The efficacy of splinting for lateral epicondylitis: a systematic review
Borkholder C D, Hill V A, Fess E E

CRD summary
This review assessed the efficacy of splinting for lateral epicondylitis. The authors concluded that there was some, but not conclusive, support for the use of splinting for lateral epicondylitis and that further research was required. There was limited evidence from the included small, generally flawed studies. Given the limitations of the evidence, the authors' tentative conclusions about efficacy appear appropriate.

Authors' objectives
To assess the efficacy of splinting for treating lateral epicondylitis.

Searching
MEDLINE, CINAHL, EMBASE, PEDro and the Cochrane CENTRAL Register were searched for reports in the English language (up to December 2003); the search terms were stated. The reference lists of identified studies were screened.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion, regardless of whether the outcome assessment was conducted blind or not. The studies had to use inferential statistical analysis.

Specific interventions included in the review
Studies that compared splinting with conservative non-operative treatments, including pharmacologic or therapy, were eligible for inclusion. Studies that did not use splinting were excluded. In the review, splints were classified using the American Society of Hand Therapists Splint Classification System expanded and refined version. The included studies used the following types of splints: elbow flexion, forearm neutral, wrist neutral immobilisation splint; elbow flexion restriction splint, nonarticular proximal forearm non elastic or elastic splint; nonarticular forearm splint and wrist immobilisation splint. The splints were used either alone or in combination with other treatments such as oral non-steroidal anti-inflammatory drugs (NSAIDs), topical cream, local injections and manipulations.

Participants included in the review
Studies in participants with lateral epicondylitis or normal participants with appropriate 'associated issues' were eligible for inclusion. Studies of participants with diagnoses other than lateral epicondylitis, or combinations of diagnoses, were excluded.

Outcomes assessed in the review
Studies that assessed the outcomes using objective measures with documented reliability and validity were eligible for inclusion. Studies were excluded if they only reported subjective outcome measures. The review assessed strength, load and pain. None of the included studies assessed the outcomes beyond 4 weeks.

How were decisions on the relevance of primary studies made?
At least three reviewers independently selected studies for inclusion. Any disagreements pertaining to the quality criteria required for inclusion were resolved through consensus.

Assessment of study quality
Studies were assessed using MacDermid's Evaluation Guidelines (details of modifications made to the scoring system were reported in the paper). The studies were also classified using Sackett's hierarchy of study design. Three reviewers independently evaluated validity using blinded copies of studies. The reviewers had to reach consensus on all quality
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
The studies were grouped by type of splint and outcome, then combined in a narrative.

How were differences between studies investigated?
Differences between the studies were discussed in the paper.

Results of the review
Eleven RCTs were included. There were 6 parallel-group RCTs (n=213) and 2 repeated measures RCTs (n=64) in patients with lateral epicondylitis, and 5 repeated measures RCTs (n=85) in normal participants.

One Sackett level 1b study and 10 Sackett level 2b studies were included.

The methodological flaws included short-term follow-up, a lack of sample size calculations, and a failure to describe the methods used to select patients. Few studies (3 of 11) considered the reliability and validity of the methods used to measure the outcomes. Only one study reported the statistical package used, and most analyses did not adjust for duration of symptoms. The adjusted quality scores ranged from 44.5 to 16.5 (mean 26.3).

Elbow flexion, forearm neutral, wrist neutral immobilisation splint (1 RCT in patients).

The Sackett level 1b RCT (128 patients with lateral epicondylitis, quality score 44.5) found that cast immobilisation or cast plus NSAIDs for 14 days significantly increased grip strength and function, and reduced pain at 4 weeks. It found no significant difference in grip or function between splint plus NSAID and splint alone, but found that splint plus NSAID significantly improved pain compared with splint alone.

Elbow flexion restriction splint (1 RCT in patients and 1 RCT in normal people).

One RCT (50 patients) found no significant difference in pain between splint and no splint. One RCT (10 normal people) found no difference between two different elbow flexion splints, but found that both splints significantly decreased the load at the lateral epicondyle in comparison with no splint.

Nonarticular proximal forearm non elastic (3 RCTs in patients and 3 RCTs in normal people).

Two RCTs (14 and 16 patients, respectively) found that splints increased grip and wrist extension immediately and at 4 weeks, respectively, compared with no splint. Two RCTS found no significant immediate effect on pain with splint, although one of these RCTs found that splint plus either injection or NSAID reduced pain at 3 to 4 weeks (from baseline) and the other RCT found that splint reduced pain in comparison with no splint. One RCT (36 patients) found that splint plus local injection significantly improved grip strength in comparison with splint alone or splint plus NSAID. Studies in normal people (30, 17 and 15 people, respectively) found different results for wrist extension strength.

Nonarticular proximal forearm elastic (1 RCT in patients and 2 RCTs in normal people). One RCT (33 patients who all received manipulation) found no significant difference in wrist extension between splint, topical cream, splint plus topical cream, and manipulation alone. One RCT (17 normal people) found no significant difference in wrist extension/forearm or pronation/supination with splint. One RCT (10 normal people) found no significant difference between two different elastic splints and four other splints in load.
Nonarticular forearm splint (1 RCT in normal people).

The RCT (10 normal people) found that two different nonarticular forearm splints decreased load at the lateral epicondyl in comparison with four other splints.

Wrist immobilisation splint (1 RCT in normal people).

The RCT (13 normal people) compared three different wrist immobilisation splints and found that only the splint with semicircumferential design significantly reduced wrist extensor activity over 3 days when compared with no splint. All three splints significantly decreased grip force in comparison with no splint.

Authors' conclusions
There was some, but not conclusive, support for the use of splinting in patients with lateral epicondylitis. Further research is required.

CRD commentary
The review question was clear in terms of the study design, intervention and outcomes. The inclusion criteria were broadly defined in terms of the participants. Several relevant sources were searched and the search terms were stated. By limiting the included studies to those in English, the authors might have missed some relevant studies. Three reviewers independently selected studies, assessed validity and extracted the data, thus reducing the potential for bias and errors. The methods used to extract the data were not described, so it is not known whether any efforts were made to reduce errors and bias. Validity was assessed using established criteria.

The narrative synthesis was appropriate given the heterogeneity among studies. Many of the studies were flawed, and used combinations of interventions that included splinting and compared these with a variety of control treatments. This weakens the evidence for splinting. Given the limitations of the evidence, the authors' tentative conclusions about the efficacy of splinting appears appropriate and the conclusions about the need for further research are supported.

Implications of the review for practice and research
Practice: The authors stated that clinicians must implement treatments supported by valid evidence.

Research: The authors stated that, based on the promising results of the studies included in the review, future studies should be carefully designed. They recommended that future studies classified splints using the Expanded Splint Classification System, described handedness and functional capacity, and examined single interventions.

Bibliographic details

PubMedID
15162105

DOI
10.1197/j.jht.2004.02.007

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

**MeSH**
Equipment Design; Humans; Splints; Tennis Elbow /therapy

**Accession Number**
12004009813

**Date bibliographic record published**
31/10/2005

**Date abstract record published**
31/10/2005

**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.