**Management of Closed Diaphyseal Humerus Fractures in Polytrauma Patients**

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**Background/Purpose:** The management of diaphyseal humerus fractures in the polytrauma patient varies widely. The only absolute indication for operative indications is an associated vascular injury; open fracture, floating shoulder, polytrauma, segmental fractures, and progressive radial nerve deficit all remain relative indications for surgical treatment. In addition, operative intervention is often considered with the theoretical goals of aiding with self-care, activities of daily living, and the earlier resumption of activities. The aim of this study was to compare outcomes of operative and nonoperative management of closed diaphyseal humerus fractures in polytraumatized patients. We hypothesized that operative management will improve patient mobility status and decrease time to union with a low complication rate when compared with nonoperative management.

**Methods:** A retrospective review of all patients with ISS >17 and diaphyseal humerus fractures treated at a Level I trauma center between January 1, 2006 and December 31, 2011 was performed. Medical records, radiographs, and trauma registry data were used to document patient demographics, injury characteristics, treatment intervention, complications, and outcome. Inclusion criteria included age = 18, AO/OTA fracture type 12 (humeral shaft fracture), and the presence of final outcome defined as healed fracture or nonunion requiring operative intervention. Patients were excluded if they had an ipsilateral proximal humerus fracture (including the anatomic neck and tuberosities), an ipsilateral intra-articular distal humerus fracture, or if the injury was open. Comparisons were then made between operative and nonoperative cohorts for injury characteristics, complications, and outcome. The Student t and chi-square tests were used to determine statistical difference between cohorts.



**Results:** 288 patients with humeral shaft fractures were identified, 142 of whom had an ISS >17 (mean 32; range, 17-66). 27 patients were excluded, 17 for open injury, 4 for ipsilateral proximal humerus, and 6 for ipsilateral distal humerus fractures. 68 patients had final outcome documented, 38 in the operative group and 30 in the nonoperative group. There was no statistically significant difference between age, ISS (34 vs 30), or fracture type between the two cohorts. There was, however, a statistically significant higher incidence of associated orthopaedic injury, and more specifically, lower extremity injury in the group treated with operative intervention. Time to union in the operative group was 17 weeks, and in the nonoperative groups 14.5 weeks (P = 0.22). Time to resumption of unrestricted activity was 9 weeks in the operative group, and 12 weeks in the nonoperative cohort (P <0.05). Each group had 2 nonunions (5% vs 6.7%). Within the operative group, there were 2 postoperative radial nerve palsies (both recovered by 6 months), 1 deep infection, and 1 DVT (deep venous thrombosis). Within the nonoperative group, 4 (13%) patients failed to maintain their reduction, going on to ORIF (open reduction and internal fixation) within the first 2 weeks of injury. Complications in this group included 4 (13%) malunions (none of which showed any functional limitations, nor required reoperation), and 1 DVT.

**Conclusion:** Patients treated operatively were more likely to have lower extremity injuries ($P < 0.05$), with a significant number being bilateral. Operative treatment allowed resumption of unrestricted activity 3 weeks earlier ($P < 0.05$) but did not significantly change time to union or rate of nonunion. Closed management can be successful in this patient population with an acceptable complication rate in the appropriately selected patient.



See pages 47 - 108 for financial disclosure information.