Conservative treatments for carpal tunnel syndrome

Carpal tunnel syndrome (CTS) is a neuropathy caused by compression of the median nerve within the wrist canal. It was first described as a complication of trauma by Sir James Paget in 1854, and as a spontaneous, bilateral illness by Lord Brain in 1947. Until around 1930, most people thought that idiopathic hand numbness was due to problems in the brachial plexus, not in the hand.[2] Historically, treatment options included electric currents, shoulder girdle physiotherapy, heat and vitamin B1. In 1930, Learmonth performed the first carpal tunnel release at the Mayo Clinic and, by 1960, the diagnosis of CTS had become routine in general medical, neurologic and orthopedic practice.[8]

The median nerve contains motor, sensory and autonomic nerve fibres. Because the sensory nerve fibres are more vulnerable to compression than the motor (thicker) fibres, the initial symptom is usually numbness (more common at night) in the thumb, index and middle fingers–areas innervated by the median nerve. Other symptoms caused by compression of the sensory fibres are pain, tingling or burning sensations. If the disease progresses, motor fibres may be damaged, leading to symptoms of hand muscle weakness, but complete paralysis is rare except in severe cases. Symptoms of compression of the autonomic nerve system fibres are rare but might include dry skin, swelling or colour changes in the hand. In advanced cases, complete thenar atrophy and complete loss of sensation occur frequently. Even ulcerations of the fingertips can be seen. However, such sequelae are less common today because of early diagnosis and treatment, although these symptoms are occasionally seen in very elderly patients.[2]

The most characteristic symptom of CTS is tingling in the fingers, which disturbs sleep or is noticed upon awakening. Symptoms may be provoked by static postures involving pinch or grip, such as holding a telephone, newspaper, or steering wheel. Symptoms may also be elicited by tapping over the median nerve at the wrist (Tinel's sign), or by forced flexion or extension of the wrist (Phalen's sign). Physical examination is usually normal, but in advanced cases there is measurable loss of sensibility in the median nerve distribution and atrophy

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Transferring Research into Practice

The purpose of Linkages is to critically review the best available evidence in the literature regarding soft-tissue injury and to disseminate these reviews to clinical decision-makers in health-care delivery, workplace, policy and compensation settings. For these reviews, we draw on topical articles about the diagnosis, treatment and prevention of soft-tissue injury.

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of thenar muscles. Electromyography and nerve conduction studies can confirm–but do not exclude–the diagnosis of CTS.[9]

The cause of CTS is usually not easily identified, but some cases are attributed to space occupying lesions (tumor, hypertrophic synovial tissue, fracture callus, osteophytes), infections, neuropathies (diabetes mellitus or alcoholism), familial disorders, metabolic or physiologic conditions (pregnancy, hypothyroidism, rheumatoid arthritis).[7]

A 1999 Swedish survey suggested the prevalence of CTS was three per cent in the general population. CTS was more common among the following groups: blue-collar workers, workers whose jobs required them to use their hands with excessive force for more than one hour daily, workers who excessively flexed or extended their wrists during work activity, and workers who used hand-held vibratory tools. Women and older persons were more likely to be affected than men and younger persons. The study also found that obese persons (defined as having a body mass index of at least 25kg/m^2) were more likely to develop CTS.[3]

In 2001, American workers were off the job for an average of 25 days because of CTS. Carpal tunnel syndrome was the leading condition in the "nonfatal occupational injuries and illness involving days away from work" category, followed by fractures (21 days), amputations (18 days) and sprains and strains (six days). Forty-four per cent of workers with CTS were away from work for 31 days or more.[1] The cost per upper-extremity case was estimated at US $8,070 (1989 dollars).[13]

Although many preventive measures have been tested, a systematic review of 24 studies of primary prevention studies failed to find a single experimental study that demonstrated conclusive results in favour of ergonomic intervention. The interventions reviewed were: engineering (alternative keyboards, computer mouse designs, wrist supports, keyboard supports, tool redesign), personal (ergonomic training, splinting, electromyographic biofeedback and on-the-job exercise programs) and interventions with multiple components (workstation redesign, establishment of an ergonomic task force, job rotation, ergonomic training and restricted duty provisions).[6]

Surgery is usually reserved for the most severe cases of CTS, including those that are resistant to conservative treatments. A recent Cochrane systematic review found no randomized controlled trials (RCTs) that compared surgery to placebo. Researchers did find two RCTs that showed greater clinical improvement in patients who underwent surgery than in patients who underwent splinting of the hand/wrist.[12] When it comes to evaluating methods of surgical release, it seems that there is no clear evidence of a difference between endoscopic carpal tunnel release compared to open carpal tunnel release, but endoscopic release may cause more transient nerve problems whereas open release may cause more wound problems.[7]

In this issue of *Linkages*, we report and comment on evidence supporting various conservative interventions for CTS. The evidence was summarized in two recently published Cochrane systematic reviews.

The value of systematic reviews

Every year, six million new articles reporting results of biomedical research are published. The sheer volume of new publications makes it nearly impossible for health professionals, consumers and policy-makers to keep up with the literature and make timely, evidence-based decisions on patient care, treatment choice and health policy.

Traditionally, research results have been summarized in non-systematic narrative reviews. However, these are open to bias because the author's subjective opinion of an article's quality may influence the narrative review. Systematic reviews offer a better alternative. They apply scientific strategies in ways that limit bias, to the assembly, critical appraisal, and synthesis of all relevant studies that address a specific clinical question.

Although systematic reviews are supposed to use methods that minimize bias and error, they are not immune from flaws in methodology that can compromise the validity of results. This is why it is so important to "review the reviews."

In this edition of *Linkages*, we report on two recent reviews of conservative treatments for carpal tunnel syndrome, which were published in the Cochrane Library. Six clinical experts provided commentaries on the relevance and applicability of the results.

We thank all those who contributed to this issue of *Linkages*.

Questions about *Linkages*?

You will find this issue of *Linkages* (and an archive of previous issues) on the Institute's web site (www.iwh.on.ca). They can be downloaded at no charge in PDF. For more information about *Linkages*, please contact Andrea Furlan at the Institute for Work & Health,
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Research Excellence Advancing Employee Health

ARTICLES REVIEWED

O'Connor D, Marshall S, Massy-Westropp N. Non-surgical treatment (other than steroid injection) for carpal tunnel syndrome. *Cochrane Database Syst Rev.* 2003;(1):CD003219.

OBJECTIVE
The objective of this systematic review was to compare the effectiveness of non-surgical treatment (other than steroid injection) for carpal tunnel syndrome with no treatment, placebo or another non-surgical treatment in improving clinical outcomes.

TYPES OF STUDIES
All published and unpublished studies using or attempting to use a randomized methodology were included.

TYPES OF PARTICIPANTS
All participants with a diagnosis of CTS, as defined by the authors of each paper, were included. Participants who had previous surgery for CTS were excluded.

TYPES OF INTERVENTIONS
All non-surgical treatments except steroid injection were included, since determining the effectiveness of steroid injection as a treatment for CTS was the objective of another Cochrane review.

TYPES OF OUTCOME MEASURES
The primary outcome measure was improvement in clinical symptoms, such as pain and paresthesia, measured at least three months after the end of treatment.

SEARCH STRATEGIES FOR IDENTIFICATION OF STUDIES
The authors searched the Cochrane Neuromuscular Disease Group specialized register (to March 2002), MEDLINE (to February 2001), EMBASE (to March 2002), CINAHL (to December 2001), AMED (to January 2002), Current Contents (to March 2002), PEDro and reference lists of retrieved articles.

METHODS
Three reviewers independently selected the trials to be included. Two reviewers independently extracted data. Results of clinically and statistically homogeneous trials were pooled to provide estimates of intervention efficacy.

Two reviewers independently assessed the methodological quality of the included trials, with a particular emphasis on selection, performance, attrition and detection bias as advocated by the Cochrane Reviewers' Handbook.[4] The risk of bias in a trial was rated (A) low when all the criteria were met, (B) moderate when one or more criteria were only partly met, or (C) high when one or more criteria were not met. A descriptive approach to quality assessment was employed rather than using a scale due to concerns about the validity of existing quality scales.

The quality of the diagnostic criteria used in the included trials was assessed according to the criteria proposed by Rempel and colleagues.[10] Based on these criteria, the quality of the diagnostic criteria was classified as (A) high, (B) moderate or (C) low:

(A) a combination of electrodiagnostic findings and symptoms for the diagnosis of CTS;

(B) a combination of symptoms and physical examination findings for the diagnosis of CTS (in the absence of electrodiagnostic findings);

(C) symptoms or physical examination findings for the diagnosis of CTS (in the absence of electrodiagnostic findings).

Using qualitative analysis, the authors' findings were reported and reviewers rated the levels of evidence following the rating system adapted from van Tulder and colleagues.[11]

Strong evidence - generally consistent findings in multiple RCTs with low bias ratings

Moderate evidence - generally consistent findings in one RCT with low bias plus one or more RCTs with moderate or high bias ratings, or by generally consistent findings in multiple RCTs with moderate or high bias ratings

Limited evidence - with only one RCT (any bias rating)

Equivocal evidence - conflicting evidence, with inconsistent findings in multiple RCTs

No evidence - no RCTs found

RESULTS
Twenty-one trials involving 884 people were included. Nineteen trials were published in English, one in German and one in Turkish. The 21 trials presented findings in 12 treatment areas: splinting, therapeutic

ultrasound, ergonomic keyboards, oral medications, vitamins, exercise, yoga, mobilization, magnet therapy, chiropractic care, laser acupuncture and insulin injection.

The overall methodological quality showed that the risk of bias was rated as low in three of the included trials, as moderate in eight and as high in 10. The most common sources of bias included inadequate or unclear allocation concealment (selection bias) and lack of blinding of subjects or clinicians to treatment (performance bias).

Seventeen of the included trials reported using a combination of electrophysiologic findings and symptoms to diagnose CTS and were graded as (A) high quality. Three trials received a (B) moderate quality rating of diagnosis criteria. Only one of the included trials reported the use of symptoms alone for the diagnosis of CTS and received a (C) low quality rating of diagnostic criteria.

The table (page 7) shows the results for all conservative interventions.

CONCLUSIONS

There is moderate evidence that patients with CTS who were treated with oral steroids experienced a significant short-term benefit; there is limited evidence that the use of splinting, ultrasound, yoga and carpal bone mobilization results in significant short-term benefit. The use of other non-surgical treatments does not confer significant benefits.

Marshall S, Tardif G, Ashworth N. Local corticosteroid injection for carpal tunnel syndrome. ***Cochrane Database Syst Rev.*** **2000;(4):CD001554. Review. Update in:** ***Cochrane Database Syst Rev.*** **2002;(4):CD001554.**

OBJECTIVE

To evaluate the effectiveness of local steroid injection for CTS versus placebo injection or other non-surgical interventions in improving clinical outcomes.

TYPES OF STUDIES

Only randomized, or quasi-randomized, controlled trials were included.

TYPES OF PARTICIPANTS

Persons must have been diagnosed with CTS in one or both hands but were not eligible if they had previous carpal tunnel release surgery. Persons with other peripheral nervous system disorders, such as polyneuropathy, were excluded. (The diagnosis of carpal tunnel syndrome used by the authors was accepted, but the preferred criteria was the *Practice Parameter For Carpal Tunnel Syndrome*, published by the Quality Standards Subcommittee of the American Academy of Neurology.[9])

TYPES OF INTERVENTIONS

The intervention treatment was local steroid injection into the carpal tunnel.

TYPES OF OUTCOME MEASURES

The primary outcome measure was clinical improvement measured at three months follow-up, preferably demonstrated through functional or quality-of-life measures.

SEARCH STRATEGIES FOR IDENTIFICATION OF STUDIES

The authors searched the Cochrane Neuromuscular Disease Group trials register (to June 2002), MEDLINE (to May 2002), EMBASE (to May 2002) and CINAHL (to May 2002).

METHODS

Three reviewers independently selected the trials to be included in the study. To assess methodological quality, the scale developed by Jadad[5] was used. The Jadad instrument contains three questions (randomization, double blinding and drop-outs) and the possible scores range from 0 (low quality) to 5 (high quality). The results of homogeneous trials were pooled to provide a point estimate of the effect of local corticosteroid injection in the treatment of CTS.

RESULTS

Five trials were included; four were published in English and one in Italian. Two trials scored five using the Jadad instrument; the other three trials scored respectively four, three and one. Only three of the five included trials evaluated the outcome at three months or longer after treatment. However, all five evaluated clinical outcomes during the first three months after treatment.

The table (page 7) shows the results for all conservative interventions.

This review demonstrated that patients with CTS symptoms obtained significant relief as a result of local corticosteroid injection. These benefits were generally observed at one month after the injection. The benefits beyond one month cannot be commented on reliably since only three out of the four trials evaluated longer-term effects. There were no adverse effects reported in these trials.

CONCLUSIONS

Local corticosteroid injections for carpal tunnel syndrome provide greater clinical improvement in symptoms than a placebo for up to one month after injection, but symptom relief beyond one month has not been measured. Local corticosteroid injections provide significantly greater clinical improvement for up to three months after treatment compared to oral steroids. Local corticosteroid injections do not improve clinical outcome after eight weeks (compared to either anti-inflammatory medication or splinting) or after six months (compared to Helium-Neon laser treatment).

What does this mean?

There is good evidence of short-term benefits for carpal tunnel syndrome from corticosteroids administered either orally or by local injection. The evidence of benefit is weaker for the use of (in descending order of the strength of the evidence): splinting, ultrasound, yoga and carpal bone mobilization. Other conservative treatments do not appear to offer significant benefits.

COMMENTARIES

I read with interest the systematic reviews by O'Connor et al and Marshall et al. The comprehensive, high-quality review of conservative treatments completed by O'Connor et al provides a convenient one-stop summary of available randomized trials. Their methods are sound and their summary of each study is informative. Although they also used an extensive search and independent selection and data extraction, Marshall et al were somewhat less rigorous in linking their conclusions to the quality and number of studies. Most of their conclusions are based on single trials, which–by the standards used in the other review–would automatically qualify them as "limited evidence." The use of different quality criteria across Cochrane reviews is a recognized problem, making it difficult for readers to interpret relative quality from review to review.

For both reviews, I have some reservations about the conclusion that many treatments do not produce significant benefit. I believe the low quality of many trials and the small number of subjects warrant a more tentative conclusion. When you compare 10-20 persons in each group using suboptimal methodology, it is easy to miss a significant difference. For example, one comparison of pyridoxine to placebo had no more than six subjects in each group. Another study comparing the benefits of steroid injection to the benefits of laser treatment at six months found that the confidence interval around the relative risk estimate went from 0.48 to 1.21, which does not rule out a significant benefit from steroid injections.

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These two systematic reviews of non-surgical treatment of Carpal Tunnel Syndrome (CTS) are very useful because they bring together the current research. O'Connor et al present a methodologically sound qualitative review examining the effects of a variety of non-surgical CTS treatments. The comprehensive search strategy identified studies of mixed methodological quality. Overall, the authors suggest that there is moderate or limited evidence for some of the treatments and no evidence for others, pointing to the need for more quality research in this area. The authors further point out the need to focus on fewer treatments in future reviews and we concur. The Marshall et al review does exactly this by examining the effects of local corticosteroid injections for CTS. This review is of high methodological quality with a thorough literature search strategy that identified studies of mixed methodological quality. The authors conclude that there is some support that the use of local corticosteroid injections decreases the symptoms of CTS in the short term, but may not be superior to the effect of anti-inflammatory medication or splinting at neutral postures. Again, the need for more quality research in this area is highlighted. Both reviews articulate the need for clear diagnostic criteria for CTS, as this can affect the interpretation of treatment effects.

While both of these reviews provide some useful information about treatments for CTS, it is far from clear how a clinician would use this information to choose an appropriate non-surgical treatment. In a review of many different treatments, it is difficult to provide all of the details about each specific treatment, for example the best splinting methods. However, these details are important in guiding clinical care. One further difficulty is the

interpretation of the two reviews together. They use different criteria to appraise the quality of the CTS definition/diagnosis and they use different approaches to assess the methodological quality of the studies reviewed. These differences may result in non-comparable summaries. O'Connor et al clearly indicate that these differences must be addressed in future reviews and we concur.

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In both reviews, similar outcome measures (i.e. improvement in clinical symptoms at least three months after the end of treatment) were used to measure the effectiveness of non-surgical treatments for Carpal Tunnel Syndrome (CTS). Most of the studies included in these reviews reported only short-term symptom relief via a wide variety of outcome measures–many with no evidence regarding their reliability and validity. Interpretation of the clinical significance of the results is difficult in the absence of valid and reliable information regarding the long-term effects of non-surgical treatments.

These reviews are also limited because they fail to address important sources of heterogeneity in the studies, both in terms of the severity of disease and in terms of patient factors like age, gender and occupation. It was not possible for the authors to conduct sensitivity analyses to test the effects of symptom severity and other patient factors due to inadequate information.

Publication bias is an important consideration in systematic reviews. Although the researchers note that they included unpublished studies, they did not report any statistical analyses that specifically detect publication bias. Finally, in any study that reports a null effect, one must consider the possibility that a type II error has occurred due to insufficient sample size. Most of the studies in these reviews were not amenable to data-pooling (except ultrasound vs. placebo, oral steroids and local steroids) to increase statistical power, so there is a real possibility that type II errors may have occurred.

I will not change my clinical practices in light of the evidence presented in this review. Currently, my only non-surgical intervention for the treatment of CTS is neutral, nocturnal splinting. More high quality research is needed to strengthen the evidence currently available on non-surgical treatment.

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The results of these two systematic reviews confirm the anecdotal experience of most clinicians working in this area–namely that splinting and local corticosteroid injection are both effective non-operative treatments for carpal tunnel syndrome. The roles of ultrasound treatments and carpal bone mobilization are less clear. Both of these modalities must be, in most circumstances, associated with extra cost since an allied health worker provides them. While the literature shows a demonstrable benefit of oral corticosteroids in the treatment of carpal tunnel syndrome, the potential for significant and serious side effects severely limits their usefulness. The risk of development of avascular necrosis of the femoral head after even a very short course of treatment with oral corticosteroids is too great to merit the use of these drugs as treatment for a minor condition like carpal tunnel syndrome.

The experience of most surgeons is that, in well-selected cases identified by reliable diagnostic criteria, the results of operative intervention are almost universally excellent and surgery should be considered the treatment of choice when simple non-operative measures like splinting prove to be either unsuccessful or unfeasible.

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This review validates clinical practice as approached by the hand surgeon. When a doctor is faced with a patient with unambiguous carpal tunnel syndrome, surgery is a very effective option. If the surgeon and patient wish to avoid surgery, or if the diagnosis is less clear, then nighttime splinting and steroids–either a brief course orally or (my preference) locally by depot injection–are likely to provide at least temporary relief. Other interventions have little to recommend them, and are likely to provide benefit through a placebo effect.

In this case, the evidence and common practice are aligned. I wish I could say this was due to the scientific rigor with which surgeons have approached the management of carpal tunnel syndrome, but, frankly, I think it is more a matter of good luck: once carpal tunnel syndrome was identified as a discrete pathology, the initial treatments tried were surgery (1946) and steroids (1955). It is fortuitous that they were effective, and that no newer, more effective modality has been identified in the intervening years. It is only more recently, however, that we have bothered to collect the evidence supporting this common wisdom.

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Interventions	Studies	Outcomes	Results
Nocturnal hand splint compared to no treatment	One trial with a high bias rating	Effects on symptoms, function and nerve conduction after 2 to 4 weeks of use	Nocturnal hand splint improves symptoms, hand function and overall patient-reported change in the short term
Full-time wrist splint	One trial with a high bias rating	Symptoms, function and nerve conduction after 6 weeks of use	Full-time wrist splint use is equally effective as night-only splint use
Neutral versus 20 degrees extension wrist splint	One trial with a high bias rating	Overall, nocturnal and daytime symptoms after 2 weeks	A significant effect was demonstrated in favour of the neutral position
Ultrasound versus placebo	Two trials (one with high and one with low bias rating) were pooled using meta-analysis for the short-term effects on symptoms	Symptoms and nerve conduction in short term (2 weeks). Other outcomes: sensation, grip strength, pinch strength, patient-reported improvement, pain and nocturnal waking	Two weeks of ultrasound treatment results in better short-term symptoms than placebo. Seven weeks of ultrasound therapy results in better sensory perception and self-reported improvement than placebo
Ultrasound 1/5 W/cm^2 versus 0.8 W/cm^2	One trial with moderate bias rating	Pain, symptoms, nocturnal waking and nerve conduction at 2 weeks	Continuous ultrasound at 1/5 W/cm^2 is equally as effective as continuous ultrasound at 0.8 W/cm^2
Ultrasound 1MHz versus 3MHz	One trial with high bias rating	Pain, paraesthesia, sensation, grasping ability, provocative tests and nerve conduction at 4 weeks	Ultrasound delivery at 1MHz is similar to ultrasound delivery at 3MHz
Ergonomic keyboard versus standard keyboard	Two trials, one with moderate and one with high bias rating	Pain, hand function, Tinel's and Phalen's tests, nerve conduction at 6 weeks, 12 weeks and 6 months	Ergonomic and standard keyboards provide similar improvements in Phalen's and Tinel's tests and nerve conduction. There is equivocal evidence with regards to pain and function
Diuretic[a] versus placebo	Two trials with moderate bias ratings	Symptoms and nerve conduction at 2 weeks, 4 weeks and 6 months	Diuretic treatment does not improve short-term symptoms
NSAID[b] versus placebo	One trial with moderate bias rating	Symptoms and nerve conduction at 2 and 4 weeks	NSAID treatment does not improve short-term symptoms
Oral steroids[c] versus placebo	Three trials: two with moderate and one with low bias ratings	Symptom improvement in the short term (2 weeks and 4 weeks) and 6 months	Oral steroid treatment for two weeks improves short-term symptoms. Equivocal evidence regarding the short-term symptom benefit beyond the end of an oral steroid treatment period
Diuretic[a] versus NSAID[b] versus oral steroids[c]	One trial with moderate bias rating	Symptoms and nerve conduction at 2 and 4 weeks	Oral steroid treatment improves symptoms significantly more than diuretic treatment and NSAIDs
Vitamin B6 versus placebo	Two trials: one with low and one with high bias rating	Symptoms, hand co-ordination, Phalen's and Tinel's tests, nerve conduction after 12 weeks of intervention	Vitamin B6 does not improve symptoms, nocturnal discomfort, hand co-ordination, Phalen's and Tinel's tests in the short term
Exercise and neutral splint versus neutral splint alone	One trial with high bias rating	Symptoms, function, strength, 2-point discrimination, Tinel's and Phalen's signs and patient satisfaction at 8 weeks	No difference between groups except for 2-point discrimination test
Yoga versus wrist splint	One trial with high bias rating	Nocturnal waking, pain, Phalen's and Tinel's signs, grip strength and nerve conduction after 8 weeks of treatment	Yoga is superior for short-term pain relief and Phalen's sign, but similar with regards to nocturnal waking, Tinels' sign and grip strength
Neurodynamic mobilization versus no treatment	One trial with high bias rating	Short-term effects on pain, function, motion, upper-limb tension testing and need for surgery	No difference between the groups
Carpal bone mobilization versus no treatment	One trial with high bias rating	Short-term effects on pain, function, motion, upper-limb tension testing and need for surgery	Carpal bone mobilization improves symptoms in the short term (3 weeks). but no difference was found for other outcomes
Neurodynamic versus carpal bone mobilization	One trial with high bias rating	Short-term effects on on pain, function, motion, upper-limb tension testing and need for surgery	No significant difference between the two techniques of mobilization

Interventions	Studies	Outcomes	Results
Magnet therapy versus placebo	One trial with moderate bias rating	Short-term effect on pain	No difference between the groups
Chiropractic[d] versus medical[e] treatment	One trial with a high bias rating	Physical and mental distress, vibrometry, hand function, health-related quality of life and nerve conduction	Medical care over 9 weeks improves physical distress in the short term; chiropractic and medical treatment provide similar short-term improvement in other outcomes
Laser acupuncture versus placebo	One trial with moderate bias rating	Short-term effect on paresthesia and night pain	Laser acupuncture does not improve short-term paraesthesia and night pain
Steroid and insulin injection versus steroid and placebo injection	One trial with moderate bias rating	Medium and long-term effects on symptoms and nerve conduction	Steroid injection followed by weekly insulin injections for eight weeks results in superior outcomes than steroid injection and weekly placebo injections over the same period
Local injection of lidocaine plus corticosteroid[f] versus placebo	One trial (Jadad score=5)	Symptom improvement one month after injection	Significant improvement in the local corticosteroid group
Local injection of corticosteroid[g] versus systemic corticosteroid	Two trials (Jadad score=4 and 5)	Subjective improvement and global symptom scores at 2, 8 and 12 weeks	No difference at 2 weeks, but local injections of corticosteroid group was significantly better than oral steroid group at 8 and 12 weeks
Local injection of corticosteroid[f] versus nocturnal neutral angle splint and NSAID (acemetacine)	One trial (Jadad score=3)	VAS, Tinel's and Phalen's signs, nerve conduction and symptom severity at 2 and 8 weeks	No significant difference at 2 or 8 weeks
Local injection of corticosteroid[f] versus Helium-Neon Laser therapy	One trial (Jadad score=1)	Symptom improvement and nerve conduction at 20 days and 6 months	Local corticosteroid injection is significantly better at 20 days in relieving symptoms, but there was no difference at 6 months

NSAID: non-steroidal anti-inflammatory drug; [a]Trichlormethiazide; [b]Tenoxicam-SR; [c] Prednisolone or Prednisone; [d] Manual thrusts, massage, ultrasound and nocturnal wrist splint. [e]Ibuprofen and nocturnal wrist splint; [f]methylprednisolone; [g]betamethasone or prednisolone

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