Are the Best Anatomic Total Shoulder Arthroplasties Better than the Best Reverse Total Shoulder Arthroplasties?

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INTRODUCTION:

Surgeons often state anecdotally that their best anatomic shoulder arthroplasties (TSA) do better than their best reverse shoulder arthroplasties (RSA). Limited data exists comparing patients at the upper limits of outcomes between RSA and TSA.

METHODS:

A retrospective study was performed in patients undergoing TSA and RSA with minimum two-year follow up. Baseline patient demographic information as well as preoperative and postoperative active range of motion (ROM), American Shoulder and Elbow Surgeons (ASES) score, Single Assessment Numeric Evaluation (SANE), and Visual Analog Scale (VAS) for pain were collected. Patients in the top 20% of postoperative ASES scores were identified as the best outcomes. Descriptive statistics, univariate, and multivariate analyses were performed to evaluate differences between patients in the top 20% of ASES scores undergoing TSA and RSA.

RESULTS: A total of 40 TSAs and 88 RSAs were included in the top 20% of each group, from a total of 205 TSAs and 447 RSAs, with mean postoperative follow up of 33 ± 14 months. Baseline patient-reported outcome measures (PROs) and ROM did not differ between groups (*P* > .05). There were no significant differences in the change of preoperative to postoperative VAS-pain (*P* = .539), SANE (P = .388), ASES (*P* =.912), and forward elevation (*P* =.439). The median (Interquartile range) change in external rotation (40° (30°,50°) vs. 30° (20°,50°); *P* = .017) and internal rotation (4.0 (2.0,6.0) vs. 2.0 (1.0, 4.0); *P* = .005) was statistically different between the TSA and RSA groups, respectively. Minimal clinically important difference for ASES was achieved by 100% of patients in both groups. Substantial clinical benefit was achieved by 100% of patients in the TSA group and 98% (n = 86) of patients in the RSA group.

DISCUSSION AND CONCLUSION:

While there is a common notion that patients treated with TSA have a greater potential for excellent outcomes, our findings show that clinical outcomes for the best TSAs are comparable to the best RSAs. Longer follow up is needed to identify long-term differences in outcomes including revision and implant durability.

Table I. Whole Cohort Patient Demographic Information

	n (%) or Average ± SD
Total	128
Age (years)	68.6 ± 7.3
Sex	
Female	63 (49.2)
Male	65 (50.8)
Follow-up (months)	33.2 ± 13.7
BMI	29.6 ± 5.7
ASA	
1	5 (3.9)
2	104 (81.3)
3	19 (14.8)
Comorbid Conditions	
Depression	28 (21.9)
Diabetes	14 (10.9)
Obesity	34 (26.6)
Smoker	69 (53.9)
Current	4 (3.1)
Former	65 (50.8)
Prior Surgery	21 (16.4)

BMI; body mass index, ASA; American Society of Anesthesiologists' classification of Physical Health, VAS; Visual Analog Scale, SANE; Single Assessment Numeric Evaluation; ASES; American Shoulder and Elbow Surgeons' Score

Table II. Patient Demographic Information

	TSA	RSA	P-Value
No. of patients	40	88	N/A
Age (yr)	62.3 ± 6.2	71.5 ± 5.8	<0.001*
Mean clinical follow-up (mo)	40.4 ± 16.2	30.0 ± 11.1	<0.001*
Sex [n (%)]			
Female	21 (53)	42 (48)	0.757
Male	39 (47)	46 (52)	
BMI	28.4 ± 3.7	30.1 ± 6.3	0.051
ASA comorbidity score [n(%)]			
1	3 (7.5)	2 (2.3)	
2	35 (88)	69 (78)	0.033*
3	2 (5)	17 (19)	
Primary Diagnosis [n(%)]			
GHOA	40 (100)	64 (72.7)	
RCA	0	19 (21.6)	<0.001*
RCT	0	2 (2.2)	
Other	0	3 (3.4)	
Prior Surgery [n(%)]	5 (12.5)	16 (19.2)	0.607
Complications [n(%)]	0	3 (3.4)	0.581

BMI; body mass index, N/A; not applicable, ASA; American Society of Anesthesiologists' classification of Physical Health, DJD; Degenerative joint disease, RCA; Rotator cuff arthropathy, RCT; Rotator cuff tear, PCA; Post-capsulorrhaphy arthropathy, AVN; Avascular necrosis, RCR; Rotator cuff Repair

* Signifies statistical significance of P < 0.05

Table III. Influence of Arthroplasty Type on Clinical Outcomes

	TSA (n = 40)	RSA (n = 88)	P-Value
VAS-pain Score			
Pre-op	6.0 (4.0, 7.0)	6.0 (4.0, 8.0)	
Post-op	0 (0,0)	0 (0,0)	
Δ	-6.0 (-7.0, -4.0)	-6.0 (-8.0, -4.0)	0.539
SANE Score			
Pre-op	30.0 (20.0, 50.0)	32.5 (19.5, 50.0)	
Post-op	100.0 (100.0, 100.0)	100.0 (96.5, 100.0)	
Δ	70.0 (50.0, 80.0)	62.5 (49.7, 80.5)	0.388
ASES Score			
Pre-op	40.0 (28.0, 49.6)	38.0 (27.0, 48.1)	
Post-op	100.0 (100.0, 100.0)	100.0 (98.3, 100.0)	
Δ	60.0 (50.4, 72.0)	61.0 (50.0, 71.7)	0.912
MCID [n (%)]	40 (100)	88 (100)	1.000
SCB [n(%)]	40 (100)	86 (98)	1.000
Forward Elevation (Degrees)			
Pre-op	90 (90, 103)	90 (90, 110)	
Post-op	150 (140, 160)	150 (135, 155)	
Δ	60 (45, 65)	50 (30, 65)	0.439
External Rotation (Degrees)			
Pre-op	25 (20, 30)	30 (20, 30)	
Post-op	70 (50, 80)	60 (50, 76)	
Δ	40 (30, 50)	30 (20, 50)	0.017*
Internal Rotation†			
Pre-op	0.0 (0.0, 2.0)	0.0 (0.0, 2.0)	
Post-op	6.0 (2.8, 6.3)	4.0 (2.0, 6.0)	
Δ	4.0 (2.0, 6.0)	2.0 (1.0, 4.0)	0.005*

ASES; American Shoulder Elbow Surgeon Score, SANE; Single Assessment Numeric Evaluation, VAS; Visual Analog Scale, MCID; Minimally important clinical difference, SCB; Substantial clinical benefit

* Denotes Statistical Significance

† Sequential point system with 0 representing rotation to the buttocks/hip, 1 representing sacrum, 2 representing L5, and so on.

Table IV. Preoperative Factors Associated with Top 20% TSA

Factor	OR	95% CI Lower	95% CI Upper	P-Value
Sex (refence: male)	1.04	0.49	2.20	0.917
Age	0.96	0.90	1.02	0.190
ASA (reference: 2)				
1	0.70	0.16	2.96	0.625
3	0.55	0.11	2.72	0.467
BMI	**0.90**	**0.82**	**0.98**	**0.022***
Diabetes	0.65	0.13	3.27	0.600
Smoking Status (reference: never)				
Previous	1.53	0.70	3.36	0.289
Current	0.50	0.06	4.52	0.538
Prior Surgery	**0.24**	**0.08**	**0.70**	**0.009***

OR; Odds Ratio, CI; Confidence Interval, ASA; American Society of Anesthesiologists' classification of Physical Health, BMI; Body Mass Index

* Signifies significance with alpha risk set at 0.05

Table V. Preoperative Factors Associated with Top 20% RSA

Factor	OR	95% CI Lower	95% CI Upper	P-Value
Sex (refence: male)	**0.40**	**0.23**	**0.67**	**0.001***
Age	0.99	0.95	1.03	0.467
ASA (reference: 2)				
1	1.08	0.20	5.86	0.926
3	0.80	0.41	1.56	0.515
BMI	0.98	0.94	1.03	0.406
Diabetes	0.69	0.32	1.47	0.417
Smoking Status (reference: never)				
Former	1.63	0.97	2.74	0.066
Current	0.78	0.20	0.70	0.729
Prior Surgery	**0.37**	**0.20**	**0.71**	**0.003***
Diagnosis (reference: RCA)				
GHOA	1.00	0.54	1.89	0.979
RCT	**0.15**	**0.03**	**0.71**	**0.016***
Other	0.55	0.14	2.08	0.378

OR; Odds Ratio, CI; Confidence Interval, ASA; American Society of Anesthesiologists' classification of Physical Health, BMI; Body Mass Index, RCA; Rotator Cuff Arthropathy, GHOA; Glenohumeral Osteoarthritis, RCT; Rotator Cuff Tear

* Signifies significance with alpha risk set at 0.05