## The impact of infraspinatus integrity on outcomes following Reverse Shoulder Arthroplasty for Massive Rotator Cuff Tears

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As confidence with reverse total shoulder arthroplasty (RTSA) has increased so have the indications. Currently the presence of a massive rotator cuff tear is one of the main indications for RTSA. However, it is unknown whether the type of massive rotator cuff tear or tendons involved affects outcomes or reoperation rates in these patients. We aim to compare clinical outcomes and reoperation rates of patients who have undergone primary RTSA for massive rotator cuff tears including anterosuperior (supraspinatus/subscapularis), posterosuperior (supraspinatus/infraspinatus) and all three tendons (supraspinatus/infraspinatus/subscapularis).

## METHODS:

We retrospectively reviewed patients from a prospectively maintained patient database between March 2011 to February 2023, who underwent a primary RTSA for the treatment of a massive rotator cuff tear with an intact teres minor. Preoperative and post-operative outcomes at 1 year were recorded for each patient. These outcomes included range of motion (ROM), Single Assessment Numeric Evaluation (SANE), Visual Analog Score (VAS), American Shoulder and Elbow Surgeons scores (ASES), complication rates, and reoperation rates. The patients were stratified based on the MRI findings of an anterosuperior, posterosuperior or massive 3 tendon rotator cuff tear, which was confirmed by the operative findings. Exclusion criteria included: deficient teres minor, prior open reduction internal fixation of the proximal humerus, prior shoulder arthroplasty, advanced cuff tear arthropathy, a concomitant tendon transfer with the reverse shoulder arthroplasty or clinical follow-up less than 1 year. These patients were then de-identified and sent to our statistical analysis team for further investigation. Fisher-Freeman-Halton or Chi-Square was utilized to look for statistical differences in categorical variables, while analysis of variance (ANOVA) was used for continuous variables utilizing the Tukey-Kramer multiple comparison method.

## RESULTS:

224 shoulders met the inclusion criteria of this study. Improvements were seen in clinical outcome scores among the different rotator cuff tear types, but no statistically significant differences were detected for SANE, VAS, ASES, reoperations, or complication rates at 1 year follow-up. Regarding range of motion, the anterosuperior rotator cuff tear group demonstrated statistically significant higher external rotation (average=52.8 degrees, P < 0.01) and internal rotation (average=58.3 degrees, P = 0.03) at 1 year postop compared to the other 2 groups. Further, the anterosuperior group had a statistically significant increased change from baseline external rotation measurement (average improvement=21.3 degrees, P = 0.04), compared to the other groups (average improvement=7.8 degrees).

	Anterosuperior	Posterosuperior	Massive (n=97)	P-Value
	(n=31)	(n=96)		
ASES Pre-op	39.8 (17.3)	40.0 (18.5)	37.9 (16.7)	0.72
SANE Pre-op	36.3 (22.7)	37.2 (27.9)	33.7 (22.6)	0.68
VAS Pre-op	6.47 (2.36)	5.75 (2.84)	5.74 (2.59)	0.40
FE Pre-op	102.1 (54.2)	89.6 (51.7)	83.5 (52.1)	0.22
ER Pre-op	33.9 (19.7)	30.5 (25.1)	32.1 (23.5)	0.79
IR Pre-op	46.5 (18.9)	47.1 (20.0)	42.6 (22.2)	0.32
ASES @ 1-Year	79.8 (18.1)	73.6 (18.2)	74.2 (17.7)	0.28
SANE @ 1-Year	80.0 (21.9)	74.5 (19.4)	78.3 (17.4)	0.29
VAS @ 1-Year	1.10 (1.52)	1.57 (2.11)	1.56 (2.09)	0.50
FE @ 1-Year	149.7 (29.4)	146.1 (23.2)	146.8 (24.4)	0.78
ER @ 1-Year	52.8 (15.8)	37.8 (14.0)	39.6 (12.9)	<0.01
IR @ 1-Year	58.3 (23.1)	49.4 (15.4)	48.6 (16.7)	0.03
Reoperations	0 (0%)	4 (4.2%)	5 (5.2%)	0.59
Complications-				
Postoperative	6 (19.4%)	12 (12.5%)	14 (14.4%)	0.61
ASES CFB	41.6 (27.9)	34.5 (23.9)	37.8 (20.9)	0.41
SANE CFB	43.7 (27.2)	39.6 (33.1)	45.3 (29.7)	0.54
VAS CFB	-5.37 (3.03)	-4.39 (3.27)	-4.21 (2.99)	0.23

FE CFB	48.2 (54.9)	57.2 (50.8)	63.5 (56.7)	0.38
ER CFB	21.3 (22.1)	7.82 (25.1)	7.83 (25.8)	0.04
IR CFB	14.4 (21.4)	1.91 (25.0)	5.88 (25.2)	0.09

## DISCUSSION AND CONCLUSION:

Our data shows no differences in regard to patient reported outcome scores, reoperation rates, or complication rates at 1year following RTSA for different massive rotator cuff tear types. However, patients with a diagnosis of a massive anterosuperior rotator cuff tear with an intact infraspinatus tendon can expect greater improvement in and higher overall external rotation. This data suggests the vital role of the infraspinatus in achieving external rotation following RTSA.