New therapy for musculoskeletal conditions? Extracorporeal shockwave treatment

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Public interest in the use of extracorporeal shockwave treatment for musculoskeletal problems is increasing. This article will review the empirical evidence for its effectiveness in four specific conditions.

What is extracorporeal shockwave therapy?

Extracorporeal shockwave treatment (ESWT) or 'orthotripsy' is a new therapy for musculoskeletal conditions that is receiving significant media attention. The use of shock waves (high intensity sound waves) in medicine is not new and, in the setting of calcific tendonitis of the shoulder, ESWT is analogous to classic lithotripsy (the calcium deposit being the target). In other conditions (such as enthesopathy) the mechanism of action is uncertain, although there may be a direct effect on local nerves causing 'hyperstimulation anaesthesia',[1] and physical effects on cell permeability and induction of diffusible radicals.[2]

Techniques for using ESWT for musculoskeletal problems have not yet been standardised. The shock waves should be directed to the target area by radiological imaging or ultrasound, but the latter is preferable because no ionising radiation is involved (Figure 1). Direct focusing on bone should be avoided for fear of causing microfractures.

Precise dosages and the optimal frequency of application have not been studied extensively. A dose–effect study of the Achilles tendon of rabbits demonstrated no ultrasound or histological abnormalities at the energy concentrations that are commonly used therapeutically; however, transient tendon swelling with minor inflammatory reaction was noted at higher concentrations, and marked swelling occurred with the highest concentration.[3] The authors concluded that ESWT should not be used directly on damaged or inflamed tendons.

Reported adverse effects of ESWT include local bruising and (usually) a temporary worsening of pain. At times, the treatment is unpleasant and painful. Some studies have used injections of local anaesthetic into the target area before treatment or oral analgesics afterwards. No serious long term effects have yet been reported.

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Lateral epicondylitis

Lateral epicondylitis (tennis elbow) is usually a self-limiting condition, with studies revealing evidence of bony remodelling but little inflammatory cell infiltration.[4] A small but significant percentage of patients go on to have persistent symptoms.

One of the first controlled studies of ESWT was performed in patients with refractory pain (mean duration approximately two years) who were being considered for surgery.[5] Treatment consisted of a single session each week for three weeks: the treatment group received 1000 shock waves at each sitting, and the control group received 10. A highly significant improvement was noted in pain scores and grip strength at 3, 6 and 24 weeks. The strength and persistence of the beneficial effect was impressive, but there was a high dropout rate in the early stages and the blinding of the assessor was not commented on. It was reported that no adverse effects occurred.

A second report of an identical protocol on a larger number of patients by the same authors (which may have included some of the same patients), found similar results to the first study.[1]

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Figure 1. Extracorporeal shockwave therapy to treat lateral epicondylitis. The direction of shock transmission is perpendicular to the area being treated to avoid bone. The smaller ultrasound transducer is used to target the waves accurately.

Medial epicondylitis

Medial epicondylitis (golfer's elbow) is not as common as lateral epicondylitis and it has been studied less. Similar pathologies have been proposed on the basis of analogy only.

We have been unable to locate any controlled studies of ESWT for medial epicondylitis. An uncontrolled follow up study has assessed the outcome of 30 patients one year after ESWT, and only 20% of patients reported satisfaction with the treatment.[6] Interestingly, these results were significantly worse than for patients treated in an identical fashion for lateral epicondylitis. These results suggest that, at this point, ESWT should not be used for medial epicondylitis. The differential effect remains unexplained.

Plantar fasciitis

Plantar fasciitis is a common enthesopathic musculoskeletal problem. Although it may be a component of a seronegative spondyloarthropathy, most cases are idiopathic. The aetiology of plantar fasciitis is thought to relate to subtle biomechanical abnormalities in the feet or lower limbs causing excessive traction on the enthesis.[7]

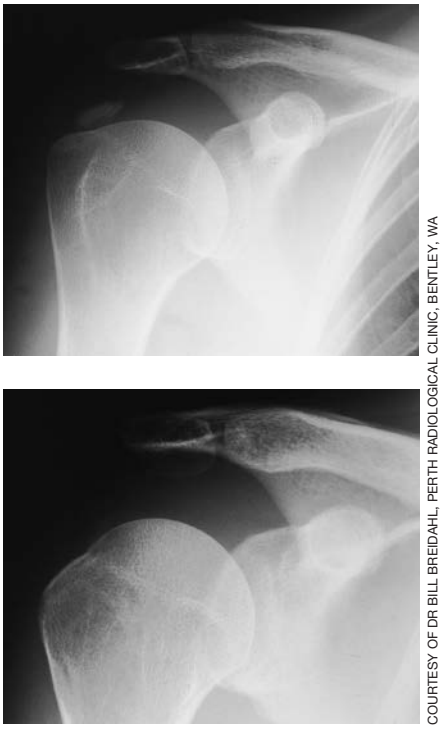
A positive effect from ESWT in persistent severe heel pain has been reported in two studies.[8,9] The first study compared low energy ESWT against simulated ESWT; treatment was administered three times at weekly intervals. The same machine was used in the second study for 119 patients randomised to receive either 1000 or 10 impulses three times at weekly intervals. In both studies, significant beneficial effects were noted in the treatment groups with improvement in pain and function at six weeks. Many patients reported the treatment as being unpleasant, and similar to discomfort associated with the local infiltration of anaesthetic.

Calcific tendonitis of the shoulder

About 40% of people who have calcium deposits in their rotator cuff tendons develop symptoms. Typically, younger patients present with acute shoulder pain, whereas older patients have more chronic problems of impingement and catching.

Two controlled studies of ESWT for chronic shoulder calcific tendonitis have been published in English. In one study, 80 patients with refractory shoulder pain of more than 12 months' duration were randomised into four groups to receive no treatment or treatment at one of three doses.[10] Using the Constant score to assess shoulder pain and function, a significant improvement was observed in patients treated with either of the two highest doses compared with the placebo group or those treated with the lowest dose. The second study compared two doses of ESWT and found better function and less pain in the higher dose group at 6 and 24 weeks.[11] There was a significant, unexplained dropout rate in the latter study, and the blinding (or otherwise) of the assessors was not addressed.

Figures 2a and b show a patient with calcific supraspinatus tendonitis before and after a course of ESWT.



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Figures 2a and b. ESWT for calcific tendonitis. a (top). The shoulder of a 45-year-old woman showing calcific supraspinatus tendonitis. b (above). The calcific deposit resolved following a course of ESWT.

Access and costs

ESWT is currently offered by a small number of private radiology practices in capital cities and major regional centres in Australia. At this time, there is no government rebate for musculoskeletal conditions. In Sydney, a course of three sessions costs around $300. Each session takes approximately 30 minutes.

Key points

- ESWT is a novel approach to some painful and persistent musculoskeletal conditions. The studies performed to date have some flaws, but there is evidence of benefit for chronic refractory lateral epicondylitis, plantar fasciitis and calcific tendonitis of the shoulder. ESWT provides a novel treatment option for these conditions.
- The lack of effect for ESWT for medial epicondylitis raises important caveats about extrapolating the results from existing trials to other conditions.
- The use of ESWT for acute musculoskeletal conditions has not been studied and, given the generally good prognosis for most of these problems, is not currently justified.
- No serious side effects have yet been reported for ESWT; however, the collective experience in the literature is modest. Dosing and positioning protocols are still being developed.
- For many patients, the current costs of treatment are a significant barrier to widespread use of ESWT. Carefully designed Australian studies are underway that should better clarify the role of ESWT in the local environment. MT

A list of references is available on request to the editorial office.

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