Extracorporeal shockwave therapy: An audit report on initial outcomes and annotated bibliography

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CITATION
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Abstract
In an extracorporeal shockwave therapy (ESWT) trial undertaken within a hospital physiotherapy department, 70.8% of patients who received ESWT as part of their treatment package recorded a significant positive outcome when comparing their pre- and post-patient-specific functional scale (PSFS) measures.

Keywords
extracorporeal shockwave therapy; clinical audit; outcomes; bibliography

Introduction
ESWT is treatment that delivers high-energy shockwaves to areas of chronic inflammation and pain using a portable hand piece which stimulates the growth of new blood vessels and healing. Radial shockwave treatment utilises a ballistic technique. A projectile accelerated by compressed air and propelled at high kinetic energy, hits an applicator placed on the skin. By using a coupling medium such as ultrasound gel, this impulse is delivered to the tissue in the form of a shockwave. From this point, the shockwave continues to spread inside the body in the form of a spherical ‘radial’ wave with the applicator surface being the geometric point with the highest pressure and the highest energy density.

The treatment initiates an inflammation-like response in the tissue that is being treated. The body responds by increasing the blood circulation and metabolism in the impact area, which in turn accelerates the body’s own healing processes. The shockwaves break down injured tissue and calcifications.

The uses of ESWT have been reviewed by National Institute for Health and Care Excellence (NICE). The four areas that have been reviewed are:
- shockwave for Achilles (NICE, 2009a);
- shockwave for plantar fasciitis (NICE, 2009b);
- shockwave for tennis elbow (NICE, 2009c);
- shockwave for calcific tendonitis shoulder (NICE, 2003).

A 2009 guidance statement found that the current evidence on the efficacy of ESWT is inconsistent and should only be used with special arrangements for clinical governance, consent, and audit or research. The annotated bibliography at the end of this article shows that the research data has mixed results for the use of ESWT; although many areas require further good quality studies, there is evidence that does suggest ESWT has positive effects.

More evidence is emerging to support the use of ESWT particularly in the treatment of Achilles tendinopathy, plantar fasciitis, and lateral epicondylgia.

Aim
The purpose of the audit was to assess the effectiveness of ESWT on patient treatment outcomes when used within the musculoskeletal outpatient physiotherapy team at West Cumberland Hospital. ESWT was used on conditions identified on clinical assessment as being appropriate for ESWT with reference to the manufactures guidelines. The outcome of the intervention was recorded with pre- and post-validated outcome measures (the Patient Specific Functional Scale (PSFS); Stratford et al., 1995).

Method
Two ESWT machines were loaned on a six-week basis (total loan time 12 weeks – August to October 2012). The machines used were the Shockmaster 500 supplied by Phoenix Healthcare Products Ltd and BTL-6000SWT supplied by BTL Industries Ltd. The machines were demonstrated within the Physiotherapy Department and each physiotherapist was allocated time to familiarise themselves with the machines’ operational procedures and the parameters of use.

The ESWT machines were kept and used within the Physiotherapy Musculoskeletal (MSK) Outpatient Department at West Cumberland Hospital. All patients assessed were reviewed for suitability for the application of ESWT. ESWT, if indicated, was used in accordance to the operational parameters and as part of the
patient’s treatment package. All patients were scored using the PSFS (Stratford et al., 1995) prior to and at the end of the course of ESWT. It was not a randomised control trial or blinded study.

Response
Twenty four patients completed pre- and post-PSFS scales during the trial period. The pain sites of the patients seen were: Achilles (9), knee (2), lateral epicondylygia (3), plantar fasciitis (6), infra patella (1), shoulder (3).

Seventeen of the 24 patients recorded a significant positive improvement in the PSFS measure. Therefore, 70.8% of patients had a significant positive change following the application of the ESWT. Seven of the nine Achilles patients treated with ESWT had a significant positive shift in their recorded PSFS outcome measure. Therefore, 78% of Achilles pain patients were improved with the use of ESWT.

The average PSFS score at pre-treatment was 3.5 and at post-treatment was 7.4; thus there was, on average, a 3.9 point shift in the PSFS recorded across the patients in this trial.

Clinical feedback
The feedback from physiotherapists using the ESWT machines throughout the trial was positive. The machine was used initially on some patients who had failed to improve with previous physiotherapy treatment, yet who went on to record improvements on the PSFS following treatment with ESWT. The physiotherapists also started to have a ‘feel’ for when they thought it would be appropriate for use. As a result, a shift began to occur in the success rate of its use. It was used less but with greater effect.

There were some patients who were not able to tolerate its use due to treatment discomfort, so for some patients who it was thought the shockwave would be an appropriate treatment choice, the treating physiotherapist was unable to use it due to patient’s compliance.

Conclusion
The ESWT trial undertaken within the Physiotherapy Department, West Cumberland Hospital demonstrated that 70.8% of patients who received ESWT as part of their treatment package recorded a significant positive outcome when comparing their pre- and post-PSFS measures. The recorded improvements may be even higher in particular sub-groups, although for most groups the numbers were too small to interpret meaningfully. However, in our trial, 78% of Achilles patients who used ESWT had a significant improvement recorded on the PSFS outcome measure.

This audit was only designed to review patients in the window period who had loan of the ESWT machines. As a result, our review has a number of limitations. These include a small sample size, no use of controls, an exclusion from the study of patients with incomplete data, varying number of treatments, variation in treatment parameters between patients even with similar conditions, and use of two different ESWT machines within the trial period. However, enough treatments were given in all cases to ensure that the treatment had time to take effect.

A larger and more robust trial is indicated to validate the results of this trial; however, the results are similar to those reflected in some of the published studies.

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References


Annotated bibliography
Eighty-eight percent of the ESWT group were pain free or had good results compared to 0% of the placebo group who were pain-free and 33% had good results. The results of this study corroborate the value of ESWT for recalcitrant plantar fasciitis as a non-invasive technique with low side effects; it can complement the conservative treatments.

Rompe, J.D., Furia, J. & Maffulli, N.J. (2008). Eccentric loading compared with shock wave treatment for chronic insertional achilles tendinopathy. A randomized, controlled trial. *Journal of Bone and Joint Surgery, American Volume*, 90, 52–61 – Eccentric loading as applied in the present study showed inferior results to low-energy shockwave therapy as applied in patients with chronic recalcitrant tendinopathy of the insertion of the Achilles tendon at four months of follow-up. Further research is warranted to better define the indications for this treatment modality.


Rompe. J. D., Segal, N. A., Cacchio, A., Furia, J. P., Morrall, A. & Maffulli, N. (2009). Home training, local corticosteroid injection, or radial shock wave therapy for greater trochanter pain syndrome. *American Journal of Sports Medicine*, 37, 1981–1990 – The role of corticosteroid injection for greater trochanter pain syndrome needs to be reconsidered. Subjects should be properly informed about the advantages and disadvantages of the treatment options, including the economic burden. The significant short-term superiority of a single corticosteroid injection over home training and shockwave therapy declined after 1 month. Both corticosteroid injection and home training were significantly less successful than was shockwave therapy at 4-month follow-up. Corticosteroid injection was significantly less successful than was home training or shockwave therapy at 15-month follow-up.