

# Cervical Disc Arthroplasty versus Anterior Cervical Discectomy and Fusion in Older Adults: Comparison of Short and Long-Term Postoperative Outcomes

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**INTRODUCTION:** Anterior cervical discectomy and fusion (ACDF) and cervical disc arthroplasty (CDA) are commonly performed procedures in the treatment of cervical disc disease. Related postoperative complications have thus been extensively characterized and reported. However, the majority of studies have examined the adult patient population at large without stratification by age groups. While both ACDF and CDA surgeries are increasingly performed in patients older than age 65, no studies have specifically compared ACDF to CDA in this cohort. Therefore, we aimed to compare outcomes, including prolonged length of stay (LOS); discharge disposition; 30 and 90-day complications; 90-day readmissions; and 2-year revision/reoperation following CDA versus ACDF in older adults.

**METHODS:** In this retrospective cohort study, we identified fee-for-service beneficiaries aged 65+ in the Medicare Limited Data Set who underwent a CDA or ACDF in 2013-2021 for disc herniation, stenosis, myelopathy, radiculopathy, or disc degeneration/spondylosis. We used a propensity score analysis to match up to 4 similar ACDF patients to each CDA patient. Mixed-effects models were then applied to examine the associations between procedure type and outcomes. We repeated the matching procedure and regression model for the outcome of 2-year revision/reoperation in a sub-cohort limited to 2-year follow-up. To further investigate the impact of age, we stratified an additional analysis by age 75. Here, we repeated all models with an interaction between age (under 75 vs. 75 and over) and procedure type. We report adjusted odds ratios (ORs) and 95% confidence intervals (CIs).

**RESULTS SECTION:** The 90-day matched cohort included 1,523 CDA (47.8% female) and 6,092 ACDF (47.1% female) patients. Compared to ACDF, CDA procedures were associated with lower odds of extended hospital stay (OR: 0.50, CI: 0.35-0.72, P<0.001), institutional discharge (OR: 0.70, CI: 0.50-0.99, P=0.04), and 90-day readmissions (OR: 0.79, CI: 0.62-0.999, P = 0.049). Other short-term outcomes did not significantly differ based on receipt of CDA versus ACDF in multivariable models, including 30-day combined medical complications (OR: 0.85, CI: 0.66-1.10, P=0.22), 90-day combined surgical complications (OR: 1.02, CI: 0.70-1.48, P=0.93), and 90-day dysphagia events (OR: 0.80, CI: 0.63-1.03, P=0.08). In the matched sub-cohort with 2-year follow up (998 CDA, 3,991 ACDF), there was no significant association between the type of procedure and 2-year revision/reoperation (OR: 1.38, CI: 0.98-1.94, P=0.06). The interaction between age group and procedure type was not significant for any outcome, indicating that our findings would not have been any different in patients aged <75 vs. ≥75.

**DISCUSSION:** In this study focusing on older adults, we found that patients undergoing CDA procedures were less likely to experience prolonged length of hospital stay, post-acute care institutional discharge, and 90-day readmissions compared to similar patients undergoing ACDF procedures. However, we detected no significant differences between the procedures in other outcomes, including 2-year revision/reoperation. Clinicians can utilize these findings as a component of their decision making when weighing different surgical options and counseling older patients. Future studies should compare additional outcomes between the two cohorts including pain, functional scores, adjacent segment involvement, and longer-term revision/reoperation in the older population.

**SIGNIFICANCE/CLINICAL RELEVANCE:** Traditionally, the ideal candidates for CDA are younger patients with a soft disc herniation and little degeneration, but a significant rise in the aging population and nearly 400% increase in CDA utilization over the last decade presents a need to study its efficacy in older patients. This study compared utilization and postoperative outcomes between ACDF and CDA specifically in patients older than 65, and our findings of similar dysphagia rates, complications, and 2-year revision/reoperation rates suggest that CDA is a viable option in the older adult population.