Loss of Lordosis at C5-7 Following Two-Level Anterior Cervical Discectomy and Fusion is Associated with Subsequent Reoperations

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INTRODUCTION:
The C5-6 and C6-7 levels are frequently involved in multisegment degenerative disc disease due to their high flexion-extension mobility and role as a transitional zone between the flexible cervical spine and more rigid thoracic spine. As such, two-level anterior cervical discectomy and fusion (ACDF) is most often performed at these levels. Understanding the extent of sagittal correction achieved by cervical fusion at these levels and their association with postoperative complications may be beneficial for preoperative surgical planning.
METHODS:
Patients who underwent a C5-7 ACDF at a single academic institution were identified. Patient demographics, spinopelvic alignment, and postoperative complications were summarized up to one-year postoperatively. Multivariate logistic regression analysis, accounting for age, gender, Charlson Comorbidity Index (CCI), and baseline cervical deformity were performed to examine the association between the degree of sagittal correction at C5-7 and subsequent reoperation. Finally, a receiver operating characteristic (ROC) curve was generated and a cutoff for the degree of lordotic change at this level that was predictive of subsequent reoperation was established.
RESULTS:
Among 92 C5-7 ACDF patients included in this study, the mean age was 51.7 years, 57% were female, mean CCI was 0.5, and mean follow-up was 13 months. The primary indication for surgery was often radiculopathy (91%) followed by myeloradiculopathy (8%). Postoperatively, they experienced significant improvements in their C2-C7 lordosis (Preop = 2.4° vs Postop = 7.3°), particularly at the fused levels (-4.3° vs 2.1°), and T1-CL (23.8° vs 20.9°) ($p<0.01$). The average correction at the fused levels was 6.5° (standard deviation = 7.4°). In total, 3% had in-hospital complications (e.g., dysphagia), 5% developed adjacent segment disease, 4% developed pseudoarthrosis, 5% experienced recurrent/worsening symptoms, and 12% had a reoperation. Multivariate logistic regression revealed that each degree increase in correction at the fused levels was associated with a 11% decrease in the odds of reoperation (AUC = 0.79, 95% CI = 0.63 – 0.95, p=0.001). ROC analysis identified a cutoff of 0.1° pre- to one-year postoperative lordotic loss at C5-7 that was predictive of subsequent reoperation. After controlling for confounding variables, patients below this threshold had 7.2 times higher odds of reoperation over a one-year follow-up period (p=0.028).
DISCUSSION AND CONCLUSION: Two-level C5-7 ACDF offers substantial correction of sagittal spinal alignment. However, any kyphotic change in these segments over a one-year follow-up period may be associated with subsequent reoperations. These findings underscore the importance of careful preoperative planning to achieve adequate and sustained postoperative correction in sagittal alignment in order to mitigate surgical complications.

FIGURES

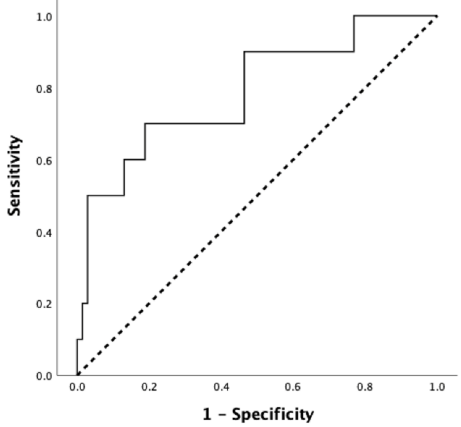

Figure 1. Receiver operating characteristic (ROC) curve showing the association between the degree of lordotic change at C5-7 and subsequent reoperations.