Intervention At C3 Does Not Affect Alignment Or Patient Reported Outcome Measures In Those Undergoing Cervical Laminoplasty

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INTRODUCTION: There remains controversy regarding C3 intervention and risk of instability, muscle preservation, increased kyphosis, and risk of impingement with C2 spinous process. The primary objective of this retrospective cohort study is to assess the association between surgical intervention at C3 and changes in sagittal cervical alignment and patient-reported outcome measures in patients undergoing cervical laminoplasty.

METHODS: Consecutive cervical open door laminoplasties with instrumentation performed at a single institution since 2016 were reviewed. Exclusion criteria included patients less than 18 years of age, history of prior cervical surgery, history of neuromuscular disorder, diagnosis of ossification of the posterior longitudinal ligament (OPLL), less than 3 months of follow up, or incomplete imaging. Radiographic measurements of sagittal alignment were performed for pre- and post-operative imaging, including cervical sagittal vertical axis (cSVA), C2-7 Cobb angle, and T1 slope. Pre- and postoperative PROMIS Global-10 and neck disability index scores were compiled when available. Between-group comparisons for continuous variables were conducted using t-tests, while categorical data were analyzed using Chi-square. Multivariable linear regression models were applied to adjust for age, sex, and race to examine the effect of C3 intervention on the change of radiographic alignment patient-reported outcomes. Statistical significance was set as $p < 0.05$.

RESULTS: Two cohorts were identified based on the presence or absence of surgical intervention at C3. There were no statistically significant differences in demographics between the two groups. Of the 95 patients that met inclusion criteria, 63 (66%) underwent intervention at C3. Of those 63 patients, 47 (74.6%) underwent C3 laminectomy while 16 (25.4%) underwent C3 laminoplasty. Mean time to final imaging was 628 ± 619 days. Patients who underwent intervention at C3 experienced a mean pre- to postoperative change in cSVA of +4.0 ± 10.5mm, change in Cobb angle of –4.7 ± 9.3 degrees, and change in T1 slope of –1.5 ± 8.8 degrees. Meanwhile, patients who did not undergo C3 intervention experienced a mean pre- to post-operative change in cSVA of +7.3 ± 7.6 mm, change in Cobb angle of –3.1 ± 10.0 degrees, and change in T1 slope of –0.75 ± 6.6 degrees. Comparative analysis of these results demonstrated no statistically significant differences in change in cSVA (p= 0.132), change in C2-7 Cobb angle (p=0.466), or change in T1 slope (p=0.579). Similarly, comparative analysis demonstrated no significant difference in change in PROMIS Global-10 mental score (p=0.455) and PROMIS Global-10 physical score (p=0.443).

DISCUSSION AND CONCLUSION: There were no statistically significant differences in sagittal alignment or the change in sagittal alignment after undergoing cervical laminoplasty regardless of whether there was intervention at C3. Similarly, there were no statistically significant differences in PROMIS Global-10 scores, NDI scores, or changes in those scores. Therefore, our data suggest that intervention at C3 during cervical laminoplasty does not confer change in outcomes.