Comparative effectiveness of focused shock wave therapy of different intensity levels and radial shock wave therapy for treating plantar fasciitis: a systematic review and network meta-analysis

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CRD summary
This well-conducted review concluded that medium-intensity therapy with the highest level of energy output was the ideal form of focused shockwave therapy for plantar fasciitis (heel pain and inflammation), with radial shockwave a cheaper and possibly more effective alternative. Despite limited details on included trial comparability, the authors' conclusions follow from the evidence and are likely to be reliable.

Authors' objectives
To compare the effectiveness of different intensity levels of focused shockwave therapy and a new radial shockwave for managing plantar fasciitis.

Searching
PubMed, The Cochrane Library and ClinicalTrials.gov were searched up to June 2011. Bibliographies of included trials and related meta-analyses were searched for additional references.

Study selection
Randomised controlled trials (RCTs) that compared shockwave and placebo therapy in adults complaining of at least three months of heel pain near the proximal plantar fascia on the medial calcaneal tuberosity were eligible for inclusion in the review. Outcomes of interest were clinical success rates and mean difference in visual analogue scales for pain before and after therapy.

In the included trials, participant age ranged from 25 to 87 years; body mass index ranged from 20 to 39kg/m². The duration of pain ranged from six to 312 months. Treatment doses ranged from 1500 to 3x4000 pulses at shockwave intensity ranging from 0.08 (low-intensity focused shockwave) to 0.64mJ/mm² (high-intensity focused shockwave). Methods for placebo treatment varied including minimal pulses (30 per treatment), zero or minimal energy pulses (0.04mJ/mm²), polyethylene foil, and foam/air cushion.

Two reviewers independently selected the studies for inclusion, with disagreements resolved by discussion and consensus.

Assessment of study quality
RCTs were scored from 0 to 5 points on the Jadad scale, based on the reporting of randomisation, blinding, and handling of patient withdrawals. Trials that scored less than 3 points were excluded from the meta-analyses.

Two reviewers independently selected the studies for inclusion, with disagreements resolved by discussion and consensus.

Data extraction
Two reviewers independently calculated odds ratios for clinical success and mean differences in pain visual analogue scales, along with associated 95% confidence intervals.

Methods of synthesis
Pair-wise comparisons of each therapy type with placebo were analysed using a random-effects model in the presence of heterogeneity or a fixed-effect model if its absence. Heterogeneity was assessed using I² and the Q statistic. Relationships between focused shockwave intensity and outcomes were explored by meta-regression.

Shockwave therapies were compared with one another in a network meta-analysis using a Bayesian Markov chain. Outcomes were analysed using a random-effects model.
Results of the review

Twelve RCTs (1,431 participants) scoring 3 or more out of 5 points on the Jadad scale were included in the review.

**Success rates:** Statistically higher success rates were observed for medium-intensity focused shockwave (OR 1.56, 95% CI 1.23 to 1.96; five RCTs; I²=0%) and high-intensity focused shockwave (OR 1.43, 95% CI 1.07 to 1.91; two RCTs; I²=60%) compared with placebo. Larger, but statistically non-significant, pooled effects were seen for low-intensity focused shockwave and radial shockwave versus placebo. In the network meta-analysis with Bayesian mixed-treatment comparisons, only radial shockwave showed an increase in success in which the entire credible interval was greater than one (OR 38.26, 95% CrI 2.14 to 202.4). The probability of being ranked best treatment was 82.7% for radial shockwave, 12.3% for low-intensity focused shockwave, 1.7% for medium-intensity focused shockwave, and 3.1% for high-intensity focused shockwave.

**Reduction in pain scales:** Statistically lower pain visual analogue scale score rates were observed for medium-intensity focused shockwave (-1.21, 95% CI -1.76 to -0.67; two RCTs; I²=40%) and high-intensity focused shockwave (-0.33, 95% CI -0.58 to -0.08; two RCTs; I²=0%) compared with placebo. Larger, but statistically non-significant, pooled effects were seen for low-intensity focused shockwave and radial shockwave versus placebo. In the network meta-analysis with Bayesian mixed-treatment comparisons, only radial shockwave showed a reduction in pain scores in which the entire credible interval (CrI) was less than zero (-6.09, 95% CrI -8.30 to -3.42). The probability of being ranked best treatment was 91.0% for radial shockwave, 2.8% for low-intensity focused shockwave, 4.2% for medium-intensity focused shockwave, and 1.8% for high-intensity focused shockwave.

Meta-regression showed some correlation between focused shockwave intensity and pain reduction, but not for success.

**Authors' conclusions**

Setting the highest and most tolerable energy output within medium-intensity ranges was the ideal option when using focused shockwave therapy for plantar fasciitis. Radial shockwave was an appropriate alternative due to lower price and probably better effectiveness.

**CRD commentary**

The research question was supported by appropriate selection criteria. Although it was unclear whether language restrictions were applied, efforts were made to identify relevant studies from the literature. Attempts to minimise the potential for error and bias were made throughout the review process. Greater details on the comparability of trials included in the analyses would have been helpful in assessing the reliability of the results.

This appeared to be a generally well-conducted and reported review. The authors conclusions follow from the presented evidence and are likely to be reliable.

**Implications of the review for practice and research**

**Practice:** The authors recommended medium-intensity focused shockwave therapy with the highest tolerable level of energy output, with radial shockwave as a cheaper and possibly more effective alternative.

**Research:** The authors stated that it would be worth a further RCT to compare radial shockwave with focused shockwave for the treatment of planar fasciitis.

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**Bibliographic details**

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.