Reverse Shoulder Arthroplasty for Proximal Humerus Fractures: Outcomes Comparing Primary Reverse Arthroplasty for Fracture versus Reverse Arthroplasty After Failed Osteosynthesis

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Purpose: Surgical treatment of proximal humerus fractures in the elderly pose challenges in decision making. Reverse total shoulder arthroplasty (RTSA) has been established as a reliable option for salvage of failed hemiarthroplasty, although few studies have analyzed RTSA after failed open reduction and internal fixation (ORIF). The purpose of this study was to evaluate the outcomes of patients with failed osteosynthesis who undergo salvage RTSA compared to patients undergoing primary RTSA for proximal humerus fractures.

Methods: We retrospectively reviewed 18 patients who underwent primary RTSA for acute proximal humerus fractures and 26 patients who underwent arthroplasty following failed ORIF at our institution between 2003 and 2013. Minimum follow-up was 2 years, with a mean follow-up of 3 years (range, 2.0-6.0).

Results: There are no statistically significant differences in clinical outcomes between the 2 cohorts with regard to American Shoulder and Elbow Surgeons (ASES) scores, most recent forward flexion, or external rotation. The salvage RTSA cohort experienced a higher complication rate (8%) including dislocation and aseptic loosening. The primary RTSA cohort had a 5% complication rate, with 1 late prosthetic joint infection requiring reoperation.

Table 1: Patient Demographics

	Salvage RTSA	Primary RTSA	P-Value
Patients	26	18	
Side (Right : Left)	12 : 14	9 : 9	p =0.74
Follow up (yrs.)	2 (2-6)	3 (2. – 5)	p =0.14
Age (yrs.)	70 (54-87)	75 (60-88)	p = 0.13
Gender: Male : Female	3:23	4:14	P=0.18
BMI (kg/m2)	32.5 (22 –47)	31.4 (20 –52)	p = 0.71
Neer Classification			
3-Part	42% (11)	50% (9)	P=0.58
4-Part	58% (15)	50% (9)	

Table 2: Clinical outcomes of prior ORIF patients before and after RTSA

Parameters	Prior ORIF Before RTSA(n=26)	After Salvage RTSA(n=26)	Difference (95% CI)	*P* value
ASES	24.7	63.0	38 (33-43)	**P<0.0001**
Active range of motion				
Forward Flexion (degrees)	51	133	82 (65-96)	**P<0.0001**
External Rotation (degrees)	0.5	42	41.5 (27-53)	**P<0.0001**
Satisfaction	1.0	5.6	4.6 (4-5)	**P<0.0001**

Table 3: Clinical outcomes of prior ORIF s/p RTSA compared to acute RTSA

Parameters	Salvage RTSA (n=26)	Primary RTSA (n=18)	Difference (95% CI)	*P* value
ASES	64.6	70.6	5.9 (1.69-14)	P = 0.2112
Active range of motion				
Forward Flexion (degrees)	130	133	3.1 (14-29)	P=0.785
External Rotation (degrees)	41.8	35.9	5.93 (13-25)	P=0.518
Satisfaction	5.18	4.8	0.4 (0.5-1.4)	P=0.371

Table 4: Clinical outcomes of 3-Part Fractures prior ORIF s/p RTSA compared to acute RTSA

Parameters	Salvage RTSA (n=11)	Primary RTSA (n=9)	Difference (95% CI)	*P* value
ASES	62.3	66.6	4.2 (6-14)	P = 0.373
Active range of motion (degrees)				
Forward Flexion (degrees)	146	114	31.6 (10-63)	**P=0. 048**
External Rotation (degrees)	45.5	33.3	12.2 (15-39)	P=0.338
Satisfaction	6.2	5	1.2 (1-3)	P=0.1789

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Table 5: Clinical outcomes of 4-Part Fractures prior ORIF s/p RTSA compared to acute RTSA

Parameters	Salvage RTSA (n=15)	Primary RTSA (n=9)	Difference (95% CI)	*P* value
ASES	62.5	73.3	10.7 (6-28)	P=0.187
Active range of motion (degrees)				
Forward Flexion (degrees)	126.6	147.2	20 (12-53)	P=0.189
External Rotation (degrees)	40	38.3	1.6 (21-24)	P=0.872
Satisfaction	5.1	4.5	0.5 (0.12-1)	P=0.0955

Table 6: Complications

	Salvage RTSA	Primary RTSA	P-Value
Complication Rate	8% (n=3)	5% (n=1)	0.782
Dislocation	1	0	0.331
Aseptic Loosening	1	0	0.331
Reoperation	0	1	0.331

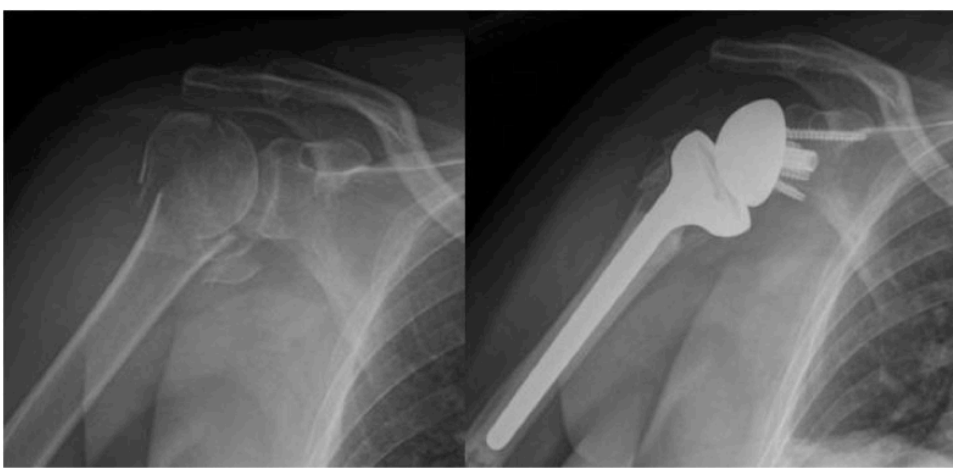

Figure 1: Acute 4-Part Proximal Humerus Fracture treated with RTSA.

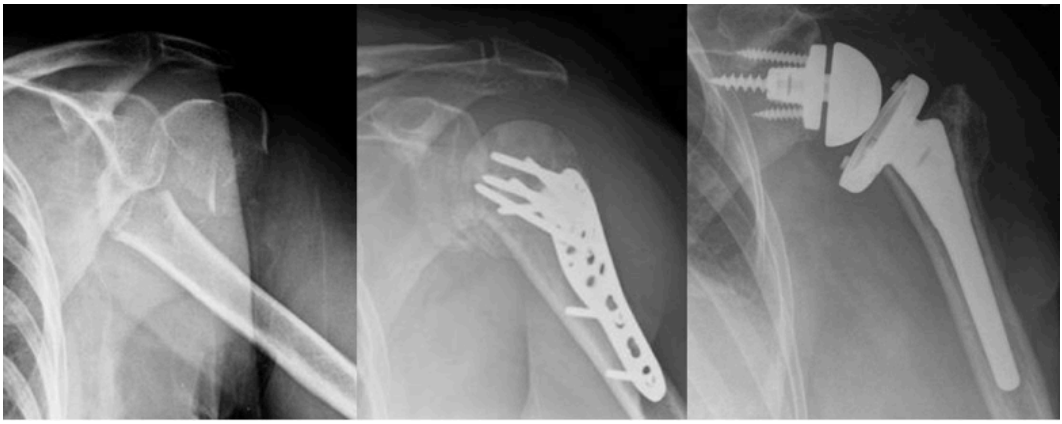

Figure 2: 4-Part Proximal Humerus Fracture that underwent ORIF with subsequent failure and salvage RTSA.

Conclusion: Although RTSA after failed ORIF does have a higher rate of complications when compared to acute RTSA, the revision and reoperation rate, as well as clinical outcomes and shoulder function, remained comparable. When a surgeon approaches these complex fractures in patients with poor underlying bone stock, this study supports either acute arthroplasty or ORIF with the knowledge that salvage RTSA still has the potential to achieve good outcomes if osteosynthesis fails.

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