

Early Recovery Trajectory After Ream and Run Shoulder Arthroplasty

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INTRODUCTION:

Ream and Run (RnR) is considered for patients with advanced glenohumeral arthritis who desire an active lifestyle without restrictions and to avoid late complications of polyethylene glenoids used in anatomic total shoulder arthroplasty. However, there are concerns that RnR is associated with a longer recovery time. The purpose of this study was to analyze the trajectory of recovery after RnR and to identify factors associated with early recovery.

METHODS:

89 shoulders (83 males) mean age 59.9 ± 8.2 years (27.7 to 75.0) and minimum follow-up of 1 year (mean 4.1 ± 2.4 years) were included. Patient-reported outcomes and range of motion were assessed preoperatively, and at 3, 6, and 12 months, and annually after surgery. Recovery was defined as achievement of the patient acceptable symptom score (PASS) and substantial clinical benefit (SCB) for VAS pain, Simple Shoulder Test (SST), and American Shoulder and Elbow Surgeons score (ASES), and SCB for active forward elevation (AFE), active external rotation (AER), and passive internal rotation (PIR). Patients who achieved PASS/SCB at 3, 6, and 12 months were compared to those who did not. Factors associated with recovery were evaluated using multivariable regression. Generalized estimating equations were used to assess the significance of changes in outcome across time points. Receiver operating characteristic curves were used to determine baseline thresholds predictive of early recovery at each time point.

RESULTS:

There was significant improvement in VAS pain ($p < 0.001$) up to 6 months and significant improvements in SST ($p < 0.001$), ASES ($p = 0.012$), and DASH ($p = 0.036$) up to 1 year postop. There were no significant changes between 1 and 2 year follow up (Table 1). There were significant improvements in AFE and PIR up to 6 months post op and AER improved up to 1 year post op (Table 1). There were increases in the percentages achieving PASS, MCID, and SCB for function (PROMs and ROM) up to 12 months post op (Table 2). In contrast, while the percentages of patients achieving MCID and SCB for VAS pain also plateaued at 12 months post op, the percentage achieving PASS continued to improve between 12 months and 2 years post op. In addition, the percentage achieving PASS for VAS pain was substantially less than PASS for PROMs.

Higher preoperative expectations were associated with greater ASES (3m: $p = 0.002$, 6m: $p = 0.002$, 12m: $p = 0.005$) and SST (3m: $p < 0.001$, 6m: $p = 0.013$, 12m: $p = 0.001$) scores and lower DASH (3m: $p < 0.001$, 6m: $p < 0.001$, 12m: $p < 0.001$) and VAS pain (3m: $p = 0.001$, 6m: $p = 0.008$, 12m: $p = 0.022$) scores at 3, 6, and 12 months post op. At 3 months post op, greater preoperative expectations were associated with achieving PASS for SST (OR=10.7; 95% CI 1.4-78.8; $p = 0.020$), and SCB for both SST (OR=13.3; 95%CI 1.4-131.1; $p = 0.026$) and ASES (OR=11.3; 95%CI 2.0-64.3; $p = 0.006$). At 6 months post op, greater preoperative expectations were associated with achieving PASS for VAS pain (OR =6.29; 95% CI 1.16-33.33; $p = 0.033$) and SCB for ASES (OR=6.2; 95%CI 1.3-29.4; $p = 0.022$). At 12 months post op greater preoperative expectations were associated with achieving SCB for ASES (OR=15.4; 95%CI 1.5-157.9; $p = 0.021$).

At 6 months post op, having prior shoulder surgery was associated with decreased odds of achieving PASS (OR 0.23; 95%CI 0.07-0.83; $p = 0.018$) and SCB (OR 0.14; 95%CI 0.02-0.82; $p = 0.029$) for ASES and at 12 months post op was associated with decreased odds of achieving PASS for SST (OR 0.01; 95% CI 0.0-0.76; $p = 0.037$)

DISCUSSION AND CONCLUSION: Most patients reach a plateau in their recovery of PROMs and ROM between 6 and 12 months after RnR. In contrast, achieving PASS for VAS pain was relatively prolonged, continuing up to 2 years post op, and was ultimately lower than PASS for PROMs and ROM. Greater preoperative expectations were positively associated with clinically relevant outcomes while prior shoulder surgery was negatively associated with outcomes. This study provides an outline of recovery after RnR and further highlights that aspects of patient selection are important factors in determining the outcome of this procedure.

Table 1. Recovery trajectory of patient reported outcomes and range of motion after RnR surgery.*

Outcome	Preoperative	3 months	P-value Preop vs 3m	6 months	P-value 3m vs 6m	1 year	P-value 6m vs 1Y	2 years	P-value 1Y vs 2Y
VAS pain	7.1 ± 1.9	3.1 ± 2.5	<.001	2.2 ± 2.2	.001	1.9 ± 2.0	.320	1.9 ± 2.3	.780
SST	4.6 ± 2.8	7.0 ± 3.3	<.001	7.3 ± 4.3	.590	10.2 ± 2.7	<.001	10.4 ± 2.2	.480
ASES	34.3 ± 16.7	63.8 ± 23.9	<.001	76.9 ± 20.3	<.001	83.3 ± 18.4	.012	84.2 ± 19.1	.970
DASH	39.0 ± 17.2	26.9 ± 17.5	<.001	15.3 ± 15.6	<.001	11.7 ± 13.9	.036	9.0 ± 13.0	.120
AFE	109.0 ± 26.1	120.0 ± 27.2	.002	134.4 ± 19.3	<.001	137.8 ± 15.2	.140	140.1 ± 17.4	.540
AER	12.1 ± 20.4	30.5 ± 13.7	<.001	35.3 ± 13.5	<.001	38.0 ± 13.3	.057	39.7 ± 12.4	.760
PIR	3.6 ± 1.6	5.1 ± 1.0	<.001	5.4 ± 0.9	.005	5.5 ± 1.1	.830	10.3 ± 2.9	.460

*Bold font indicates statistical significance $p < 0.05$.

*PIR - Greater trochanter/hip (1); gluteal (2); sacrum (3); L5-L1 (5); T12-T8 (6); T7-T9 (7)

Table 2. Percentages of patients achieving PASS, MCID, and SCB at each post-operative time point.

Outcome	Thresholds	3 months	6 months	12 months	24 months
VAS pain	PASS (1.5)	26 (37.1%)	35 (50.0%)	40 (58.0%)	35 (66.0%)
	MCID (-2.1)	54 (77.1%)	58 (82.9%)	57 (82.6%)	43 (81.1%)
	SCB (-3.2)	46 (65.7%)	51 (72.9%)	53 (76.8%)	39 (73.6%)
SST	PASS (8.4)	28 (38.9%)	37 (53.6%)	58 (82.9%)	44 (81.5%)
	MCID (+2.9)	38 (52.8%)	43 (62.3%)	62 (88.6%)	46 (85.2%)
	SCB (+3.4)	27 (37.5%)	38 (55.1%)	56 (80.0%)	39 (72.2%)
ASES	PASS (76)	25 (36.2%)	44 (62.9%)	52 (74.3%)	43 (81.1%)
	MCID (+16.9)	51 (73.9%)	60 (85.7%)	58 (82.9%)	47 (88.7%)
	SCB (+23.9)	40 (58.0%)	56 (80.0%)	57 (81.4%)	45 (84.9%)
AFE	MCID (+12°)	40 (47.6%)	56 (72.7%)	57 (80.3%)	42 (80.8%)
	SCB (+35.4°)	10 (11.9%)	28 (36.4%)	23 (32.4%)	20 (38.5%)
AER	MCID (+3°)	66 (79.5%)	72 (92.3%)	67 (93.1%)	59 (101.7%)
	SCB (+11.7°)	54 (65.1%)	57 (73.1%)	59 (81.9%)	41 (70.7%)
PIR	MCID (+0.6)	55 (79.7%)	60 (82.2%)	51 (75.0%)	49 (100.0%)
	SCB (+1.1)	38 (55.1%)	43 (58.9%)	49 (72.1%)	30 (61.2%)

*No published PASS, MCID, SCB for EQ-5D and DASH.