Is surgical intervention more effective than non-surgical treatment for carpal tunnel syndrome? A systematic review
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CRD summary
This review concluded that both surgical and conservative interventions had treatment benefit in the management of carpal tunnel syndrome. Surgical treatment had a superior benefit in symptoms and function at six and twelve months. These conclusions should be interpreted with caution given the risk of publication and language bias and limitations in review methods.

Authors' objectives
To compare the efficacy of surgical versus conservative treatment of carpal tunnel syndrome.

Searching
The following databases were searched for studies in English up to June 2010: MEDLINE, EMBASE, PEDro and Cochrane Central Register of Controlled Trials (CENTRAL). Search terms were reported. Reference lists of relevant publications were screened and international guidelines were searched to identify relevant studies.

Study selection
Prospective controlled trials that compared any surgical versus non-surgical intervention in patients with carpal tunnel syndrome (regardless of the diagnostic criteria used) were eligible for inclusion. The eligible surgical treatments included standard open carpal tunnel release, endoscopic carpal tunnel release, open carpal tunnel release with additional procedures such as internal neurolysis, epineurotomy or tenosynovectomy, and open carpal tunnel release using various incision techniques. Eligible non-surgical treatments included: wrist splints; drugs such as oral or local steroids, non-steroidal anti-inflammatory drugs (NSAIDs), diuretics and pyridoxine; physical therapy, therapeutic exercises and manipulations (such as ultrasound, laser therapy, yoga and acupuncture). The primary outcome was self-reported functional and symptoms improvement at six months of follow-up. Secondary outcomes included self-reported functional and symptoms improvement at three months of follow-up, self-reported functional and symptoms improvement at twelve months of follow-up, complications and side-effects.

Most included studies evaluated surgery versus steroid injection or multi-modality, while the remaining studies evaluated surgery versus splinting or laser. Where reported, most studies excluded patients with severe thenar muscle atrophy. The diagnosis of carpal tunnel syndrome for most included patients was confirmed by electro-diagnostic studies. The patient age in included studies was not reported.

Two reviewers independently assessed studies for inclusion.

Assessment of study quality
The quality of studies was assessed using the Jadad scale, a five-point scale that evaluated randomisation, blinding and withdrawals/drop-outs. Additional quality criteria from Structured Effectiveness Quality Evaluation Scale (SEQES, 24-items) were also used. The maximum quality score was 48. Studies that scored between 17 and 32 were classified as moderate quality. Studies that scored at least 33 were classified as high quality.

Two reviewers independently performed quality assessment, with any disagreements resolved by discussion.

Data extraction
For continuous outcomes, data were extracted on mean and standard deviations (SD) to enable the calculation of mean differences (MDs) with 95% confidence intervals (CIs). For dichotomous outcomes, data were extracted on event rates to enable the calculation of odds ratios (ORs) with 95% confidence intervals.

Two reviewers independently performed data extraction.
Methods of synthesis
The studies were combined in a meta-analysis. The pooled odds ratios and weighted mean differences (WMDs), with 95% confidence intervals, were calculated. A random-effects model was used when there was significant heterogeneity; otherwise a fixed-effect model was employed. Statistical heterogeneity was assessed using the $X^2$ and $I^2$ statistic.

Results of the review
Seven trials (five RCTs and two controlled trials) were included in the review (712 participants). The Jadad score of trials ranged from 0 to 3. The SEQES score of trials ranged from 29 to 40, which indicated that the quality of trials ranged from moderate to high.

Compared with non surgical interventions, surgical interventions were associated with a significant improvement at six months for self-reported functional status (WMD -0.35, 95% CI -0.47 to -0.22; four RCTs) and self-reported symptom severity (WMD -0.43, 95% CI -0.57 to -0.29; four RCTs).

Compared with non surgical interventions, surgical interventions were associated with a significant improvement at 12 months for self-reported functional status (WMD -0.35, 95% CI -0.55 to -0.15; two RCTs) and self-reported symptom severity (WMD -0.37, 95% CI -0.56 to -0.19; two RCTs). There were no significant differences for both outcomes between the treatment groups at three months.

Compared with non surgical interventions, surgical interventions were significantly associated with an increased rate of complication (RR 2.03, 95% CI 1.28 to 3.22; six RCTs). The most commonly reported complications in the surgical group were skin irritation and wound haematoma.

Significant heterogeneity ($I^2$>80%) was only observed on the outcomes at three months.

Authors' conclusions
Both surgical and conservative interventions had treatment benefit in the management of carpal tunnel syndrome. Surgical treatment had a superior benefit in symptoms and function at six and twelve months.

CRD commentary
This review's inclusion criteria were clear. Several relevant databases were searched. Only published studies in English were included, which may have increased the potential for both publication and language biases. Sufficient attempts were made to minimise errors and biases in the review process. Appropriate criteria were used to assess study quality. Statistical heterogeneity was assessed. However, pooling results from studies with different study designs may not have been appropriate. The authors' conclusion should be interpreted with caution given the risk of publication and language bias and limitations in review methods.

Implications of the review for practice and research
Practice: The authors state that the conventional approach to use a trial of conservative management within three months in patients with mild and moderate or transient carpal tunnel syndrome was supported by evidence.

Research: The authors state that better prognostic studies were required to identify characteristics of patients most likely to respond to both surgical and non-surgical interventions for the management of carpal tunnel syndrome.

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