Outcomes for Type C Proximal Humerus Fractures in the Geriatric Population: Comparison of Nonoperative Treatment, Locked Plate Fixation, and Reverse Shoulder Arthroplasty

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INTRODUCTION: While the majority of geriatric proximal humerus fracture are managed nonoperatively, operative treatment such as open reduction internal fixation (ORIF) with locked plating or reverse shoulder arthroplasty (RSA) have also been supported by the literature. However, optimal management remains controversial, particularly in complex patterns such as Orthopaedic Trauma Association (AO/OTA) Type C fractures. The purpose of this study is to evaluate patient-reported outcomes, Range of Motion (ROM), and complication rates for geriatric AO/OTA Type C proximal humerus fractures managed either nonoperatively, with ORIF, or with RSA.

METHODS: A retrospective cohort study was performed of all patients >55 years old treated with nonoperative management, ORIF, or RSA for AO/OTA Type 11C proximal humerus fractures from January 2015-December 2018. Patients were grouped by treatment type (nonoperative, ORIF, RSA). Outcomes including Visual Analog Scale (VAS) pain scores, Range of Motion (ROM) values (active forward flexion [aFF], passive forward flexion [pFF], external rotation [ER]), and Patient-Reported Outcomes Measurement Information System (PROMIS) scores (pain interference, depression, and physical function) were collected at 2-week, 6-week, 3-month, and 6-month follow up. Complications up to 1 year after treatment were recorded and included varus malunion, nonunion, head-shaft translation, avascular necrosis, valgus malunion, screw cutout, hardware failure, adhesive capsulitis, and symptomatic hardware. Reoperations were also recorded and included conversion to arthroplasty, revision ORIF, removal of hardware, and lysis of adhesions. Outcomes were compared between groups using analysis of variance for continuous variables and chi square analysis for categorical variables. A p-value <0.05 was used to determine significance.

RESULTS: A total of 94 geriatric patients with AO/OTA type 11C proximal humerus fractures were identified: 46 were managed nonoperatively, 24 underwent ORIF, and 24 underwent RSA. No significant differences in patient characteristics were identified (p>0.05 for all). The RSA group had a significantly lower complication rate (0%) compared to the ORIF group (54%) and the nonoperative group (80%) (p<0.01). Reoperation rates were also significantly different between groups (nonoperative = 4%, ORIF = 33%, RSA = 0%) (p<0.01). Significant differences were observed for VAS pain scores at 2 weeks (nonoperative= 6.2 ± 3.3, ORIF= 2.6 ± 2.4, RSA= 2.7 ± 2.6; p<0.01), 6 weeks (nonoperative= 3.7 ± 3.0, ORIF= 2.1 ± 2.4, RSA= 1.1 ± 1.7; p<0.01), and 3 months (nonoperative= 2.4 ± 2.6, ORIF= 1.8 ± 2.1, RSA= 1.1 ± 2.0; p<0.05). At 2 weeks, significant differences (p< 0.01) were observed for pFF and ER ROM between nonoperative (pFF=0° ± 0°, ER=0° ± 0°), ORIF (pFF=11.7° ± 28.6°, ER=0.5° ± 1.5°), and RSA (pFF=46.5° ± 47.7°, ER=3.3° ± 6.1°) groups. At 6 weeks, significant differences (p< 0.01) were observed for aFF, pFF, and ER ROM between nonoperative (aFF=16.4° ± 28.1°, pFF=48.4° ± 40.8°, ER=12.3° ± 14.7°), ORIF (aFF=32.6° ± 31.8°, pFF=59.9° ± 41.5°, ER=14.7° ± 14.5°), and RSA (aFF=57.1° ± 50.8°, pFF=114.1° ± 31.5°, ER=23.4° ± 13.8°) groups. At 3 months, significant differences (p< 0.05) were observed for aFF, pFF, and ER ROM between nonoperative (aFF=56.4° ± 47.0°, pFF=68.7° ± 53.4°, ER=22.3° ± 23.4°), ORIF (aFF=80.6° ± 41.1°, pFF=100.4° ± 46.5°, ER=29.1° ± 21.8°), and RSA (aFF=125.1° ± 20.4°, pFF=147.9° ± 15.1°) groups. Additionally, significant differences (p<0.05) were reported at 6 weeks and 6 months for PROMIS physical function scores and at all timepoints for PROMIS pain interference scores (Table 1).

DISCUSSION AND CONCLUSION: The results of this study indicate that management of geriatric AO/OTA type 11C proximal humerus fractures with RSA is associated with greater postoperative ROM and a decreased complication rate compared to both ORIF and nonoperative management. Additionally, operative treatment with either RSA or ORIF led to decreases in pain and improvement in physical function compared to nonoperative management. This suggests that RSA may be a superior treatment option for the management of AO/OTA type 11C proximal humerus fractures in the older adult population.