Subscapularis CT-scan evaluation in patients with proximal humerus fracture: Reverse Total Shoulder Arthroplasty versus Hemi-Arthroplasty.

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INTRODUCTION: Hemiarthroplasty (HA) and Reverse Total Shoulder Arthroplasty (RTSA) are both a reliable treatment option for complex proximal humerus fractures. While subscapularis tendon role is defined in HA, it plays a controversial role in RTSA; although very few studies have defined whether subscapularis may affect the clinical outcome in both types of prosthesis.

The purpose of our study was to compare subscapularis trophism in the postoperative period between patients treated with HA or RTSA. The secondary aim of the study was to investigate whether an association existed between the subscapularis trophism and the clinical outcomes at the final follow-up.

METHODS: Sixty-eight consecutive patients with proximal humeral fracture were prospectively enrolled into the study from June 2015 to May 2020. Thirty-six patients with preexisting or anticipated rotator cuff deficiency or a comminution of the greater tuberosity underwent RTSA and the remaining thirty-two underwent HA. Shoulder CT scan were performed pre- and postoperatively, and subscapularis muscle cross-sectional area (SMCSA) and supraspinatus fossa cross-sectional area (SFCSA) were measured in squared millimeters. SMCSA/SFCSA ratio was employed to standardize values for individual anatomical differences between patients. Patient reported outcomes were completed at the final follow-up: Constant score (CS), Quick Dash, Simple Shoulder Test (SST), and Visual Analog Scale (VAS) pain. Range of Motion (ROM) was evaluated at the final follow up. Parametric variables were expressed as medians. Frequencies and percentages were used to assess the distribution of nonparametric variables. Wilcoxon-Mann-Whitney test was used to analyze differences in ROM, clinical scores, and absolute reduction in SMCSA between the two groups. Chi-square test and Fisher's exact test were used to analyze differences in non-parametric variables. Statistical significance was defined as $p < .05$.

RESULTS: RTSA group showed better results in Constant Score, Quick Dash, Simple Shoulder Test compared to HA patients. VAS score was lower in HA group (Table 1). Statistically significant results were found in RTSA group in internal rotation (IR), external rotation (ER), abduction, and forward flexion compared to HA patients (Table 2). Twenty (55%) RTSA-patients versus eight (25%) HA-patients showed a reduction of subscapularis size of >35% ($p = 0.01$). The loss of subscapularis surface was greater in the RTSA patients (RTSA -682,5±561,32mm² vs HA -338,5±416,25mm²) (p=0.018).

DISCUSSION AND CONCLUSION:

RTSA demonstrated better results compared to HA as a treatment for acute proximal humeral fracture, providing better ROM and higher degree of patient satisfaction. Postoperative loss in subscapularis size was significantly higher in RTSA group than HA group. Subscapularis condition seems to show no correlation with functional outcome in RTSA; nonetheless, repair of the subscapularis tendon could improve other properties not influencing clinical outcomes.

Table 1 – Comparison between median post-operative clinical scores (±SD) outcomes for patients undergoing HA and RTSA

	HA	RTSA	P value
Constant Score	38.50±11.73	58.00±16.23	.0001
Quick Dash	27.25±23.10	14.75±9.34	.0006
Simple Shoulder Test	4.50±14.75	8.00±15.80	.0129
VAS (0-10)	0.00±2.12	2.00±2.04	.0311

Table 2 – Comparison of post-operative ROM degrees (±SD) between patients undergoing HA and RTSA

		HA	RTSA	P value
Forward elevation		90.00±37.64	147.50±39.74	< .0001
Abduction		85.00±37.87	95.00±37.83	.0175
ER	Arm in adduction	25.00±13.26	45.00±22.93	.0011
	Arm in abduction	30.00±13.18	30.00±26.12	.0258
IR	Arm in adduction	35.00 ±10.55	42.50±19.51	.0047
	Arm in abduction	30.00±13.56	42.50±24.38	.0257