Functional Outcome of Distal Fibula Fractures Comparing Conventional AO-Semitubular Plating to Minimally Invasive Intramedullary "Photodynamic Bone Stabilization"

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Purpose: Since in the modern Western world people grow older and older, the incidence of fractures (eg, of the distal fibula) increases correspondingly. Regarding surgical treatment, soft tissue needs to be preserved especially in the elderly patients in delicate anatomic regions such as the ankle. The aim of the study was to find out whether the use of a novel, minimally invasive intramedullary osteosynthesis technique in distal fibula fractures in an elderly population results in a reduction of postoperative complications and hospitalization time and might lead to improved clinical outcome.

Methods: In this prospective study, all patients older than 65 years, with a Charlson comorbidity index ≥1 suffering from a distal fibula fracture (AO 44 B1.1, B1.2, B1.3) with indication for surgery were included. Patients were randomized to a treatment using either the one-third semitubular plate (group I) or a minimally invasive intramedullary (group II). In group II, early weight bearing was allowed immediately after surgery. Primary outcome parameters were function of the ankle joint, assessed by the Olerud and Molander ankle score (OMAS) and Karlsson and Peterson Scoring System for ankle function (KPSS). Secondary outcome parameters were postoperative complications divided into minor (eg, superficial wound infection) and major (eg, deep wound infection requiring revision surgery). Clinical and radiological follow-up were performed 6 and 12 weeks as well as 6 and 12 months postoperatively.

Results: 45 patients (27 F/18 M) with a mean age of 77 years (range, 65-93) were enrolled. 6 patients (13%) were excluded, so that 39 patients were available for follow-up. Group I patients (n = 18, 46%) were treated with one-third semitubular plate while 21 patients were treated minimally invasively with an intramedullary Photodynamic Bone Stabilization System (54%, group II). Four minor complications were detected in group I (22%), compared to none in group II. One patient in each group showed a major complication (group I: 5%, group II: 4.7%). Group II patients presented significantly better clinical results in OMAS ($P<0.01$, $P<0.01$) as well as in KPSS ($P<0.01$, $P = 0.02$) 6 and 12 weeks after surgery. Regarding the interval between trauma and surgery, a significantly shortened interval was found for group II ($P<0.01$).

Conclusion: In our study, a significantly better clinical function during the early postoperative follow-ups (6 and 12 weeks postoperatively) resulted in distal fibula fractures of elderly patients treated with minimally invasive intramedullary Photodynamic Bone Stabilization System (IlluminOss). Furthermore, the use of this new intramedullary stabilization system in combination with immediate postoperative weight bearing seems to be a safe, stable treatment option for ankle fractures in geriatric patients especially in the early stages of recovery.

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