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Review

# Lateral epicondylitis: This is still a main indication for extracorporeal shockwave therapy

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ABSTRACT

Extracorporeal shockwave therapy (ESWT) is used in a number of indications in the medical field. A number of tendinopathies show good and excellent results due to evidence based medicine. The treatment of lateral epicondylitis is known to show conflicting results. This overview of the published RCT's on ESWT for lateral epicondylitis tries to show the reasons for this conflicting data-base and point out, why we think that this is still a main indication for extracorporeal shockwave therapy.



**Contents**



## 1. Introduction

The German Dr. F. Runge first described Epicondylitis humeri radialis in 1873, as “writers cramp”, and then 1883 as “Lawn Tennis elbow” in the British Journal of Sports Medicine [1]. Tennis elbow is more accurately described and understood as lateral elbow tendinopathy — a process of failed healing affecting the common extensor tendon. Tennis elbow (also known as lateral epicondylitis) is characterized by chronic degeneration at the origin of the extensor carpi radialis brevis muscle on the lateral epicondyle of the humerus. It is usually caused by injury or overuse. Symptoms include pain, weakness and stiffness of the outer elbow. It is one of the most common tendinopathies of the upper extremity with an annual incidence of 1–3% of the total population [2]. Conservative treatments include rest, application of ice, analgesic medications with NSAR or orthopedic devices. As well physiotherapy and eccentric training and stretching are in use. Controversially discussed but still in use are corticosteroid injections. Over 50% of the patients go to an orthopedic surgeon, and there is a percentage of 12%, that undergo surgery after failed conservative treatment.

In the beginning of the 1990s extracorporeal shockwave therapy found it's way to orthopedic treatment procedures and epicondylitis was one of the first and obviously most successful treated

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indications for ESWT. Quite a number of RCTs (Randomized Controlled Trials) were performed to prove the efficacy of the treatment. The treatment of radial epicondylitis by ESWT even got an FDA-approval in the USA [14,15].

But there are high-quality studies, which showed not as strong results in comparison to placebo as expected and the role of ESWT for epicondylitis had to be discussed again.

According to the guidelines of ISMST (International Society for Medical Shockwave Treatment) and DIGEST (Deutschsprachige Internationale Gesellschaft für Extrakorporale Stoßwellentherapie) in the following overview we want to summarize the actual known and published level-1b studies (Level of Evidence based on AHCPR 1992) with Evidence obtained from at least one randomized controlled trial. Therefor we performed a search in internet using Pubmed and Cochrane-Registers and took a look at the reference lists of articles and dissertations as well as the given talks at the international conferences of DIGEST and ISMST. We tried to compare and analyze the studies, especially on behalf of the diverging results and outcomes as well as to point out possible conflicts according to the study-design and the use of different shockwave-devices. The interpretation of the data shows to be very difficult as there is a high diversity of treatment protocols and the used scores and end-points. In earlier publications and meta-analyses these studies were excluded and smallest collections of three publications were compared or all studies are included without differentiation of all the bias of generators, local anesthesia and so on.

We therefor wanted to include the published level-1b-Studies and rated them due to the clinical use and guidelines of ISMST and DIGEST.

## 2. A number of studies with negative results were published in the years of 2002 to 2008

**Crowther et al.** [3] published in 2002 a controlled trial shockwave-therapy vs. local steroid injection with 93 patients with a follow-up after 6 weeks and 3 months. After three months, 84% of patients in group 1 were considered to have had successful treatment by a single injection of 20 mg triamcinolone with lignocaine compared with 60% in group 2 receiving 2000 shock waves in three sessions at weekly interval.

The conclusion of the authors showed in the medium term local injection of steroid being more successful and 100 (??) times less expensive than ESWT in the treatment of tennis elbow. However local injections of steroids have to be discussed as harmful in the long term and therefore seems not to be a treatment option. Taking a closer look to the study the randomization has to be criticized as a number of patients randomized to receive the injection refused the injection and therefore the patients receiving the injection are a positive-selection.

In our opinion Crowther et al. even showed a positive result for ESWT but the study has to be excluded as comparison to corticosteroids in chronic tissue disorders seems to be inadequate and the randomization process was incorrect.

In one of the biggest studies **Haake et al.** [4] randomized 271 patients in a multi center study in 2002 comparing ESWT vs. placebo.

**Results:** follow up at 6 weeks, 12 weeks and 12 months, Roles and Maudsley score (see Figs. 1 and 2).

After three months, 25,8% in ESWT and 25,4% in placebo group reached the primary end point in the Roles and Maudsley score "1 or 2" out of 4 and no requirement for additional treatment.

Conclusions of the authors

"Extracorporeal shockwave therapy as applied in the present study is ineffective for the treatment of chronic lateral epicondylitis. Six weeks, three months, and one year after extracorporeal shockwave therapy with 3 × 2000 pulses and positive energy flux density (ED+) of 0,07 to 0.09 mJ/mm$^2$ and use of local anesthesia, we detected no relevant difference in the clinical success rate compared with that in a placebo therapy group."

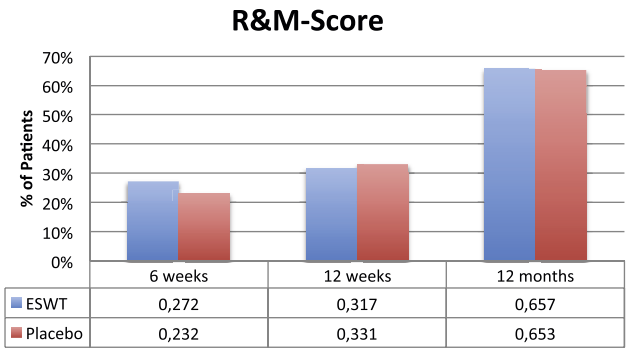


**Fig. 1.** Haake et al. [4] – R&M-Score.

In an additional follow-up after one year, the authors found an improvement in two-thirds of the patients in both groups.

The study-design unfortunately includes the use of local anesthesia, very low intensities and as a multi center-study the shockwave-generators were not similar and different intensities were in use as revealed by the authors. According to Labek et al. [5] the use of local anesthesia shows a negative influence on shockwave treatment and might have impaired this study. Local anesthesia inhibits the C-fibre-activity and substantially alters the biological response to ESWT (see Fig. 5).

In an often quoted study **Speed et al.** [6] showed 2002 no significant effect of ESWT in lateral epicondylitis within a short period of 3 months (Figs. 3 and 4).

**Results:** 3 months follow-up. VAS.

At three months, 14 (35%) of the subjects in the ESWT group and 12 (34%) of the subjects in the sham group showed a positive response (50% improvement from baseline) with respect to pain.

Conclusions of the authors

There appears to be a significant placebo effect of moderate dose ESWT in subjects with lateral epicondylitis but there is no evidence of added benefit of treatment when compared to sham therapy.

In comparison both groups show a low positive effect to the treatment, but the sham group was treated with a minimal Energy flux density of 0.04 mJ/mm. No matter the little amount of energy this controverts the principle of a sham group.

[4] Haake et al. (2002)
Protocol:
271 patients in 2 groups
Group 1: ESWT, 3 sessions, 2000 pulses, 0.07-0.09 mJ/mm², 6-8 days interval, (n=135)
Group 2: Placebo, same protocol with PE bubble foil (n=137)
WITH local anesthesia 3 ml of 1% mepivacaine
Results: follow up at 6, 12 weeks and 12 months, Roles and Maudsley score
After three months, 25.8% in ESWT and 25.4% in placebo group reached primary end point R&M score 1 and 2

**Fig. 2.** Haake et al. [4] is Text 1 and belongs to Fig. 1.