Outcomes for Geriatric Proximal Humerus Fractures: A Matched Comparison of Nonoperative Management and Reverse Shoulder Arthroplasty

*Steven Samborski, MD; **Brittany Haws, MD**; Steven Karnyski, MD; Kyle T. Judd, MD; Catherine A. Humphrey, MD, MBA; Gillian Soles, MD; John T. Gorczyca, MD; Ilya Voloshin, MD; Gregg T. Nicandri, MD; John P. Ketz, MD*
University of Rochester, Rochester, NY, United States

Purpose: The purpose of this study is to evaluate differences in patient-reported outcomes (PROs), range of motion (ROM), and complication rates after geriatric proximal humerus fractures managed nonoperatively or with reverse shoulder arthroplasty (RSA).

Methods: Patients >55 years old with a proximal humerus fracture managed nonoperatively or with RSA from 2015 to 2018 were included. Patients were matched by age, Charleson Comorbidity Index, and fracture type (AO/OTA 11A, 11B, 11C) using coarsened exact matching. Visual analog scale (VAS) pain scores, Patient-Reported Outcomes Measurement Information System (PROMIS) scores, ROM values, and complication and reoperation rates were compared between treatment groups.

Results: 95 patients were included in this analysis (62 nonoperative, 33 RSA). Results are listed in Table 1. At 2 weeks RSA showed lower VAS scores, and better ROM and PROMIS scores (P<0.05) compared to nonoperative treatment. At 6 weeks, RSA had lower VAS scores, better ROM and PROMIS scores (P<0.05) compared to nonoperative treatment. At 3 months, RSA showed similar VAS scores (P>0.05), but better ROM and PROMIS scores (P<0.05) compared to nonoperative treatment. At 6 months, RSA showed similar VAS scores and PROMIS scores (P>0.05), but better ROM (P<0.05) compared to nonoperative treatment. Complication rates were significantly higher in the nonoperative group (P<0.01). There was no difference in reoperation rates between groups (P>0.05).

Table 1. Matched Analysis Outcomes*

	Nonoperative (N=62)	RSA (N=33)	†p-value
Any Complication (n)ǂ	**75.8% (47)**	**12.1% (4)ǂ**	**<0.001**
Varus Malunion	48.4% (30)	--	--
Reoperation (n)§	8.1% (5)	3.0% (1)	0.142
Range of Motion (Mean ± SD, °)			
Active Forward Flexion			
2-week follow up	0.5 ± 3.7	0.7 ± 5.8	0.816
6-week follow up	**20.7 ± 30.6**	**62.2 ± 47.5**	**<0.001**
3-month follow up	**75.1 ± 45.5**	**125.0 ± 21.1**	**<0.001**
6-month follow up	**101.4 ± 31.9**	**135.5 ± 20.5**	**<0.001**
Passive Forward Flexion			
2-week follow up	**1.5 ± 9.5**	**49.0 ± 45.6**	**<0.001**
6-week follow up	**55.9 ± 37.6**	**114.2 ± 31.1**	**<0.001**
3-month follow up	**82.7 ± 52.3**	**140.9 ± 19.2**	**<0.001**
6-month follow up	**120.9 ± 23.2**	**149.0 ± 16.4**	**<0.001**
External Rotation			
2-week follow up	**0.2 ± 2.9**	**4.0 ± 6.3**	**<0.001**
6-week follow up	**14.6 ± 13.7**	**24.3 ± 12.7**	**<0.001**
3-month follow up	32.2 ± 23.5	37.4 ± 20.7	0.246
6-month follow up	41.7 ± 20.2	45.0 ± 17.1	0.453
Patient Reported Outcomes (Mean ± SD)			
VAS Pain Score			
2-week follow up	**6.2 ± 3.1**	**2.9 ± 2.6**	**<0.001**
6-week follow up	**3.7 ± 2.6**	**1.3 ± 1.8**	**<0.001**
3-month follow up	2.1 ± 2.1	1.4 ± 1.9	0.079
6-month follow up	1.4 ± 1.8	1.0 ± 1.8	0.296
PROMIS Depression			
2-week follow up	53.7 ± 10.4	55.3 ± 7.3	0.425
6-week follow up	**47.6 ± 9.1**	**51.9 ± 8.3**	**0.024**
3-month follow up	47.8 ± 7.5	46.6 ± 10.1	0.535
6-month follow up	48.0 ± 10.0	44.1 ± 9.4	0.101
PROMIS Pain Interference			
2-week follow up	**68.1 ± 5.9**	**64.3 ± 7.4**	**0.013**
6-week follow up	**60.5 ± 5.8**	**57.4 ± 6.8**	**0.025**
3-month follow up	**56.9 ± 6.3**	**50.4 ± 7.2**	**<0.001**
6-month follow up	55.7 ± 7.8	52.6 ± 6.4	0.074
PROMIS Physical Function			
2-week follow up	29.9 ± 8.1	28.4 ± 4.3	0.303
6-week follow up	32.6 ± 5.8	32.3 ± 4.5	0.757
3-month follow up	38.3 ± 9.1	39.3 ± 5.1	0.565
6-month follow up	41.6 ± 9.1	43.0 ± 5.0	0.457

SD = Standard deviation; RSA = Reverse shoulder arthroplasty; HS = Head-shaft; AVN = Avascular necrosis; VAS = Visual analog scale; PROMIS = Patient reported outcomes measurement information system
***Boldface** indicates statistical significance.
†P-value calculated using linear and poisson regression for continuous and categorical variables, respectively
ǂ Additional complications: Nonoperative – valgus malunion (9), head-shaft translation (5, nonunion (3), avascular necrosis (2); RSA – intraoperative humerus fracture (1), musculocutaneous/radial nerve palsy (1), acromion stress fracture (1), and deep infection (1)
§ Includes failure of nonoperative management with conversion to plate fixation (2), intramedullary fixation (1), or arthroplasty (2); and irrigation & debridement with staged revision arthroplasty for deep infection (1)

Conclusion: RSA was associated with early decreased pain, and better ROM and PROMIS scores compared to nonoperative treatment. This suggests that RSA may be superior to nonoperative management in the early recovery period for proximal humerus fractures.