Use of Non-Invasive, Low Intensity Pulsed Ultrasound in Subtalar Fusion
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Background

Low-intensity pulsed ultrasound (LIPUS): frequency 1.5 MHz, intensity 30 mW/cm²

FDA approved for acute fractures in 1994 and in fracture nonunions in 2000

Efficacy in accelerating fracture healing demonstrated in 2 milestone double-blind randomized control trials:
1) Acute tibia fractures¹
2) Acute distal radius fractures²

Multiple cellular response theories have been proposed³

Limited data published on use of LIPUS for arthrodeses, primary or revision

Revision Subtalar (ST) Arthrodesis

Easley et al⁴ reported a 29% nonunion rate for revision ST arthrodeses

Jones et al⁵ published a prospective series of 10 ST nonunions treated with LIPUS and revision surgery which included CT evaluation and quantification of fusion mass:
1) CT scanning confirmed poor reliability of plain films
2) Fusion ratio 66% (77.3% if one nonunion excluded)
3) Many confounding factors – difficult to determine the importance of LIPUS without control group

Primary ST Arthrodesis

Coughlin et al⁶ reported a prospective series of 15 primary ST arthrodeses treated with adjuvant LIPUS evaluated with postoperative CT scans compared to a similar cohort treated with surgery alone:
1) 100% fusion rate in LIPUS group
2) Significantly faster healing rate in LIPUS group based on routine radiographs at 9 weeks and CT scans at 12 weeks

References


6. Coughlin M.J.; Smith B.W.; Traughber P: The evaluation of the healing rate of subtalar arthrodeses, part 2: the effect of low-intensity ultrasound stimulation. Foot Ankle Int, 29(10): 970-