Impact of Osteoporosis on Postoperative Outcomes Following Rotator Cuff Repair

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INTRODUCTION: Osteoporosis is a systemic skeletal disorder characterized by reduced bone mineral density (BMD) and an increased susceptibility to fracture. It is especially prevalent in postmenopausal women and older adults – populations that commonly experience rotator cuff tears and often require rotator cuff repair surgery (RCR). While osteoporosis has been associated with increased complications following total shoulder arthroplasty (TSA), its impact on RCR outcomes is not well-defined. This study aimed to evaluate postoperative complication rates and healthcare utilization following RCR in patients with osteoporosis compared to those without.

METHODS: Using a large national insurance database, we compared demographics, comorbidities, and postoperative complications in patients with and without a diagnosis of osteoporosis undergoing RCR. Primary study outcomes included 2-year RCR revision surgery, conversion to shoulder arthroplasty, adhesive capsulitis, and pathological fractures. Secondary outcomes included 90-day wound complications, thromboembolic events, infections, and healthcare utilization. Rotator cuff repair patients with osteoporosis and those without osteoporosis were propensity matched in a 1:1 ratio. Statistical analyses were performed using Welch's two-sample t-test to compare continuous variables and chi-square tests to compare categorical variables, both with a Bonferroni-corrected alpha value of 0.002 for statistical significance.

RESULTS: After matching, 65,118 patients of similar age (66.4 years), gender distribution (87.1% female) and comorbidity burdens (Elixhauser comorbidity index: 5.33) were included in each cohort. At 2 years post-RCR, osteoporosis patients had significantly higher rates of pathological fractures and adhesive capsulitis **(Table 1)**. No significant differences were found between incidence of revision RCR or conversion to TSA between groups. Within 90-days postoperatively, osteoporotic patients had significantly higher incidences of general surgical complications, anemia, effusion, arthrocentesis/ steroid injection, and medical visits **(Table 2)**. No significant differences were found in incidences of surgical site infections, wound complications, venous thromboembolism, sepsis, MRSA, pneumonia, renal failure, effusion, shoulder stiffness, emergency room (ER) visits, or readmisisons between the two groups.

DISCUSSION: Osteoporotic patients undergoing RCR experience higher rates of medical complications within the 90-day postoperative period and within 2 years compared to those without osteoporosis. These findings suggest that osteoporosis may influence both early postoperative recovery and longer-term surgical outcomes, underscoring the potential value of considering bone health during surgical planning and follow-up.

SIGNIFICANCE/ CLINICAL RELEVANCE: These findings highlight osteoporosis as a significant risk factor for adverse outcomes following RCR. Integrating bone health assessment into preoperative planning may guide surgical decision-making and optimize outcomes in an aging population with increasing requirements for shoulder surgery.

Complications	Osteoporosis (N = 65,118)		No Osteoporosis (N = 65,118)		OR	95% CI	p-value
	Value	%	Value	%			
RCR Revision	1,659	2.55	1,711	2.63	0.97	0.90, 1.04	0.37
Reverse TSA	92	0.14	79	0.12	1.16	0.86, 1.57	0.36
Anatomic TSA	42	0.06	34	0.05	1.23	0.78, 1.94	0.42
Partial TSA	9	0.01	5	0.008	1.80	0.60, 5.37	0.42
Pathological fracture	1,523	2.33	715	1.10	2.16	1.97, 2.34	< 0.001
Adhesive capsulitis	3,932	6.04	3,255	5.00	1.22	1.16, 1.28	< 0.001

Table 1: Postoperative outcomes within 2 years of RCR. Odd ratio (OR) is defined as likelihood of event to occur in the osteoporosis population compared to the no osteoporosis population, confidence interval (CI) of 2.5%, 97.5%.

Complications	Osteoporosis (N = 65,118)		No Osteoporosis (N = 65,118)		OR	95% CI	p-value
	Value	%	Value	%			
General Surgical Complication	1,038	1.59	879	1.35	1.18	1.08, 1.30	< 0.001
Surgical Site Infection	4	0.006	3	0.004	1.33	0.30, 5.96	1.0
Wound complications	73	0.11	49	0.08	1.49	1.04, 2.14	0.04
Venous thromboembolism	297	0.46	268	0.41	1.11	0.94, 1.31	0.24
Sepsis	231	0.35	233	0.36	0.99	0.83, 1.19	0.96
MRSA	21	0.03	17	0.03	1.24	0.65, 2.34	0.63
Anemia	3,377	5.18	2,971	4.56	1.14	1.09, 1.20	< 0.001
Pneumonia	510	0.78	444	0.68	1.15	1.01, 1.31	0.03
Effusion	1,802	2.77	1,554	2.39	1.16	1.09, 1.25	< 0.001
Shoulder Stiffness	379	0.58	319	0.49	1.19	1.02, 1.38	0.03
Arthrocentesis/ Steroid Injection	10,738	16.5	10,266	15.8	1.06	1.02, 1.09	< 0.001
Medical visits	5,320	8.17	4,377	6.72	1.23	1.18, 1.29	< 0.001
ER visits	109	0.17	75	0.12	1.45	1.08, 1.95	0.01
Readmission	964	1.48	1,022	1.57	0.94	0.86, 1.03	0.20

Table 2: Postoperative outcomes within 90 days of RCR. Odds ratio (OR) is defined as likelihood of event to occur in the osteoporosis population compared to the no osteoporosis population, confidence interval (CI) of 2.5%, 97.5%.