

# Extracorporeal Shock Wave Therapy in the treatment of delayed union and nonunion.

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The pathologies of healing of bone fractures (delayed union and non-union) remain one of the major complications after skeletal trauma despite progress reached by surgical techniques and conservative approaches.

Extracorporeal shock wave therapy (ESWT) has become a common treatment for orthopaedic disorders in the last decade. Many experimental and clinical studies have confirmed a positive effect of shock waves on fracture healing.

The **purpose** of this study was to examine the effect of ESWT on the treatment of delayed union and pseudarthrosis.

Ninety-three patients were enrolled in this study. There were 52 males and 41 females with an average age of 42.6 years (range 15-73 years). 34 patients had a diagnosis of delayed union (mean, 4.9 months) and 59 were non-unions (mean, 16.7 months; range 6-84 months).

The **results** of treatment were assessed clinically and fracture healing was assessed with plain radiographs, CT, MRI and three-phase bone scintigraphy.

High-energy shock wave treatment was applied using two different electromagnetic shock wave generators, Minilith® SL-1 (43 patients) and Modulith® SLK (50 patients), both developed by STORZ MEDICAL AG. The shock waves were applied in 3-5 sessions with 2500-6000 impulses at 0,25-0,4 mJ/mm<sup>2</sup> energy flux density for Minilith® SL-1 and at 0,25-0,84 mJ/mm<sup>2</sup> for Modulith® SLK.

After treatment patients with fractures without osteosynthesis were immobilized with various plaster casts or orthotic devices until an osseous reaction was proven. Follow up assessments were done at short, medium and long term.

The Student T Test was used for statistical analysis of data.

The assessment of fracture healing showed total consolidation in 69 patients (74%), partial consolidation in 11 patients (12%) and no apparent changes in 13 patients (14%).

The **analysis** of our results showed similar results in delayed unions (79%) and non-unions (71%). As foreseeable, differentiation was noted in cases of hypertrophic and oligotrophic pseudarthroses which showed significantly better results than those relating to atrophic non-unions.

Although our results appear to be more successful with long bones rather than short bones, they cannot be considered statistically relevant. With respect to devices used, it is not possible at this time to evaluate the performance of the two devices on the basis of preliminary results. Evaluation will be possible at a later date.

The extracorporeal shock wave therapy to be a safe and effective alternative treatment for delayed union and pseudarthrosis.