Anterior Cervical Discectomy and Fusion Has a Greater Rate of Neck Disability Index Improvement Compared to Posterior Cervical Foraminotomy

Katie Lee, Arpitha Pamula, Alex Tang, Tan Chen

INTRODUCTION:
Anterior cervical discectomy and fusion (ACDF) and posterior cervical foraminotomy (PCF) are two effective options for treating cervical degenerative disease. While previous studies have compared outcomes between ACDF and PCF, there is limited data comparing the rate of clinical improvement between the two techniques. The purpose of this study was to (1) compare differences in neck disability index (NDI) score improvements, (2) identify patient characteristics that may influence rate of improvement, and (3) compare complication and reoperation rates.
METHODS:
A retrospective analysis was performed from 2019–2023 identifying patients who underwent elective ACDF or PCF for cervical degenerative disease. Data collected included patient demographics, perioperative data, and postoperative complications and reoperations. NDI scores were collected preoperatively and longitudinally at 6-weeks, 12-weeks, 6-months, and 1-year. Delta (∆) NDI was calculated by subtracting each patient's latest NDI score from preoperative at each timepoint. A minimal clinically important difference (MCID) of 11 was assumed based on previous literature. Student's t-tests and chi-squared tests were used to compare continuous and categorical data, respectively. Univariate and multivariate linear regression analyses were used to identify patient characteristics that may influence ∆NDI scores from preoperative to latest follow-up.
RESULTS: A total of 309 patients (ACDF, n=271; PCF n=38) were included. Average follow-up time was 2.2±0.9 years (range:1–4 years). The ACDF cohort had significantly lower average NDI scores than PCF at all timepoints ($p<0.0001$) and greater ∆NDI at latest follow-up (-24.1±16.9 vs. -15.9±17.7, $p=0.006$). In total, 218 (78%) ACDF patients achieved MCID within the study period compared to 23 (61%) of PCF patients ($p=0.04$). There was no difference in the proportion of patients who achieved MCID at 6 weeks between ACDF and PCF (54% vs. 53%, $p=0.98$). At 12-weeks, 72% of ACDF patients achieved MCID versus 46% PCF patients ($p=0.004$). At 6-months, 76% of ACDF patients achieved MCID versus 50% PCF patients ($p=0.005$). At 1-year, 78% of ACDF patients achieved MCID versus 61% PCF patients ($p=0.04$).
In terms of patient demographics and characteristics, the ACDF cohort was younger in age (56.1±10.5 vs. 60.4±8.8, $p=0.016$), had a greater proportion of primary surgeries compared to revision (99% vs. 74%, $p<0.0001$), fewer estimated blood loss (EBL) [34.9±57.1 vs. 128.2±97.6, $p=0.0001$] and shorter length of stay (LOS) [2.0±0.9 vs. 2.9±1.6, $p=0.001$], and a lesser proportion of patients using an assistive device postoperatively (8% vs. 23%, $p=0.032$). No demographic data was found to influence ∆NDI scores at latest follow-up in both groups based on multivariate linear regression analysis. There was no difference in complications or revision rates between the two groups.
DISCUSSION AND CONCLUSION: The average ∆NDI by 1-year of both ACDF and PCF cohorts show improvement exceeding NDI MCID, with a greater proportion of ACDF patients achieving MCID than PCF. Additionally, a greater proportion of ACDF patients achieved the NDI-MCID on average at 12-weeks and onwards compared to PCF patients. There is no difference in complications or revision rates between the two groups. This information has potential to help guide providers in counseling patients, establishing feasible recovery timelines, and managing postoperative patient expectations for each technique.