The effect of osteoporosis on medical and implant-related complications following total shoulder arthroplasty: a propensity-matched cohort analysis

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INTRODUCTION:
Osteoporosis is a degenerative bone disorder that, with the aging population, is becoming more common in patients seeking total shoulder arthroplasty. While the effects of osteoporosis have been described in the broader orthopedic literature, it is presently unclear how osteoporosis affects total shoulder arthroplasty (TSA) postoperative medical and implant-related outcomes.
METHODS:
A multicenter insurance claims database, TriNetX, was queried for patients between 2011-2021 who underwent TSA with and without osteoporosis. Patients with less than 2-years of follow-up and those with a prior major arthroplasty were excluded. Primary outcomes included 2-year periprosthetic joint infection (PJI), prosthesis dislocation, periprosthetic fracture, and revision surgery. Secondary outcomes included 90-day medical complications and readmissions. Osteoporotic and control patient cohorts were propensity matched in a 1:1 ratio.
RESULTS: 10,363 patients were included after matching in each cohort. Baseline demographic variables were similar between groups, except osteoporotic patients had a lower BMI (28.8 vs 30.8 kg/m2; $p < 0.001$). Osteoporotic patients undergoing TSA were more likely to experience infection, stroke, pulmonary embolism, deep vein thrombosis, myocardial infarction, anemia, pneumonia, renal failure, transfusion, readmission, and death within 90 days after surgery ($p < 0.05$, Table 1). At 2 years postoperative, osteoporotic TSA patients experienced an elevated risk of mechanical loosening, PJI, dislocation, periprosthetic fracture, and required revision surgery at a higher rate than control patients ($p < 0.05$, Table 2).
DISCUSSION AND CONCLUSION:
Osteoporotic patients undergoing shoulder arthroplasty are at greater risk for medical complications within the 90-day peri-operative period as well as implant-related complications within 2 years of surgery. Patients and surgeons should be aware of the potential higher risk of complications in osteoporotic patients following SA, and further investigation into benefits of preoperative management and treatment of osteoporosis is necessary.

Table 1: 90-Day Postoperative Systemic Outcomes in Patients With and Without Osteoporosis.

Demographics	Osteoporosis n = 10,363		Control n = 10,363		OR	95% CI	P
	n	%	n	%			
Infection	45	0.43	26	0.25	1.73	(1.069, 2.812)	0.024
Sepsis	10	0.10	10	0.01	1.00	(0.416, 2.404)	1
Wound Disruption	43	0.41	27	0.26	1.60	(0.985, 2.583)	0.055
Stroke	226	2.18	153	1.48	0.66	(1.205, 1.810)	<0.001
Pulmonary Embolism	145	1.40	86	0.83	0.99	(1.297, 2.217)	<0.001
Deep Vein Thrombosis	167	1.61	93	0.90	1.43	(1.402, 2.334)	<0.001
Myocardial Infarction	166	1.60	94	0.91	1.78	(1.379, 2.294)	<0.001
Anemia	1,152	11.12	646	6.23	1.88	(1.701, 2.080)	<0.001
Pneumonia	326	3.15	129	1.24	1.42	(2.098, 3.165)	<0.001
Urinary Tract Infection	10	0.10	10	0.10	1.00	(0.80, 1.52)	0.535
Renal Failure	339	3.27	252	2.43	1.12	(1.150, 1.601)	<0.001
Transfusion	455	4.39	301	2.90	0.97	(1.324, 1.780)	<0.001
Readmission	469	4.53	793	7.65	1.75	(1.554, 1.966)	<0.001
Death	143	1.38	110	1.06	1.33	(1.016, 1.675)	<0.001

OR: Odds Ratio, 95% CI: 95% Confidence interval, PE: Pulmonary Embolism, DVT: Deep Vein Thrombosis, MI: Myocardial Infarction, UTI: Urinary Tract Infection

Table 2: Two-year Postoperative Implant-Related Outcomes in Patients With and Without Osteoporosis

	Osteoporosis n = 10,363		Control n = 10,363		OR	95% CI	P
Demographics	n	%	n	%			
Mechanical Loosening	172	1.66	98	0.95	1.768	(1.377, 2.269)	<0.001
Periprosthetic Fracture	127	1.26	42	0.41	3.049	(2.149, 4.326)	<0.001
Dislocation	202	1.95	97	0.94	2.104	(1.649, 2.685)	<0.001
PJI	33	0.32	12	0.12	2.756	(1.422, 5.338)	0.002
Revision	135	1.30	86	0.83	1.496	(1.275, 1.590)	<0.001

PJI: Periprosthetic Joint Infection, OR: Odds Ratio, 95% CI: 95% Confidence Interval