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[Physical treatment options with impact on bone healing]

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Abstract

The impact of physical stimulation of a fracture remains unsolved because of the complexity of this process. Differences in the localization and the morphology of the fracture, soft tissue injury, pretreatment and risk factors have an influence on study results, leading to problems in evaluation of physical modulation concerning fractures and nonunions. Extracorporeal shock wave therapy (ESWT) is technically demanding and often associated with local complications including bone and soft tissue stress; however, it is still applied in some centers for the treatment of nonunions. The study situation assessing the effectiveness of this treatment consists of a single randomized controlled trial (RCT) with a medium risk of bias. A positive effect for bony healing could be seen in 70-71% of ESWT patients but also in 73% of the surgically treated group. A systematic review and meta-analysis demonstrated an insufficient and inconsistent study quality but acknowledged that ESWT can be an effective treatment for delayed union and nonunion. For low-intensity pulsed ultrasound (LIPUS) studies with a reduced bias are available, representing a better level of evidence. Concerning advantages in the consolidation of acute fractures, only one RCT showed a reduction of healing time in fractures with an expected prolonged bony bridging. For the treatment of delayed unions, a highly rated RCT showed a significantly improved consolidation of midshaft tibial fractures using LIPUS. A systematic review and meta-analysis of nonunions showed positive effects in biologically active lesions, e.g. in hypertrophic pseudarthrosis, leading to a fusion rate of 80%. The consolidation process was better in patients without surgical revision 3-6 months prior to LIPUS.

Keywords: Delayed union; Fractures; Pseudarthrosis; Shockwave therapy; Ultrasound waves.

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