Treatment of scaphoid nonunion by one, two headless compression screws or plate with or without Extracorporeal Shock Wave Therapy

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Background:

Non-union of the scaphoid is even today a challenge for the treating hand surgeon and does if occurs, present notable consequences in hand function. Several methods for treating scaphoid nonunions are available, like sole bone graft in the technique according to Matti – Russe, with or without additional stabilization by a headless compression screw (HCS) or plate.

In the last decades, Extracorporeal Shockwave Therapy (ESWT) has become an established procedure for nonunion treatment. However, the mechanism of shockwave therapy is poorly understood, but it’s considered verified, that it leads to an angio- and vasculogenesis in the treated tissue, which causes a persisting increase of blood supply.

Main aim of this study was to investigate union rate and clinical outcome of a combined treatment of scaphoid nonunion by surgery and ESWT and to compare union rates after stabilization by one HCS, two HCS or plate.

Methods:

42 patients with a scaphoid nonunion treated by non-vascularized bone graft from the iliac crest and a interval between injury and surgery of at least 6 months were investigated.

26 patients were treated with an additional ESWT within two weeks after surgery and 16 without. A scaphoid plate was used in 20 patients, a double HCS in 12 patients, and one HCS in 10 patients.

Age, gender, range of motion (ROM), date of surgery, the last follow-up examination were included in the statistical analysis. DASH scores, PRWE, the Green O´Brien Score, and the Michigan Hand Questionnaire score were determined for all patients.

A CT was performed in each patient to analyze union and signs of osteoarthritis.

Results:

In total 74% (31/42) of the scaphoid nonunions showed bone healing at the follow-up investigation. Patients in the ESWT group showed in 21/26 (81%) and in the group without ESWT 12/16 (75%) bony healing. No significant differences could be found between the groups in ROM, grip strength, DASH score, PRWE score or MHQ.

Patients stabilized by one HCS showed in 6/10 (60 %), by two HCS 10/12 (83 %) and by scaphoid plate 17/20 (85 %) union. No significant differences could be found between the groups in respect of VAS, ROM, grip strength, PRWE Score, DASH Score and MHQ.

Conclusion:

• Non-union of the scaphoid is even today a challenge for the treating hand surgeon.

• In the last decades, Extracorporeal Shockwave Therapy (ESWT) has become an established procedure for nonunion treatment.

• Nonunions of the scaphoid are treated typically by one HCS, but provides no absolute stability against rotational forces.

• The results of this study suggest that a combination of ESWT and surgery is reasonable in treating scaphoid nonunions and a stabilization by two HCS or scaphoid plate provide higher unions rates than a stabilization by one HCS.

Figure a – g: a, b: 20 year old man with a scaphoid nonunion 24 months after primary injury. c – f: Follow-up 20 months after surgery showed the scaphoid nonunion healed in the x-rays and CT-scans g: intraoperative view after stabilization of the nonunion by angular stable scaphoid plate.