Return to Sport after Reverse Shoulder Arthroplasty: A Retrospective Analysis of Preoperative Sport-Specific Factors Predictive of Successful Post-Operative Sport Activity

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INTRODUCTION:

Many reverse shoulder arthroplasty (RSA) patients indicate a desire to return to sport after surgery, however literature to guide these patients is lacking. This study aimed to identify the rate of return to sports following RSA as well as preoperative patient and sport-specific performance factors predictive of optimal return to activity.

METHODS:

A retrospective multicenter study was performed involving 8 American Shoulder and Elbow Surgeons (ASES) members across the United States. Analysis of clinical outcomes and data from a retrospectively administered return-to-sport (RTS) questionnaire was performed on patients who underwent RSA between April 2021 to March 2023 with minimum 1 year follow up. The RTS questionnaire and study parameters were defined through the Delphi method, requiring 75% agreement for consensus. Seven sports were identified by the authors to be most prevalent in the RSA patient population (golf, pickleball, tennis, running, weightlifting, yoga, and swimming). The RTS questionnaire also evaluated preoperative function and patients' current ability to participate in their chosen sport. The primary outcome was patient reported 'postoperative inhibition', which was rated on a scale of 0 (not at all inhibited) to 5 (unable to play). Pearson's correlation tests and univariate regressions were performed to analyze the relationships between degree of postoperative inhibition and patient characteristics, patient-reported outcome measures (PROMs), and range of motion (ROM). Multivariable linear regression was performed to identify preoperative factors independently associated with degree of postoperative inhibition.

RESULTS:

A total of 271 patients who met the inclusion criteria completed the RTS questionnaire. 58.6% (n = 162) of these patients indicated that they participated in one of the seven sports preoperatively, with 91% (n = 147/162) reporting that they returned to sport. Looking at type of sport, the highest rates of return to play were for tennis and running (100%), while pickleball was the lowest (64%). The final cohort (n = 162) had a mean age of 68.4 ± 7.1, and 67.9% (n = 110/162) were males. The average duration between surgery and completing the RTS questionnaire was 23.0 ± 6.2 months. Following univariate regression analysis, the two patient characteristics significantly associated with a greater degree of postoperative inhibition were: male sex (ß = [0.56], 95% CI [0.20, 0.93] p = 0.002) and those undergoing RSA for 'failed arthroplasty' (ß = [1.20], 95% CI [0.22, 2.19] p = 0.017). Through Pearson correlation testing, no preoperative PROMs were significantly correlated with degree of postoperative inhibition, however postoperative forward elevation (P < 0.001), postoperative internal rotation (P < 0.027), postoperative ASES (P < 0.001), and postoperative SANE (P < 0.001) were all positively correlated with a lower degree of postoperative inhibition. A preoperative diagnosis of failed arthroplasty was independently associated with a greater degree of postoperative inhibition (ß = [1.32], 95% CI [0.11, 2.52] p = 0.033).

DISCUSSION AND CONCLUSION:

Patients undergoing RSA due to a prior failed arthroplasty are more likely to experience increased inhibition when returning to sports postoperatively. Postoperative clinical outcome measures, including forward elevation and internal rotation, are highly correlated with reduced inhibition and their optimization should be a primary postoperative focus for patients seeking to return to sport free of inhibition.

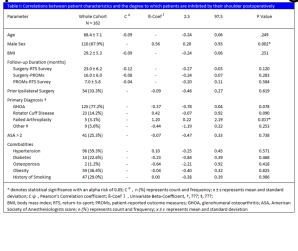

Table I: Correlations between patient characteristics and the degree to which patients are inhibited by their shoulder preoperatively

Parameter	Whole Cohort N = 162	C ᵠ	B-Coef [†]	2.5	97.5	P Value
Age	68.4 ± 7.1	-0.09	-	-0.24	0.06	.249
Male Sex	110 (67.9%)	-	0.56	0.20	0.93	0.002*
BMI	29.2 ± 5.3	-0.05	-	-0.24	0.66	.251
Follow-up Duration (months)	-	-	-	-	-	-
Surgery-RTS Survey	23.0 ± 6.2	-0.12	-	-0.27	0.65	0.120
Surgery-PROMs	18.0 ± 6.0	-0.08	-	-0.24	0.07	0.281
PROMs-RTS Survey	7.0 ± 5.6	-0.04	-	-0.20	0.31	0.584
Prior Ipsilateral Surgery	54 (33.3%)	-	-0.09	-0.46	0.27	0.619
Primary Diagnosis ‡						
OHOA	126 (77.2%)	-	-0.37	-0.79	0.04	0.078
Rotator Cuff Disease	23 (14.2%)	-	0.42	-0.07	0.92	0.090
Failed Arthroplasty	9 (5.5%)	-	1.20	0.22	2.19	0.017*
Other ǂ	9 (5.6%)	-	-0.44	-1.19	0.32	0.253
ASA > 2	45 (25.9%)	-	-0.07	-0.47	0.33	0.738
Comorbidities	-	-	-	-	-	-
Hypertension	96 (59.3%)	-	0.33	-0.20	0.45	0.571
Diabetes	14 (10.4%)	-	-0.33	-0.84	0.39	0.388
Osteoporosis	2 (1.2%)	-	-0.64	-2.21	0.92	0.418
Obesity	39 (36.4%)	-	-0.02	-0.40	0.32	0.820
History of Smoking	47 (29.0%)	-	0.00	-0.35	0.35	0.986

* denotes statistical significance with an alpha risk of 0.05; C ᵠ , = (%) represents count and frequency; ± = represents mean and standard deviation; C ψ , Pearson's correlation coefficient; B-Coef †, Univariate Beta-Coefficient, ‡, ???; ǂ, ???;
BMI, body mass index; RTS, return to sport; PROMs, patient-reported outcome measures; OHOA, glenohumeral osteoarthritis; ASA, American Society of Anesthesiologists score; # (%) represents count and frequency; ± = represents mean and standard deviation

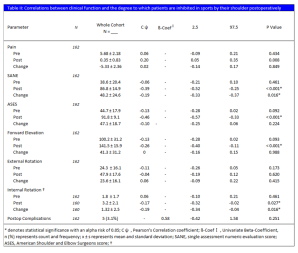

Table II: Correlations between clinical function and the degree to which patients are inhibited in sports by their shoulder preoperatively

Parameter	n	Whole Cohort N = ____	C ψ	B-Coef †	2.5	97.5	P Value
Pain	162						
Pre		3.88 ± 3.28	-0.06	-	-0.09	0.21	0.444
Post		0.20 ± 0.81	-0.20	-	-0.65	0.15	0.088
Change		-3.33 ± 3.26	0.02	-	-0.14	0.17	0.849
SANE	162						
Pre		30.4 ± 28.4	-0.06	-	-0.21	0.10	0.481
Post		89.8 ± 14.9	-0.39	-	-0.52	-0.25	<0.001*
Change		46.2 ± 24.6	-0.19	-	-0.33	-0.37	0.016*
ASES	162						
Pre		44.7 ± 17.9	-0.13	-	-0.28	0.02	0.092
Post		91.8 ± 9.1	-0.40	-	-0.57	-0.33	<0.001*
Change		47.1 ± 18.7	-0.30	-	-0.25	0.06	0.224
Forward Elevation	162						
Pre		100.2 ± 31.2	-0.13	-	-0.28	0.02	0.093
Post		161.9 ± 19.9	-0.26	-	-0.40	-0.11	<0.001*
Change		41.3 ± 31.2	0	-	-0.16	0.15	0.988
External Rotation	162						
Pre		24.3 ± 16.1	-0.11	-	-0.28	0.05	0.173
Post		47.9 ± 17.6	-0.04	-	-0.19	0.12	0.630
Change		23.4 ± 18.1	0.06	-	-0.09	0.22	0.415
Internal Rotation †							
Pre	162	1.0 ± 1.7	0.06	-	-0.10	0.21	0.481
Post	160	3.2 ± 2.1	-0.17	-	-0.32	-0.02	0.027*
Change	160	1.83 ± 2.3	-0.19	-	-0.34	-0.04	0.016*
Postop Complications	162	9 (5.5%)	-	0.38	-0.42	1.18	0.351

* denotes statistical significance with an alpha risk of 0.05; C ψ , Pearson's Correlation coefficient; B-Coef †, Univariate Beta-Coefficient, n (%) represents count and frequency; ± = represents mean and standard deviation; SANE, single assessment numeric evaluation score; ASES, American Shoulder and Elbow Surgeons score; ǂ

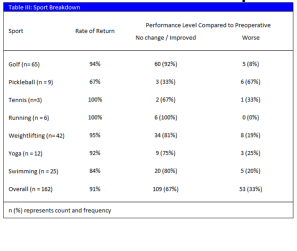

Table III: Sport Breakdown

Sport	Rate of Return	Performance Level Compared to Preoperative	
		No change / Improved	Worse
Golf (n= 65)	94%	60 (92%)	5 (8%)
Pickleball (n = 9)	67%	3 (33%)	6 (67%)
Tennis (n=3)	100%	2 (67%)	1 (33%)
Running (n = 6)	100%	6 (100%)	0 (0%)
Weightlifting (n= 42)	95%	34 (81%)	8 (19%)
Yoga (n = 12)	92%	9 (75%)	3 (25%)
Swimming (n = 25)	84%	20 (80%)	5 (20%)
Overall (n = 162)	91%	109 (67%)	53 (33%)

n (%) represents count and frequency

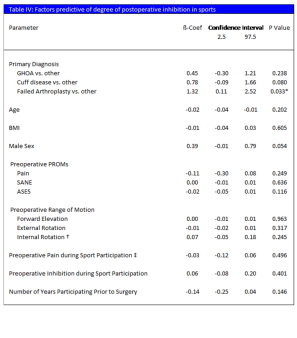

Table IV: Factors predictive of degree of postoperative inhibition in sports

Parameter	B-Coef	Confidence Interval 2.5	97.5	P Value
Primary Diagnosis				
GHOA vs. other	0.45	-0.30	1.21	0.238
Cuff disease vs. other	0.78	-0.09	1.66	0.080
Failed Arthroplasty vs. other	1.32	0.11	2.52	0.033*
Age	-0.02	-0.04	-0.01	0.202
BMI	-0.01	-0.04	0.03	0.605
Male Sex	0.39	-0.01	0.79	0.054
Preoperative PROMs				
Pain	-0.11	-0.30	0.08	0.249
SANE	0.00	-0.01	0.01	0.636
ASES	-0.02	-0.05	0.01	0.116
Preoperative Range of Motion				
Forward Elevation	0.00	-0.01	0.01	0.963
External Rotation	-0.01	-0.02	0.01	0.317
Internal Rotation †	0.07	-0.05	0.18	0.245
Preoperative Pain during Sport Participation ‡	-0.03	-0.12	0.06	0.496
Preoperative Inhibition during Sport Participation	0.06	-0.08	0.20	0.401
Number of Years Participating Prior to Surgery	-0.14	-0.25	0.04	0.146