Combined Treatment of Scaphoid Non-Union by Surgery and Additional Extracorporeal Shockwave Therapy (ESWT)

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Device and producing company: OrthoWave 280, MTS, Konstanz, Germany

Introduction:
Non-union of the scaphoid is even today a challenge for the treating hand surgeon. Main cause of a scaphoid non-union is the overlooked fracture with an inadequate immobilization or a fracture in the proximal third of the scaphoid. Through its specific retrograde blood supply, with entrance of nutritive blood vessels in the distal pole the proximal pole is only supplied by terminal blood vessels. However as a consequence scaphoid non-union lead to an osteosclerosis at the fracture surfaces and tilting of the fracture ("humpback – deformity"). Tilting of the fracture and instability of the wrist causes a change in wrist biomechanics and leads to wrist arthritis. These changes consequently result at the end in a carpal collapse the so-called SNAC – wrist. Several methods for treating scaphoid non-union are available, like sole bone graft in the technique according to Matti–Russe additional stabilization through a headless bone screw or angle stable plate. In the last decades extracorporeal shockwave (ESWT) established in the treatment of non-union. Schaden et. al reported a healing rate of delayed union or non-union treated by ESWT of 81%. However the mechanism of shockwave therapy is not fully understood, there is good evidence that it leads to an angio- and vasculogenesis in the treated tissue which causes a persisting increase of blood supply. It was also shown in recent publications that shockwaves have a positive influence on the migration and even differentiation of stem cells. To our knowledge there is no publication that proves the effects of combined therapy of scaphoid non-union by surgery with headless bone screw or plate and additional extracorporeal shockwave therapy.

Methods:
All scaphoid non-unions, treated by operation and additional ESWT had been read out of the archive of the AUVA (Allgemeine Unfallversicherungsanstalt - the Austrian Workers’ Compensation Board), anonymized by the patient’s number and had been analyzed retrospectively. For statistical analysis age, gender, range of motion (ROM), date of accident, date of surgery, last follow up, surgical technique were investigated. All fractures had been classified by the Herbert classification. The last CT was analyzed to judge bony bridging and signs of arthritis. An existing DISI – deformity, SNAC – wrist or humpback deformity had been documented.

Results:
With a combined therapy of surgery and additional ESWT in all cases fracture union was achieved. DISI – deformity, SNAC – wrist or humpback deformity wasn’t found in any case.

Discussion:
In a high percentage ESWT leads to union of delayed or non-union fractures and increases the union rates in combination with surgery in scaphoid non-unions.