

# FACT SHEET

## The effect of shockwave on lateral epicondylitis

### INTRODUCTION

---

#### Occurrence (1)

##### Lateral epikondylit

- Is by far the most common cause of elbow pain in general practice and one of the most common tendinopathies overall?
- Affects approx. 1-2% of the adult population, most frequently in the age group 35-50 years
- Approximately 50% of tennis players over the age of 30 are reported to have the disorder
- Other athletes such as throwers, swimmers, fencers and baseball players have an increased incidence of lateral elbow pain

##### Medial epikondylit

- Is much rarer (about 1:10) and often less bothersome than the lateral
- Among athletes, golfers, tennis players and climbers are more

Most patients are between 40-60 years old and report constant repetition of certain movements with one-sided and repetitive strain on the forearm/wrist during work or leisure, e.g. carpentry, painting, use of a computer mouse, writing, etc.

## METHOD

---

We have selected the following search string.

extracorporeal AND shock AND wave OR ESWT OR shockwave AND tennis elbow OR epicondylitis

134 results. When reading through the abstracts, 2 articles are retrieved for review:

- Liu, W. C., Chen, C. T., Lu, C. C., Tsai, Y. C., Liu, Y. C., Hsu, C. W., Shih, C. L., Chen, P. C., & Fu, Y. C. (2022). Extracorporeal Shock Wave Therapy Shows Superiority Over Injections for Pain Relief and Grip Strength Recovery in Lateral Epicondylitis: A Systematic Review and Network Meta-analysis. *Arthroscopy : the journal of arthroscopic & related surgery : official publication of the Arthroscopy Association of North America and the International Arthroscopy Association*, 38(6), 2018–2034.e12. (2)
- Marigi, E. M., Dancy, M., Alexander, A., Marigi, I. M., Clark, J., Krych, A. J., Camp, C. L., & Okoroa, K. R. (2023). Lateral Epicondylitis: Critical Analysis Review of Current Nonoperative Treatments. *JBJS reviews*, 11(2), e22.00170. (3)

Omend Margiri et al. (3) is more recent in date, Liu et al (2) as this is a meta-analysis.

The meta-analysis compares the effect of ESWT and known injections for lateral epicondylitis, and their effect on pain and handgrip strength. This can also be interesting information, but we choose to select the effect of ESWT, as this is the focus we have.

# RESULTS

Below is an overview of the methods and effects of the included studies.

Liu et al. (2)			
40 studies included in total	The treatment effect has been measured:	6 studies with fESWT 4 studies with rESWT	Assessment:
10 deals with ESWT	Baseline, 4, 12 weeks Baseline, 1, 3 months		<ul style="list-style-type: none"> <li>• Visual Analogue Scale (VAS)</li> <li>• Hand Strength</li> <li>• Thomsen provocative testing</li> <li>• Ultrasound scan before and after</li> <li>• Short-form McGill pain questionnaire</li> <li>• Roles and Maudsley scale</li> <li>• Patient-Rated Tennis Elbow Evaluation for pain and function</li> <li>• EuroQol 5D (EQ5D)</li> <li>• DASH questionnaire</li> </ul>
667 included participants	Baseline 6,12,24 weeks Baseline, 4,12,26 and 52 weeks Baseline, 3, 12 months Baseline, post-treatment, 6 months Baseline, 6 weeks, 3 and 6 months	1 bar = 0.1 mJ/mm2  1MPa = 10 bar	

STUDY	DOSE	CONTROL GROUP	EFFECT	METHOD
Beyazal and Devrimsel. (4)  rESWT  64 included	2000 pulses, 16 Hz  1.6 bar  3 treatments 1 week apart	A: ESWT  B: steroid injection	Significant improvement in strength, pain and function in both groups.  After 12 weeks significantly better in the ESWT group compared to the injection group	Most painful area treated with ESWT
Capan et al. (5)  rESWT  56 included	2000 pulses, 10 Hz  1.8 bar  3 treatments 1 week apart	A: ESWT  B: Sham ESWT	Both groups have significantly improved  No significant difference between the groups after 3 months	Most painful area treated with ESWT  Sitting with shoulder at 45 degrees, elbow at 45 degrees
Chung and Wiley.(6)  fESWT  60 included	2000 pulses, ?? Hz  0.03-0.17 mJ/mm2  3 treatments 1 week apart	A.: ESWT  B: sham ESWT All completed the same exercise program	No significant differences between the groups after 8 weeks	Intensity to maximum pain threshold

<p>Ozturan et al.(7)</p> <p>fESWT</p> <p>60 included</p>	<p>2000 pulses, ?? Hz</p> <p>0.17 mJ/mm2</p> <p>3 treatments 1 week apart</p>	<p>A: ESWT</p> <p>B: Cortisone injection</p> <p>C: "autologous blood injection" (injection of small drop of venous blood around the tendon. PT's own blood)</p>	<p>Function:</p> <p>After 4 weeks, greatest improvement in the cortisone group</p> <p>After 12 weeks, no difference between the groups</p> <p>After 26 weeks, improvement in all groups, but significantly greatest in the ESWT and "blood" groups</p> <p>After 52 weeks, improvement continued in all groups, but still significant in the ESWT and "blood" group.</p> <p>T: After 4 weeks, the greatest improvement in the cortisone group.</p> <p>After 12 weeks continued improvement in all groups - no significant difference</p> <p>After 26 weeks continued improvement, but significantly better in the ESWT and "blood" group</p> <p>After 52 weeks, continued improvement in all groups, but significantly better in the ESWT and "blood" groups</p> <p>Hand Strength:</p> <p>After 4 weeks, the greatest improvement in the cortisone group, and only small improvement in the ESWT and "blood" group</p> <p>After 12 weeks improvement in all groups, but no difference between the groups</p> <p>After 26 weeks, Improvement in all groups, greatest in the ESWT group</p> <p>After 52 weeks, the ESWT group has the greatest improvement compared to the other 2 groups. The cortisone group with the least improvement.</p>	<p>Most painful area is treated.</p>
--	---	---	---	--------------------------------------

Rompe et al.(8) fESWT 78 included	Ultrasound-guided 2000 pulses, 4 Hz 0.09 mJ/mm2 3 treatments, 1 x weekly	A: ESWT B sham ESWT	Significant improvement in the ESWT group compared to the sham ESWT group at 3 and 12 months control	Sitting, arm supported, painful area found on palpation, treated ESWT
Spacca et al. (9) rESWT 62 included	2000 pulses in total 1.2 bar, 4 Hz, 500 pulses 1 bar, 10 Hz, 1500 pulses 4 treatments, 1 per week	A: ESWT B: sham ESWT	Decreased smart, increased grip strength and increased function in the ESWT group	Sitting, shoulder abducted 45 degrees, elbow flexed 90 degrees. Most painful area treated
Speed et al. (10) fESWT 75 included	Ultrasound-guided 1500 pulses, 0.18 mJ/mm2 3 treatments at 1 month interval	A: ESWT B: sham ESWT	Significant improvement in both groups at 2 month intervals  No significant difference between the groups during the entire period.	Most painful area treated
Staples et al. (11) fESWT 68 included	2000 pulses, 4 Hz Maximum pain threshold 3 treatments 1 week apart Both groups of stretching exercises	A: ESWT B: sham ESWT	Improvement in both groups without significant differences	Sitting, forearm resting in the lap, most painful area is treated
Yang et al. (12) rESWT 30 included	2000 pulses, 10 Hz Maximum pain threshold 3 treatments 1 week apart	A: rESWT + physiotherapy (US + TENS+exercises + cross-frictions + static stretching exercises 3 x per week) B: sham ESWT + physiotherapy (UL + TENS+exercises + cross-	ESWT+ treatment bring significant and faster pain relief, increase handgrip strength, and increased functional level than physical therapy alone  5 participants showed rupture of the tendons upon adhesion, all 5 ruptures heal over time	

		frictions + static stretching exercises 3 x per week)		
Pettrone et al. (13)	2000 pulses, ?? Hz	A: ESWT	Significant improvement in hand strength, increased functional level and reduced pain in the ESWT group compared to sham ESWT.	Most painful area treated
fESWT	0.06 mJ/mm <sup>2</sup>	B: placebo ESWT		
114 included	3 treatments 1 week apart		Participants who crossed from sham rESWT to the active group also achieved significant improvements over the course of 12 weeks.	
	Included participants who did not achieve a 50% reduction in pain after 12 weeks, and were treated with sham ESWT, were given the opportunity to cross over into the ESWT group. Those in the active group who did not achieve affect were offered other treatment			

The authors' own conclusion when comparing all the results found in the included studies:

“ DPT (dextrose prolotherapy) and ESWT were the best two treatment options for pain control and ESWT was the best treatment option for grip strength recovery.

CSs (cortisone) were not recommended for the treatment of LE. More evidence is required to confirm the superiority in pain control of DPT among all these treatment options on LE. “

Other info:

Prolotherapy is a nonsurgical regenerative injection technique that introduces small amounts of an irritant solution to the site of painful and degenerated tendon insertions (entheses), joints, ligaments, and in adjacent joint spaces during several treatment sessions to promote growth of normal cells and tissues. Irritant solutions most often contain dextrose (d-glucose), a natural form of glucose normally found in the body, but may also contain combinations of polidocanol, manganese, zinc, human growth hormone, pumice, ozone, glycerin, or phenol. In severe cases, autologous cellular solutions may also be needed, such as platelet-rich plasma (PRP), bone marrow, or adipose tissue. A major goal of prolotherapy in chronic musculoskeletal conditions is the stimulation of regenerative processes in the joint that will facilitate the restoration of joint stability by augmenting the tensile strength of joint stabilizing structures, such as ligaments, tendons, joint capsules, menisci, and labral tissue.(14)

## CONCLUSION

---

The included studies have divergent conclusions and results, but also large differences in protocols. For example, most people are treated with 3 treatments divided and 3 weeks, to a study that is treated with 1 treatment per month for 3 months.

4 out of 10 studies find no difference between active ESWT and sham ESWT. 6 studies find significant differences in favor of the active ESWT group. A study indicates that ESWT+ physiotherapy achieves faster recovery than physiotherapy alone.

It therefore indicates that ESWT is an option as a treatment, preferably in combination with other indicated treatment. A previous meta-analysis indicates that ESWT and cortisone have no documented effect on tennis elbow problems, but are however more effective than laser and ultrasound.(15)

We can therefore recommend trying ESWT + other relevant treatment, as the expected achieved pain position may create a window for other measures. Expected improvement after about 4 weeks

## RECOMMENDATION

---

**Dose fESWT:** 3 treatments 1 week apart, 2000 pulses, 4-10 Hz, for maximum pain threshold

**Dose rESWT:** 3 treatments 1 week apart, 2000 pulses, 4-10 Hz, to maximum pain threshold

Sitting, arm supported with shoulder in 45 degree abduction, elbow in 90 degree flexion, most painful area found on palpation is treated with ESWT.

## REFERENCES:

---

1. Lind M, Christensen B. Epikondylit [Internet]. Available from: <https://www.sundhed.dk/sundhedsfaglig/laegehaandbogen/fysmed-og-rehab/tilstande-og-sygdomme/albue-og-underarm/epikondylit/>
2. Liu WC, Chen CT, Lu CC, Tsai YC, Liu YC, Hsu CW, et al. Extracorporeal Shock Wave Therapy Shows Superiority Over Injections for Pain Relief and Grip Strength Recovery in Lateral Epicondylitis: A Systematic Review and Network Meta-analysis. *Arthrosc - J Arthrosc Relat Surg* [Internet]. 2022; 38(6):2018-2034.e12. Available from: <https://doi.org/10.1016/j.arthro.2022.01.025>
3. Marigi, E. M., Dancy, M., Alexander, A., Marigi, I. M., Clark, J., Krych, A. J., Camp, C. L., Okoroafor KR. Lateral Epicondylitis Critical Analysis Review of Current Nonoperative Treatments. *JBJS Rev*. 2023; 11(2):e22.00170.
4. Beyazal MS, Devrimsel G. Comparison of the effectiveness of local corticosteroid injection and extracorporeal shock wave therapy in patients with lateral epicondylitis. *J Phys Ther Sci*. 2015; 27(12):3755–8.
5. Capan N, Esmaeilzadeh S, Oral A, Basoglu C, Karan A, Sindel D. Radial extracorporeal shock wave therapy is not more effective than placebo in the management of lateral epicondylitis: A double-blind, randomized, placebo-controlled trial. *Am J Phys Med Rehabil*. 2016; 95(7):495–506.
6. Chung B, Wiley JP. Effectiveness of extracorporeal shock wave therapy in the treatment of previously untreated lateral epicondylitis: A randomized controlled trial. *Am J Sports Med*. 2004; 32(7):1660–7.
7. Ozturan KE, Yucel I, Cakici H, Guven M, Sungur I. Autologous blood and corticosteroid injection and extracorporeal shock wave therapy in the treatment of lateral epicondylitis. *Orthopedics*. 2010; 33(2).
8. Rompe JD, Decking J, Schoellner C, Theis C. Repetitive Low-Energy Shock Wave Treatment for Chronic Lateral Epicondylitis in Tennis Players. *Am J Sports Med*. 2004; 32(3):734–43.
9. Spacca G, Necozone S, Cacchio A. Radial shock wave therapy for lateral epicondylitis: a prospective randomised controlled single-blind study. *Eura Medicophys*. 2005; 41(1):17–25.
10. Speed CA, Nichols D, Wies J, Humphreys H, Richards C, Burnet S, et al. Extracorporeal shock wave therapy for plantar fasciitis. A double blind randomized controlled trial. *J Orthop Res*. 2003; 21(5):937–40.
11. Staples MP, Forbes A, Ptasznik R, Gordon J, Buchbinder R. A randomized controlled trial of extracorporeal shock wave therapy for lateral epicondylitis (tennis elbow). *J Rheumatol*. 2008; 35(10):2038–46.
12. Yang TH, Huang YC, Lau YC, Wang LY. Efficacy of Radial Extracorporeal Shock Wave Therapy on Lateral Epicondylitis, and Changes in the Common Extensor Tendon Stiffness with Pretherapy and Posttherapy in Real-Time Sonoelastography: A Randomized Controlled Study. *Am J Phys Med Rehabil*. 2017; 96(2):93–100.
13. Pettrone FA, McCall BR. Extracorporeal shock wave therapy without local anesthesia for chronic lateral epicondylitis. *J Bone Jt Surg*. 2005; 87(6):1297–304.
14. Hauser RA, Lackner JB, Steilen-Matias D, Harris DK. A systematic review of dextrose prolotherapy for chronic musculoskeletal pain. *Clin Med Insights Arthritis Musculoskelet Disord*. 2016; 9:139–59.
15. Karanasios S, Tsamasiotis GK, Michopoulos K, Sakellari V, Gioftsos G. Clinical effectiveness of shockwave therapy in lateral elbow tendinopathy: systematic review and meta-analysis. *Clin Rehabil*. 2021; 35(10):1383–98.



...

>

Search: **extracorporeal AND shock AND wave OR ESWT OR shockwave AND tennis elbow OR epicondylitis** Filters: **Meta-Analysis, Review, Systematic Review, in the last 5 years, Humans, English** Sort by: **Most Recent**

134 07:37:06