Sarcopenia and Shoulder Arthroplasty: Does Sarcopenia Influence Outcomes Differently in Anatomical TSA vs Reverse TSA?

Roma Fe Mabanag, MD[1]; Majd Mzeihem, MD[1]; Ali Rteil, MD, MSc[2]; Jason Koh, MD[2]; Farid Amirouche, PhD[1,2]

[1] Department of Orthopaedic Surgery, University of Illinois at Chicago, Chicago, Illinois, USA
[2] Department of Orthopaedic Surgery, Northshore University Health System, an Affiliate of the University of Chicago Pritzker School of Medicine. Skokie, Illinois, USA

Disclosures: Majd Mzeihem (N), Roma Fe Mabanag (N), Ali Rteil (N), Jason Koh (N), Farid Amirouche (N)

Introduction: Sarcopenia is an emerging risk factor for adverse outcomes after joint arthroplasty, and its prevalence is rising with the aging population. While prior studies have linked sarcopenia to instability, nerve injury, readmissions, and higher costs, little is known about how these risks differ between anatomic (aTSA) and reverse (rTSA) total shoulder arthroplasty. This study evaluates whether postoperative outcomes vary by procedure type in patients with sarcopenia.

Methods: Data were retrospectively extracted from the TriNetX Research Network. Patients with sarcopenia were identified using ICD-10 and CPT codes, who subsequently underwent a total shoulder arthroplasty. Procedure codes defined anatomic and reverse TSA cohorts. Propensity score matching was performed 1:1 using age, gender, BMI, tobacco use, osteoporosis, heart, pulmonary, hepatic and kidney diseases, dementia and diabetes mellitus. Outcomes included prosthetic dislocation, periprosthetic fracture (PF), prosthetic fracture, aseptic loosening (AL), periprosthetic joint infection (PJI), revision, and readmission at 3, 6, 12 months and 2 years.

Results: An initial query identified 335 sarcopenic patients who underwent anatomic total shoulder arthroplasty (TSA) and 1,497 who underwent reverse TSA (rTSA). After 1:1 propensity score matching, each cohort included 328 patients. At both 3 and 6 months, complication rates were generally similar between sarcopenic patients undergoing rTSA and aTSA, though some differences emerged. At 3 months, rTSA was associated with higher rates of postoperative infection (0.03% vs 0%, p=0.001), aseptic loosening (0.03% vs 0%, p=0.001), DVT (0% vs 0.03%, p=0.001), and mortality (0.03% vs 0%, p=0.001). By 6 months, the differences persisted for postoperative infection and mortality (both p=0.001), while other complications, including prosthetic dislocation, implant fracture, wound issues, pain, opioid use, readmissions, and ER visits, showed no significant variation between cohorts. At 12 months, complication rates between sarcopenic rTSA and aTSA remained largely comparable, with no significant differences in prosthetic complications, dislocation, mechanical loosening, periprosthetic or prosthetic fracture, or revision. However, mortality was higher in the rTSA group (0.03% vs 0%, p=0.001). By 2 years, outcomes continued to be similar between groups, with no significant differences in prosthetic complications, dislocation, loosening, fractures, opioid dependence, mortality, or revision rates (Table 2).

Discussion: Overall, no significant differences in complication rates were observed between sarcopenic patients undergoing rTSA and aTSA, with both procedures demonstrating comparable outcomes through two years. The slightly higher early complication rates in the rTSA cohort may be attributable to the fact that patients selected for rTSA are generally more comorbid, rather than to the procedure itself. From a biomechanical perspective, rTSA relies on deltoid compensation for rotator cuff deficiency, which may be impaired in sarcopenic patients, though this effect was not clearly demonstrated in our data. Finally, the relatively small sample size limits the ability to detect differences in rare but clinically relevant complications.

Clinical Relevance: Although some differences reached statistical significance, the absolute differences in outcomes were modest, suggesting limited clinical impact. These findings do not indicate that rTSA is inappropriate in sarcopenic patients but rather emphasize the need for individualized risk assessment and shared decision-making. Given that sarcopenia is a modifiable risk factor, targeted preoperative optimization, such as nutritional support and resistance training may help improve outcomes in this vulnerable population.

	3 Months				6 Months			
	Sarcopenia rTSA (N=328)	Sarcopenia aTSA (N=328)	OR (95% CI)	P-value	Sarcopenia rTSA (N=328)	Sarcopenia aTSA (N=328)	OR (95% CI)	P-value
Postop Infection, n(%)	10 (0.03%)	0 (0.00%)	-	**0.001**	10 (0.03%)	0 (0.00%)	-	**0.001**
PJI, n(%)	0 (0.00%)	0 (0.00%)	-	-	0 (0.00%)	0 (0.00%)	-	-
Prosthetic Complications, n(%)	12 (0.04%)	12 (0.04%)	1.00 (0.44-2.26)	1.00	14 (0.04%)	16 (0.05%)	1.15 (0.55-2.40)	0.71
Prosthetic Dislocation, n(%)	11 (0.03%)	10 (0.03%)	0.906 (0.38-2.16)	0.82	13 (0.04%)	11 (0.03%)	0.84 (0.37-1.91)	0.68
Aseptic Loosening, n(%)	10 (0.03%)	0 (0.00%)	-	**0.001**	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00
Implant Fracture n(%)	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00
Periprosthetic Fracture, n(%)	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00
Wound Complications, n(%)	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00
DVT, n(%)	0 (0.00%)	10 (0.03%)	-	**0.001**	0 (0.00%)	10 (0.03%)	-	**0.001**
Post-op Blood Transfusion, n(%)	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00
Revision, n(%)	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00	13 (0.04%)	10 (0.03%)	0.76 (0.33-1.76)	0.52
Mortality, n(%)	10 (0.03%)	0 (0.00%)	-	**0.001**	10 (0.03%)	0 (0.00%)	-	**0.001**
Surgical Complications, n(%)	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00
Pain, n(%)	201 (0.61%)	195 (0.60%)	0.93 (0.68-1.27)	0.63	228 (0.70%)	208 (0.63%)	0.76 (0.55-1.05)	0.10
Opioid Use, n (%)	293 (0.89%)	290 (0.88%)	0.91 (0.56-1.48)	0.80	281 (0.88%)	284 (0.89%)	1.10 (0.67-1.80)	0.71
Postop Diagnosis Opioid Abuse/Dependence, n(%)	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00
Readmissions n(%)	94	77	0.76 (0.53-1.08)	0.13	97	80	0.76 (0.53-1.08)	0.13
ER Visits, n(%)	29 (0.09%)	33 (0.10%	1.15 (0.68-1.95)	0.590	38 (0.12%)	48 (0.15%)	1.31 (0.83-2.06)	0.25

Table 1: Comparison of Surgical Complication Rates Between TSA and rTSA Groups at 3 & 6 Months

	12 Months				2 Years			
	Sarcopenia rTSA (N=328)	Sarcopenia aTSA (N=328)	OR (95% CI)	P-value	Sarcopenia rTSA (N=328)	Sarcopenia aTSA (N=328)	OR (95% CI)	P-value
Prosthetic Complications, n(%)	19 (0.06%)	24 (0.07%)	1.28 (0.69-2.39)	0.43	28 (0.09%)	31 (0.10%)	1.12 (0.66-1.91)	0.68
Prosthetic Dislocation, n(%)	16 (0.05%)	13 (0.04%)	0.81 (0.38-1.70)	0.57	21 (0.06%)	16 (0.05%)	0.75 (0.38-1.46)	0.40
Mechanical Loosening, n(%)	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00
Periprosthetic Fracture, n(%)	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00	10 (0.03%)	11 (0.03%)	1.1 (0.46-2.64)	0.82
Prosthetic Fracture, n(%)	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00
Postop Diagnosis Opioid Abuse/Dependence, n(%)	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00
Mortality, n(%)	10 (0.03%)	0 (0.00%)	-	**0.001**	10 (0.03%)	10 (0.03%)	1.00 (0.41-2.44)	1.00
Revision, n(%)	19 (0.06%)	11 (0.03%)	0.56 (0.26-1.21)	0.14	24 (0.07%)	17 (0.05%)	0.69 (0.37-1.32)	0.26

Table 2: Long-Term Surgical Outcomes in Sarcopenic vs. Control Patients at 1-Year and 2 Years