Comparison of a Fracture versus Standard Stem in Reverse Total Shoulder Arthroplasty for the Treatment of Acute Proximal Humerus Fractures

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Introduction: Proximal humerus fractures have been treated using open reduction internal fixation and hemiarthroplasty (HA), but the use of reverse total shoulder arthroplasty (rTSA) has been increasing due to improved outcomes. Fracture stems were initially introduced to enhance tuberosity healing in HA, but their use in rTSA compared to standard stems has not been well studied to date. It is unclear if the use of fracture stems improves the clinical outcomes in rTSA for proximal humerus fracture. The purpose of this study is to determine the clinical and radiographic outcomes of a fracture stem compared to a standard stem in the treatment of acute proximal humerus fractures treated with rTSA.

Methods: A prospective multi-national Institutional Review Board-approved registry with a minimum two-year follow-up was queried from 2007 to 2020 to identify 231 patients that underwent rTSA for acute proximal humerus fracture with either a fracture (n=187) or standard (n=44) stem. Patients were excluded if they were under the age of 60 years, had revision surgery, had a previous open reduction internal fixation, or had a malunion or nonunion. Standardized data collection forms were collected preoperatively and at latest follow-up. Range of motion (ROM) measurements included abduction, forward elevation, internal rotation (IR) score, external rotation (ER). Pain was measured with the Visual Analog Scale (VAS), and patient reported outcome measures (PROMs) included Global Shoulder Function (GSF), Simple Shoulder Test (SST), American Shoulder and Elbow Surgeons (ASES), Constant score, University of California Los Angeles (UCLA), and Shoulder Arthroplasty Smart (SAS). Radiographic analysis included humeral radiolucent lines (RLL) and scapular notching. Patient satisfaction was classified as much better, better, the same, or worse. Welch’s t-test, Fisher’s exact test, and Chi-squared test were used for data analysis when appropriate. For all tests, p<0.05 was defined as significant.

Results: The mean follow-up was 48 months and 54 months, mean age was 74 years and 72 years, and mean body mass index was 28 and 30 kg/m² for fracture and standard stems, respectively. All patients in both groups postoperatively had statistically significant improvements in abduction, forward elevation, IR score, ER, VAS, GSF, SST, ASES scale, Constant score, UCLA score, and SST score. When comparing the two stems, there was greater preoperative abduction (p=0.042) and forward elevation (p=0.044) in the standard stem group, but there were no significant differences in the IR score, ER, VAS, or any of the PROMs between the two groups. Both groups had similar rates of humeral RLL (fracture and standard stem = 15%), scapular notching (fracture = 6.3%; standard = 6.1%), complication rates (fracture = 3.2%; standard = 2.3%) and revision rates (fracture = 2.7%; standard = 2.3%) (p=1.000). Patient satisfaction was high, with 87% in the fracture stem and 95% in the standard stem saying they were much better or better at follow-up (p=0.05).

Discussion: There were no significant differences in postoperative clinical outcomes, radiographic outcomes, complication rates, revision rates, and patient satisfaction between the fracture and standard stem groups for the treatment of acute proximal humerus fracture with rTSA. Both stems were observed to significantly improve clinical outcomes postoperatively. Either stem may be used, as it appears attention to technical details and not the type of stem used are most important in achieving improved clinical outcomes for acute proximal humerus fracture with rTSA.