On the treatment of tennis elbow. Effectiveness and prognostics of braces and physical therapy
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Chapter IX

Summary
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Lateral epicondylitis, or tennis elbow, is a complaint often seen in general practice. Classically, the patient will present with pain at the lateral side of the elbow, aggravating with contraction of the extensor muscles of the wrist. Its incidence in general practice of 4-7 per 1000 patients per year makes the complaint a substantial problem. In approximately 10% of all patients, the complaint will lead to sick-leave for a mean period of 11 weeks. The natural course of the injury is relatively mild, but will last, if untreated, for an average of six months to two years. Several treatment strategies have been described. A problem for the treating physician is that no optimal therapeutic strategy has been identified yet. One of the underlying problems is the lack of sufficient randomised clinical trials evaluating the effectiveness of the different therapeutic methods.

The main aim of this thesis is to evaluate the effectiveness of a brace, a physical therapy regimen and a combination of both for patients with tennis elbow complaints, to be able to give direction to the discussion on the optimal treatment strategy for a tennis elbow.

Chapter II comprises a review on currently available literature on effectiveness of orthotic devices, supportive aids, among which braces, for treatment of tennis elbow. The literature was systematically searched in five electronic databases, reference lists of retrieved articles and contacts with experts on tennis elbow. All randomised clinical trials (RCT) describing individuals with diagnosed lateral epicondylitis and comparing the use of an orthotic device as a treatment strategy were evaluated for inclusion. Two reviewers independently assessed the validity of the included trials and extracted data on relevant outcome measures. Dichotomous outcomes were expressed as Relative Risks (RRs) and continuous outcomes as Standardised Mean Differences (SMD), both with corresponding 95% confidence intervals (95% CI). Five small-size RCTs (N per group 7-49) were included. Validity score ranged from 3-9 positive items out of 11. Subgroup analyses were not performed due to the small number of trials. The limited number of included trials present few outcome measures and limited long-term results. Pooling was not possible due to large heterogeneity amongst trials. No definitive conclusions can be drawn concerning effectiveness of orthotic devices for lateral epicondylitis. More well-designed and well-conducted RCTs of sufficient power are warranted.

In chapter III the Epicondylitis Lateralis Onderzoek (ELO trial or Lateral Epicondylitis Study in English) was described. The ELO-trial is a randomised clinical trial in effectiveness of braces, physical therapy and the combination of both for treatment of tennis elbow complaints is compared. Outcomes were compared at 6, 26 and 52 weeks after randomisation. Outcome measures used were success rate; severity of complaints; pain during the patients main complaint; functional limitations (assessed on a pain free function questionnaire); pain free grip strength
and maximal grip strength; pressure pain; limitation during daily activities; satisfaction. Both an intention-to-treat as well as a per-protocol analysis were used to analyse the data. On short term (six weeks), superior results favouring physical therapy when compared to brace-only treatment on pain, functional limitations and satisfaction. Brace-only was superior on limitations during daily activities. Conflicting results, but explainable from the supposed working-mechanism.

Combination treatment showed superior to brace-only treatment on severity of complaints, functional limitations and satisfaction. Combination was superior to physical therapy on pressure pain only. On intermediate-term and long-term, no differences between strategies were identified. Concluding, conflicting results were retrieved. For limitations during daily activities, brace-only treatment might be useful: it is relatively cheap and it is useful to await the natural course. This potentially favourable results for brace-only treatment on functional status should, however, be replicated in other well-designed trials, to exclude the favourable outcome on inconvenience during daily activities being based on chance.

Chapter IV describes and interesting, pre-planned, subgroup-analysis. The so-called extensor grip test was studied for a possible predictive value of a good result of the brace-only treatment. During the test, the action of the brace is imitated while the patient dorsiflexes the wrist against resistance. It was noted whether the second test was less painful (positive test) or not (negative test). The test was performed after inclusion and before the randomisation procedure. The results of this subgroup analysis support the hypothesis behind the test: patients with a positive test showed statistically superior results when compared to patients with a negative test on success-rate decrease in pain and patient satisfaction.

Whilst ultrasound is a non-invasive and relatively cheap diagnostic strategy, it might be useful to support a certain choice of therapy. In Chapter V, the prognostic value of ultrasound for the effectiveness of brace-only, physical therapy or the combination of both for treating tennis elbow, was studied. The results of this study show no significant differences in effectiveness when looked at subgroups based on entities identified by ultrasound. Therefore, the pathologic findings on ultrasound examination seem to have no predictive value for patients with tennis elbow.

Chapter VI comprises the cost-effectiveness analysis of the ELO-trial. Using standardised questionnaires both direct and indirect costs were assembled related to the tennis elbow complaints of all patients. Whilst the clinical results did not differ between studied strategies, a cost-minimisation analysis was performed. Physical therapy was the least costly strategy, although not significantly. Between physical therapy and combination treatment, no differences were identified.
Another vision on the aetiology of tennis elbow was studied in Chapter VII. Manipulation of the wrist was studied as a treatment strategy for tennis elbow and compared to the physical therapy protocol as applied in the ELO-trial. The hypothesis is that a displacement of a motion segment in the carpal bones is the underlying cause of tennis elbow complaints. Treatment using manipulation of the wrist is aimed at restoration of this displacement. In a randomised clinical pilot-study, 30 patients were included. The methodology of this study was conform the ELO trial. The results of the study show that manipulation of the wrist was superior to physical therapy on 3 weeks follow-up for success-rate and decrease in pain during the patients main complaints. All other outcomes showed a comparable trend, but did not differ statistically significant.

A post-hoc power-analysis revealed that the pilot-study had a power of 0.68. Therefore, results should be interpreted with great prudence. The promising results of this trial need replication in a large-scale randomised clinical trial. The trial should be sufficiently powered and should compare manipulation of the wrist to the most commonly used and potentially effective conservative treatment strategies for tennis elbow.

Chapter VIII is a general discussion based on the previously mentioned chapters. On the clinical outcome measures, there seems no preferable therapy. Physical therapy is then the least costly strategy, although differences were not statistically significant. Brace-only treatment might be useful in patients with a positive extensor grip test. Further research on effectiveness of manipulation of the wrist is warranted.