed forearm conduction velocity in carpal tunnel syndrome | Egyptian Journal of Neurology, Psychiatry and Neurosurgery | insufficient data; very low study design |

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| Naeser,M.A.; Hahn,K.A.; Lieberman,B.E.; Branco,K.F. | 2002 | Carpal tunnel syndrome pain treated with low-level laser and microamperes transcutaneous electric nerve stimulation: A controlled study | Arch Phys Med Rehabil. | Incorrect patient population (&lt;10 patients/group) |
| Nagle,D.J. | 1995 | Endoscopic carpal tunnel release: Chow dual-portal technique | Instr.Course Lect. | Narrative review |
| Nagle,D.J.; Fischer,T.J.; Harris,G.D.; Hastings,H.; Osterman,A.L.; Palmer,A.K.; Viegas,S.F.; Whipple,T.L.; Foley,M. | 1996 | A multicenter prospective review of 640 endoscopic carpal tunnel releases using the transbursal and extrabursal chow techniques | | very low quality |
| Nagpal,K.; Gossiel,M.; Kumar,H. | 2007 | The impact of tourniquet on patient satisfaction in carpal tunnel decompression | Central European Journal of Medicine | Retrospective case series |
| Nahra,M.E. | 1999 | Carpal tunnel syndrome in the workplace | Current Opinion in Orthopaedics | Background Information |
| Naito,K.; Lequint,T.; Zemirline,A.; Gouzou,S.; Facca,S.; Liverneaux,P. | 2012 | Should we stop oral anticoagulants in the surgical treatment of carpal tunnel syndrome? | Hand (N.Y) | Very low strength |
| Nakamichi,K.; Tachibana,S. | 1997 | Ultrasonographically assisted carpal tunnel release | J Hand Surg Am | Insufficient data (missing N at each follow-up time point) |
| Nakamichi,K.; Tachibana,S. | 1995 | Restricted motion of the median nerve in carpal tunnel syndrome | J Hand Surg Br | insufficient data; very low study design |
| Nakamichi,K.; Tachibana,S. | 1995 | Small hand as a risk factor for idiopathic carpal tunnel syndrome | Muscle Nerve | Short report |
| Nakamichi,K.; Tachibana,S. | 1993 | Unilateral carpal tunnel syndrome and space-occupying lesions | J Hand Surg Br | +Does not answer a question of interest |
| Nakamichi,K.; Tachibana,S.; Yamamoto,S.; Ida,M. | 2010 | Percutaneous carpal tunnel release compared with mini-open release using ultrasonographic guidance for both techniques | J Hand Surg Am | very low quality |
| Nakamichi,K.I.; Tachibana,S. | 2000 | Enlarged median nerve in idiopathic carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |

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| Nakamura,Y.; Uchiyama,S.; Toriumi,H.; Nakagawa,H.; Miyasaka,Ta | 1999 | Longitudinal Median Nerve Conduction Studies After Endoscopic Carpal Tunnel Release | Hand Surg | does not address question of interest |
| Nakano,K.K. | 1991 | Peripheral nerve entrapments, repetitive strain disorder, occupation-related syndromes, bursitis, and tendonitis | Curr.Opin.Rheumatol. | Background Information |
| Nakano,K.K. | 1978 | The entrapment neuropathies | Muscle Nerve | background |
| Nakano,K.K. | 1984 | Liquid crystal contact thermography (LCT) in the evaluation of patients with upper limb entrapment neuropathies | Journal of Neurological and Orthopaedic Surgery | no comparison group; not CTS exclusive |
| Nakazumi,Y.; Hamasaki,M. | 2001 | Electrophysiological studies and physical examinations in entrapment neuropathy: sensory and motor functions compensation for the central nervous system in cases with peripheral nerve damage | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Nakladalova,M.; Fialova,J.; Korycanova,H.; Nakladal,Z. | 1995 | State of health in dental technicians with regard to vibration exposure and overload of upper extremities | Cent.Eur.J Public Health | Not relevant, prevalence study |
| Nalamachu,S.; Nalamasu,R.; Jenkins,J.; Marriott,T. | 2013 | An Open-Label Pilot Study Evaluating the Effectiveness of the Heated Lidocaine/Tetracaine Patch for the Treatment of Pain Associated with Carpal Tunnel Syndrome | Pain Pract. | Very Low Quality |
| Nalamachu,S.; Nalamasu,R.; Jenkins,J.; Marriott,T. | 2014 | An open-label pilot study evaluating the effectiveness of the heated lidocaine/tetracaine patch for the treatment of pain associated with carpal tunnel syndrome | Pain Practice | Does not meet inclusion criteria (follow-up&lt;1 month) |
| Nam,K.P.; Gong,H.S.; Bae,K.J.; Rhee,S.H.; Lee,H.J.; Baek,G.H. | 2014 | The effect of patient involvement in surgical decision making for carpal tunnel release on patient-reported outcome | J Hand Surg Am | Does not address question of interest |
| Namazi,H.; Majd,Z. | 2007 | Carpal tunnel syndrome in patients who are receiving long-term renal hemodialysis | Arch Orthop Trauma Surg | Not relevant, hemodialysis patient |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Nandoe Tewarie,R.D.; Bartels,R.H. | 2010 | The perioperative use of oral anticoagulants during surgical procedures for carpal tunnel syndrome. A preliminary study | Acta Neurochir.(Wien.) | Very low quality |
| Nanthavanij,S. | 1996 | Body height-workstation settings matrix: A practical tool for ergonomic VDT workstation adjustment | International Journal of Industrial Ergonomics | review |
| Napadow,V.; Kettner,N.; Liu,J.; Li,M.; Kwong,K.K.; Vangel,M.; Makris,N.; Audette,J.; Hui,K.K. | 2007 | Hypothalamus and amygdala response to acupuncture stimuli in Carpal Tunnel Syndrome | | Very Low Quality |
| Napadow,V.; Liu,J.; Li,M.; Kettner,N.; Ryan,A.; Kwong,K.K.; Hui,K.K.; Audette,J.F. | 2007 | Somatosensory cortical plasticity in carpal tunnel syndrome treated by acupuncture | Hum.Brain Mapp. | Very Low Quality |
| Naranjo,A.; Ojeda,S.; Arana,V.; Baeta,P.; Fernandez-Palacios,J.; Garcia-Duque,O.; Rodriguez-Lozano,C.; Carmona,L. | 2009 | Usefulness of clinical findings, nerve conduction studies and ultrasonography to predict response to surgical release in idiopathic carpal tunnel syndrome | Clin Exp.Rheumatol. | Does not address question of interest |
| Naranjo,A.; Ojeda,S.; Rua-Figueroa,I.; Garcia-Duque,O.; Fernandez-Palacios,J.; Carmona,L. | 2010 | Limited value of ultrasound assessment in patients with poor outcome after carpal tunnel release surgery | Scand.J Rheumatol. | very low quality |
| Narasimha,P.D.; Rajeev,D.; Dharmanand,B.G. | 2001 | Rheumatological manifestations in hypothyroidism | JK Science | Background Information |
| Nathan,P.A.; Keniston,R.C. | 1993 | Carpal tunnel syndrome and its relation to general physical condition | Hand Clin | inadequate presentation of data. data for risk factors presented as percent of variance explained by variable, without reporting if all of the variables were statistically significant predictors |
| Nathan,P.A.; Keniston,R.C.; Meadows,K.D.; Lockwood,R.S. | 1993 | Predictive value of nerve conduction measurements at the carpal tunnel | Muscle Nerve | Not relevant |

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| Nathan,P.A.; Keniston,R.C.; Myers,L.D.; Meadows,K.D. | 1992 | Obesity as a risk factor for slowing of sensory conduction of the median nerve in industry. A cross-sectional and longitudinal study involving 429 workers | J Occup.Med | insufficient data; no diagnosis of CTS |
| Nathan,P.A.; Meadows,K.D.; Doyle,L.S. | 1988 | Sensory segmental latency values of the median nerve for a population of normal individuals | Arch Phys Med Rehabil. | insufficient data; very low study design |
| Nathan,P.A.; Meadows,K.D.; Doyle,L.S. | 1988 | Occupation as a risk factor for impaired sensory conduction of the median nerve at the carpal tunnel | J Hand Surg Br | insufficient data; no diagnosis of CTS |
| Nathan,P.A.; Meadows,K.D.; Keniston,R.C. | 1993 | Rehabilitation of carpal tunnel surgery patients using a short surgical incision and an early program of physical therapy | J Hand Surg Am | Very low strength |
| Nathan,P.A.; Srinivasan,H.; Doyle,L.S.; Meadows,K.D. | 1990 | Location of impaired sensory conduction of the median nerve in carpal tunnel syndrome | J Hand Surg Br | +Does not answer a question of interest |
| Nathan,P.A.; Wilcox,A.; Emerick,P.S.; Meadows,K.D.; McCormack,A.L. | 2001 | Effects of an aerobic exercise program on median nerve conduction and symptoms associated with carpal tunnel syndrome | J Occup.Environ.Med | Very Low Quality |
| Nau,H.E.; Lange,B.; Lange,S. | 1988 | Prediction of outcome of decompression for carpal tunnel syndrome | J Hand Surg Br | Retrospective case series |
| Neal,N.C.; McManners,J.; Stirling,G.A. | 1987 | Pathology of the flexor tendon sheath in the spontaneous carpal tunnel syndrome | J Hand Surg Br | +Does not answer a question of interest; bio-study |
| Neary,D. | 1980 | Entrapment neuropathy | Br.J.Hosp.Med. | background |
| Nelson,K.H.; Briner,Jr; Cummins,J. | 1995 | Corticosteroid injection therapy for overuse injuries | Am.Fam.Physician | Background article |
| Netscher,D.T. | 2003 | The benefit of transverse carpal ligament reconstruction following open carpal tunnel release | Plast.Reconstr.Surg. | Commentary |

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| Neundorfer,B.; Jaspert,A.; Grehl,H. | 1993 | Nerve entrapment syndromes: Non-surgical treatment and postoperative care | European Journal of Physical Medicine and Rehabilitation | Background article |
| Neustadt,D.H. | 1981 | Complications of local corticosteroid injections | Journal of the American Medical Association | Letter |
| Nicholas,G.G.; Noone,R.B.; Graham,W.P. | 1971 | Carpal tunnel syndrome in pregnancy | | Does not address question of interest |
| Nicholas,J.J.; Reidy,M.; Oleske,D.M. | 1998 | An epidemiologic survey of injury in golfers | Journal of Sport Rehabilitation | not exclusive to CTS; insufficient data |
| Niekel,M.C.; Lindenhovius,A.L.; Watson,J.B.; Vranceanu,A.M.; Ring,D. | 2009 | Correlation of DASH and QuickDASH with measures of psychological distress | J Hand Surg Am | insufficient data; very low study design |
| Niemer,G.W.; Bolster,M.B.; Buxbaum,L.; Judson,M.A. | 2001 | Carpal tunnel syndrome in sarcoidosis | Sarcoidosis Vasc.Diffuse Lung Dis | Not relevant, prevalence study |
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| Niempoog,S.; Sanguanjit,P.; Waitayawinyu,T.; Angthong,C. | 2007 | Local injection of dexamethasone for the treatment of carpal tunnel syndrome in pregnancy | J Med Assoc Thai. | Very low quality |
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| Nimigan,A.S.; Gan,B.S. | 2011 | Pain and efficacy rating of a microprocessor-controlled metered injection system for local anaesthesia in minor hand surgery | Pain Res.Treat. | Deemed clinically irrelevant |
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| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Nitz,A.J.; Dobner,J.J. | 1989 | Upper extremity tourniquet effects in carpal tunnel release | J Hand Surg Am | Does not address question of interest |
| Noble,D.; Richards,T.; Mitchell,D.; Vaidya,A.C. | 2005 | Carpal tunnel syndrome following simultaneous kidney-pancreas transplant | Nephrol.Dial.Transplant | case report |
| Nobuta,S.; Sato,K.; Nakagawa,T.; Hatori,M.; Itoi,E. | 2008 | Effects of wrist splinting for Carpal Tunnel syndrome and motor nerve conduction measurements | Ups.J Med Sci | Very Low Quality |
| Nodera,H.; Herrmann,D.N.; Holloway,R.G.; Logigian,E.L. | 2003 | A Bayesian argument against rigid cut-offs in electrodiagnosis of median neuropathy at the wrist | | insufficient data; very low study design |
| Nolan III,W.B.; Alkaitis,D.; Glickel,S.Z.; Snow,S. | 1992 | Results of treatment of severe carpal tunnel syndrome | Journal of Hand Surgery | Retrospective case series |
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| Nora,D.B.; Becker,J.; Ehlers,J.A.; Gomes,I. | 2004 | Clinical features of 1039 patients with neurophysiological diagnosis of carpal tunnel syndrome | Clin Neurol Neurosurg. | Confounding comorbidities |
| Nord,K.M.; Kapoor,P.; Fisher,J.; Thomas,G.; Sundaram,A.; Scott,K.; Kothari,M.J. | 2008 | False positive rate of thoracic outlet syndrome diagnostic maneuvers | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
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| Novak,L.M. | 2000 | Carpal tunnel syndrome | Lippincotts.Prim.Care Pract. | background |
| Nowak,M.; Noszczyk,B. | 2012 | Simple clinical tests in severe carpal tunnel syndrome | Pol.Przegl.Chir | no comparison group; not best evidence |
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| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Nygaard,I.E.; Saltzman,C.L.; Whitehouse,M.B.; Hankin,F.M. | 1989 | Hand problems in pregnancy | Am Fam Physician | Background Information |
| O'Brian,J.T.; Massey,E.W. | 1979 | Mononeuropathy in diabetes mellitus: a phenomenon easily overlooked | Postgrad.Med | Background Information |
| O'Brien,E.T. | 1984 | Acute fractures and dislocations of the carpus | Orthop.Clin.North Am. | Background Information |
| O'Brien,L.; Hardman,A.; Goldby,S. | 2013 | The impact of a hand therapy screening and management clinic for patients referred for surgical opinion in an Australian public hospital | J Hand Ther | Very low quality |
| O'Connor,D.; Marshall,S.; Massy-Westropp,N. | 2003 | Non-surgical treatment (other than steroid injection) for carpal tunnel syndrome | Cochrane Database Syst.Rev. | Systematic review |
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| Oh,S.; Kim,H.K.; Kwak,J.; Kim,T.; Jang,S.H.; Lee,K.H.; Kim,M.J.; Park,S.B.; Han,S.H. | 2013 | Causes of hand tingling in visual display terminal workers | Ann.Rehabil.Med | &lt;10 patients per group; not exclusive to CTS |
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| Omdal,R.; Mellgren,S.I.; Husby,G. | 1988 | Clinical neuropsychiatric and neuromuscular manifestations in systemic lupus erythematosus | Scand.J Rheumatol. | &lt;10 patients per group; not exclusive to CTS |
| Omer,S.R.; Ozcan,E.; Karan,A.; Ketenci,A. | 2003 | Musculoskeletal system disorders in computer users: Effectiveness of training and exercise programs | Journal of Back and Musculoskeletal Rehabilitation | Incorrect patient population (not exclusive to CTS patients) |
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| Ooi,C.C.; Wong,S.K.; Tan,A.B.; Chin,A.Y.; Abu,Bakar R.; Goh,S.Y.; Mohan,P.C.; Yap,R.T.; Png,M.A. | 2014 | Diagnostic criteria of carpal tunnel syndrome using high-resolution ultrasonography: correlation with nerve conduction studies | Skeletal Radiol | insufficient data; case control |
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| Ortiz-Corredor,F.; Calambas,N.; Mendoza-Pulido,C.; Galeano,J.; Diaz-Ruiz,J.; Delgado,O. | 2011 | Factor analysis of carpal tunnel syndrome questionnaire in relation to nerve conduction studies | Clin Neurophysiol. | +very low study design; not best evidence |
| Osborn,J.B.; Newell,K.J.; Rudney,J.D.; Stoltenberg,J.L. | 1990 | Carpal tunnel syndrome among Minnesota dental hygienists | Northwest.Dent. | Not relevant, prevalence study |
| Osei,D.A.; Boyer,M.I.; Stepan,J.; Gelberman,R.H.; Goldfarb,C.A.; Calfee,R.P. | 2013 | Simultaneous bilateral versus unilateral carpal tunnel release: A prospective comparison of early functional and economic impact in patients with bilateral carpal tunnel syndrome | Journal of Hand Surgery | Abstract/conference poster |
| Osei,D.A.; Calfee,R.P.; Stepan,J.G.; Boyer,M.I.; Goldfarb,C.A.; Gelberman,R.H. | 2014 | Simultaneous Bilateral or Unilateral Carpal Tunnel Release? A Prospective Cohort Study of Early Outcomes and Limitations | J Bone Joint Surg Am | Does not meet inclusion criteria (follow-up&lt;3 months) |
| Osorio,A.M.; Ames,R.G.; Jones,J.; Castorina,J.; | 1994 | Carpal tunnel syndrome among grocery store workers | Am J Ind.Med | not best evidence; confounded comparisons |

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| Rempel,D.;  Estrin,W.;  Thompson,D. | | | | |
| Osterman,M.;  Ilyas,A.M.;  Matzon,J.L. | 2012 | Carpal tunnel syndrome in pregnancy | Orthop Clin North Am | Background artcle |
| Oswalt,C.E. | 1977 | Median nerve injuries and their management | South Med J | background |
| Owen,D.S.,Jr.;  Leshner,R.T.;  McDowell,C.L. | 1987 | Carpal tunnel syndrome | Va.Med | background |
| Owen,Jr;  Leshner,R.T.;  McDowell,C.L. | 1987 | Grand rounds: Carpal tunnel syndrome | Va.Med. | background |
| Owen,R.D. | 1994 | Carpal tunnel syndrome: A products liability prospective | | background |
| Oyedele,O.O.;  Shokunbi,M.T.;  Malomo,A.O. | 2002 | The prevalence of hand pain in Ibadan--implications for the carpal tunnel syndrome | West Afr.J Med | Does not answer a question of interest |
| Ozben,S.;  Acar,H.;  Gunaydin,S.;  Genc,F.;  Ozer,F.;  Ozben,H. | 2012 | The second lumbrical-interosseous latency comparison in carpal tunnel syndrome | J Clin Neurophysiol. | insufficient data; very low study design |
| Ozcan,H.N.;  Kara,M.;  Ozcan,F.;  Bostanoglu,S.;  Karademir,M.A.;  Erkin,G.;  Ozcakar,L. | 2011 | Dynamic Doppler evaluation of the radial and ulnar arteries in patients with carpal tunnel syndrome | AJR Am J Roentgenol. | insufficient data; very low study design |
| Ozdolap,S.;  Emre,U.;  Karamercan,A.;  Sarikaya,S.;  Kokturk,F. | 2013 | Upper limb tendinitis and entrapment neuropathy in coal miners | Am J Ind.Med | prevalence study; insufficient data |
| Ozer,H.;  Solak,S.;  Oguz,T.;  Ocguder,A.;  Colakoglu,T.;  Babacan,A. | 2005 | Alkalinisation of local anaesthetics prescribed for pain relief after surgical decompression of carpal tunnel syndrome | J Orthop Surg (Hong Kong) | Not relevant |
| Ozer,K.;  Malay,S.;  Toker,S.;  Chung,K.C. | 2013 | Minimal clinically important difference of carpal tunnel release in diabetic and nondiabetic patients | Plast.Reconstr.Surg | very low quality |
| Ozge,A.;  Atis,S.;  Sevim,S. | 2001 | Subclinical peripheral neuropathy associated with chronic obstructive pulmonary disease | Electromyogr.Clin Neurophysiol. | insufficient data; not exclusive to CTS |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Ozge,A.; Comelekoglu,U.; Tataroglu,C.; Yalcinkaya,D.E.; Akyatan,M.N. | 2002 | Subtypes of carpal tunnel syndrome: median nerve F wave parameters | Clin Neurol Neurosurg. | insufficient data; very low study design |
| Ozkal,B.; Yaldiz,C.; Asil,K.; Selcuki,D.; Selcuki,M. | 2014 | Preoperative and postoperative evaluation of electromyography and magnetic resonance imaging findings in carpal tunnel syndrome | Journal of Neurological Sciences | Does not address question of interest |
| Ozoran,K.; Paker,N.; Basgoze,O.; Hascelik,Z. | 1989 | Nonsteroid antiinflammatory drug treatment in idiopathic carpal tunnel syndrome | Hacettepe Medical Journal | Very Low Quality |
| Oztas,O.; Turan,B.; Bora,I.; Karakaya,M.K. | 1998 | Ultrasound therapy effect in carpal tunnel syndrome | Arch Phys Med Rehabil. | Very Low Quality |
| Ozyurekoglu,T.; McCabe,S.J.; Goldsmith,L.J.; LaJoie,A.S. | 2006 | The minimal clinically important difference of the Carpal Tunnel Syndrome Symptom Severity Scale | J Hand Surg Am | Very Low Quality |
| Padua,L.; Di,Pasquale A.; Pazzaglia,C.; Liotta,G.A.; Librante,A.; Mondelli,M. | 2010 | Systematic review of pregnancy-related carpal tunnel syndrome | Muscle Nerve | Systematic review |
| Padua,L.; Lo,Monaco M.; Padua,R.; Gregori,B.; Tonali,P. | 1997 | Neurophysiological classification of carpal tunnel syndrome: assessment of 600 symptomatic hands | Ital.J Neurol Sci | Not relevant,does not answer the PICO question |
| Padua,L.; Lo,Monaco M.; Valente,E.M.; Tonali,P.A. | 1996 | A useful electrophysiologic parameter for diagnosis of carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
| Padua,L.; Lo,Monaco M.; Valente,E.M.; Tonali,P.A. | 1996 | Erratum: A useful electrophysiologic parameter for diagnosis of carpal tunnel syndrome (Muscle and Nerve (1996) 19 (48-53)) | Muscle Nerve | abstract correction; no text |
| Padua,L.; LoMonaco,M.; Aulisa,L.; Tamburrelli,F.; Valente,E.M.; Padua,R.; Gregori,B.; Tonali,P. | 1996 | Surgical prognosis in carpal tunnel syndrome: usefulness of a preoperative neurophysiological assessment | Acta Neurol Scand. | Retrospective case series |
| Padua,L.; LoMonaco,M.; Gregori,B.; Valente,E.M.; Padua,R.; Tonali,P. | 1997 | Neurophysiological classification and sensitivity in 500 carpal tunnel syndrome hands | Acta Neurol Scand. | insufficient data; no true comparison group |
| Padua,L.; Padua,R.; Aprile,I.; Caliandro,P.; Tonali,P. | 2005 | Boston Carpal Tunnel Questionnaire: the influence of diagnosis on patient-oriented results | Neurol Res. | +Does not answer a question of interest |

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| Padua,L.; Padua,R.; Lo,Monaco M.; Aprile,I.; Tonali,P. | 1999 | Multiperspective assessment of carpal tunnel syndrome: A multicenter study | | Duplicate results to AAOS ID 995 |
| Padua,L.; Padua,R.; Moretti,C.; Nazzaro,M.; Tonali,P. | 1999 | Clinical outcome and neurophysiological results of low-power laser irradiation in carpal tunnel syndrome | Lasers in Medical Science | Very Low Quality |
| Padua,L.; Pazzaglia,C.; Caliandro,P.; Granata,G.; Foschini,M.; Briani,C.; Martinoli,C. | 2008 | Carpal tunnel syndrome: ultrasound, neurophysiology, clinical and patient-oriented assessment | Clin Neurophysiol. | insufficient data; &lt;10 patients in comparison group |
| Padua,R.; Padua,L.; Bondi,R.; Campi,A.; Ceccarelli,E.; Padua,S. | 2003 | Intrasurgical use of steroids on carpal tunnel syndrome: A randomized, prospective, double-blind controlled study | Journal of Orthopaedics and Traumatology | Does not meet inclusion criteria (invasive follow-up&lt;3 month) |
| Padua,R.; Padua,L.; Ceccarelli,E.; Romanini,E.; Zanoli,G.; Amadio,P.C.; Campi,A. | 2003 | Italian version of the disability of the arm, shoulder and hand (DASH) questionnaire. Cross-cultural adaptation and validation | Journal of Hand Surgery | +Does not answer a question of interest |
| Page,M.J.; Massy-Westropp,N.; O'Connor,D.; Pitt,V. | 2012 | Splinting for carpal tunnel syndrome | Cochrane Database Syst.Rev. | Systematic review |
| Page,M.J.; O'Connor,D.; Pitt,V.; Massy-Westropp,N. | 2013 | Therapeutic ultrasound for carpal tunnel syndrome | Cochrane Database Syst.Rev. | Systematic review |
| Page,M.J.; O'Connor,D.; Pitt,V.; Massy-Westropp,N. | 2012 | Exercise and mobilisation interventions for carpal tunnel syndrome | Cochrane Database Syst.Rev. | systematic review |
| Pagnanelli,D.M.; Barrer,S.J. | 1991 | Carpal tunnel syndrome: surgical treatment using the Paine retinaculatome | J Neurosurg. | Very Low Quality. Prospective case series. |
| Pai,I.; Guy,N.J.; Nicholl,J.E. | 2005 | Carpal tunnel decompression: should the tourniquet be released before or after closure? | European Journal of Orthopaedic Surgery & Traumatology | Insufficient data (irrelevant outcomes) |
| Pajardi,G.; Bortot,P.; Ponti,V.; Novelli,C. | 2014 | Clinical usefulness of oral supplementation with alpha-lipoic Acid, curcumin phytosome, and B-group vitamins in patients with carpal tunnel | Evid.Based Complement Alternat.Med | Not relevant |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| | | syndrome undergoing surgical treatment | | |
| Pajardi,G.; Pegoli,L.; Pivato,G.; Zerbinati,P. | 2008 | Endoscopic carpal tunnel release: our experience with 12,702 cases | Hand Surg | Retrospective case series |
| Pal,B. | 1996 | Rheumatic disorders in diabetes with special reference to orthopaedic surgery in diabetics | Journal of Orthopaedic Rheumatology | Background article |
| Palazzi,S.; Palazzi,J.L. | 1980 | Neurolysis in compressive neuropathies | Int.Surg | Retrospectice case series. Will be Very Low. Patient population is not specific to CTS. |
| Paley,D.; McMurtry,R.Y. | 1985 | Median nerve compression test in carpal tunnel syndrome diagnosis. Reproduces signs and symptoms in affected wrist | Orthop.Rev. | Background Information |
| Paliwal,P.R.; Therimadasamy,A.K.; Chan,Y.C.; Wilder-Smith,E.P. | 2014 | Does measuring the median nerve at the carpal tunnel outlet improve ultrasound CTS diagnosis? | J Neurol Sci | insufficient data; very low study design |
| Palliyath,S.K.; Holden,L. | 1990 | Refractory studies in early detection of carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Palma,G. | 1983 | Carpal tunnel syndrome and hyperparathyroidism | Ann.Neurol. | case report |
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| Palmer,K.; Smith,G.; Kellingray,S.; Cooper,C. | 1999 | Repeatability and validity of an upper limb and neck discomfort questionnaire: the utility of the standardized Nordic questionnaire | Occup.Med (Lond) | not exclusive to CTS |
| Palmer,K.T.; Harris,E.C.; Coggon,D. | 2007 | Carpal tunnel syndrome and its relation to occupation: a systematic literature review | Occup.Med (Lond) | systematic review |
| Palumbo,C.F.; Szabo,R.M.; Olmsted,S.L. | 2000 | The effects of hypothyroidism and thyroid replacement on the development of carpal tunnel syndrome | J Hand Surg Am | &lt;10 patients per group; no comparison group |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Panahi,E.; O'Connor,C.R.; Checa,A. | 2014 | Sonographic assessment of the carpal tunnel syndrome secondary to a tenosynovitis of the flexor digitorum superficialis in a patient with rheumatoid arthritis | J Clin Rheumatol. | case report |
| Paoloni,M.; Tavernese,E.; Cacchio,A.; D',Orazi,V; Ioppolo,F.; Fini,M.; Santilli,V.; Mangone,M. | 2015 | Extracorporeal shock wave therapy and ultrasound therapy improve pain and function in patients with carpal tunnel syndrome. A randomized controlled trial | Eur J Phys Rehabil Med | Incorrect patient population (&lt;10 patients/group) |
| Papaioannou,T.; Rushworth,G.; Atar,D.; Dekel,S. | 1992 | Carpal canal stenosis in men with idiopathic carpal tunnel syndrome | Clin Orthop Relat Res. | insufficient data; very low study design |
| Papez,B.J.; Palfy,M.; Turk,Z. | 2008 | Infrared thermography based on artificial intelligence for carpal tunnel syndrome diagnosis | J.Int.Med.Res. | insufficient data; very low study design |
| Papez,B.J.; Turk,Z. | 2004 | Clinical versus electrodiagnostic effectiveness of splinting in the conservative treatment of carpal-tunnel syndrome | Wien.Klin.Wochenschr. | Very Low Quality |
| Pappas,G.; Markoula,S.; Seitaridis,S.; Akritidis,N.; Tsianos,E. | 2005 | Brucellosis as a cause of carpal tunnel syndrome | Ann.Rheum.Dis. | case report |
| Pardal-Fernandez,J.M.; Vega-Gonzalez,G.; Rodriguez-Vazquez,M.; Iniesta-Lopez,I. | 2012 | A new median motor test: comparison with conventional motor studies in carpal tunnel syndrome | J Clin Neurophysiol. | insufficient data; very low study design |
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| Park,I.J.; Kim,H.M.; Lee,S.U.; Lee,J.Y.; Jeong,C. | 2010 | Opponensplasty using palmaris longus tendon and flexor retinaculum pulley in patients with severe carpal tunnel syndrome | Arch Orthop Trauma Surg | very low quality |
| Parkhad,S.; Palve,S. | 2014 | Utility of nerve conduction study in early diagnosis of Carpal Tunnel Syndrome (CTS) | National Journal of Physiology, Pharmacy and Pharmacology | insufficient data; very low study design |
| Parmet,S. | 2002 | JAMA patient page. Carpal tunnel syndrome | | background |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Parry,G.J.; Sumner,A.J. | 1989 | Nerve conduction and electromyography | Curr.Opin.Neurol.Neurosurg. | Background Information |
| Pascual,E.; Giner,V.; Arostegui,A.; Conill,J.; Ruiz,M.T.; Pico,A. | 1991 | Higher incidence of carpal tunnel syndrome in oophorectomized women | Br J Rheumatol. | &lt;10 patients per group; very low study design |
| Pascuzzi,R.M. | 2003 | Peripheral neuropathies in clinical practice | Med.Clin.North Am. | case reports |
| Pastan,R.S.; Cohen,A.S. | 1978 | The rheumatologic manifestations of diabetes mellitus | Med Clin North Am | Background Information |
| Pasternack,I.I.; Malmivaara,A.; Tervahartiala,P.; Forsberg,H.; Vehmas,T. | 2003 | Magnetic resonance imaging findings in respect to carpal tunnel syndrome | Scand.J Work Environ.Health | systematic review |
| Patel,M.R.; Bassini,L. | 1999 | A comparison of five tests for determining hand sensibility | J Reconstr.Microsurg. | insufficient data; very low study design |
| Patijn,J.; Vallejo,R.; Janssen,M.; Huygen,F.; Lataster,A.; van,Kleef M.; Mekhail,N. | 2011 | Carpal tunnel syndrome | Pain Pract. | background |
| Patijn,J.; Vallejo,R.; Janssen,M.; Huygen,F.; Lataster,A.; van,Kleef M.; Mekhail,N. | 2011 | 19. Carpal Tunnel Syndrome | Pain Practice | Narrative review |
| Patil,A.; Rosecrance,J.; Douphrate,D.; Gilkey,D. | 2012 | Prevalence of carpal tunnel syndrome among dairy workers | Am J Ind.Med | Not relevant, prevalence study |
| Patil,S.; Ramakrishnan,M.; Stothard,J. | 2006 | Local anaesthesia for carpal tunnel decompression: a comparison of two techniques | J Hand Surg Br | |
| Pavesi,G.; Olivieri,M.F.; Misk,A.; Mancia,D. | 1986 | Clinical-electrophysiological correlations in the carpal tunnel syndrome | Ital.J Neurol Sci | insufficient data; no comparison group |
| Pazzaglia,C.; Caliandro,P.; Granata,G.; Tonali,P.; Padua,L. | 2010 | "Dropping objects": a potential index of severe carpal tunnel syndrome | Neurol Sci | Does not answer a question of interest |
| Pease,W.S.; Cannell,C.D.; Johnson,E.W. | 1989 | Median to radial latency difference test in mild carpal tunnel syndrome | Muscle Nerve | insufficient data; no comparison of modalities |
| Pease,W.S.; Cunningham,M.L.; Walsh,W.E.; Johnson,E.W. | 1988 | Determining neurapraxia in carpal tunnel syndrome | Am J Phys Med Rehabil. | Does not answer a question of interest |

| **Authors** | **Year** | **Article Title** | **Periodical** | **Reason for Exclusion** |
|---|---|---|---|---|
| Pease,W.S.; Lee,H.H.; Johnson,E.W. | 1990 | Forearm median nerve conduction velocity in carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Peer,S.; Gruber,H.; Loizides,A. | 2012 | Sonography of carpal tunnel syndrome: Why, when and how | Imaging in Medicine | review; background information |
| Perez-Ruiz,F.; Calabozo,M.; Alonso-Ruiz,A.; Herrero,A.; Ruiz-Lucea,E.; Otermin,I. | 1995 | High prevalence of undetected carpal tunnel syndrome in patients with fibromyalgia syndrome | J Rheumatol. | not best evidence; very low study design |
| Peric,Z.; Sinanovic,O. | 2006 | Sensory-motor index is useful parameter in electroneurographical diagnosis of carpal tunnel syndrome | Bosn.J Basic Med Sci | insufficient data; very low study design |
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| Phalen,G.S. | 1972 | The carpal-tunnel syndrome. Clinical evaluation of 598 hands | Clin Orthop Relat Res. | clinical review |
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| Pickett,J.B. | 1984 | The carpal tunnel syndrome | J S.C Med Assoc | background |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Pierce,R.O. | 1976 | A different surgical approach for carpal tunnel syndrome | J Natl.Med Assoc | Surgical technique/background article |
| Pierre-Jerome,C.; Bekkelund,S.I.; Mellgren,S.I.; Nordstrom,R. | 1997 | Quantitative MRI and electrophysiology of preoperative carpal tunnel syndrome in a female population | | insufficient data; very low study design |
| Pierre-Jerome,C.; Bekkelund,S.I.; Mellgren,S.I.; Torbergsen,T. | 1996 | Quantitative magnetic resonance imaging and the electrophysiology of the carpal tunnel region in floor cleaners | Scand.J Work Environ.Health | Does not answer a question of interest |
| Pierre-Jerome,C.; Smitson,R.D.,Jr.; Shah,R.K.; Moncayo,V.; Abdelnoor,M.; Terk,M.R. | 2010 | MRI of the median nerve and median artery in the carpal tunnel: prevalence of their anatomical variations and clinical significance | Surg Radiol.Anat. | +Does not answer a question of interest |
| Pinilla,I.; Martin-Hervas,C.; Sordo,G.; Santiago,S. | 2008 | The usefulness of ultrasonography in the diagnosis of carpal tunnel syndrome | J Hand Surg Eur.Vol. | insufficient data; very low study design |
| Pinkham,J. | 1988 | Carpal tunnel syndrome sufferers find relief with ergonomic designs | Occup.Health Saf | Background article |
| Piravej,K.; Boonhong,J. | 2004 | Effect of ultrasound thermotherapy in mild to moderate carpal tunnel syndrome | J Med Assoc Thai. | Very Low Quality |
| Pitchford,T. | 1985 | Carpal tunnel syndrome: occupational hazard | Dent.Assist.(Waco.Tx.) | Background Information |
| Piza-Katzer,H. | 2003 | Carpal Tunnel Syndrome: Diagnosis and Treatment | European Surgery - Acta Chirurgica Austriaca | Background article |
| Plaja,J. | 1971 | Comparative value of the different electrodiagnostic methods in the carpal tunnel syndrome | Scand.J Rehabil.Med | insufficient data; very low study design |
| Pocekay,D.; McCurdy,S.A.; Samuels,S.J.; Hammond,S.K.; Schenker,M.B. | 1995 | A cross-sectional study of musculoskeletal symptoms and risk factors in semiconductor workers | Am.J.Ind.Med. | Not relevant, prevalence study |
| Podhorodecki,A.D.; Spielholz,N.I. | 1993 | Electromyographic study of overuse syndromes in sign language interpreters | Arch Phys Med Rehabil. | prevalence study; insufficient data |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Podnar,S. | 2005 | Critical reappraisal of referrals to electromyography and nerve conduction studies | Eur.J Neurol | not exclusive to CTS; insufficient data |
| Polykandriotis,E.; Premm,W.; Horch,R.E. | 2007 | Carpal tunnel syndrome in young adults--an ultrasonographic and neurophysiological study | Minim.Invasive Neurosurg. | &lt;10 patients per group; no comparison group |
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| Ponrouch,M.; Bouic,N.; Bringuier,S.; Biboulet,P.; Choquet,O.; Kassim,M.; Bernard,N.; Capdevila,X. | 2010 | Estimation and pharmacodynamic consequences of the minimum effective anesthetic volumes for median and ulnar nerve blocks: a randomized, double-blind, controlled comparison between ultrasound and nerve stimulation guidance | Anesth.Analg. | Does not address question of interest |
| Porrata,H.; Porrata,A.; Sosner,J. | 2007 | New carpal ligament traction device for the treatment of carpal tunnel syndrome unresponsive to conservative therapy | J Hand Ther | Very Low Quality |
| Porter,P.; Venkateswaran,B.; Stephenson,H.; Wray,C.C. | 2002 | The influence of age on outcome after operation for the carpal tunnel syndrome | Journal of Bone and Joint Surgery - Series B | duplicate of PM:12188486 |
| Pourmand,R. | 1997 | Diabetic neuropathy | Neurol.Clin. | |
| Pourmemari,M.H.; Viikari-Juntura,E.; Shiri,R. | 2014 | Smoking and carpal tunnel syndrome: A meta-analysis | Muscle Nerve | meta-analysis |
| Povlsen,B. | 2010 | High incidence of absent nerve conduction in older patients with bilateral carpal tunnel syndrome | Ann.R Coll Surg Engl. | does not address question of interest |
| Povlsen,B.; Bashir,M.; Wong,F. | 2013 | Long-term result and patient reported outcome of wrist splint treatment for Carpal Tunnel Syndrome | J Plast.Surg Hand Surg | Very Low Quality |
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| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Stecco,A.; Petrocelli,A.; Pasquetti,P. | | | | |
| Pressman,A.; Doumit,G.; Rosaeg,O.; Bell,M. | 2005 | A double-blind randomized controlled trial showing the analgesic and anesthetic properties of lidocaine E to be equivalent to those of ropivicaine and bupivacaine in carpal tunnel release surgery | Can J Plast.Surg | Insufficient data |
| Priganc,V.W.; Henry,S.M. | 2003 | The relationship among five common carpal tunnel syndrome tests and the severity of carpal tunnel syndrome | J Hand Ther | insufficient data; very low study design |
| Pronicka,E.; Tylki-Szymanska,A.; Kwast,O.; Chmielik,J.; Maciejko,D.; Cedro,A. | 1988 | Carpal tunnel syndrome in children with mucopolysaccharidoses: needs for surgical tendons and median nerve release | J Ment.Defic.Res. | Incorrect patient population (non-CTS patients included) |
| Pryse-Phillips,W.E. | 1984 | Validation of a diagnostic sign in carpal tunnel syndrome | J Neurol Neurosurg.Psychiatry | +not best available evidence |
| Pujol,J.; Pascual-Leone,A.; Dolz,C.; Delgado,E.; Dolz,J.L.; Aldoma,J. | 1998 | The effect of repetitive magnetic stimulation on localized musculoskeletal pain | | Incorrect patient population (not exclusive to CTS) |
| Pullopdissakul,S.; Ekpanyaskul,C.; Taptagaporn,S.; Bundhukul,A.; Thepchatri,A. | 2013 | Upper extremities musculoskeletal disorders: Prevalence and associated ergonomic factors in an electronic assembly factory | Int.J Occup.Med Environ.Health | Not relevant, prevalence study |
| Punnett,L.; Robins,J.M.; Wegman,D.H.; Keyserling,W.M. | 1985 | Soft tissue disorders in the upper limbs of female garment workers | Scand.J Work Environ.Health | not exclusive to CTS; &lt;10 non-cases |
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| Pyun,S.B.; Kang,C.H.; Yoon,J.S.; Kwon,H.K.; Kim,J.H.; Chung,K.B.; Oh,Y.W. | 2011 | Application of 3-dimensional ultrasonography in assessing carpal tunnel syndrome | J Ultrasound Med | insufficient data; very low study design |
| Qerama,E.; Kasch,H.; Fuglsang-Frederiksen,A. | 2009 | Occurrence of myofascial pain in patients with possible carpal tunnel syndrome - a single-blinded study | Eur.J Pain | Not relevant, not a CTS correlational study |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Rab,M.; Grunbeck,M.; Beck,H.; Haslik,W.; Schrogendorfer,K.F.; Schiefer,H.P.; Mittlbock,M.; Frey,M. | 2006 | Intra-individual comparison between open and 2-portal endoscopic release in clinically matched bilateral carpal syndrome | J Plast.Reconstr.Aesthet.Surg | Very low quality |
| Radecki,P. | 1994 | The familial occurrence of carpal tunnel syndrome | Muscle Nerve | reference standard not consistent; confounded results |
| Radecki,P. | 1997 | Carpal tunnel syndrome: Effects of personal factors and associated medical conditions | Phys.Med.Rehabil.Clin.N.Am. | Background Information |
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| Radwin,R.G.; Wertsch,J.J.; Jeng,O.J.; Casanova,J. | 1991 | Ridge detection tactility deficits associated with carpal tunnel syndrome | J Occup.Med | &lt;10 patients in CTS group |
| Ragbir,M.; Devaraj,V.S.; Evans,D. | 1997 | The 'yellow fat sign' - a reliable indicator of the completeness of carpal tunnel release | European Journal of Plastic Surgery | Background article |
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| Rahmani,M.; Ghasemi Esfe,A.R.; Vaziri-Bozorg,S.M.; Mazloumi,M.; Khalilzadeh,O.; Kahnouji,H. | 2011 | The ultrasonographic correlates of carpal tunnel syndrome in patients with normal electrodiagnostic tests | Radiol.Med | insufficient data; very low study design |
| Ralte,P.; Selvan,D.; Morapudi,S.; Kumar,G.; Waseem,M. | 2010 | Haemostasis in Open Carpal Tunnel Release: Tourniquet vs Local Anaesthetic and Adrenaline | Open Orthop J | Does not address question of interest |
| Randolph,J.A. | 2000 | Carpal tunnel syndrome. Testing the sensitivity and validity of four "localized discomfort" instruments | AAOHN J | +Does not answer a question of interest; very low study design |
| Rankin,E.A. | 1995 | Carpal tunnel syndrome: issues and answers | J Natl.Med Assoc | background |
| Rashid,M.; Sarwar,S.U.; Haq,E.U.; Islam,M.Z.; | 2006 | Tuberculous tenosynovitis: a cause of Carpal Tunnel Syndrome | J Pak.Med Assoc | all CTS cases; no comparison group |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Rizvi,T.A.; Ahmad,M.; Shah,K. | | | | |
| Rathakrishnan,R.; Therimadasamy,A.K.; Chan,Y.H.; Wilder-Smith,E.P. | 2007 | The median palmar cutaneous nerve in normal subjects and CTS | Clin Neurophysiol. | insufficient data; very low study design |
| Ratzon,N.; Schejter-Margalit,T.; Froom,P. | 2006 | Time to return to work and surgeons' recommendations after carpal tunnel release | Occup.Med (Lond) | very low quality |
| Read,R.L. | 1991 | Stress testing in nerve compression | Hand Clin | Background Information |
| Reddeppa,S.; Bulusu,K.; Chand,P.R.; Jacob,P.C.; Kalappurakkal,J.; Tharakan,J. | 2000 | The sympathetic skin response in carpal tunnel syndrome | Auton.Neurosci. | insufficient data; very low study design |
| Reddy,M.P. | 1983 | Peripheral nerve entrapment syndromes | Am Fam Physician | background |
| Redmond,M.D.; Rivner,M.H. | 1988 | False positive electrodiagnostic tests in carpal tunnel syndrome | Muscle Nerve | only healthy study subjects |
| Reinstein,L. | 1981 | Hand dominance in carpal tunnel syndrome | Arch Phys Med Rehabil. | all CTS cases; no comparison group |
| Reis,P.; Moro,A. | 2012 | Preventing Rsi/Wruld: use of esthesiometry to assess hand tactile sensitivity of slaughterhouse workers | Work | Does not answer a question of interest |
| Remerand,F.; Laulan,J.; Couvret,C.; Palud,M.; Baud,A.; Velut,S.; Laffon,M.; Fusciardi,J. | 2010 | Is the musculocutaneous nerve really in the coracobrachialis muscle when performing an axillary block? An ultrasound study | Anesth.Analg. | Incorrect patient population (not exclusive to CTS) |
| Rempel,D.; Tittiranonda,P.; Burastero,S.; Hudes,M.; So,Y. | 1999 | Effect of keyboard keyswitch design on hand pain | J Occup.Environ.Med | insufficient data; no diagnosis of CTS |
| Resende,L.A.; Adamo,A.S.; Bononi,A.P.; Castro,H.A.; Kimaid,P.A.; Fortinguerra,C.H.; Schelp,A.O. | 2000 | Test of a new technique for the diagnosis of carpal tunnel syndrome | J Electromyogr.Kinesiol. | insufficient data; very low study design |
| Resende,L.A.; Alves,R.P.; Castro,H.A.; Kimaid,P.A.; Fortinguerra,C.R.; Schelp,A.O. | 2000 | Silent period in carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | +Does not answer a question of interest |
| Rettig,A.C. | 1994 | Wrist problems in the tennis player | Med.Sci.Sports Exerc. | Background Information |

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| Rhode,J. | 1990 | Ambidextrous gloves--can they contribute to carpal tunnel syndrome? | Dent.Today | letter |
| Rhodes,K.E. | 1992 | Prescription of diuretic drugs and monitoring of long-term use in one general practice | Br.J.Gen.Pract. | Cross-sectional study |
| Richer,R.J.;  Peimer,C.A. | 2005 | Flexor superficialis abductor transfer with carpal tunnel release for thenar palsy | J Hand Surg Am | Retrospective case series |
| Ritchie,J.R. | 2003 | Orthopedic considerations during pregnancy | Clin Obstet.Gynecol. | Background article |
| Ritting,A.W.;  Leger,R.R.; Tucker,R.;  Mogielnicki,L.H.; Rodner,C.M. | 2011 | Duration of postoperative dressing after mini-open carpal tunnel release: A randomized clinical control trial level 2 evidence | Journal of Hand Surgery | Conference poster |
| Rob,C.;  May,A.G. | 1975 | Neurovascular compression syndromes | Adv.Surg | background |
| Robaux,S.;  Blunt,C.;  Viel,E.; Cuvillon,P.;  Nouguier,P.; Dautel,G.;  Boileau,S.; Girard,F.;  Bouaziz,H. | 2004 | Tramadol added to 1.5% mepivacaine for axillary brachial plexus block improves postoperative analgesia dose-dependently | Anesth.Analg. | Deemed clinically irrelevant |
| Robertson,V.J. | 2010 | A review of therapeutic ultrasound: effectiveness studies |  | Systematic review |
| Robins,R.H. | 1976 | Letter: Carpal tunnel syndrome and tennis elbow | Br Med J | letter |
| Robinson,L.R.;  Micklesen,P.J.; Wang,L. | 1998 | Strategies for analyzing nerve conduction data: superiority of a summary index over single tests | Muscle Nerve | insufficient data; very low study design |
| Robinson,L.R.;  Strakowski,J.; Kennedy,D.J. | 2013 | Is the combined sensory (Robinson) index routinely indicated for all cases of suspected carpal tunnel syndrome undergoing electrodiagnostic evaluation? | PM R | case report; commentary |
| Rodriquez,A.A.;  Radwin,R.G.; Jeng,O.J. | 1993 | Median nerve electrophysiologic parameters and psychomotor performance in carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | +Does not answer a question of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Rojviroj,S.; Sirichativapee,W.; Kowsuwon,W.; Wongwiwattananon,J.; Tamnanthong,N.; Jeeravipoolvarn,P. | 1990 | Pressures in the carpal tunnel. A comparison between patients with carpal tunnel syndrome and normal subjects | J Bone Joint Surg Br | insufficient data; very low study design |
| Roll,S.C.; Case-Smith,J.; Evans,K.D. | 2011 | Diagnostic accuracy of ultrasonography vs. electromyography in carpal tunnel syndrome: a systematic review of literature | Ultrasound Med Biol. | systematic review |
| Roll,S.C.; Evans,K.D.; Li,X.; Freimer,M.; Sommerich,C.M. | 2011 | Screening for carpal tunnel syndrome using sonography | J Ultrasound Med | insufficient data; very low study design |
| Romeo,P.; d'Agostino,M.C.; Lazzerini,A.; Sansone,V.C. | 2011 | Extracorporeal shock wave therapy in pillar pain after carpal tunnel release: a preliminary study | Ultrasound Med Biol. | Very low quality |
| Roquelaure,Y.; Ha,C.; Rouillon,C.; Fouquet,N.; Leclerc,A.; Descatha,A.; Touranchet,A.; Goldberg,M.; Imbernon,E. | 2009 | Risk factors for upper-extremity musculoskeletal disorders in the working population | Arthritis Care Res. | not exclusive to CTS |
| Rosales,R.S.; Diez,de la Lastra,I; McCabe,S.; Ortega Martinez,J.I.; Hidalgo,Y.M. | 2009 | The relative responsiveness and construct validity of the Spanish version of the DASH instrument for outcomes assessment in open carpal tunnel release | J Hand Surg Eur.Vol. | +Does not answer a question of interest |
| Rose,E.H.; Norris,M.S.; Kowalski,T.A.; Lucas,A.; Flegler,E.J. | 1991 | Palmaris brevis turnover flap as an adjunct to internal neurolysis of the chronically scarred median nerve in recurrent carpal tunnel syndrome | J Hand Surg Am | Very Low Quality. Prospective case series. |
| Rosecrance,J.C.; Cook,T.M.; Anton,D.C.; Merlino,L.A. | 2002 | Carpal tunnel syndrome among apprentice construction workers | Am J Ind.Med | Not relevant, prevalence study |
| Rosen,I. | 1993 | Neurophysiological diagnosis of the carpal tunnel syndrome: evaluation of neurographic techniques | Scand.J Plast.Reconstr.Surg Hand Surg | insufficient data; very low study design |
| Rosen,I.; Stromberg,T.; Lundborg,G. | 1993 | Neurophysiological investigation of hands damaged by vibration: comparison with idiopathic carpal tunnel syndrome | Scand.J Plast.Reconstr.Surg Hand Surg | insufficient data; confounded comparison group |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Rosenbaum,R.B.; Donaldson,J.O. | 1994 | Peripheral nerve and neuromuscular disorders | Neurol.Clin. | Narrative review |
| Rosenberg,D.; Conolley,J.; Dellon,A.L. | 2001 | Thenar eminence quantitative sensory testing in the diagnosis of proximal median nerve compression | J Hand Ther | Not exclusive to CTS; &lt;10 patients per group |
| Rosenbloom,A.L. | 1989 | Limitation of finger joint mobility in diabetes mellitus | J Diabet.Complications | review; background information |
| Rosenblum,A. | 1995 | Two simple, very useful nerve conduction tests for carpal tunnel syndrome | Am.J.EEG Technol. | Commentary/review |
| Rosenthal,E.A. | 1987 | Tenosynovitis: tendon and nerve entrapment | Hand Clin | background |
| Ross,P. | 1994 | Ergonomic hazards in the workplace: Assessment and prevention | AAOHN J. | background |
| Rossi,E.; Sighinolfi,E.; Bortolotti,P.; De,Santis G.; Schoenhuber,R.; Grandi,M.; Landi,A. | 1984 | Nocturnal prolactin secretion in carpal tunnel syndrome | Ital.J Neurol Sci | all CTS cases; no comparison group |
| Rossi,S.; Giannini,F.; Passero,S.; Paradiso,C.; Battistini,N.; Cioni,R. | 1994 | Sensory neural conduction of median nerve from digits and palm stimulation in carpal tunnel syndrome | Electroencephalogr.Clin Neurophysiol. | insufficient data; very low study design |
| Rossignol,M.; Stock,S.; Patry,L.; Armstrong,B. | 1997 | Carpal tunnel syndrome: what is attributable to work? The Montreal study | Occup.Environ.Med | Not relevant, incidence study of montreal population metal workers |
| Roth,J.H.; Richards,R.S.; MacLeod,M.D. | 1994 | Endoscopic carpal tunnel release | Can J Surg | very low quality |
| Rottgers,S.A.; Lewis,D.; Wollstein,R.A. | 2009 | Concomitant presentation of carpal tunnel syndrome and trigger finger | J Brachial.Plex.Peripher.Nerve Inj. | +Does not answer a question of interest |
| Rozali,Z.I.; Noorman,F.M.; De Cruz,P.K.; Feng,Y.K.; Razab,H.W.; Sapuan,J.; Singh,R.; Sikkandar,F.M. | 2012 | Impact of carpal tunnel syndrome on the expectant woman's life | Asia Pac.Fam Med | very low quality |
| Rozanski,M.; Neuhaus,V.; Reddy,R.; Jupiter,J.B.; Rathmell,J.P.; Ring,D.C. | 2014 | An open-label comparison of local anesthesia with or without sedation for minor hand surgery | Hand (N Y) | Incorrect patient population (not exclusive to CTS) |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Rozmaryn,L.M. | 1997 | Carpal tunnel syndrome: A comprehensive review | Current Opinion in Orthopaedics | background |
| Rozmaryn,L.M.; Dovelle,S.; Rothman,E.R.; Gorman,K.; Olvey,K.M.; Bartko,J.J. | 1998 | Nerve and tendon gliding exercises and the conservative management of carpal tunnel syndrome | J Hand Ther | Very Low Quality |
| Ruby,L.K. | 1980 | Common hand injuries in the athlete | Orthop Clin North Am | Background Information |
| Ruch,D.S.; Seal,C.N.; Bliss,M.S.; Smith,B.P. | 2002 | Carpal tunnel release: efficacy and recurrence rate after a limited incision release | J South Orthop Assoc | Retrospective case series |
| Rudman,D.; Feller,A.G.; Cohn,L.; Shetty,K.R.; Rudman,I.W.; Draper,M.W. | 1991 | Effects of human growth hormone on body composition in elderly men | Horm.Res. | not relevant to CTS; background information |
| Rudolfer,S.M. | 1992 | CTSS: an interactive microcomputer program for the clinical screening of carpal tunnel syndrome. II. Statistical and computational aspects | Electromyogr.Clin Neurophysiol. | database records review; statistical review |
| Rudolfer,S.M. | 1988 | CTSS: an interactive microcomputer program for the clinical screening of carpal tunnel syndrome. I. Clinical aspects | Electromyogr.Clin Neurophysiol. | review |
| Rudolph,R.; Jaffe,S. | 1975 | Painless fibro fatty hamartoma of the median nerve | Br.J.Plast.Surg. | case report |
| Sabeti-Aschraf,M.; Serek,M.; Pachtner,T.; Auner,K.; Machinek,M.; Geisler,M.; Goll,A. | 2008 | The Enduro motorcyclist's wrist and other overuse injuries in competitive Enduro motorcyclists: a prospective study | Scand.J Med Sci Sports | Not relevant, prevalence study |
| Sable,A.W. | 1998 | Median and ulnar nerves in the hand | Phys.Med.Rehabil.Clin.N.Am. | Background Information |
| Sailer,S.M. | 1996 | The role of splinting and rehabilitation in the treatment of carpal and cubital tunnel syndromes | Hand Clin | Background article |
| Sakakibara,H.; Kondo,T.; Miyao,M.; Yamada,S. | 1994 | Digital nerve conduction velocity as a sensitive indication of peripheral neuropathy in vibration syndrome | Am J Ind.Med | +Does not answer a question of interest |
| Sakellarides,H.T. | 1983 | The management of carpal tunnel compression syndrome. Follow-up of 500 cases over a 25-year period | Orthop.Rev. | +not best available evidence; summary document |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Sakthivel,K.; Madan,S.; O'Connor,D.; Samuel,A.W. | 2006 | Efficacy of a new provocative test for carpal tunnel syndrome: The straight arm raise (SAR) test | European Journal of Orthopaedic Surgery and Traumatology | insufficient data; very low study design |
| Salerno,D.F.; Franzblau,A.; Werner,R.A.; Bromberg,M.B.; Armstrong,T.J.; Albers,J.W. | 1998 | Median and ulnar nerve conduction studies among workers: normative values | Muscle Nerve | Does not answer a question of interest; assessment of thresholds |
| Salinas,M.; Blas,G.; Regidor,I.; LyPen,D.; Andreu,J.; Sanchez,Olaso A. | 2003 | An electro-clinical comparison of carpal tunnel syndrome therapy | Muscle Nerve | Abstract/conference poster |
| Sambandam,S.N.; Priyanka,P.; Gul,A.; Ilango,B. | 2008 | Critical analysis of outcome measures used in the assessment of carpal tunnel syndrome | Int.Orthop | systematic review |
| Sanati,K.A.; Mansouri,M.; Macdonald,D.; Ghafghazi,S.; Macdonald,E.; Yadegarfar,G. | 2011 | Surgical techniques and return to work following carpal tunnel release: a systematic review and meta-analysis | J Occup.Rehabil. | systematic review |
| Sander,H.W.; Quinto,C.; Saadeh,P.B.; Chokroverty,S. | 1999 | Sensitive median-ulnar motor comparative techniques in carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
| Sansone,J.M.; Gatzke,A.M.; Aslinia,F.; Rolak,L.A.; Yale,S.H. | 2006 | Jules Tinel (1879-1952) and Paul Hoffmann (1884-1962) | Clinical Medicine and Research | historical review; background information |
| Sarkar,S.D. | 1968 | Carpal tunnel syndrome | Br J Clin Pract. | background |
| Sarria,L.; Cabada,T.; Cozcolluela,R.; Martinez-Berganza,T.; Garcia,S. | 2000 | Carpal tunnel syndrome: usefulness of sonography | Eur.Radiol. | insufficient data; very low study design |
| Sarris,I.K.; Sotereanos,D.G. | 2004 | Vein wrapping for recurrent median nerve compression | Journal of the American Society for Surgery of the Hand | Background article |
| Sato,Y.; Honda,Y.; Iwamoto,J.; Kanoko,T.; Satoh,K. | 2005 | Amelioration by mecobalamin of subclinical carpal tunnel syndrome involving unaffected limbs in stroke patients | J Neurol Sci | Does not address question of interest |
| Satoh,K.; Nemoto,J. | 1984 | Sub-clinical carpal Tunnel syndrome: Electrophysiological study and natural course | Nihon University Journal of Medicine | not best available evidence; no comparison of modalities |

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| Sauni,R.; Paakkonen,R.; Virtema,P.; Jantti,V.; Kahonen,M.; Toppila,E.; Pyykko,I.; Uitti,J. | 2009 | Vibration-induced white finger syndrome and carpal tunnel syndrome among Finnish metal workers | Int.Arch Occup.Environ.Health | Not relevant |
| Sauzet,O.; Carvajal,A.; Escudero,A.; Molokhia,M.; Cornelius,V.R. | 2013 | Illustration of the weibull shape parameter signal detection tool using electronic healthcare record data | Drug Saf | Not relevant to CTS/ very low study design |
| Sawaya,R.A.; Sakr,C. | 2009 | When is the Phalen's test of diagnostic value: an electrophysiologic analysis? | J Clin Neurophysiol. | confounded comparisons; not best available evidence |
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| Scelsa,S.N.; Herskovitz,S.; Bieri,P.; Berger,A.R. | 1998 | Median mixed and sensory nerve conduction studies in carpal tunnel syndrome | Electroencephalogr.Clin Neurophysiol. | insufficient data; very low study design |
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| Schenck,R.R. | 1995 | The role of endoscopic surgery in the treatment of carpal tunnel syndrome | | Does not address question of interest |

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| Schmid,A.B.; Elliott,J.M.; Strudwick,M.W.; Little,M.; Coppieters,M.W. | 2012 | Effect of splinting and exercise on intraneural edema of the median nerve in carpal tunnel syndrome--an MRI study to reveal therapeutic mechanisms | J Orthop Res. | Does not meet inclusion criteria (follow-up&lt;1 month) |
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| Schottland,J.R.; Kirschberg,G.J.; Fillingim,R.; Davis,V.P.; Hogg,F. | 1991 | Median nerve latencies in poultry processing workers: an approach to resolving the role of industrial "cumulative trauma" in the development of carpal tunnel syndrome | J Occup.Med | insufficient data; no diagnosis of CTS |
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| Schwarz,A.; Keller,F.; Seyfert,S.; Poll,W.; Molzahn,M.; Distler,A. | 1984 | Carpal tunnel syndrome: a major complication in long-term hemodialysis patients | Clin Nephrol. | insufficient data; no comparison groups |
| Schweitzer,G.; Miller,R.D. | 1973 | Carpal tunnel syndrome due to median nerve enlargement | S.Afr.Med J | case report |
| Scoggins,K.M.; Campbell,R.M. | 1995 | Impact of carpal tunnel education on changing dental hygienists knowledge, risk behaviors, symptoms and functional performance | Work | Does not answer a question of interest |
| Sebright,J.A. | 1986 | Gloves, behavior changes can reduce carpal tunnel syndrome | Occup.Health Saf | Background article |
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| See,D.H. | 1980 | Electromyography: when to consider it and what to expect from it | Med Times | Background Information; case reports |
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| Seitz,Jr; Lall,A. | 2013 | Open carpal tunnel release with median neurolysis and Z-plasty reconstruction of the transverse carpal ligament | Current Orthopaedic Practice | very low quality |
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| Sener,H.O.; Tascilar,N.F.; Balaban,H.; Selcuki,D. | 2000 | Sympathetic skin response in carpal tunnel syndrome | Clin Neurophysiol. | insufficient data; very low study design |
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| Seradge,H.; Jia,Y.C.; Owens,W. | 1995 | In vivo measurement of carpal tunnel pressure in the functioning hand | J Hand Surg Am | Does not address question of interest |
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| Seror,P. | 2001 | Simplified orthodromic inching test in mild carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
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| Seror,P. | 2000 | Comparative diagnostic sensitivities of orthodromic or antidromic sensory inching test in mild carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data; very low study design |
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| Seror,P. | 1998 | Pregnancy-related carpal tunnel syndrome | J Hand Surg Br | Insufficient data (included from unpublished data) |
| Seror,P. | 1995 | The value of special motor and sensory tests for the diagnosis of benign and minor median nerve lesion at the wrist | Am J Phys Med Rehabil. | +not best available evidence |
| Seror,P. | 1994 | Sensitivity of the various tests for the diagnosis of carpal tunnel syndrome | J Hand Surg Br | insufficient data; no comparison group |
| Seror,P. | 1991 | Carpal tunnel syndrome in the elderly. "Beware of severe cases" | Ann.Chir Main Memb.Super. | +Does not answer a question of interest |
| Seror,P. | 1988 | Phalen's test in the diagnosis of carpal tunnel syndrome | J Hand Surg Br | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Seror,P.; Seror,R. | 2012 | Hand workload, computer use and risk of severe median nerve lesions at the wrist | Rheumatology (Oxford) | +Does not answer a question of interest |
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| Sesek,R.F.; Khalighi,M.; Bloswick,D.S.; Anderson,M.; Tuckett,R.P. | 2007 | Effects of prolonged wrist flexion on transmission of sensory information in carpal tunnel syndrome | J Pain | Does not answer a question of interest |
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| Shafer,S.W.; Koreerat,N.R.; Gordon,L.B.; Santillo,D.R.; Moore,J.H.; Greathouse,D.G. | 2013 | Median and ulnar neuropathies in u.s. Army medical command band members | Med Probl.Perform.Art. | Not relevant, prevalence study |
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| Shellenbarger,T. | 1991 | When you're asked about carpal tunnel syndrome |  | background |
| Sheon,R.P. | 1997 | Repetitive strain injury 2. Diagnostic and treatment tips on six common problems | Postgrad.Med. | background |
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| Shim,H.;  Shin,B.;  Lee,M.;  Jung,A.;  Lee,H.;  Ernst,E. | 2012 | Acupuncture for carpal tunnel syndrome: A systematic review of randomized controlled trials | BMC Complementary and Alternative Medicine | Presentation |
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| Shiri,R. | 2014 | Hypothyroidism and carpal tunnel syndrome: a meta-analysis | Muscle Nerve | meta-analysis |
| Shiri,R.;  Falah-Hassani,K. | 2015 | Computer use and carpal tunnel syndrome: A meta-analysis | J Neurol Sci | meta-analysis |
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| Shivde,A.J.;  Dreizin,I.;  Fisher,M.A. | 1981 | The carpal tunnel syndrome. A clinical - electrodiagnostic analysis | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Shizukuishi,S.;  Nishii,S.;  Ellis,J.;  Folkers,K. | 1980 | The carpal tunnel syndrome as a probable primary deficiency of vitamin B6 rather than a deficiency of a dependency state | Biochem.Biophys.Res.Commun. | &lt;10 patients per group; does not answer a question of interest |
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| Short,W.H.; Palmer,A.K. | 1981 | Amyloidosis and the carpal tunnel syndrome | Orthop.Rev. | biopsy study; no comparison group |
| Shoushtari,M.J.; Shokri,A.; Shahab,S. | 2007 | Numerical correlation between nerve conduction velocity and compound nerve action potential of median nerve in patients with carpal tunnel syndrome and normal group | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| Shuman,L.H.; Hirsh,H.L. | 1995 | Acute compartment syndromes and entrapment neuropathies | Trauma | background |
| Shuman,S.; Osterman,L.; Bora,F.W. | 1987 | Compression neuropathies | Semin.Neurol | background |
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| Siebenaler,M.J.; McGovern,P. | 1992 | Carpal tunnel syndrome. Priorities for prevention | AAOHN J | Background article |
| Siegmeth,A.W.; Hopkinson-Woolley,J.A. | 2006 | Standard open decompression in carpal tunnel syndrome compared with a modified open technique preserving the superficial skin nerves: a prospective randomized study | J Hand Surg Am | Very low quality |
| Sigmond,E.; Luthra,H.S. | 1980 | Carpal tunnel syndrome | Minn.Med | background |
| Sikka,A.; Kemmann,E.; Vrablik,R.M.; Grossman,L. | 1983 | Carpal tunnel syndrome associated with danazol therapy | Am J Obstet.Gynecol. | Case report |
| Silver,M.A.; Gelberman,R.H.; Gellman,H.; Rhoades,C.E. | 1985 | Carpal tunnel syndrome: associated abnormalities in ulnar nerve function and the effect of carpal tunnel release on these abnormalities | J Hand Surg Am | |
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| Silverstein,B.A.; Fan,Z.J.; Bonauto,D.K.; Bao,S.; Smith,C.K.; Howard,N.; Viikari-Juntura,E. | 2010 | The natural course of carpal tunnel syndrome in a working population | Scand.J Work Environ.Health | very low strength of evidence |
| Silverstein,B.A.; Hughes,R.E. | 1996 | Upper extremity musculoskeletal disorders at a pulp and paper mill | Appl.Ergon. | Not relevant, prevalence study |

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| Sim,H.; Shin,B.C.; Lee,M.S.; Jung,A.; Lee,H.; Ernst,E. | 2011 | Acupuncture for carpal tunnel syndrome: a systematic review of randomized controlled trials | J Pain | Systematic review |
| Sim,Hoseob; Choi,Gwang Ho; Wieland,L.Susan; Lee,Hyangsook; Lee,Myeong Soo; Shin,Byung Cheul | 2014 | Acupuncture and related interventions for the treatment of symptoms associated with carpal tunnel syndrome | Cochrane Database of Systematic Reviews | systematic review |
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| Simmer,Beck M.; Bray,K.K.; Branson,B.; Glaros,A.; Weeks,J. | 2006 | Comparison of muscle activity associated with structural differences in dental hygiene mirrors | Journal of dental hygiene : JDH./ American Dental Hygienists'.Association | +Does not answer a question of interest |
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| Skoff,H.D.; Sklar,R. | 1994 | Endoscopic median nerve decompression: early experience | Plast.Reconstr.Surg | very low quality |
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| Sluiter,J.K.; Rest,K.M.; Frings-Dresen,M.H.W. | 2001 | Criteria document for evaluating the work-relatedness of upper-extremity musculoskeletal disorders | Scand.J.Work.Environ.Health | Background Information |
| Slutsky,D.J. | 2009 | Use of nerve conduction studies and the pressure-specified sensory device in the diagnosis of carpal tunnel syndrome | J Hand Surg Eur.Vol. | insufficient data; very low study design |
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| Smith,J. | 1981 | Radial nerve conduction in patients with carpal tunnel syndrome | Appl Neurophysiol. | +Does not answer a question of interest |
| Smith,N.J. | 2002 | Nerve conduction studies for carpal tunnel syndrome: essential prelude to surgery or unnecessary luxury? | J Hand Surg Br | |

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| Sohn,M.K.; Jee,S.J.; Hwang,S.L.; Kim,Y.J.; Shin,H.D. | 2011 | Motor unit number estimation and motor unit action potential analysis in carpal tunnel syndrome | Ann.Rehabil.Med | insufficient data; very low study design |
| Sohn,S.Y.; Seo,J.H.; Min,Y.; Seo,M.H.; Eun,J.P.; Song,K.J. | 2012 | Changes in Dermatomal Somatosensory Evoked Potentials according to Stimulation Intensity and Severity of Carpal Tunnel Syndrome | J Korean Neurosurg.Soc. | insufficient data; very low study design |
| Soltani,A.M.; Allan,B.J.; Best,M.J.; Mir,H.S.; Panthaki,Z.J. | 2013 | Revision Decompression and Collagen Nerve Wrap for Recurrent and Persistent Compression Neuropathies of the Upper Extremity | Ann.Plast.Surg | systematic review |
| Soltani,A.M.; Allan,B.J.; Best,M.J.; Mir,H.S.; Panthaki,Z.J. | 2013 | A systematic review of the literature on the outcomes of treatment for recurrent and persistent carpal tunnel syndrome | Plast.Reconstr.Surg | systematic review |
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| Sonohata,M.; Tsuruta,T.; Mine,H.; Morimoto,T.; Mawatari,M. | 2013 | The relationship between neuropathic pain, and the function of the upper limbs based on clinical severity according to electrophysiological studies in patients with carpal tunnel syndrome | Open Orthop J | +Does not answer a question of interest |

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| Sorensen,A.A.; Howard,D.; Tan,W.H.; Ketchersid,J.; Calfee,R.P. | 2013 | Minimal clinically important differences of 3 patient-rated outcomes instruments | Journal of Hand Surgery | Incorrect patient population (not exclusive to CTS) |
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| Sozay,S.; Sarfakoglu,A.B.; Ayas,S.; Cetin,N. | 2011 | Diurnal variation in clinical and electrophysiologic parameters associated with carpal tunnel syndrome | Am J Phys Med Rehabil. | +Does not answer a question of interest |
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| Spindler,H.A.; Dellon,A.L. | 1982 | Nerve conduction studies and sensibility testing in carpal tunnel syndrome | J Hand Surg Am | insufficient data |
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| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Spyropoulos,A.C.; Douketis,J.D. | 2012 | How I treat anticoagulated patients undergoing an elective procedure or surgery | | Case reports |
| Sri-Ram,K.; Vellodi,A.; Pitt,M.; Eastwood,D.M. | 2007 | Carpal tunnel syndrome in lysosomal storage disorders: simple decompression or external neurolysis? | J Pediatr Orthop B | very low quality |
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| Stapleton,M.J. | 2006 | Occupation and carpal tunnel syndrome | ANZ J Surg | retrospective review; summary document |
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| Stark,W.A. | 1968 | Carpal tunnel syndrome, failure of surgery | J Indiana State Med Assoc | background |
| Stasinopoulos,D.; Stasinopoulos,I.; Johnson,M.I. | 2005 | Treatment of carpal tunnel syndrome with polarized polychromatic noncoherent light (Bioptron light): a preliminary, prospective, open clinical trial | Photomed.Laser Surg | Very Low Quality |
| Stedt,J.D. | 1989 | Carpal tunnel syndrome: the risk to educational interpreters | Am Ann.Deaf | Background Information |
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| Steinberg,R.B.; Reuben,S.S.; Gardner,G. | 1998 | The dose-response relationship of ketorolac as a component of intravenous regional anesthesia with lidocaine | Anesth.Analg. | Deemed clinically irrelevant |
| Stepic,N.; Novakovic,M.; Martic,V.; Peric,D. | 2008 | Effects of perineural steroid injections on median nerve conduction during the carpal tunnel release | Vojnosanit.Pregl. | Does not address question of interest |
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| Stetson,D.S.; Silverstein,B.A.; Keyserling,W.M.; Wolfe,R.A.; Albers,J.W. | 1993 | Median sensory distal amplitude and latency: Comparisons between nonexposed managerial/professional employees and industrial workers | Am.J.Ind.Med. | Not relevant, not a risk study |
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| Stevens,J.C. | 1997 | AANEM minimonograph 26: The electrodiagnosis of carpal tunnel syndrome | Muscle Nerve | Background Information |
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| Stewart,H.D.; Innes,A.R.; Burke,F.D. | 1985 | The hand complications of Colles' fractures | J Hand Surg Br | no comparison group; not CTS exclusive |
| Stewart,J.D.; Eisen,A. | 1978 | Tinel's sign and the carpal tunnel syndrome | Br Med J | insufficient data; very low study design |
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| Stock,S.R. | 1991 | Workplace ergonomic factors and the development of musculoskeletal disorders of the neck and upper limbs: a meta-analysis | Am J Ind.Med | meta-analysis |

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| Stoehr,M.; Petruch,F.; Scheglmann,K.; Schilling,K. | 1978 | Retrograde changes of nerve fibers with the carpal tunnel syndrome. An electroneurographic investigation | J Neurol | insufficient data; no comparison group |
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| Street,E.R.; Eastwood,G.L.; Royle,S.G. | 2013 | Staged release of bilateral carpal tunnel syndrome: cancellation rates of the second side procedure | J Hand Surg Eur.Vol. | Letter |
| Strickland,J.W.; Gozani,S.N. | 2011 | Accuracy of in-office nerve conduction studies for median neuropathy: a meta-analysis | J Hand Surg Am | meta-analysis |
| Strickland,J.W.; Idler,R.S.; Creighton,J.C. | 1991 | Carpal tunnel syndrome | Indiana Med | background |
| Strohecker,J.; Piotrowski,W.; Lametschwandtner,A. | 1985 | Ultrastructural findings after the use of a CO2 laser in carpal tunnel surgery | Lasers Surg Med | Incorrect patient population (N&lt;10 patients) |
| Stromberg,T.; Dahlin,L.B.; Lundborg,G. | 1996 | Hand problems in 100 vibration-exposed symptomatic male workers | J Hand Surg Br | not assessing RF of CTS but if CTS causes other problems |
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| Strong,D.R.; Lennartz,F.H. | 1992 | Carpal tunnel syndrome | J Calif.Dent.Assoc | background |

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| Stutz,N.; Gohritz,A.; van,Schoonhoven J.; Lanz,U. | 2006 | Revision surgery after carpal tunnel release--analysis of the pathology in 200 cases during a 2 year period | J Hand Surg Br | Incorrect patient population (prior invasive intervention) |
| Su,C.Y.; Liang,W.L.; Chen-Sea,M.J.; Liu,C.W.; Huang,M.H.; Lai,Y.C. | 2004 | Physician practices in the diagnosis of carpal tunnel syndrome at a medical center in southern Taiwan | Kaohsiung J Med Sci | records review |
| Su,P.H.; Chen,W.S.; Wang,T.G.; Liang,H.W. | 2013 | Correlation between subclinical median neuropathy and the cross-sectional area of the median nerve at the wrist | Ultrasound Med Biol. | insufficient data; very low study design |
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| Sugimoto,H.; Miyaji,N.; Ohsawa,T. | 1994 | Carpal tunnel syndrome: evaluation of median nerve circulation with dynamic contrast-enhanced MR imaging |  | &lt;10 patients per group |
| Sundar,S.; Gonzalez-Cueto,J.A.; Gilbert,C.S. | 2008 | Conduction velocity distribution estimation using the collision technique-Theory and simulation study | Biomedical Signal Processing and Control | Background Information |
| Sunderland,S. | 1976 | The nerve lesion in the carpal tunnel syndrome | J Neurol Neurosurg.Psychiatry | Background Information; review |

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| Sunderland,S. | 1974 | The restoration of median nerve function after destructive lesions which preclude end to end repair | | Background article |
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| Suresh,S.S.; Raniga,S.; Shanmugam,V.; George,M.; Zaki,H. | 2013 | Carpal tunnel syndrome due to hydroxyapatite crystal deposition disease | J Hand Microsurg. | case report |
| Sutro,C.J. | 1969 | Carpal tunnel syndrome caused by calcification in the deep or volar radio-carpal ligament | Bull Hosp.Joint Dis | case report |
| Swajian,G.R. | 1981 | Carpal tunnel syndrome: a five-year study | J Am Osteopath.Assoc | background |
| Swinton,N.W.,Jr.; Rosen,B.J.; Shefer,A.L.; Leach,R.E. | 1970 | The carpal tunnel syndrome and multiple myeloma | Lahey.Clin Found.Bull | case report |
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| Szabo,R.M.; Madison,M. | 1992 | Carpal tunnel syndrome | Orthop Clin North Am | Background article |
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| Szczechowicz,J.; Pieniazek,M.; Pelczar-Pieniazek,M. | 2008 | Restoration of hand function and ability to perform activities of daily living following surgery for carpal tunnel syndrome | Ortop.Traumatol.Rehabil. | Results not completely in English |
| Szyluk,K.; Koczy,B.; Jasinski,A.; Widuchowski,J.; Widuchowski,W. | 2006 | Evaluation of results of single portal endoscopic carpal tunnel release | Ortop.Traumatol.Rehabil. | not in english |
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| Tackmann,W.; Kaeser,H.E.; Magun,H.G. | 1981 | Comparison of orthodromic and antidromic sensory nerve conduction velocity measurements in the carpal tunnel syndrome | J Neurol | insufficient data; very low study design |
| Tackmann,W.; Lehmann,H.J. | 1974 | Relative refractory period of median nerve sensory fibres in the carpal tunnel syndrome | Eur.Neurol | &lt;10 patients per group |
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| Tahririan,M.A.; Moghtaderi,A.; Aran,F. | 2012 | Changes in electrophysiological parameters after open carpal tunnel release | Adv.Biomed Res. | very low quality |
| Tai,T.W.; Wu,C.Y.; Su,F.C.; Chern,T.C.; Jou,I.M. | 2012 | Ultrasonography for diagnosing carpal tunnel syndrome: a meta-analysis of diagnostic test accuracy | Ultrasound Med Biol. | meta-analysis |
| Tait,P. | 1976 | Carpal tunnel syndrome. The physiotherapist's role | Nurs.Mirror Midwives J | background |
| Tajika,T.; Kobayashi,T.; Yamamoto,A.; Kaneko,T.; Takagishi,K. | 2013 | Diagnostic utility of sonography and correlation between sonographic and clinical findings in patients with carpal tunnel syndrome | J Ultrasound Med | insufficient data; very low study design |
| Talebi,G.A.; Oskouei,A.E.; Shakori,S.K. | 2012 | Reliability of upper limb tension test 1 in normal subjects and patients with carpal tunnel syndrome | J Back Musculoskelet.Rehabil. | insufficient data; very low study design |
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| Talia,B.; Landi,A. | 1976 | Intraoperative thermography in micro surgery: physiopathologic study of the carpal tunnel syndrome | Acta Thermographica | Background article |
| Tan,M.; Tan,U. | 1998 | Correlation of carpal tunnel size and conduction velocity of the sensory median and ulnar nerves of male and female controls and carpet weavers | Percept.Mot.Skills | all healthy subjects; no CTS diagnosis determined |
| Tanaka,H.; Hashizume,H.; McCown,C.; Senda,M.; Nishida,K.; Inoue,H. | 2005 | Accuracy of a portable electroneurometer for measuring distal motor latency | J Orthop Sci | +does not answer a question of interest; very low study design |

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| Tanaka,S.; Wild,D.K.; Seligman,P.J.; Halperin,W.E.; Behrens,V.J.; Putz-Anderson,V. | 1995 | Prevalence and work-relatedness of self-reported carpal tunnel syndrome among U.S. workers: analysis of the Occupational Health Supplement data of 1988 National Health Interview Survey | Am J Ind.Med | Not relevant, prevalence study |
| Tanaka,Shiro; McGlothlin,James D. | 1993 | A conceptual quantitative model for prevention of work-related carpal tunnel syndrome (CTS) | International Journal of Industrial Ergonomics | Background Information |
| Tardif,G.S. | 1995 | Nerve injuries: Testing and treatment tactics | Physician and Sportsmedicine | background |
| Tascioglu,F.; Degirmenci,N.A.; Ozkan,S.; Mehmetoglu,O. | 2012 | Low-level laser in the treatment of carpal tunnel syndrome: clinical, electrophysiological, and ultrasonographical evaluation | Rheumatol.Int. | Does not meet inclusion criteria (follow-up &lt;1 month) |
| Tasdelen,N.; Gurses,B.; Kilickesmez,O.; Firat,Z.; Karlikaya,G.; Tercan,M.; Ulug,A.M.; Gurmen,A.N. | 2012 | Diffusion tensor imaging in carpal tunnel syndrome | Diagn.Interv.Radiol. | insufficient data; very low study design |
| Tat,J.; Kociolek,A.M.; Keir,P.J. | 2013 | Repetitive differential finger motion increases shear strain between the flexor tendon and subsynovial connective tissue | J Orthop Res. | Not relevant to CTS |
| Tawfik,E.A.; El Zohiery,A.K.; Abaza,N.M. | 2013 | The second lumbrical-interossei latency difference in carpal tunnel syndrome: Is it a mandatory or a dispensable test? | Alexandria Journal of Medicine | insufficient data; very low study design |
| Tay,L.B.; Urkude,R.; Verma,K.K. | 2006 | Clinical profile, electrodiagnosis and outcome in patients with carpal tunnel syndrome: a Singapore perspective | Singapore Med J | +Does not answer a question of interest |
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| Tchou,S.; Costich,J.F.; Burgess,R.C.; Wexler,C.E. | 1992 | Thermographic observations in unilateral carpal tunnel syndrome: report of 61 cases | J Hand Surg Am | insufficient data; very low study design |
| Teasell,R.W.; McClure,J.A.; Walton,D.; Pretty,J.; Salter,K.; | 2010 | A research synthesis of therapeutic interventions for whiplash-associated disorder (WAD): part 5 - surgical and | Pain Res.Manag. | Not relevant to CTS |

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| Meyer,M.; Sequeira,K.; Death,B. | | injection-based interventions for chronic WAD | | |
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| Tekeoglu,I.; Dogan,A.; Demir,G.; Dolar,E. | 2007 | The pneumatic compression test and modified pneumatic compression test in the diagnosis of carpal tunnel syndrome | J Hand Surg Eur.Vol. | insufficient data; very low study design |
| Tekin,I.; Mirzai,H.; Ok,G. | 2005 | Carpal tunnel release under intravenous regional anaesthesia with ropivacaine or lidocaine | Pain Clinic | Deemed clinically irrelevant |
| Teli,M.; Bidwell,J.; Kinninmonth,A.; Zoccali,C. | 2005 | Prevalence and treatment of carpal tunnel syndrome in renal haemodialysis | Chir Organi Mov | insufficient data; very low study design |
| Tennent,T.D.; Goddard,N.J. | 1997 | Carpal tunnel decompression: open vs endoscopic | Br J Hosp.Med | Background article |
| Terrono,A.L. | 2005 | Carpal tunnel syndrome in rheumatoid or inflammatory arthritic patients | Atlas of Hand Clinics | Background Information |
| Terzis,S.; Paschalis,C.; Metallinos,I.C.; Papapetropoulos,T. | 1998 | Early diagnosis of carpal tunnel syndrome: comparison of sensory conduction studies of four fingers | Muscle Nerve | insufficient data; very low study design |
| Tetro,A.M.; Evanoff,B.A.; Hollstien,S.B.; Gelberman,R.H. | 1998 | A new provocative test for carpal tunnel syndrome. Assessment of wrist flexion and nerve compression | J Bone Joint Surg Br | insufficient data; very low study design |
| Tetro,A.M.; Evanoff,B.A.; Hollstien,S.B.; Gelberman,R.H. | 1998 | A new provocative test for carpal tunnel syndrome | Journal of Bone and Joint Surgery - Series B | insufficient data; very low study design |
| Tezel,E.; Imer,B.; Numanoglu,A. | 2002 | Carpal tunnel release via limited palmar incision using rhinoplasty instruments | Marmara Medical Journal | Retrospective case series |
| Thal,H.U. | 1998 | Advantages and pitfalls of endoscopic versus open surgery of carpal ligament in carpal tunnel syndrome | Zentralbl.Neurochir. | Abstract/conference poster |
| Thoma,A. | 2014 | Methylprednisolone injections reduced carpal tunnel syndrome symptoms at 10 weeks and surgery at 1 year | Ann.Intern.Med | Duplicate study (AAOS ID 146) |
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| | | trials comparing endoscopic and open carpal tunnel release | | |
| Thoma,A.; Veltri,K.; Haines,T.; Duku,E. | 2004 | A meta-analysis of randomized controlled trials comparing endoscopic and open carpal tunnel decompression | Plast.Reconstr.Surg | meta-analysis |
| Thoma,A.; Veltri,K.; Haines,T.; Duku,E. | 2004 | A systematic review of reviews comparing the effectiveness of endoscopic and open carpal tunnel decompression | Plast.Reconstr.Surg | Systematic review |
| Thomas,J.E.; Lambert,E.H.; Cseuz,K.A. | 1967 | Electrodiagnostic aspects of the carpal tunnel syndrome | Arch Neurol | +very low study design; not best evidence |
| Thomas,M.; Heron,C. | 2008 | Imaging of common nerve entrapment syndromes | CPD Journal Radiology Update | Background Information |
| Thomas,R.E.; Butterfield,R.K.; Hool,J.N.; Herrick,R.T. | 1993 | Effects of exercise on carpal tunnel syndrome symptoms | Appl Ergon. | Incorrect patient population (&lt;10 patients/group) |
| Thompson,J.S.; Phelps,T.H. | 1990 | Repetitive strain injuries. How to deal with 'the epidemic of the 1990s' | Postgrad.Med | Background Information |
| Thomsen,J.F.; Gerr,F.; Atroshi,I. | 2008 | Carpal tunnel syndrome and the use of computer mouse and keyboard: a systematic review | BMC Musculoskelet.Disord. | systematic review |
| Thomsen,J.F.; Mikkelsen,S. | 2003 | Interview data versus questionnaire data in the diagnosis of carpal tunnel syndrome in epidemiological studies | Occup.Med (Lond) | very low study design |
| Thomsen,N.O.; Bjork,J.; Cederlund,R.I. | 2014 | Health-related quality of life 5 years after carpal tunnel release among patients with diabetes: a prospective study with matched controls | BMC Endocr.Disord. | Does not address question of interest |
| Thomsen,N.O.; Cederlund,R.; Rosen,I.; Bjork,J.; Dahlin,L.B. | 2009 | Clinical outcomes of surgical release among diabetic patients with carpal tunnel syndrome: prospective follow-up with matched controls | J Hand Surg Am | Does not address question of interest |
| Thomsen,N.O.; Cederlund,R.; Speidel,T.; Dahlin,L.B. | 2011 | Vibrotactile sense in patients with diabetes and carpal tunnel syndrome | Diabet.Med | all CTS cases; no comparison group |

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| Thomsen,N.O.; Cederlund,R.I.; Andersson,G.S.; Rosen,I.; Bjork,J.; Dahlin,L.B. | 2014 | Carpal tunnel release in patients with diabetes: a 5-year follow-up with matched controls | J Hand Surg Am | Does not address question of interest |
| Thomsen,N.O.; Rosen,I.; Dahlin,L.B. | 2010 | Neurophysiologic recovery after carpal tunnel release in diabetic patients | Clin Neurophysiol. | Does not address question of interest |
| Thonnard,J.; Saels,P.; Van den Bergh,P.; Lejeune,T. | 1999 | Effects of chronic median nerve compression at the wrist on sensation and manual skills | Exp.Brain Res. | insufficient data; very low study design |
| Thungen,T.; Sadowski,M.; El,Kazzi W.; Schuind,F. | 2012 | Value of Gilliatt's pneumatic tourniquet test for diagnosis of carpal tunnel syndrome | Chir Main | +Does not answer a question of interest; insufficient data |
| Thurston,A.J.; Krause,B.L. | 1988 | The possible role of vascular congestion in carpal tunnel syndrome | J Hand Surg Br | &lt;10 patients after exclusions |
| Tittiranonda,P.; Rempel,D.; Armstrong,T.; Burastero,S. | 1999 | Effect of four computer keyboards in computer users with upper extremity musculoskeletal disorders | Am J Ind.Med | Not exclusive to CTS; not best available evidence |
| Tobin,S.M. | 1967 | Carpal tunnel syndrome in pregnancy | Am J Obstet.Gynecol. | Incorrect patient population (&lt;10 patients/group) |
| Tobin,W.E.; Jeffreys,D.E. | 1973 | Detection of carpal tunnel syndrome | Arch Phys Med Rehabil. | +Does not answer a question of interest; insufficient data |
| Todnem,K.; Lundemo,G. | 2000 | Median nerve recovery in carpal tunnel syndrome | Muscle Nerve | no patient oriented outcomes |
| Tolonen,U.; Kallio,M.; Ryhanen,J.; Raatikainen,T.; Honkala,V.; Lesonen,V. | 2007 | A handheld nerve conduction measuring device in carpal tunnel syndrome | Acta Neurol Scand. | clinician deemed insufficient methods; lack of training and proper reporting |
| Tomaino,M.M.; Weiser,R.W. | 2001 | Carpal tunnel release for advanced disease in patients 70 years and older: does outcome from the patient's perspective justify surgery? | J Hand Surg Br | Retrospective case series |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
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| Tomlinson,P.J.; Field,J. | 2010 | Warm or refrigerated local anaesthetic for open carpal tunnel release: a single blind randomized controlled study | J Hand Surg Eur.Vol. | Deemed clinically irrelevant |
| Tommaso,M.; Libro,G.; Difruscolo,O.; Sardaro,M.; Serpino,C.; Calabrese,R.; Vecchio,E.; Livrea,P. | 2009 | Laser evoked potentials in carpal tunnel syndrome | Clinical neurophysiology : official.journal of the International Federation of Clinical Neurophysiology | +Does not answer a question of interest |
| Toosi,K.K.; Impink,B.G.; Baker,N.A.; Boninger,M.L. | 2011 | Effects of computer keyboarding on ultrasonographic measures of the median nerve | Am J Ind.Med | biomechanical study; no diagnosis of CTS |
| Torpy,J.M.; Lynm,C.; Golub,R.M. | 2011 | JAMA patient page. Carpal tunnel syndrome | | background |
| Torrens,M.J. | 1995 | Endoscopic neurosurgery | Neurosurgery Quarterly | Background article |
| Tortland,P.D. | 2003 | Nonsurgical management of carpal tunnel syndrome | Techniques in Orthopaedics | background |
| Totten,P.A.; Hunter,J.M. | 1991 | Therapeutic techniques to enhance nerve gliding in thoracic outlet syndrome and carpal tunnel syndrome | Hand Clin | Background article |
| Tountas,C.P.; MacDonald,C.J.; Meyerhoff,J.D.; Bihrle,D.M. | 1983 | Carpal tunnel syndrome. A review of 507 patients | Minn.Med | Very Low Quality |
| Townshend,D.N.; Taylor,P.K.; Gwynne-Jones,D.P. | 2005 | The outcome of carpal tunnel decompression in elderly patients | J Hand Surg Am | Retrospective case series |
| Toyonaga,K.; DeFaria,C.R. | 1978 | Electromyographic diagnosis of the carpal tunnel syndrome | Arq Neuropsiquiatr. | insufficient data; very low study design |
| Tremblay,F.; Mireault,A.C.; Letourneau,J.; Pierrat,A.; Bourrassa,S. | 2002 | Tactile perception and manual dexterity in computer users | Somatosens.Mot.Res. | Not relevant, prevalence study |
| Trimm,A.; Evans,J.H. | 1966 | Carpal tunnel syndrome. A note on conservative treatment | | Retrospective case series |
| Trumble,T.E.; Gilbert,M.; McCallister,W.V. | 2001 | Endoscopic versus open surgical treatment of carpal tunnel syndrome | Neurosurg.Clin N.Am | background |
| Tsai,C.P.; Liu,C.Y.; Lin,K.P.; Wang,K.C | 2006 | Efficacy of botulinum toxin type a in the relief of Carpal tunnel syndrome: A preliminary experience | Clin Drug Investig. | Incorrect patient population (&lt;10 patients) |
| Tseng,C.-H.; Wang,P.-Y. | 2000 | Electrophysiological study of carpal tunnel syndrome | Acta Neurologica Taiwanica | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Tsou,I.Y.Y.; Khoo,J.N. | 2012 | Ultrasound of the wrist and hand | Ultrasound Clinics | Background Information |
| Tsujii,M.; Hirata,H.; Morita,A.; Uchida,A. | 2009 | Palmar bowing of the flexor retinaculum on wrist MRI correlates with subjective reports of pain in carpal tunnel syndrome | J Magn Reson.Imaging | insufficient data; very low study design |
| Tucker,A.T.; White,P.D.; Kosek,E.; Pearson,R.M.; Henderson,M.; Coldrick,A.R.; Cooke,E.D.; Kidd,B.L. | 2007 | Comparison of vibration perception thresholds in individuals with diffuse upper limb pain and carpal tunnel syndrome | | +Does not answer a question of interest |
| Turgut,F.; Cetinsahinahin,M.; Turgut,M.; Bolukbasi,O. | 2001 | The management of carpal tunnel syndrome in pregnancy | J Clin Neurosci. | Not relevant,does not answer the PICO question |
| Turgut,S.T.; Icagasioglu,A.; Selimoglu,E.; Atlig,R.S.; Adatepe,T.; Mesci,E. | 2013 | The relationship between electrodiagnostic findings and the DN4 questionnaire in patients with carpal tunnel syndrome | Journal of Musculoskeletal Pain | insufficient data; no comparison group |
| Turhanoglu,A.D.; Beyazova,M. | 2003 | Reaction time and movement time in patients with carpal tunnel syndrome: an electromyographic study | Clin Biomech.(Bristol., Avon.) | not best available evidence |
| Tuzuner,S.; Inceoglu,S.; Bilen,F.E. | 2008 | Median nerve excursion in response to wrist movement after endoscopic and open carpal tunnel release | J Hand Surg Am | Incorrect patient population (&lt;10 patients/group) |
| Tuzuner,S.; Ozkaynak,S.; Acikbas,C.; Yildirim,A. | 2004 | Median nerve excursion during endoscopic carpal tunnel release | | very low quality |
| Tzamaloukas,A.H.; Kunzelman,C.L.; Carroll,L.L.; Scremin,A.E.; Merlin,T.L.; Avasthi,P.S.; Bicknell,J.M. | 1988 | Carpel tunnel syndrome in patients on chronic hemodialysis | Dialysis and Transplantation | insufficient data; no comparison group |
| Tzeng,S.S.; Wu,Z.A.; Chu,F.L. | 1990 | Proximal slowing of nerve conduction velocity in carpal tunnel syndrome | Zhonghua Yi Xue Za Zhi (Taipei) | insufficient data; very low study design |
| UÃ§ar,B.Y.; -Demirta?-A; Bulut,M.; Azboy,I.; UÃ§ar,D. | 2012 | Carpal tunnel decompression: two different mini-incision techniques | Eur.Rev.Med.Pharmacol.Sci. | duplicate of PM:22696883 |
| Ubogu,E.E.; Benatar,M. | 2006 | Electrodiagnostic criteria for carpal tunnel syndrome in axonal polyneuropathy | Muscle Nerve | not exclusive to CTS |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Uchiyama,S.; Imaeda,T.; Toh,S.; Kusunose,K.; Sawaizumi,T.; Wada,T.; Okinaga,S.; Nishida,J.; Omokawa,S. | 2007 | Comparison of responsiveness of the Japanese Society for Surgery of the Hand version of the carpal tunnel syndrome instrument to surgical treatment with DASH, SF-36, and physical findings | J Orthop Sci | +not best available evidence |
| Uchiyama,S.; Itsubo,T.; Yasutomi,T.; Nakagawa,H.; Kamimura,M.; Kato,H. | 2005 | Quantitative MRI of the wrist and nerve conduction studies in patients with idiopathic carpal tunnel syndrome | J Neurol Neurosurg.Psychiatry | insufficient data; very low study design |
| Uchiyama,S.; Yasutomi,T.; Fukuzawa,T.; Nakagawa,H.; Kamimura,M.; Kato,H. | 2007 | Reducing neurologic and vascular complications of endoscopic carpal tunnel release using a modified chow technique | | very low quality |
| Uemura,T.; Hidaka,N.; Nakamura,H. | 2010 | Clinical outcome of carpal tunnel release with and without opposition transfer | J Hand Surg Eur.Vol. | very low quality |
| Ugurlu,U.; Ozkan,M.; Ozdogan,A.H. | 2007 | Development of a "Neuro-orthosis" for the control of wrist movements in patients with carpal tunnel syndrome: preliminary results | Conf.Proc.IEEE Eng Med Biol.Soc. | background |
| Ugurlu,U.; Ozkan,M.; Ozdogan,H. | 2008 | The development of a new orthosis (neuro-orthosis) for patients with carpal tunnel syndrome: its effect on the function and strength of the hand | Prosthet.Orthot.Int. | Very Low Quality |
| Ulasli,A.M.; Duymus,M.; Nacir,B.; Rana,Erdem H.; Kosar,U. | 2013 | Reasons for using swelling ratio in sonographic diagnosis of carpal tunnel syndrome and a reliable method for its calculation | Muscle Nerve | insufficient data; very low study design |
| Umbach,I.; Parent,A. | 1990 | Median and cubital nerve compression in paraplegics | Journal of Rehabilitation Sciences | not exclusive to CTS; no unexposed group |
| Uncini,A.; Di,Muzio A.; Awad,J.; Manente,G.; Tafuro,M.; Gambi,D. | 1993 | Sensitivity of three median-to-ulnar comparative tests in diagnosis of mild carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
| Uncini,A.; Di,Muzio A.; Cutarella,R.; Awad,J.; Gambi,D. | 1990 | Orthodromic median and ulnar fourth digit sensory conductions in mild carpal tunnel syndrome | Neurophysiol.Clin | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Uncini,A.; Lange,D.J.; Solomon,M.; Soliven,B.; Meer,J.; Lovelace,R.E. | 1989 | Ring finger testing in carpal tunnel syndrome: a comparative study of diagnostic utility | Muscle Nerve | insufficient data; very low study design |
| Upatham,S.; Kumnerddee,W. | 2008 | Reliability of Thai version Boston questionnaire | J Med Assoc Thai. | +Does not answer a question of interest |
| Upton,A.R.; McComas,A.J. | 1973 | The double crush in nerve entrapment syndromes |  | not relevant |
| Upton,J.; Littler,J.W.; Eaton,R.G. | 1979 | Primary care of the injured hand, part 2 | Postgrad.Med | Background information |
| Urbaniak,J.R.; Roth,J.H. | 1982 | Office diagnosis and treatment of hand pain | Orthop Clin North Am | Background Information |
| Uygur,F.; Sever,C.; Yuksel,F. | 2009 | Comparing the results of limited incision technique and standard longitudinal incision technique for carpal tunnel decompression by numerical grading system | Turk Neurosurg. | very low quality |
| Uzar,E.; Tamam,Y.; Acar,A.; Yucel,Y.; Palanci,Y.; Cansever,S.; Cevik,M.U.; Tasdemir,N. | 2011 | Sensitivity and specificity of terminal latency index and residual latency in the diagnosis of carpal tunnel syndrome | Eur.Rev.Med Pharmacol.Sci | insufficient data; no comparison group |
| Vahdatpour,B.; Raissi,G.R.; Hollisaz,M.T. | 2007 | Study of the ulnar nerve compromise at the wrist of patients with carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | Not relevant, prevalence study |
| Vaile,J.H.; Mathers,D.M.; Ramos-Remus,C.; Russell,A.S. | 1999 | Generic health instruments do not comprehensively capture patient perceived improvement in patients with carpal tunnel syndrome | J Rheumatol. | Very Low Quality |
| Valenta,L.J. | 1975 | Hyperparathyroidism due to parathyroid adenoma and carpal tunnel syndrome | Ann.Intern.Med | case report |
| Valls,J.; Llanas,J.M. | 1988 | Orthodromic study of the sensory fibers innervating the fourth finger | Muscle Nerve | insufficient data; very low study design |
| Valls-Sole,J.; Alvarez,R.; Nunez,M. | 1995 | Limited longitudinal sliding of the median nerve in patients with carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
| Van Beek,A.L.; Lim,P. | 2003 | Nerve compressions syndromes | Operative Techniques in Plastic and Reconstructive Surgery | Background Information |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| van den Bekerom,M.P.; Breemans,E.; Schaffer,K. | 2006 | Outcome of open versus endoscopic approach for the surgical treatment of carpal tunnel syndrome | Acta Orthop Belg. | very low quality |
| van Dijk,M.A.; Reitsma,J.B.; Fischer,J.C.; Sanders,G.T. | 2003 | Indications for requesting laboratory tests for concurrent diseases in patients with carpal tunnel syndrome: a systematic review | Clin Chem. | systematic review |
| van Doesburg,M.H.; Henderson,J.; Yoshii,Y.; Mink van der Molen AB; Cha,S.S.; An,K.N.; Amadio,P.C. | 2012 | Median nerve deformation in differential finger motions: ultrasonographic comparison of carpal tunnel syndrome patients and healthy controls | J Orthop Res. | insufficient data; very low study design |
| van Rijn,R.M.; Huisstede,B.M.; Koes,B.W.; Burdorf,A. | 2009 | Associations between work-related factors and the carpal tunnel syndrome--a systematic review | Scand.J Work Environ.Health | systematic review |
| Van Ypersele de,Strihou C.; Jadoul,M.; Malghem,J.; Maldague,B.; Jamart,J. | 1991 | Effect of dialysis membrane and patient's age on signs of dialysis-related amyloidosis | Kidney Int. | Does not answer a question of interest; no comparison group |
| Vanwijck,R.; Bouillenne,C. | 1986 | HL-A and carpal tunnel syndrome | Clin Rheumatol. | bio-study; no comparison group |
| Varitimidis,S.E.; Herndon,J.H.; Sotereanos,D.G. | 1999 | Failed endoscopic carpal tunnel release. Operative findings and results of open revision surgery | J Hand Surg Br | Incorrect patient population (pre-existing invasive treated patients) |
| Vasen,A.P.; Kuntz,K.M.; Simmons,B.P.; Katz,J.N. | 1999 | Open versus endoscopic carpal tunnel release: a decision analysis | J Hand Surg Am | Decision analysis study |
| Vasiliadis,H.S.; Georgoulas,P.; Shrier,I.; Salanti,G.; Scholten,R.J. | 2014 | Endoscopic release for carpal tunnel syndrome | Cochrane Database Syst.Rev. | Systematic review |
| Vasiliadis,H.S.; Xenakis,T.A.; Mitsionis,G.; Paschos,N.; Georgoulis,A. | 2010 | Endoscopic versus open carpal tunnel release |  | very low quality |
| Vasiliadis,Haris S.; Georgoulas,Petros; Shrier,Ian; Salanti,Georgia; Scholten-Rob,J.P.M. | 2014 | Endoscopic release for carpal tunnel syndrome | Cochrane Database of Systematic Reviews | systematic review |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Vasiliadis,Haris S.; Sakellaridou,Maria Eleni; Shrier,Ian; Salanti,Georgia; Scholten-Rob,J.P.M. | 2014 | Open release for carpal tunnel syndrome | Cochrane Database of Systematic Reviews | systematic review |
| Vaughan,N.M.; Pease,W.S. | 1997 | Postoperative complications of carpal tunnel surgery | Phys.Med.Rehabil.Clin.N.Am. | Case report |
| Vellani,G.; Dallari,D.; Fatone,F.; Martella,D.; Bonomini,V.; Gualtieri,G. | 1993 | Carpal tunnel syndrome in hemodialyzed patients | Chir Organi Mov | no control group |
| Verdugo,R.J.; Salinas,R.A.; Castillo,J.L.; Cea,J.G. | 2008 | Surgical versus non-surgical treatment for carpal tunnel syndrome | Cochrane Database Syst.Rev. | Systematic review |
| Verghese,J.; Galanopoulou,A.S.; Herskovitz,S. | 2000 | Autonomic dysfunction in idiopathic carpal tunnel syndrome | Muscle Nerve | all CTS cases; no comparison group |
| Verhagen,A.P.; Karels,C.; Bierma-Zeinstra,S.M.; Feleus,A.; Dahaghin,S.; Burdorf,A.; de Vet,H.C.; Koes,B.W. | 2007 | Ergonomic and physiotherapeutic interventions for treating work-related complaints of the arm, neck or shoulder in adults. A Cochrane systematic review | Eura.Medicophys. | Not relevant to CTS |
| Verhagen,A.P.; Karels,C.; Bierma-Zeinstra,S.M.; Feleus,A.; Dahaghin,S.; Burdorf,A.; Koes,B.W. | 2007 | Exercise proves effective in a systematic review of work-related complaints of the arm, neck, or shoulder | J Clin Epidemiol. | systematic review |
| Viegas,S.F.; Pollard,A.; Kaminksi,K. | 1992 | Carpal arch alteration and related clinical status after endoscopic carpal tunnel release | J Hand Surg Am | Does not address question of interest |
| Viera,A.J. | 2003 | Management of carpal tunnel syndrome | Am Fam Physician | Background article |
| Vinik,A.I.; Emley,M.S.; Megerian,J.T.; Gozani,S.N. | 2004 | Median and ulnar nerve conduction measurements in patients with symptoms of diabetic peripheral neuropathy using the NC-Stat(registered trademark) system | Diabetes Technology and Therapeutics | Not relevant to CTS |
| Virokannas,H. | 1995 | Dose-response relation between exposure to two types of hand-arm vibration and sensorineural perception of vibration | Occup.Environ.Med | Not relevant to CTS |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Virokannas,H. | 1992 | Vibration perception thresholds in workers exposed to vibration | Int.Arch Occup.Environ.Health | Does not answer a question of interest |
| Visser,L.H.; Smidt,M.H.; Lee,M.L. | 2008 | High-resolution sonography versus EMG in the diagnosis of carpal tunnel syndrome | J Neurol Neurosurg.Psychiatry | insufficient data; healthy controls used for comparison |
| Vogelin,E.; Nuesch,E.; Juni,P.; Reichenbach,S.; Eser,P.; Ziswiler,H.R. | 2010 | Sonographic follow-up of patients with carpal tunnel syndrome undergoing surgical or nonsurgical treatment: prospective cohort study | J Hand Surg Am | no patient oriented outcomes |
| Vogt,T.; Scholz,J. | 2002 | Clinical outcome and predictive value of electrodiagnostics in endoscopic carpal tunnel surgery | Neurosurg.Rev. | very low quality |
| Voitk,A.J.; Mueller,J.C.; Farlinger,D.E.; Johnston,R.U. | 1983 | Carpal tunnel syndrome in pregnancy | Can Med Assoc J | Does not address question of interest |
| Waddell,D.E.; Wyvill,C.; Gregor,R.J. | 2003 | Upper extremity kinetics in poultry processing: A comparison between two different cutting tasks | Journal of Applied Biomechanics | &lt;10 patients per group; does not answer a question of interest |
| Wade,J. | 1976 | Carpal tunnel syndrome. A patient's view | Nurs.Mirror Midwives J | background |
| Wadstroem,J.; Nigst,H. | 1986 | Reoperation for carpal tunnel syndrome. A retrospective analysis of forty cases | Ann.Chir Main | Incorrect patient population (pre-existing surgical intervention) |
| Waegeneers,S.; Haentjens,P.; Wylock,P. | 1993 | Operative treatment of carpal tunnel syndrome | Acta Orthop Belg. | Retrospective case series |
| Waersted,M.; Hanvold,T.N.; Veiersted,K.B. | 2010 | Computer work and musculoskeletal disorders of the neck and upper extremity: a systematic review | BMC Musculoskelet.Disord. | Not relevant to CTS |
| Wahbeh,H.; Elsas,S.M.; Oken,B.S. | 2008 | Mind-body interventions: applications in neurology |  | Not relevant to CTS |
| Wainapel,S.F.; Davis,L.; Rogoff,J.B. | 1981 | Electrodiagnostic study of carpal tunnel syndrome after Colles fracture | Am J Phys Med | all CTS cases; no comparison group |
| Walker,F.O.; Cartwright,M.S.; Blocker,J.N.; Arcury,T.A.; Suk,J.I.; Chen,H.; | 2013 | Prevalence of bifid median nerves and persistent median arteries and their association with carpal tunnel syndrome | Muscle Nerve | Not relevant, prevalence study |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Schultz,M.R.; Grzywacz,J.G.; Mora,D.C.; Quandt,S.A. | | in a sample of Latino poultry processors and other manual workers | | |
| Walters,C.; Rice,V. | 2002 | An evaluation of provocative testing in the diagnosis of carpal tunnel syndrome | Mil.Med | +not best available evidence |
| Walters,J.L.; Murray,N.M.F. | 2001 | Transcarpal motor conduction velocity in carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
| Walters,R.J.; Murray,N.M. | 2001 | Transcarpal motor conduction velocity in carpal tunnel syndrome | Muscle Nerve | no comparison group or reference standard |
| Wand,J.S. | 1990 | Carpal tunnel syndrome in pregnancy and lactation | J Hand Surg Br | Very low quality |
| Wand,J.S. | 1989 | The natural history of carpal tunnel syndrome in lactation | J R Soc.Med | Retrospective case series |
| Wang,A.A.; Hutchinson,D.T.; Vanderhooft,J.E. | 2003 | Bilateral simultaneous open carpal tunnel release: a prospective study of postoperative activities of daily living and patient satisfaction | J Hand Surg Am | Very low quality |
| Wang,A.A.; Whitaker,E.; Hutchinson,D.T.; Coleman,D.A. | 2003 | Pain levels after injection of corticosteroid to hand and elbow | Am J Orthop (Belle.Mead NJ) | Not exclusive to CTS |
| Wang,A.K.; Raynor,E.M.; Blum,A.S.; Rutkove,S.B. | 1999 | Heat sensitivity of sensory fibers in carpal tunnel syndrome | Muscle Nerve | +Does not answer a question of interest |
| Wang,C.K.; Jou,I.M.; Huang,H.W.; Chen,P.Y.; Tsai,H.M.; Liu,Y.S.; Lin,C.C. | 2012 | Carpal tunnel syndrome assessed with diffusion tensor imaging: comparison with electrophysiological studies of patients and healthy volunteers | Eur.J Radiol. | insufficient data; very low study design |
| Wang,L.Y.; Leong,C.P.; Huang,Y.C.; Hung,J.W.; Cheung,S.M.; Pong,Y.P. | 2008 | Best diagnostic criterion in high-resolution ultrasonography for carpal tunnel syndrome | Chang Gung Med J | insufficient data; very low study design |
| Wang,Y.J.; Yan,S.H. | 2013 | Improvement of Diagnostic Rate of Carpal Tunnel Syndrome with Additional Median-to-ulnar Comparative Nerve Conduction Studies | Acta Neurol Taiwan | insufficient data; very low study design |
| Waring III,W.P.; Werner,R.A. | 1989 | Clinical management of carpal tunnel syndrome in patients with long-term sequelae of poliomyelitis | Journal of Hand Surgery | +not best available evidence |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Waring,W.P.,III; Werner,R.A. | 1989 | Clinical management of carpal tunnel syndrome in patients with long-term sequelae of poliomyelitis | J Hand Surg Am | very low study design |
| Watanabe,T.; Sakakibara,N.; Sugimori,H.; Yabumoto,T.; Takeyama,T.; Takemura,M.; Seishima,M.; Matsuoka,T. | 2012 | Effect of long-term physical exercise of peripheral nerve: comparison of nerve conduction study and ultrasonography | J Sports Med Phys Fitness | Does not answer a question of interest |
| Watson,B.V.; Brown,W.F.; Doherty,T.J. | 2006 | Frequency-dependent conduction block in carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
| Watson,J.; DiBenedetto,M.; Gale,S.D. | 2002 | Mixed median nerve forearm conduction velocity in the presence of focal compression neuropathy at the wrist versus peripheral neuropathy | Arch Phys Med Rehabil. | insufficient data; very low study design |
| Watson,J.; Zhao,M.; Ring,D. | 2010 | Predictors of normal electrodiagnostic testing in the evaluation of suspected carpal tunnel syndrome | J Hand Microsurg. | insufficient information; very low study design |
| Watson,Jr | 1985 | Nonarthritic inflammatory problems of the hand and wrist | Emerg.Med.Clin.North Am. | background |
| Watts,A.C.; McEachan,J. | 2005 | The use of a fine-gauge needle to reduce pain in open carpal tunnel decompression: a randomized controlled trial | J Hand Surg Br | Deemed clinically irrelevant |
| Webber,J.B. | 1981 | Common pain syndromes: upper extremities |  | background |
| Weber,R.A.; Boyer,K.M. | 2005 | Consecutive versus simultaneous bilateral carpal tunnel release | Ann.Plast.Surg | Very low quality |
| Weber,R.A.; DeSalvo,D.J.; Rude,M.J. | 2010 | Five-year follow-up of carpal tunnel release in patients over age 65 | J Hand Surg Am | very low quality |
| Weber,R.A.; Rude,M.J. | 2005 | Clinical outcomes of carpal tunnel release in patients 65 and older | J Hand Surg Am | very low quality |
| Wee,A.S. | 2006 | Carpal tunnel syndrome: comparison of the compound muscle action potentials recorded at the thenar region from ulnar and median nerve stimulation | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Wee,A.S. | 2002 | Needle electromyography in carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | very low study design; recruitment based on test results |
| Wee,A.S. | 2001 | Carpal tunnel syndrome: a system for categorizing and grading electrophysiologic abnormalities | Electromyogr.Clin Neurophysiol. | no CTS |
| Weintraub,M.I. | 1997 | Noninvasive laser neurolysis in carpal tunnel syndrome | Muscle Nerve | Very Low Quality |
| Weirich,S.D.; Gelberman,R.H. | 1993 | Changing concepts in the diagnosis and treatment of carpal tunnel syndrome | Current Orthopaedics | background |
| Weis,S.; Stransky,G.; Dimitrov,L.; Wenger,E.; Neumuller,J.; Hakimzadeh,A.; Firneis,F.; Partsch,G.; Eberl,R. | 1987 | Morphometric analysis of collagen fibrils in idiopathic carpal tunnel syndrome: Part 2 | Exp.Cell Biol. | biopsy; &lt;10 patients |
| Weiss,A.P.; Akelman,E. | 1992 | Carpal tunnel syndrome: a review | R I Med | review |
| Weiss,A.P.; Sachar,K.; Gendreau,M. | 1994 | Conservative management of carpal tunnel syndrome: a reexamination of steroid injection and splinting | J Hand Surg Am | Very Low Quality |
| Weiss,K.L.; Beltran,J.; Lubbers,L.M. | 1986 | High-field MR surface-coil imaging of the hand and wrist. Part II. Pathologic correlations and clinical relevance |  | &lt;10 patients per group |
| Wellman,H.; Davis,L.; Punnett,L.; Dewey,R. | 2004 | Work-related carpal tunnel syndrome (WR-CTS) in Massachusetts, 1992-1997: source of WR-CTS, outcomes, and employer intervention practices | Am J Ind.Med | all CTS cases; no comparison group |
| Werner,C.O.; Elmqvist,D.; Ohlin,P. | 1983 | Pressure and nerve lesion in the carpal tunnel | Acta Orthop Scand. | insufficient data; no comparison group |
| Werner,R.A.; Albers,J.W. | 1995 | Relation between needle electromyography and nerve conduction studies in patients with carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data |
| Werner,R.A.; Albers,J.W.; Franzblau,A.; Armstrong,T.J. | 1994 | The relationship between body mass index and the diagnosis of carpal tunnel syndrome | Muscle Nerve | Not relevant, prevalence study |
| Werner,R.A.; Bir,C.; Armstrong,T.J. | 1994 | Reverse Phalen's maneuver as an aid in diagnosing carpal tunnel syndrome | Arch Phys Med Rehabil. | insufficient data; no comparison group |

| **Authors** | **Year** | **Article Title** | **Periodical** | **Reason for Exclusion** |
|---|---|---|---|---|
| Werner,R.A.; Franzblau,A.; Albers,J.W.; Armstrong,T.J. | 1997 | Influence of body mass index and work activity on the prevalence of median mononeuropathy at the wrist | Occup.Environ.Med. | Not relevant, CTS diagnosis not made |
| Werner,R.A.; Franzblau,A.; Albers,J.W.; Buchele,H.; Armstrong,T.J. | 1997 | Use of screening nerve conduction studies for predicting future carpal tunnel syndrome | Occup.Environ.Med. | Very low study design |
| Werner,R.A.; Gell,N.; Franzblau,A.; Armstrong,T.J. | 2001 | Prolonged median sensory latency as a predictor of future carpal tunnel syndrome | Muscle Nerve | Does not answer a question of interest |
| Werner,R.A.; Jacobson,J.A.; Jamadar,D.A. | 2004 | Influence of body mass index on median nerve function, carpal canal pressure, and cross-sectional area of the median nerve | Muscle Nerve | Not relevant,does not answer the PICO question |
| Werner,R.A.; Spiegelberg,T. | 2012 | Does the presence of the palmaris longus tendon influence median nerve function? | Muscle Nerve | insufficient data; very low study design |
| Werner,R.A.; Waring,W.P.; Maynard,F.M. | 1993 | Compression mononeuropathies in the post-polio population: A cross-sectional study | European Journal of Physical Medicine and Rehabilitation | Not relevant, prevalence study |
| Wertsch,J.J.; Melvin,J. | 1982 | Median nerve anatomy and entrapment syndromes: a review | Arch Phys Med Rehabil. | Background Information |
| Westbrook,A.P.; Tredgett,M.W.; Davis,T.R.; Oni,J.A. | 2002 | The rapid exchange grip strength test and the detection of submaximal grip effort | J Hand Surg Am | Does not address question of interest |
| Westerman,R.A.; Delaney,C.A. | 1991 | Palmar cold threshold test and median nerve electrophysiology in carpal tunnel compression neuropathy | Clin Exp.Neurol | insufficient data; very low study design |
| White,J.C. | 1997 | On the use of upper extremity proximal nerve action potentials in the localization of focal nerve lesions producing axonotmesis | Electromyogr.Clin Neurophysiol. | insufficient data; very low study design |
| White,J.C.; Hansen,S.R.; Johnson,R.K. | 1988 | A comparison of EMG procedures in the carpal tunnel syndrome with clinical-EMG correlations | Muscle Nerve | insufficient data; no confirmed diagnosis |
| White,R. | 1984 | Pain in the upper limb | Aust.Fam Physician | background |
| Whitley,J.M.; McDonnell,D.E. | 1995 | Carpal tunnel syndrome. A guide to prompt intervention | Postgrad.Med | background |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Wi,S.M.; Gong,H.S.; Bae,K.J.; Roh,Y.H.; Lee,Y.H.; Baek,G.H. | 2014 | Responsiveness of the Korean version of the Michigan Hand Outcomes Questionnaire after carpal tunnel release | Clin Orthop Surg | already CTS patients; responsiveness not diagnosis |
| Wiederien,R.C.; Feldman,T.D.; Heusel,L.D.; Loro,W.A.; Moore,J.H.; Ernst,G.P.; Allison,S.C. | 2002 | The effect of the median nerve compression test on median nerve conduction across the carpal tunnel | Electromyogr.Clin Neurophysiol. | &lt;10 patients per group |
| Wieslander,G.; Norback,D.; Gothe,C.J.; Juhlin,L. | 1989 | Carpal tunnel syndrome (CTS) and exposure to vibration, repetitive wrist movements, and heavy manual work: a case-referent study | Br J Ind.Med | not best available evidence |
| Wiesler,E.R.; Chloros,G.D.; Cartwright,M.S.; Smith,B.P.; Rushing,J.; Walker,F.O. | 2006 | The use of diagnostic ultrasound in carpal tunnel syndrome | J Hand Surg Am | insufficient data; very low study design |
| Wiesman,I.M.; Novak,C.B.; Mackinnon,S.E.; Winograd,J.M. | 2003 | Sensitivity and specificity of clinical testing for carpal tunnel syndrome | Can J Plast.Surg | +not best available evidence |
| Wigley,R.D. | 2004 | Desk-edge syndrome: Median nerve injury proximal to the carpal tunnel | APLAR Journal of Rheumatology | insufficient data; no comparison group |
| Wilder Smith,E.P.; Chan,Y.H.; Kannan,T.A. | 2007 | Medial thenar recording in normal subjects and carpal tunnel syndrome | Clin Neurophysiol. | insufficient data; very low study design |
| Wilder-Smith,E.P.; Ng,E.S.; Chan,Y.H.; Therimadasamy,A.K. | 2008 | Sensory distribution indicates severity of median nerve damage in carpal tunnel syndrome | Clin Neurophysiol. | insufficient data; no comparison group |
| Wilkinson,M.; Grimmer,K.; Massy-Westropp,N. | 2001 | Ultrasound of the carpal tunnel and median nerve: A reproducibility study | Journal of Diagnostic Medical Sonography | only healthy study subjects |
| Williams,A.M.; Baker,P.A.; Platt,A.J. | 2008 | The impact of dressings on recovery from carpal tunnel decompression | J Plast.Reconstr.Aesthet.Surg | Very low quality |
| Williams,N. | 1993 | WRULDs: Encouraging an ergonomic approach | Occup.Health (Lond). | Background information |
| Williams,T.M.; Mackinnon,S.E.; Novak,C.B.; McCabe,S.; Kelly,L. | 1992 | Verification of the pressure provocative test in carpal tunnel syndrome | Ann.Plast.Surg | insufficient data; very low study design |
| Wilson,G. | 1998 | Upper extremity complications in hemodialysis patients: | Dialysis and Transplantation | Background Information; review |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| | | Recommendations and a review of the literature | | |
| Wilson,J.R.; Sumner,A.J. | 1995 | Immediate surgery is the treatment of choice for carpal tunnel syndrome | Muscle Nerve | editorial |
| Wilson-MacDonald,J.; Caughey,M.A.; Myers,D.B. | 1984 | Diurnal variation in nerve conduction, hand volume, and grip strength in the carpal tunnel syndrome | Br Med J (Clin Res.Ed) | &lt;10 patients per group |
| Winn,F.J.,Jr.; Putz-Anderson,V. | 1990 | Vibration thresholds as a function of age and diagnosis of carpal tunnel syndrome: a preliminary report | Exp.Aging Res. | insufficient data; very low study design |
| Winn,F.J.; Morrissey,S.J.; Huechtker,E.D. | 2000 | Cross-sectional comparison of nerve conduction and vibration threshold testing: do screening tools for occupationally induced cumulative trauma disorders result in differing outcomes? | Disabil.Rehabil. | insufficient data; very low study design |
| Winn,Jr; Habes,D.J. | 1990 | Carpal tunnel area as a risk factor for carpal tunnel syndrome | Muscle Nerve | Not relevant,does not answer the PICO question |
| Winn,Jr; Morrissey,S.J.; Huechkter,E.D. | 1999 | Cross-sectional differences in nerve conduction in the Carpal tunnel syndrome | Journal of Occupational Rehabilitation | Does not answer a question of interest |
| Winn,Jr; Putz-Anderson,V. | 1990 | Vibration thresholds as a function of age and diagnosis of carpal tunnel syndrome: A preliminary report | Exp.Aging Res. | examines the effect of CTS on vibration threshold, instead of the effect of vibration threshold on CTS risk |
| Winzeler,S.; Rosenstein,B.D. | 1997 | Orthopedic problems of the upper extremities: Assessment and diagnosis | AAOHN J. | background |
| Wipperman,J.; Potter,L. | 2012 | Carpal tunnel syndrome-try these diagnostic maneuvers | J Fam Pract. | Background Information; case reports |
| Wissinger,H.A. | 1975 | Resection of the hook of the hamate. Its place in the treatment of median and ulnar nerve entrapment in the hand | Plast.Reconstr.Surg | Does not address question of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Wolfe,H.L. | 1995 | One approach to acumoxa therapy for pain due to tendinitis of the hand, wrist, and forearm | American Journal of Acupuncture | Case report |
| Won,S.J.; Kim,B.J.; Park,K.S.; Yoon,J.S.; Choi,H. | 2013 | Reference values for nerve ultrasonography in the upper extremity | Muscle Nerve | only healthy study subjects |
| Wong,E.; Lee,G.; Zucherman,J.; Mason,D.T. | 1995 | Successful management of female office workers with "repetitive stress injury" or "carpal tunnel syndrome" by a new treatment modality--application of low level laser | Int.J Clin Pharmacol.Ther | Very Low Quality |
| Wong,K.C.; Hung,L.K.; Ho,P.C.; Wong,J.M.W. | 2003 | Carpal tunnel release | Journal of Bone and Joint Surgery - Series B | duplicate of PM:12931807 |
| Wong,K.H.; Huq,N.S.; Nakhooda,A. | 2013 | Hand surgery using local anesthesia | Clin Plast.Surg | Background article |
| Wong,S.M.; Griffith,J.F.; Hui,A.C.; Tang,A.; Wong,K.S. | 2002 | Discriminatory sonographic criteria for the diagnosis of carpal tunnel syndrome | Arthritis Rheum. | insufficient data; very low study design |
| Wongsam,P.E.; Johnson,E.W.; Weinerman,J.D. | 1983 | Carpal tunnel syndrome: use of palmar stimulation of sensory fibers | Arch Phys Med Rehabil. | insufficient data; very low study design |
| Wood,M.R. | 1980 | Hydrocortisone injections for carpal tunnel syndrome | | Very Low Quality |
| Wood,V.E.; Biondi,J. | 1990 | Double-crush nerve compression in thoracic-outlet syndrome | J Bone Joint Surg Am | no comparison group; not CTS exclusive |
| Worseg,A.P.; Kuzbari,R.; Korak,K.; Hocker,K.; Wiederer,C.; Tschabitscher,M.; Holle,J. | 1996 | Endoscopic carpal tunnel release using a single-portal system | Br J Plast.Surg | very low quality |
| Wraith,J.E.; Alani,S.M. | 1990 | Carpal tunnel syndrome in the mucopolysaccharidoses and related disorders | Arch Dis Child | +Does not answer a question of interest; very low study design |
| Wulle,C. | 1996 | The synovial flap as treatment of the recurrent carpal tunnel syndrome | Hand Clin | Retrospective case series |
| Wulle,C. | 1987 | Treatment of recurrence of the carpal tunnel syndrome | Ann.Chir Main | Retrospective case series |
| Wyatt,M.C.; Gwynne-Jones,D.P.; Veale,G.A. | 2013 | Lamb boning -- an occupational cause of carpal tunnel syndrome? | J Hand Surg Eur.Vol. | confounded comparisons; conflict of interest |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Xu,L.; Huang,F.; Hou,C. | 2011 | Treatment for carpal tunnel syndrome by coronal Z-type lengthening of the transverse carpal ligament | J Pak.Med Assoc | Inadequate reporting and use of unvalidated scales. |
| Yalcin,E.; Onder,B.; Selcuk,B.; Ozer,N.; Kurtaran,A.; Yildirim,M.O.; Akyuz,M. | 2013 | The upper extremity neuropathies in turkish wheelchair users and the additive/alternative value of ultrasonography to the evaluation of entrapments | Neurosurgery Quarterly | Does not answer a question of interest |
| Yalcin,E.; Onder,B.; Selcuk,B.; Ozer,N.; Kurtaran,A.; Yildirim,M.O.; Akyuz,M. | 2014 | The upper extremity neuropathies in turkish wheelchair users and the additive/alternative value of ultrasonography to the evaluation of entrapments | Neurosurgery Quarterly | prevalence study; not CTS exclusive |
| Yao,L.; Gai,N. | 2009 | Median nerve cross-sectional area and MRI diffusion characteristics: normative values at the carpal tunnel | Skeletal Radiol. | only healthy study subjects |
| Yassi,A. | 2000 | Work-related musculoskeletal disorders | Curr.Opin.Rheumatol. | Background Information |
| Yates,S.K.; Hurst,L.N.; Brown,W.F. | 1981 | Physiological observations in the median nerve during carpal tunnel surgery | Ann.Neurol | Incorrect patient population (N&lt;10 patients) |
| Yates,S.K.; Yaworski,R.; Brown,W.F. | 1981 | Relative preservation of lumbrical versus thenar motor fibres in neurogenic disorders | J Neurol Neurosurg.Psychiatry | +Does not answer a question of interest; not CTS exclusive |
| Yazgan,P.; Simsek,Z.; Orhan,I.; Beachy,L.; Ozul,Y.; Kurcer,M.A. | 2009 | The reliability and cross-cultured adaptation of the Boston questionnaire; in Turkish illiterate patients | Turkish Journal of Rheumatology | +Does not answer a question of interest |
| Yemisci,O.U.; Yalbuzdag,S.A.; Cosar,S.N.; Oztop,P.; Karatas,M. | 2011 | Ulnar nerve conduction abnormalities in carpal tunnel syndrome | Muscle Nerve | insufficient data; very low study design |
| Yeo,K.Q.; Yeo,E.M. | 2007 | Comparison of the results of open carpal tunnel release and KnifeLight carpal tunnel release | Singapore Med J | very low quality |
| Yeo,K.Q.; Yeo,E.M.N. | 2007 | Comparison of the results of open carpal tunnel release and KnifeLight(registered trademark) carpal tunnel release | Singapore Med.J. | duplicate reference |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Yesildag,A.; Kutluhan,S.; Sengul,N.; Koyuncuoglu,H.R.; Oyar,O.; Guler,K.; Gulsoy,U.K. | 2004 | The role of ultrasonographic measurements of the median nerve in the diagnosis of carpal tunnel syndrome | Clin Radiol. | insufficient data; very low study design |
| Yiannakopoulos,C.K. | 2004 | Carpal ligament decompression under local anaesthesia: the effect of lidocaine warming and alkalinisation on infiltration pain | J Hand Surg Br | Deemed clinically irrelevant |
| Yii,N.W.; Elliot,D. | 1994 | A study of the dynamic relationship of the lumbrical muscles and the carpal tunnel | J Hand Surg Br | case report |
| Yilmaz,N.; Akdemir,G.; Gezici,A.R.; Basmaci,M.; Ergungor,M.F.; Asalanturk,Y.; Beskonakli,E.; Ucar,D. | 2010 | Electrophysiological and clinical assessment of response to surgery in carpal tunnel | Int.J Neurosci. | very low quality |
| Yoon,J.S.; Won,S.J.; Yang,S.N.; Kang,H.J. | 2012 | Nerve cross-sectional area reference values in upper extremity ultrasonography | Muscle Nerve | abstract; no text |
| Yorulmaz,S.; Turk,U.; Yorulmaz,F. | 1994 | Carpal tunnel syndrome in pregnancy: A prospective clinical study | Journal of Maternal-Fetal Investigation | Very low quality |
| Yoshida,A.; Okutsu,I.; Hamanaka,I. | 2010 | A new diagnostic provocation test for carpal tunnel syndrome: Okutsu test | Hand Surg | +Does not answer a question of interest; insufficient data |
| Yoshida,A.; Okutsu,I.; Hamanaka,I.; Motomura,T. | 2004 | Results of endoscopic management of primary versus recurrent carpal tunnel syndrome in long-term haemodialysis patients | Hand Surg | very low quality |
| Yoshii,Y.; Ishii,T.; Sakai,S. | 2013 | Median nerve deformation during finger motion in carpal tunnel syndrome: correlation between nerve conduction and ultrasonographic indices | Hand Surg | insufficient data; very low study design |
| Yoshii,Y.; Ishii,T.; Tung,W.L.; Sakai,S.; Amadio,P.C. | 2013 | Median nerve deformation and displacement in the carpal tunnel during finger motion | J Orthop Res. | insufficient data; very low study design |
| You,D.; Smith,A.H.; Rempel,D. | 2014 | Meta-analysis: association between wrist posture and carpal tunnel syndrome among workers | Saf Health Work | meta-analysis |

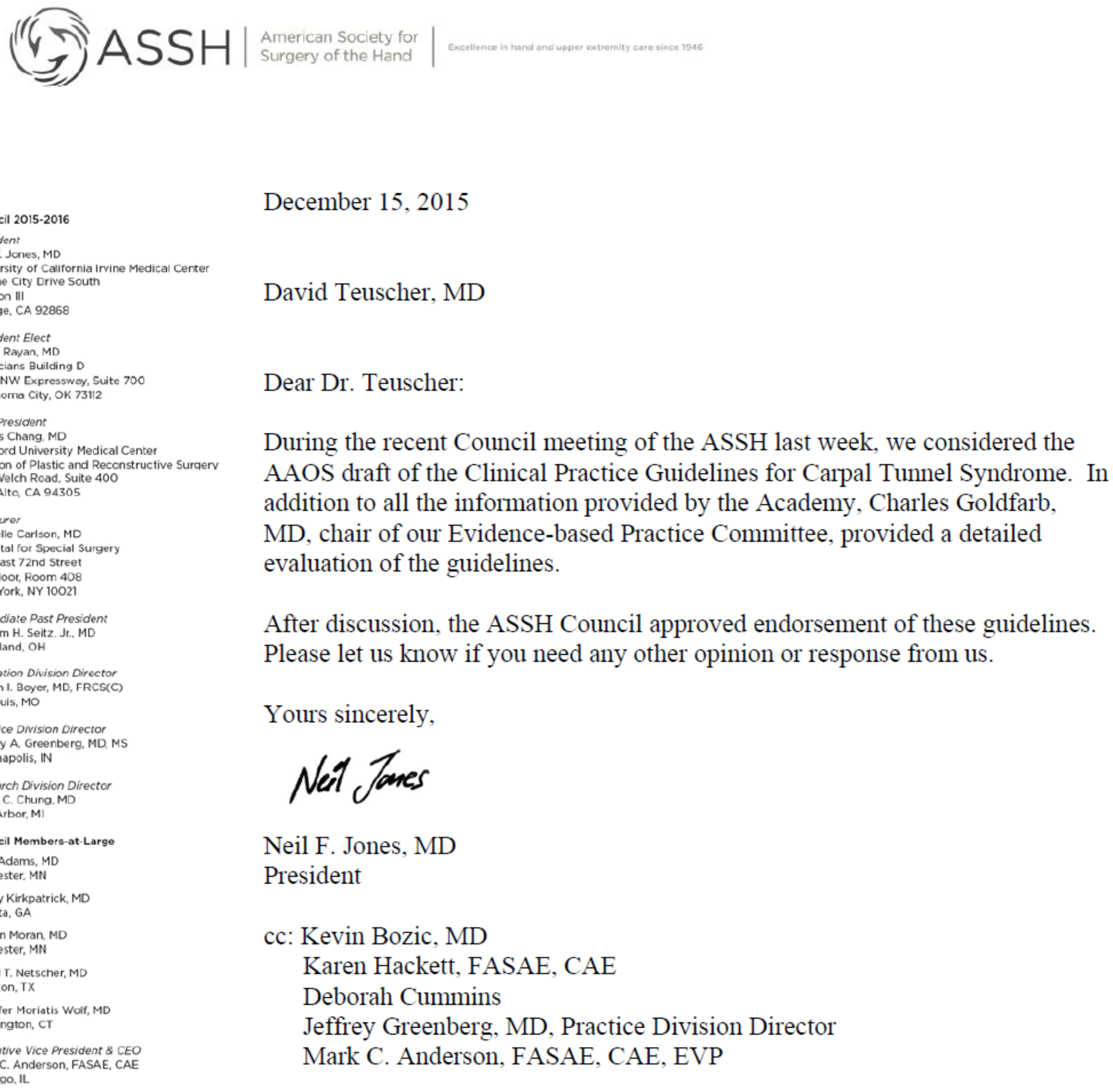
| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| You,H.; Simmons,Z.; Freivalds,A.; Kothari,M.J.; Naidu,S.H. | 1999 | Relationships between clinical symptom severity scales and nerve conduction measures in carpal tunnel syndrome | Muscle Nerve | +Does not answer a question of interest |
| Young,V.L.; Seaton,M.K.; Feely,C.A.; Arfken,C.; Edwards,D.F.; Baum,C.M.; Logan,S. | 1995 | Detecting cumulative trauma disorders in workers performing repetitive tasks | Am.J.Ind.Med. | Not relevant to CTS |
| Younger,D.S. | 2004 | Entrapment neuropathies | Primary Care - Clinics in Office Practice | background |
| Ysla,R.; McAuley,R. | 1985 | Effects of low power infra-red laser stimulation on carpal tunnel syndrome: a double blind study | Archives of Physical Medicine and Rehab | Insufficient data (conference abstract) |
| Yu,J.; Bendler,E.M.; Mentari,A. | 1979 | Neurological disorders associated with carpal tunnel syndrome | Electromyogr.Clin Neurophysiol. | all CTS cases; no comparison group |
| Yucel,A.; Yilmaz,O.; Babaoglu,S.; Acar,M.; Degirmenci,B. | 2008 | Erratum to "Sonographic findings of the median nerve and prevalence of carpal tunnel syndrome in patients with Parkinson's disease" [Eur. J. Radiol. 67 (3) (2008) 546-550] | Eur.J Radiol. | Does not answer a question of interest; prevalence study |
| Yucel,A.; Yilmaz,O.; Babaoglu,S.; Acar,M.; Degirmenci,B. | 2008 | Erratum to "Sonographic findings of the median nerve and prevalence of carpal tunnel syndrome in patients with Parkinson's disease" [Eur. J. Radiol. 67 (3) (2008) 546-550] (DOI:10.1016/j.ejrad.2007.08.001) | Eur.J.Radiol. | duplicate of pmid 19189431 |
| Yuen,A.; Dowling,G.; Johnstone,B.; Kornberg,A.; Coombs,C. | 2007 | Carpal tunnel syndrome in children with mucopolysaccaridoses | J Child Neurol | &lt;10 patients per group; no comparison group |
| Zagnoli,F.; Andre,V.; Le,Dreff P.; Garcia,J.F.; Bellard,S. | 1999 | Idiopathic carpal tunnel syndrome. Clinical, electrodiagnostic, and magnetic resonance imaging correlations | Rev.Rhum.Engl.Ed | insufficient data; very low study design |
| Zaher,A.A.; Mattar,M.A.; Gomaa,M.; Zaher,A.A. | 2012 | Value of contemporary investigation tools in management of carpal tunnel syndrome | Egyptian Journal of Neurology, Psychiatry and Neurosurgery | insufficient data; no comparison group |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Zakaria,D. | 2004 | Rates of carpal tunnel syndrome, epicondylitis, and rotator cuff claims in Ontario workers during 1997 | Chronic Dis Can | +Does not answer a question of interest |
| Zalaffi,A.; Mariottini,A.; Carangelo,B.; Buric,J.; Muzii,V.F.; Alexandre,A.; Palma,L.; Rovere,A. | 2005 | Wrist median nerve motor conduction after end range repeated flexion and extension passive movements in Carpal Tunnel Syndrome. Pilot study | Acta Neurochir.Suppl | +Does not answer a question of interest |
| Zambelis,T.; Tsivgoulis,G.; Karandreas,N. | 2010 | Carpal tunnel syndrome: associations between risk factors and laterality | Eur.Neurol | all CTS cases; no comparison group |
| Zambello,A.; Fumagalli,L.; Fara,B.; Bianchi,M.M. | 2008 | Oxygen-ozone treatment of carpal tunnel syndrome. Retrospective study and literature review of conservative and surgical techniques | International Journal of Ozone Therapy | Narrative review |
| Zanette,G.; Marani,S.; Tamburin,S. | 2006 | Extra-median spread of sensory symptoms in carpal tunnel syndrome suggests the presence of pain-related mechanisms |  | all CTS cases; no comparison group |
| Zavela | 2011 | Erratum: Acupuncture treatment for carpal tunnel syndrome (Medical Acupuncture (2010) 22: 4 (276) DOI: 10.1089/acu.2010.0752) | Medical Acupuncture | Not a study (correction of a study) |
| Zaza,C.; Fleiszer,M.S.; Maine,F.W.; Mechefske,C. | 2000 | Beating injury with a different drumstick: A pilot study | Medical Problems of Performing Artists | review; not a full structured study |
| Zelouf,D.S.; Posner,M.A. | 1995 | Hand and wrist disorders: How to manage pain and improve function |  | Background Information |
| Zetterberg,C.; Ofverholm,T. | 1999 | Carpal tunnel syndrome and other wrist/hand symptoms and signs in male and female car assembly workers | International Journal of Industrial Ergonomics | not best available evidence for most risk factors. the workstation analysis for work risk factors was not adequately presented for inclusion in the guideline. this analysis was more fully presented in another paper |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Zhang,W.; Johnston,J.A.; Ross,M.A.; Sanniec,K.; Gleason,E.A.; Dueck,A.C.; Santello,M. | 2013 | Effects of carpal tunnel syndrome on dexterous manipulation are grip type-dependent | PLoS One | +Does not answer a question of interest; Investigates development of comorbidity rather than CTS development |
| Zidan,S.; Tantawy,H.; Fouda,N.; Ali,M. | 2013 | The value of power and pulsed Doppler in the diagnosis of CTS: Is a solution in sight | Egyptian Journal of Radiology and Nuclear Medicine | insufficient data; very low study design |
| Zimmerman,G.R. | 1994 | Carpal tunnel syndrome | J Athl.Train. | background |
| Zlatkin,M.B.; Greenan,T. | 1992 | Magnetic resonance imaging of the wrist | Magn Reson.Q. | background |
| Zuo,D.; Zhou,Z.; Wang,H.; Liao,Y.; Zheng,L.; Hua,Y.; Cai,Z. | 2015 | Endoscopic versus open carpal tunnel release for idiopathic carpal tunnel syndrome: a meta-analysis of randomized controlled trials | J Orthop Surg Res | Meta-analysis |
| Zyluk,A. | 2013 | Carpal tunnel syndrome in pregnancy: a review | Pol.Orthop Traumatol. | Narrative review |
| Zyluk,A.; Kosovets,L. | 2010 | An assessment of the sympathetic function within the hand in patients with carpal tunnel syndrome | J Hand Surg Eur.Vol. | +Does not answer a question of interest; very low study design |
| Zyluk,A.; Piotuch,B. | 2011 | A Comparison of DASH, PEM and Levine questionnaires in outcome measurement of carpal tunnel release | Handchir.Mikrochir.Plast.Chir | very low quality |
| Zyluk,A.; Puchalski,P. | 2013 | A comparison of outcomes of carpal tunnel release in diabetic and non-diabetic patients | J Hand Surg Eur.Vol. | Retrospective case series (exposure status irrelevant after CT release) |
| Zyluk,A.; Puchalski,P. | 2013 | A comparison of the results of carpal tunnel release in patients in different age groups | Neurol Neurochir.Pol. | Retrospective case series (age as comparison not applicable) |
| Zyluk,A.; Szlosser,Z. | 2013 | The results of carpal tunnel release for carpal tunnel syndrome diagnosed on clinical grounds, with or without electrophysiological investigations: a randomized study | J Hand Surg Eur.Vol. | very low quality |

| Authors | Year | Article Title | Periodical | Reason for Exclusion |
|---|---|---|---|---|
| Zyluk,A.; Walaszek,I. | 2012 | The effect of the involvement of the dominant or non-dominant hand on grip/pinch strengths and the Levine score in patients with carpal tunnel syndrome | J Hand Surg Eur.Vol. | Retrospective case series |
| Zyluk,A.; Walaszek,I.; Szlosser,Z. | 2014 | No correlation between sonographic and electrophysiological parameters in carpal tunnel syndrome | J Hand Surg Eur.Vol. | +Does not answer a question of interest; insufficient data |
| Zyluk,A.; Walaszek,I.; Szlosser,Z. | 2014 | Does ultrasonography contribute significantly to the diagnosis of carpal tunnel syndrome? | Handchir.Mikrochir.Plast Chir | case control; CTS and healthy |

# APPENDIX XIII
## LETTERS OF ENDORSEMENT FROM EXTERNAL ORGANIZATIONS



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December 15, 2015

David Teuscher, MD

Dear Dr. Teuscher:

During the recent Council meeting of the ASSH last week, we considered the AAOS draft of the Clinical Practice Guidelines for Carpal Tunnel Syndrome. In addition to all the information provided by the Academy, Charles Goldfarb, MD, chair of our Evidence-based Practice Committee, provided a detailed evaluation of the guidelines.

After discussion, the ASSH Council approved endorsement of these guidelines. Please let us know if you need any other opinion or response from us.

Yours sincerely,

Neil Jones

Neil F. Jones, MD
President

cc: Kevin Bozic, MD
Karen Hackett, FASAE, CAE
Deborah Cummins
Jeffrey Greenberg, MD, Practice Division Director
Mark C. Anderson, FASAE, CAE, EVP

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May 12, 2016

Kevin Shea, MD
American Academy of Orthopaedic Surgeons
Intermountain Orthopaedics
600 N. Robbins Rd., Ste. 400
Boise, ID 83702

Dear Dr. Shea,

The American Society of Plastic Surgeons has voted to endorse the AAOS Clinical Practice Guideline on the Management of Carpal Tunnel Syndrome. This endorsement implies permission for the AAOS to officially list our organization as an endorser of this guideline and reprint our logo in the introductory section of the guideline document.

Sincerely,

David H. Song, MD, MBA, FACS
President

cc: Andrea Pusic, MD, MHS, FACS, FRCSC
William Wooden, MD, FACS
Keith M. Hume, MA
Carol Sieck, RN, MSN
Lauren Loeding, MPH

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**William T. Thorwarth Jr., MD, FACR**
*Chief Executive Officer*

Phone: 703-648-8901
Fax: 703-648-3997
Email: wthorwarth@acr.org

March 15, 2016

Erica Linskey
Administrative Assistant, Evidence-Based Medicine Unit
American Academy of Orthopedic Surgeons
9400 West Higgins Road
Rosemont, Illinois 60018

Dear Ms. Linskey,

The Board of Chancellors of the American College of Radiology hereby endorses 2015 AAOS Clinical Practice Guideline on the Management of Carpal Tunnel Syndrome effective February 26, 2016. We look forward to working with you in the future.

Sincerely,

William T. Thorwarth Jr., MD, FACR
Chief Executive Officer

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Albany, NY

March 2, 2016

American Academy of Orthopaedic Surgeons
9400 West Higgins Road
Rosemont, Illinois 60018-4976

ATTN: Kevin Shea, MD
AAOS Clinical Practice Guidelines Section Leader
of the Committee on Evidence-Based Quality and Value

Dear Kevin Shea, MD,

The American College of Surgeons has voted to endorse the AAOS Clinical Practice Guideline on the Management of Carpal Tunnel Syndrome. This endorsement implies permission for the AAOS to officially list our organization as an endorser of this guideline and reprint our logo in the introductory section of the guideline document.

Sincerely,

David B. Hoyt

David B. Hoyt, MD, FACS
Executive Director

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March 28, 2017

Kevin Shea, M.D.
American Academy of Orthopaedic Surgeons
Clinical Practice Guidelines Section Leader
of the Committee on Evidence-Based Quality and Value
9400 West Higgins Road
Rosemont, Illinois 60018

Dear Dr. Shea,

Thank you for providing the American Society of Anesthesiologists (ASA) the opportunity to review the American Academy of Orthopaedic Surgeons (AAOS) Clinical Practice Guideline on the *Management of Carpal Tunnel Syndrome.* I am pleased to share that ASA's leadership has approved ASA's endorsement of the Clinical Practice Guideline on the *Management of Carpal Tunnel Syndrome.*

The following parties reviewed the document: ASA's Committee on Regional Anesthesia, Administrative Council and Board of Directors.

ASA's Committee on Regional Anesthesia looks forward to providing input on subsequent versions of the guideline if requested. Thank you again for the opportunity to collaborate with AAOS and participate in the review of this Clinical Practice Guideline.

Sincerely,

J Plagenhoef MD

Jeffrey Plagenhoef, M.D.
President
American Society of Anesthesiologists