Is Subscapularis Tendon Repair Beneficial in Patients Undergoing Reverse Shoulder Arthroplasty for Glenohumeral Osteoarthritis with an Intact Rotator Cuff?

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INTRODUCTION: Reverse shoulder arthroplasty (RSA) is an alternative to anatomic total shoulder arthroplasty (aTSA) for treating patients with advanced primary glenohumeral osteoarthritis (GHOA) and an intact rotator cuff. While subscapularis repair is critically important in aTSA, its utility in RSA remains unclear. The purpose of this study was to investigate the impact of subscapularis (SC) repair on the outcome of RSA for treatment of GHOA and an intact rotator cuff.

METHODS:

This was a retrospective study of 80 patients with GHOA and intact rotator cuff who underwent RSA with a lateralized glenoid and inlay humeral design. SC repair was performed if it would not limit intraoperative passive external rotation (PER) in 50 (62.5%) cases and was not repaired in the other 30 (37.5%). Follow-up evaluation was performed at a minimum of 1 year. Mixed effects models were used to assess the associations between SC repair and patient-reported outcome measures (PROMs), internal rotation activities of daily living (IR-ADL), range of motion (ROM), and strength while controlling for age, sex, BMI, whether the dominant upper extremity was affected, and glenosphere size.

RESULTS:

There were no significant differences in the characteristics of the repaired and unrepaired groups. At 1-year minimum follow-up, there were no significant differences in American Shoulder and Elbow Surgeons, Disabilities of the Arm, Shoulder, and Hand, Simple Shoulder Test, visual analog scale (VAS) pain, VAS function, or VAS quality of life. The repair group had greater active external rotation (AER) preoperatively (11.9±20.0° vs -1.3±23.1°, p=0.01), but there was no difference in AER between groups postoperatively (Table 1). Patients without SC repair had greater improvement in AER (32.5±20.5° vs 20.8±20.7°, p=0.026). The SC repair group had significantly greater internal rotation (IR) ROM and strength at all follow-up time points (Table 2). A greater percentage of patients in the SC repair group achieved the patient-acceptable symptom state for IR motion (93.8% vs 75.9%; p=0.024) while a greater proportion in the unrepaired SC group achieved substantial clinical benefit for AER (90.0% vs 60.4%, p=0.005). There were no significant differences in IR-ADL at 1-year minimum follow-up. Two cases of acromial fractures occurred in each of the repaired and unrepaired groups and there was no postoperative instability.

DISCUSSION AND CONCLUSION: Selective SC repair was not associated with meaningful outcome differences at 1-year minimum follow-up in patients with GHOA and intact rotator cuff treated with lateralized glenoid and inlay humerus RSA. However, there are trade-offs to repairing the SC. If SC repair can be performed without limiting PER, patients may have better IR ROM and strength but no difference in ADL-IR. Conversely, if SC repair limits PER, foregoing repair may improve AER without impacting PROMs or complications. Longer-term follow-up is needed to determine if the outcomes are durable. The findings of this study may not be generalizable to other RSA implant designs.

Table 1. Recovery of range of motion at all follow-up time points and comparison between subscapularis repaired and unrepaired groups.

	Baseline			3-Months			6-Months			1-Year Minimum		
Range of Motion	**Repair (n = 50)**	**No Repair (n = 30)**	**P-value +**	**Repair (n = 40)**	**No Repair (n = 23)**	**P-value +**	**Repair (n = 36)**	**No Repair (n = 21)**	**P-value#**	**Repair (n = 50)**	**No Repair (n = 30)**	**P-value#**
Active Forward Elevation	84.0 ± 29.7	89.0 ± 29.8	0.881	126.0 ± 17.0	126.5 ± 15.0	0.327	131.6 ± 12.8	130.5 ± 16.9	0.271	134.0 ± 11.6	134.2 ± 13.2	0.296
P-Value^	N/A			**<0.0001**	**<0.0001**		**<0.0001**	**<0.0001**		**<0.0001**	**<0.0001**	
Active External Rotation	11.9 ± 20.0	-1.3 ± 23.1	**0.011**	27.5 ± 13.3	23.9 ± 17.6	0.157	33.9 ± 10.6	31.2 ± 14.0	0.198	32.5 ± 15.3	31.2 ± 13.6	0.772
P-Value^	N/A			**<0.0001**	**<0.0001**		**<0.0001**	**<0.0001**		**<0.0001**	**<0.0001**	
Internal Rotation Score	3.2 ± 1.6	2.6 ± 1.4	**0.014**	4.7 ± 1.3	4.1 ± 1.4	**0.002**	5.4 ± 0.9	4 1± 0.4	**<0.0001**	5.1 ± 1.3	4.2 ± 1.6	**0.0004**
P-Value^	N/A			**<0.0001**	**<0.0001**		**<0.0001**	**<0.0001**		**<0.0001**	**<0.0001**	

Data was reported as mean and standard deviation. P-value from mixed effects models adjusted for patient age, BMI, glenosphere size, sex, and whether the dominant arm was affected. Internal rotation was measured according to vertebral levels and converted to a numeric scale (0-7).
+ Indicates p-value for the comparison between baseline and each follow-up timepoint for repaired and unrepaired groups.
# Indicates p-value for the comparison between repaired and unrepaired groups at each follow-up timepoint.

Table 2. Recovery of strength at all follow-up time points and comparison between subscapularis repaired and unrepaired groups.

	Baseline			3-Months			6-Months			1-Year Minimum		
Motion	**Repair (n = 50)**	**No Repair (n = 30)**	**P-value#**	**Repair (n = 40)**	**No Repair (n = 23)**	**P-value+**	**Repair (n = 36)**	**No Repair (n = 21)**	**P-value#**	**Repair (n = 50)**	**No Repair (n = 30)**	**P-value#**
External Rotation	4.6 ± 0.6	4.7 ± 0.5	0.597	4.6 ± 0.6	4.7 ± 0.6	0.518	4.9 ± 0.2	4.9 ± 0.5	0.178	4.9 ± 0.3	4.9 ± 0.3	0.691
P-Value^	N/A			0.742	0.687		**<0.0001**	0.220		**0.003**	**0.004**	
Internal Rotation	4.5 ± 0.6	4.7 ± 0.5	0.135	4.6 ± 0.5	4.1 ± 0.9	**0.019**	4.6 ± 0.5	4.2 ± 0.7	**0.012**	4.8 ± 0.5	4.2 ± 0.7	**0.0005**
P-Value^	N/A			0.583	**0.002**		0.280	**0.002**		**0.012**	**0.0004**	

Data was reported as mean and standard deviation. P-value from mixed effects models adjusted for patient age, BMI, glenosphere size, sex, and whether the dominant arm was affected.
+ Indicates p-value for comparison between baseline and each follow-up timepoint for repaired and unrepaired groups.
# Indicates p-value of the comparison between repaired and unrepaired groups at each follow-up timepoint.