

Functional and Clinical Outcome After Plate Osteosynthesis Versus Intramedullary Nailing of a Humeral Shaft Fracture (HUMMER): Results of a Multicenter Prospective Cohort Study

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Purpose: Plate osteosynthesis and intramedullary nailing are the most common operative strategies for humeral shaft fractures; however, the most effective treatment is undecided. This study aimed to compare functional and clinical outcome of these treatment strategies in adults with a humeral shaft fracture. We hypothesized that plate osteosynthesis would result in earlier recovery of shoulder function and fewer complications.

Methods: From 23 October 2012 to 3 October 2018, adults with a humeral shaft fracture AO type 12A or 12B were enrolled in a multicenter prospective cohort study. Patients were treated with a plate or intramedullary nail (IMN). Outcome measures included the Constant-Murley score, range of motion of the shoulder and elbow, radiologic healing, complications, and surgical reinterventions. Patients were followed for 1 year. Repeated measure analysis was done with correction for age, gender, and fracture type.

Results: Of the 245 included patients, 76 were treated with a plate and 169 with an IMN. Patients in the plate group were younger (median 43 vs 57 years; $P < 0.001$). The Constant-Murley score and shoulder abduction, flexion, external rotation, and internal rotation displayed a significant treatment effect with a $P_{\text{treatment}} \leq 0.001$, in favor of plating. The plate group had 2 (2.6%) implant-related complications. The IMN group showed 24 (14.2%) implant-related complications, including 13 nail protrusions and 8 screw protrusions. Postoperative temporary radial nerve palsy was more common after plating ($n = 8$, 10.5% vs $n = 1$, 0.6%; $P < 0.001$). Nonunion was less prevalent after plating ($n = 3$, 5.7%) than after nailing ($n = 16$, 11.9%; $P = 0.285$). The surgical reintervention rate was higher after nailing ($n = 28$, 16.6% vs $n = 2$, 2.6%; $P = 0.001$).

Conclusion: Plating of a humeral shaft fracture in adults results in faster recovery, especially of the shoulder function. Since it was also associated with fewer implant-related complications and surgical reinterventions than nailing, plating should be the preferred treatment option for these fractures.