

EXTRACORPOREAL SHOCKWAVE THERAPY: AN EVIDENCE BASED PRACTICE

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Abstract: Extracorporeal Shock Wave Therapy, (or ESWT), is a new technology using shockwaves to treat chronic, painful conditions of the musculoskeletal system. A shockwave is an intense, but very short energy wave traveling faster than the speed of sound. The word "Extra-corporeal" means "outside the body" and refers to the fact that the shockwaves are generated outside the body.

Methods: Evidences Reviewed From Literature Search 2005-2018. It was taken from pubmed, Googlescholar, wiley online library.

Conclusion: EWST is often a last resort treatment once other less expensive treatments have failed (ie. manual therapy, US). Best results when used in conjunction with exercise Not a stand-alone modality. Positive findings for plantar fasciitis, patellar tendinopathy, and Achilles tendinopathy. Mixed results for calcific tendinopathy of the shoulder and lateral epicondylitis.

Keywords: Extracorporeal Shock Wave Therapy, plantar fasciitis, tendinopathy, epicondylitis.

1. INTRODUCTION

⊙ Extracorporeal Shock Wave Therapy, (or ESWT), is a new technology using shockwaves to treat chronic, painful conditions of the musculoskeletal system. A shockwave is an intense, but very short energy wave traveling faster than the speed of sound .

⊙ The word "Extra-corporeal" means "outside the body" and refers to the fact that the shockwaves are generated outside the body.

What is the origin of ESWT?

⊙ The basic science behind ESWT is analogous to lithotripsy, the technology that uses acoustic shockwaves to break up kidney stones without surgery.

⊙ The technique of using shockwaves to break up kidney stones has been around for a nearly a quarter century now, and in the process of treating thousands and thousands of patients, it was found that many people undergoing the procedure had other unrelated aches and pains disappear. It was at this point that scientists began to consider that shockwaves may have an effect to heal other sorts of tissues.

⊙ Specialized machines were then developed specifically with the idea of using these shockwaves on other parts of the body, and this is the origin of ESWT.

How Does It Work?

⊙ Mechanical pressure increases cell membrane permeability.

⊙ Acoustic waves cause small capillaries in tissue to rupture, which increases growth factors to the area.

⊙ Neovascularization or new blood supply, More blood = more oxygen = better healing

- ⊙ Stimulates fibroblasts for connective tissue healing, Tendon , ligament, fascia.
- ⊙ Stimulates osteoblasts for healing and new bone production.
- ⊙ Destroys calcifications.
- ⊙ Radial wave pulses are produced by compressed air in the cylinder of the hand piece
- ⊙ A projectile in the hand piece generates kinetic energy
- ⊙ This kinetic energy is transferred into acoustic energy which is sent into nearby tissues
- ⊙ Depth of energy penetration is approximately 0-6 cm

What conditions can you treat with ESWT?

⊙ Extracorporeal Shock Wave Therapy can be used to treat a wide variety of musculoskeletal conditions--particularly those involving where major connective tissues attach to bone.

⊙ Complaints involving attachment points for tendons and ligaments in major joints like the shoulder (such as the rotator cuff), elbow (epicondylitis or tennis elbow), hip, and knee (tendinitis or "jumper's knee) are common sites for ESWT.

⊙ One of the areas most frequently treated with ESWT, however, is the foot. This is our specialty. Some conditions in the foot that have been treated with ESWT include:

- A. Plantar Fasciitis
- B. Achilles Tendinitis or Tendinosis
- C. Calcific Tendinitis or Tendinosis
- D. Connective Tissue Pain and degeneration
- E. Muscle Pain and Injuries
- F. Joint Injuries and Morton's Neuromas.

⊙ And as ESWT encourages bone healing, it has been used to help treat:

- A. Stress Fractures
- B. Avascular Necrosis (A dead portion of bone)
- C. Slow-healing bone (Delayed unions)
- D. Non-healing bone (Non-unions)

⊙ There are also urological conditions that respond to ESWT, such as Peyronie's Disease.

Doses

- ⊙ Energy Flux Density
- ⊙ Degree of energy transmitted to the tissues

Low (<0.08 mJ/mm²)

Medium (0.08 to 0.28 mJ/mm²)

High (0.28 to 0.60mJ/mm²)

- ⊙ Pulses Per Dose

→ Ranges from 1000 to 3000

→ Several doses may be given over course of a treatment

Conditions Treated with ESWT

- ⊙ Plantar Fasciitis
- ⊙ Achilles Tendinopathy
- ⊙ Epicondylitis

- ⊙ CalcificTendinopathyof the Shoulder
- ⊙ Patellar Tendinopathy
- ⊙ Post-Traumatic MyositisOssificans
- ⊙ Non-Union Fractures
- ⊙ Trigger Points
- ⊙ Frozen Shoulder
- ⊙ Dupuytren’sContracture
- ⊙ DeQuervainSyndrome
- ⊙ And more...

Contraindications

- ⊙ There are a few occasions when shockwave should not be used:
- ⊙ Pregnancy
- ⊙ Application over open growth plates – not suitable for under 18 years.
- ⊙ Over metal pins or plates
- ⊙ Malignant tumors
- ⊙ Nerve or circulation disorders
- ⊙ Infections
- ⊙ If the patient is taking anticoagulants

2. EVIDENCES

1) Efficacy of extracorporeal shock wave therapy for knee tendinopathies and other soft tissue disorders: a meta-analysis of randomized controlled trials [1a]

Chun-De Liao, Guo-Min Xie at all.. BMC Musculoskeletal Disorders (2018)

METHOD: We performed a comprehensive search of online databases and search engines without restrictions on the publication year or language. We selected randomized controlled trials (RCTs) reporting the efficacy of ESWT for knee soft tissue disorders (KSTDs) and included them in a meta-analysis and risk of bias assessment. The pooled effect sizes of ESWT were estimated by computing odds ratios (ORs) with 95% confidence intervals (CIs) for the treatment success rate (TSR) and standardized mean differences (SMDs) with 95% CIs for pain reduction (i.e., the difference in pain relief, which was the change in pain from baseline to the end of RCTs between treatment and control groups) and for restoration of knee range of motion (ROM). **RESULT :-** We included 19 RCTs, all of which were of high or medium methodological quality and had a Physiotherapy Evidence Database score of $\geq 5/10$. In general, ESWT had overall significant effects on the TSR (OR: 3.36, 95% CI: 1.84–6.12, $P < 0.0001$), pain reduction (SMD: $- 1.49$, 95% CI: $- 2.11$ to $- 0.87$, $P < 0.00001$), and ROM restoration (SMD: 1.76, 95% CI: 1.43–2.09, $P < 0.00001$). **CONCLUSION :-** The ESWT exerts an overall effect on the TSR, pain reduction, and ROM restoration in patients with KSTDs. Shock-wave types and application levels have different contributions to treatment efficacy for KSTDs, which must be investigated further for optimizing these treatments in clinical practice.

LEVEL OF EVIDENCE: 1a

2) Efficacy and safety of extracorporeal shock wave therapy for acute and chronic soft tissue wounds: A systematic review and meta-analysis[1a]

Li Zhang, Xiao-bing Fu at all..17 January 2018, Wiley online library

Data Sources: All English-language articles on ESWT for acute and chronic soft tissue wounds indexed in PubMed, Medline, Embase, Cochrane Central Register of Controlled Trials, Cochrane Library, Physiotherapy Evidence Database, and Health STAR published prior to June 2017 were included, as well as corresponding articles cited in reference lists of related review articles.

CONCLUSION: ESWT showed better therapeutic effects on acute and chronic soft tissue wounds compared with CWT alone. However, higher-quality and well-controlled RCTs are needed to further assess the role of ESWT for acute and chronic soft tissue wounds.

LEVEL OF EVIDENCE: 1a

3) Extracorporeal shock wave therapy is effective in treating chronic plantar fasciitis - A meta-analysis of RCTs [1a]

Jiale Sun, MDa, Fuqiang Gao, MDb at all..Medicine - 23 March 2017

METHOD: The PubMed, Medline, EmBase, Web of Science, and Cochrane library databases were searched for studies comparing focused shock wave (FSW), and radial shock wave(RSW) therapy with placebo in chronic PF. Clinical outcomes included the odds ratios (ORs) of pain relief, pain reduction, and complications. Relevant data were analyzed using RevMan v5.3.

CONCLUSION: This meta-analysis suggested that FSW therapy can relieve pain in chronic PF as an ideal alternative option; meanwhile, no firm conclusions of general ESWT and RSW effectiveness can be drawn. Due to variations in the included studies,additional trials are needed to validate these conclusions.

LEVEL OF EVIDENCE: 1a

4) High-Energy Extracorporeal Shock-Wave Therapy for Treating Chronic Calcific Tendinitis of the Shoulder - A Systematic Review [1b]

Raveendhara R. Bannuru, MD; at all..Ann Intern Med. 2014;160:542-549.

Data Sources: MEDLINE, Cochrane Central Register of Controlled Trials, EMBASE, Web of Science, and Google Scholar were searched up to 1 November 2013.

CONCLUSION: High-energy ESWT is effective for improving pain and shoulder function in chronic calcific shoulder tendinitis and can result in complete resolution of calcifications. This therapy may be underutilized for a condition that can be difficult to manage.

LEVEL OF EVIDENCE: 1b

5) Shock wave therapy for lateral elbow pain- A Systematic Review [1b]

Buchbinder R, Green S, White M,at all..2005- The Cochrane Collaboration

Data Sources: Comprehensive electronic searches of MEDLINE, CINAHL, EMBASE and SCISEARCH were combined with searches of the Cochrane Clinical Trails Registrar and the Musculoskeletal Review Group's specialist trial database. Identified keywords and authors were searched again in an effort to identify as many trials as possible.

CONCLUSION: The two trials included in this review yielded conflicting results. Further trials are needed to clarify the value of ESWT for lateral elbow pain.

LEVEL OF EVIDENCE: 1b

3. CONCLUSIONS

- ⊙ EWST is often a last resort treatment once other less expensive treatments have failed (ie. manual therapy, US)
- ⊙ Best results when used in conjunction with exercise Not a stand-alone modality!
- ⊙ Positive findings for plantar fasciitis, patellar tendinopathy, and Achilles tendinopathy
- ⊙ Mixed results for calcific tendinopathy of the shoulder and lateral epicondylitis.

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