Reviewing The Biologic Effects: Radial And Focussed Shockwaves Induce New Bone Formation.

Authors:
Maier M, Tischer T, Hausdorf J, Saisu T, Schmitz C;

Institution:
Munich, Chiba, Maastricht

In recent years, extracorporeal shock wave application to the musculoskeletal system has been established in the therapy of non-unions. However, there is a controvers discussion whether both, focused and ballistic (radial) shock wave devices lead to comparable new bone formation.
Maier et al. used focussed shock waves with energy flux densities between 0 mJ/mm2 (sham-treatment) and 1.2 mJ/mm2 were applied in vivo to the distal femoral region of rabbits (1,500 pulses at 1 Hz frequency each). To investigate new bone formation, animals were injected with oxytetracycline at the days 5 to 9 after shock wave application, and were sacrificed on day 10 after shock wave application. Application of shock waves with energy flux densities of 0.9 mJ/mm2 and 1.2 mJ/mm2 resulted in new periosteal bone formation and the presence of cortical fractures and periosteal detachment. After application of shock waves with energy flux density of 0.5 mJ/mm2, however, for the first time clearly detectable signs of new periosteal bone formation were observed without cortical fractures or periosteal detachment.
In 2004 the study group of Haupt described new bone formation in a rabbit animal model following radial shock wave application of at least 2000 pulses with 3 bar or 4 bar. 60 days after the treatment new bone formation was found. The activity was osteoblasts was described to be high with extended osteoid formation. Haupt et al. concluded from their rabbit experiment that radial shockwaves might be used in future times for the treatment of e.g. non-unions or diseases with decreased bone turn-over such as parodontitis.

This present reviews actual basic science studies dealing with the effects on bone following focused and radial shockwave application. It seems to be possible that radial shockwaves have comparable effects on healthy bone as focused shock waves in an rabbit animal model.