Diagnosis and treatment of worker-related musculoskeletal disorders of the upper extremity: epicondylitis

Chapell R, Bruening W, Mitchell M D, Reston J T, Treadwell J R

Authors' objectives
The objectives were to assess the effectiveness of diagnostic tests for epicondylitis, and to assess the harms and benefits of surgical and nonsurgical interventions for patients with epicondylitis.

The report also assesses the diagnosis and treatment of carpal tunnel syndrome, cubital tunnel syndrome and de Quervain's disease. This abstract only deals with epicondylitis; the other disorders are dealt with in other DARE abstracts (DARE abstract numbers 12003008727, 12003008728, 12003008730).

Searching
The sources searched included 31 electronic databases, the World Wide Web, the bibliographies and reference lists of all identified studies, Current Contents (Clinical Medicine), and 1,600 journals and supplements maintained in the ECRI collections. Full details were provided of all electronic databases and web sources searched. Studies were only included if they were published in English. The paper reported details of the search strategy.

Study selection

Study designs of evaluations included in the review

Diagnosis.

Prospective and retrospective studies were eligible regardless of the presence of a concurrent control group. Case series and other reports were only included if they were published in 1980 or later. Case series had to enrol 10 or more patients. All included studies were diagnostic case-control studies.

Effectiveness.

Controlled trials were eligible for inclusion regardless of the use of randomisation or blinding, or whether they were prospective or retrospective. Studies were only included if they had no serious design flaw that precluded an interpretation of the results.

Specific interventions included in the review

Diagnosis.

Studies were included if they did not use obsolete tests. The identified studies evaluated imaging tests, sensory tests, and signs and symptoms.

Effectiveness.

Studies that compared treatment with placebo, sham or no treatment, or compared two or more treatments, were eligible for inclusion. Studies that compared highly similar treatments were excluded. The included studies compared the following treatments with sham treatment, placebo, or each other: laser, oral or topical non-steroidal anti-inflammatory drugs (NSAIDs), ultrasound, elbow brace, acupuncture, topical salicylate, injections of glucosamine, injections of various local anaesthetic agents, injections of various corticosteroids, fasciectomy, simple denervation, pulsed magnetic field therapy, extracorporeal shock wave therapy, manipulation, deep friction massage, immobilisation, acupuncture, transcutaneous electrical nerve stimulation, home exercise programme, and physiotherapy.

Reference standard test against which the new test was compared

The inclusion criteria for diagnostic studies were not specified in terms of a reference standard test. The included studies used signs and symptoms, or unspecified criteria, to diagnose epicondylitis.
Participants included in the review

Studies of patients diagnosed with worker-related epicondylitis were eligible for inclusion. The review defined worker-related as a disorder that affects workers. The studies included patients and healthy controls.

Diagnostic studies predominantly included patients with lateral epicondylitis; only one study included some patients with medial epicondylitis.

Effectiveness studies predominantly included patients with lateral epicondylitis; only two studies included patients with medial epicondylitis.

Outcomes assessed in the review

Diagnostic studies were included if they reported data that could be used to evaluate the test.

Effectiveness studies that assessed any of the following patient-orientated outcomes were eligible for inclusion: pain, functional activity, quality of life, return to work; return to activities of daily living, harms, and global measures such as patient satisfaction and overall relief of symptoms. The review did not assess surrogate outcomes.

How were decisions on the relevance of primary studies made?

Six reviewers independently selected the studies for inclusion.

Assessment of study quality

Diagnosis.

Studies were assessed for: source of funding; prospective or retrospective selection of the patients; patient inclusion and exclusion criteria; reporting of the sex distribution; less than 20% sex difference between the patients and controls; reporting of the patients’ age; the mean age of patients within 5 years of controls; reporting of the duration of the medical condition; reporting of co-morbidities; blinding of the test operator; blinding of the test reader; multiple test readers; method used for multiple test readers; test compared with independent reference standard; all patients given test and reference standard; and generalisability.

Effectiveness.

Studies were assessed for: sample size; the percentage of patients undergoing bilateral procedures and potential for violation of assumption of independence; the number of study centers; funding by a for-profits stakeholder; blinding; total patient attrition; intention-to-treat analysis; and generalisability.

The authors did not state how the papers were assessed for validity, or how many reviewers performed the validity assessment.

Data extraction

The data were abstracted onto electronic data abstraction forms, but the authors did not state how many reviewers performed the data extraction. Separate forms were used for studies of diagnosis and effectiveness.

Diagnosis.

Separate forms were for each diagnostic test.

Effectiveness. For each study presenting adequate data, the effect size and 95% confidence interval (CI) were estimated using Hedge’s ‘d’. For studies assessing outcomes using rating scales, the reviewers calculated the mean for each treatment group. The reviewers converted outcomes reported as odds ratios into Hedge’s ‘d’. Where possible, the minimum between-group difference that each study had the power to detect was calculated. The statistical significance of differences between the treatment groups was assessed in terms of patient characteristics and pre-treatment effect sizes. Wherever possible, the reviewers recalculated effectiveness data from studies with patient attrition by making conservative assumptions about outcomes among drop-outs.
Methods of synthesis
How were the studies combined?
The diagnostic studies were combined in a narrative.

For studies of effectiveness, when 4 or more controlled studies of a given treatment reported the same outcome, these were combined using a fixed-effect meta-analysis. A weighted summary effect size was calculated, along with the 95% CI. The results were also presented using normal distribution curves to estimate the proportion of patients in the intervention group who would have a different outcome from the control group, and the significance was tested using the Q statistic. The results were compared using conservative and non-conservative assumptions for drop-outs. Otherwise, the studies were combined in a narrative.

How were differences between studies investigated?
Differences between the studies were presented using a tabular format.

Results of the review
Sixteen studies met the initial inclusion criteria for diagnostic studies, of which 10 (348 patients) remained after excluding studies of patients who had had unsuccessful treatment.

Fifty-seven studies of effectiveness met the inclusion criteria, of which 6 were subsequently excluded (reasons were given). Of the 51 remaining studies, 38 were randomised controlled trials (RCTs), 4 were randomised crossover trials and 8 were controlled trials.

Diagnosis.
Aspects of study quality were incompletely reported. Methodological problems included a lack of blinding of the test operators, potential selection bias, use of clinical signs and symptoms to diagnose epicondylitis, lack of reporting of the signs and symptoms used for diagnosis, and only 4 studies presented sufficient data for the calculation of the sensitivity and specificity.

Six studies evaluated the resisted extension test, but none reported sensitivity and specificity.

Effectiveness.
Low-level laser versus sham laser (7 double-blind RCTs with 320 patients).

Two RCTs had significant baseline differences between the treatment groups in the proportion of female patients. Four RCTs did not use intention-to-treat analysis and three of these had high attrition rates (greater than 20%). The patients’ characteristics were similar to those of patients with epicondylitis in published epidemiological studies. Co- morbidities were incompletely reported.

Global outcomes (4 RCTs): laser therapy improved global outcomes compared with sham laser at 1 to 1.5 months (d=0.13, 95% CI: -0.17, 0.43) and at longer term follow-up (d=0.22, 95% CI: -0.08, 0.53), but the difference was not statistically significant. No statistically significant heterogeneity was found (P=0.079 and P=0.31 respectively). An analysis that assumed all drop-outs had been cured showed no significant difference but a trend favouring sham laser. Work status (1 RCT, 30 patients): compared with sham laser, laser therapy increased the proportion of people working at 5.6 months but the difference was not statistically significant (13 of 15 versus 9 of 13 with sham, P=0.262). The study had the power to detect a 26% difference.

Pain assessed using visual analogue scale (4 RCTs, 143 patients): none of the 3 RCTs for which effect sizes could be calculated showed any statistically significant difference between the treatments. The studies were small and likely to be underpowered.

Acupuncture versus sham acupuncture (2 RCTs, 134 patients). One RCT was double-blinded, while in the other only the rater was blinded. The patients’ characteristics were similar to those of patients with epicondylitis in published
epidemiological studies. Co-morbidities were incompletely reported.

Global outcomes (2 RCTs): both RCTs showed that acupuncture significantly improved global outcomes in the short term (2 to 4 weeks) compared with sham acupuncture (d=0.84, 95% CI: 0.39, 1.29 and d=1.32, 95% CI: 0.58, 2.06). One RCT found no significant difference between treatments with longer term (3 to 12 months) follow-up.

Pain (1 RCT, 48 patients): the RCT showed that acupuncture significantly improved pain relief and that pain relief lasted longer compared with sham acupuncture (patient-rated pain relief and duration of pain, P<0.012 for both outcomes).

Other interventions.

Evidence for other interventions was very limited.

Two RCTs compared oral naproxen with oral difusinal. One RCT found no significant difference between treatments, while the other found difusinal improved outcomes.

Two small RCTs found no statistically significant difference between ultrasound and phonophoresis of hydrocortisone.

Three RCTs with 220 patients found that ultrasound improved outcomes compared with sham ultrasound, but in only one RCT was the difference statistically significant.

There was insufficient evidence from two poor-quality crossover studies to assess the wearing of an elbow brace.

Two RCTs compared oral NSAIDs with corticosteroid injection. One RCT found no significant difference between the treatments, while the other found that corticosteroid injection improved outcomes.

One RCT found that placebo improved outcomes compared with topical dimethylsulphoxide, but the difference was not statistically significant.

One RCT found limited evidence that extracorporeal shock wave therapy significantly improved pain and function compared with sham therapy.

One RCT found limited evidence that corticosteroid injection improved outcomes compared with manipulation and deep friction massage.

One small RCT found that corticosteroid injection improved outcomes compared with braces or immobilisation.

One RCT found limited evidence that acupuncture improved outcomes compared with corticosteroid injection.

One RCT found no significant difference between transcutaneous electrical nerve stimulation, ultrasound, phonophoresis and steroid injection.

One RCT found no significant difference between physical therapy and ultrasound.

Five small RCTs examined various combinations of therapies, but were too small to reliably detect important clinical differences between the treatments.

Cost information

The authors also searched four additional U.S. Government datasets to obtain information about the costs. The average total charges per patient for the diagnosis-related group of major shoulder/elbow procedures with co-morbidities or complications were $9,008.94. The costs for DRG shoulder, elbow or forearm procedures (excluding major joint procedures) without co-morbidities or complications were $7,729.16. The median cost for strapping an elbow or wrist was $62.61.
Authors' conclusions
Overall, the studies were generally of a low quality, making it difficult to draw conclusions. The studies suggested trends rather than providing quantitative results.

Diagnosis.
There was insufficient evidence to assess any diagnostic tests for epicondylitis.

Effectiveness.
Laser therapy does not appear to be an effective treatment for epicondylitis. The limited evidence suggests that acupuncture improves global outcomes and pain compared with sham acupuncture.

CRD commentary
The review question was clear in terms of the study design, participants and outcomes. Eligible interventions were not specified, but this seems appropriate in view of the wide-ranging nature of the review. The literature search was restricted to English language publications and might have excluded some relevant data. More than one reviewer independently selected the studies, thus reducing the potential for bias and errors. The subsequent exclusion of some studies that met the inclusion criteria suggests that more rigorous inclusion criteria may have been appropriate. The methods used to assess validity and extract the data were not described; hence, any efforts made to reduce errors and bias cannot be judged. Validity was assessed and some methodological limitations were discussed.

Statistical heterogeneity was assessed prior to combining studies in a meta-analysis. The authors' conclusions are likely to be reliable, but it should be noted that improved outcomes with acupuncture were only seen in the short term.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that well-designed diagnostic studies are needed. In the absence of a 'gold' standard test, longitudinal studies are the most appropriate for assessing diagnostic tests. If a gold standard test was developed, then single-arm cross-sectional studies comparing the results of the gold standard test with those of the test under investigation would be appropriate. Studies should select patient populations that closely resemble the general population on whom the diagnostic test would be used.

The authors also stated that further trials are required to evaluate the following: oral and topical NSAIDs, ultrasound, elbow brace, topical salicylate, injections of glucosamine, injections of various local anaesthetic agents, and injections of various corticosteroids.

Funding
Agency for Healthcare Research and Quality, contract number 290-97-0020.

Bibliographic details

Original Paper URL
http://www.ahrq.gov/clinic/epcsums/musclsum.htm

Indexing Status
Subject indexing assigned by CRD
MeSH
Carpal Tunnel Syndrome; Hand Injuries; Musculoskeletal Diseases /prevention & control; Occupational Diseases /prevention & control; Occupational Exposure; Occupational Health; Upper Extremity; Workplace

Accession Number
12003008729

Date bibliographic record published
30/06/2005

Date abstract record published
30/06/2005

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.