

Risk Factors for Elbow Stiffness Following Operative Fixation of Distal Humerus Fractures

Alexander Mihas, BS; David Albert Patch, MD; Logan A. Reed, BS;

Matthew William Young, BS; Addison Mark Cimino, MD; William Davis, MD;

Sohaib K. Malik, MD; Clay A. Spittler, MD

University of Alabama at Birmingham, Birmingham, Alabama, UNITED STATES

Purpose: Elbow stiffness is one of the most common complications after operative fixation of distal humerus fractures; however, there is relatively limited literature assessing which factors are associated with this problem. The purpose of this study is to identify risk factors associated with elbow stiffness in operative distal humerus fractures.

Methods: A retrospective review of all distal humerus fractures (AO/OTA 13A-C) treated operatively at a single Level I trauma center from November 2014 to May 2021 was performed. A minimum 6-month follow-up and skeletal maturity were required for inclusion. Elbow stiffness was defined as a flexion-extension arc less than 100° at latest follow-up. Patient demographics, injury and operative characteristics, and surgical outcomes were compared between patients with and without elbow stiffness.

Results: A total of 88 patients with distal humerus fractures (19 OTA 13A, 8 OTA 13B, and 61 OTA 13C) were included in the study: 40 patients comprised the elbow stiffness group and 48 patients in the control group. Average follow-up was 335 days. The elbow stiffness group had a significantly higher proportion of males (60.0% vs 37.5%, $P = 0.035$), but there were no significant demographic differences. Those in the elbow stiffness group had significantly higher rates of OTA 13C fractures (82.5% vs 58.3%, $P = 0.037$), ipsilateral upper-extremity fracture (40.0% vs 16.7%, $P = 0.014$), olecranon osteotomy (25.0% vs 8.3%, $P = 0.033$), perpendicular plate placement (53.1% vs 20.9%, $P = 0.004$), more open fracture debridements prior to fixation (1.0 vs 0.4, $P < 0.001$), and more days from admission to definitive fixation (3.4 vs 1.0, $P = 0.035$). Significantly higher rates of ICU stay (12.5% vs 0.0%, $P = 0.012$), unplanned reoperation (52.5% vs 18.8%, $P < 0.001$), and longer hospital stays (10.7 vs 4.5 days, $P < 0.001$) were also observed in patients with elbow stiffness. There were no significant differences in injury mechanism, rate or type of open fracture, neurovascular injury, use of external fixation, nonunion, infection, or heterotopic ossification between the 2 groups.

Conclusion: Elbow stiffness was observed in 45.5% of patients who underwent operative fixation of distal humerus fractures in the present study. Male sex, OTA 13C fractures, ipsilateral upper-extremity fracture, olecranon osteotomy, orthogonal plate configuration, a higher number of debridements prior to fixation, and longer time to fixation were associated with elbow stiffness. Patients with these injuries should be counseled on their risk of stiffness following surgery, and modifiable risk factors like plate positioning and timing to fixation should be considered by surgeons.