

Osteoporosis is Not Associated with Reoperation after Anterior Cervical Discectomy and Fusion Through Two-Years’ Follow-Up: A Retrospective Cohort Study of US Academic Health Centers

Anthony Baumann, Robert J Trager, Davin C Gong¹, Omkar Anaspure, John T Strony², Ilyas Aleem

¹Orthopaedic Surgery, University of Michigan, ²University Hospitals Cleveland Medical Center

INTRODUCTION: Osteoporosis has been proposed as a risk factor for reoperation after anterior cervical discectomy and fusion (ACDF), yet this potential association has been understudied, with conflicting results to date. This study examined the hypothesis that adults with osteoporosis would have an increased risk of reoperation after ACDF compared to matched adults without osteoporosis.

METHODS: This retrospective cohort study utilized the United States (US) TriNetX network to identify adults undergoing their first ACDF from 2002-2022, excluding those with serious pathology, and divided patients into two cohorts: osteoporosis and non-osteoporosis. Patients were propensity matched according to key risk factors for reoperation. We examined the incidence of reoperation occurring over 6 months and 2-years postoperatively, with our primary outcome being the risk ratio (RR) of reoperation with 95% confidence intervals (CI).

RESULTS: There were 1,707 patients per cohort by osteoporosis status after matching (mean age: 62 years; 77% female). Patients with osteoporosis had no statistically significant difference in risk of reoperation compared to non-osteoporotic patients over six-months’ (7.9% versus 7.9%; RR: 1.0; 95% CI: 0.80, 1.26; p=1.00) and two-years’ follow-up (12.8% versus 12.9%; RR: 0.99; 95% CI: 0.83, 1.18; p=0.91).

DISCUSSION AND CONCLUSION: Our findings suggest that osteoporosis is not associated with a statistically significant or clinically meaningful increase in risk of reoperation in adults at six-months and two-years after ACDF. However, as we were unable to examine all possible complications of ACDF such as cage nonunion or adjacent segment disease, our findings should be interpreted with caution until additional large studies can be performed to clarify the association between osteoporosis and post-ACDF complications.

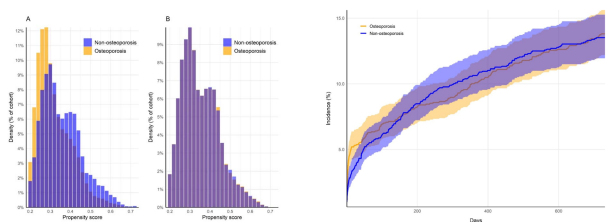


Figure 1: Propensity score densities before (A) and after (B) matching. The orange bars represent the osteoporosis cohort while the blue bars represent the non-osteoporosis cohort. Propensity score densities overlap closely after matching, which indicates adequate covariate balance.

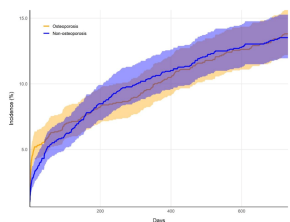


Figure 2: Cumulative incidence graph. Incidence curves for reoperation in the osteoporosis cohort (orange) and non-osteoporosis cohort (blue) are illustrated over the two-year follow-up period (730 days). Shaded regions indicate 95% confidence intervals. The overlap between curves and confidence intervals suggests a similar time-to-event pattern between cohorts.

Variable (n (%)) or mean (SD)	Before matching		After matching	
	Osteoporosis	Non-osteoporosis	Osteoporosis	Non-osteoporosis
N	1,747	1,747	1,747	1,747
Age ^a	62.3 (10.1)	62.3 (10.1)	62.3 (10.1)	62.3 (10.1)
Female ^b	763 (7.9%)	763 (7.9%)	763 (7.9%)	763 (7.9%)
White ^c	763 (7.9%)	763 (7.9%)	763 (7.9%)	763 (7.9%)
Hispanic or Latino ^d	14 (1%)	14 (1%)	14 (1%)	14 (1%)
Self-reported U.S. born ^e	763 (7.9%)	763 (7.9%)	763 (7.9%)	763 (7.9%)
White ^f	763 (7.9%)	763 (7.9%)	763 (7.9%)	763 (7.9%)
Black or African American ^g	221 (7.9%)	221 (7.9%)	221 (7.9%)	221 (7.9%)
Asian ^h	47 (2%)	47 (2%)	47 (2%)	47 (2%)
Other race ⁱ	47 (2%)	47 (2%)	47 (2%)	47 (2%)
Overweight and obese ^j	61 (2.9%)	61 (2.9%)	61 (2.9%)	61 (2.9%)
Diabetes mellitus ^k	72 (2.9%)	72 (2.9%)	72 (2.9%)	72 (2.9%)
Spinal stenosis, cervical region ^l	221 (7.9%)	221 (7.9%)	221 (7.9%)	221 (7.9%)
Cervical spine dissection with myelography, cervical region ^m	763 (7.9%)	763 (7.9%)	763 (7.9%)	763 (7.9%)
Cervical radiculopathy ⁿ	111 (2.9%)	111 (2.9%)	111 (2.9%)	111 (2.9%)
Cervical myelopathy ^o	11 (1%)	11 (1%)	11 (1%)	11 (1%)
Qualification of provider	11 (1%)	11 (1%)	11 (1%)	11 (1%)
Unplanned hospitalization	11 (1%)	11 (1%)	11 (1%)	11 (1%)

Table 1: Demographic data before and after propensity matching in this study.

	Before matching		After matching	
	Osteoporosis	Non-osteoporosis	Osteoporosis	Non-osteoporosis
Number of patients	1,747	1,747	1,747	1,747
Six-month follow-up	1,747 (7.9%)	1,747 (7.9%)	1,747 (7.9%)	1,747 (7.9%)
Reoperation N (%)	138 (7.9%)	138 (7.9%)	138 (7.9%)	138 (7.9%)
RR (95% CI, P)	1.0 (0.80, 1.26)	1.0 (0.80, 1.26)	1.0 (0.80, 1.26)	1.0 (0.80, 1.26)
Two-year follow-up	1,747 (12.8%)	1,747 (12.8%)	1,747 (12.8%)	1,747 (12.8%)
Reoperation N (%)	221 (12.8%)	221 (12.8%)	221 (12.8%)	221 (12.8%)
RR (95% CI, P)	0.99 (0.83, 1.18)	0.99 (0.83, 1.18)	0.99 (0.83, 1.18)	0.99 (0.83, 1.18)

Table 2: Six-month and two-year follow-up for reoperation after ACDF between cohorts.