Outcomes of Multilevel Anterior and Posterior Approaches to the Cervicothoracic Junction: A Single Center’s Experience on Whether to Cross the Cervicothoracic Junction

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INTRODUCTION:
Long cervical fusion is commonly utilized to treat various pathologies of the cervical spine. Multilevel fusions at the cervicothoracic junction (CTJ) can lead to adjacent segment disease (ASD), pseudarthrosis, and sagittal malalignment. In cases of multilevel disease where posterior-based constructs may necessitate crossing the CTJ, the literature is inconclusive as to whether surgeons should terminate in the lower cervical or in the upper thoracic spine. The aim of this study was to report the clinical and radiological outcomes of a single-center retrospective cohort undergoing multilevel anterior cervical discectomy and fusion (ACDF) ending at C7, long posterior cervical fusion (PCF) ending at C7, and long PCF ending at T1 or T2.
METHODS:
A retrospective review at a single institution was performed to identify all patients between 2005-2013 who underwent multilevel fusion to the CTJ. Patients were divided into three groups: 1) ACDF to C7, 2) PCF to C7, and 3) PCF to T1/T2. Patients were included in this study if they met the following criteria: adult (>18 years of age), minimum follow up of 5-years, availability of complete medical records/functional outcomes, availability of early (<1 month postop) and late (>2 year postop) radiographic studies. Perioperative outcomes (total blood loss, operative time, length of stay), early (<1 month after surgery) and late (>2 years after surgery) change in C2-C7 lordosis, revision rate, patient reported functional outcomes (Neck Disability Index [NDI], Visual Analog Scale for neck and arm pain [VAS-n, VAS-a]), rate of pseudarthrosis, and rate of adjacent segment disease (ASD) were compared between groups.
RESULTS:
A total of 215 patients were included in the study:103 ACDF, 39 PCF to C7, 73 PCF to T1/2. There were no significant differences regarding total operative time or length of hospital stay between groups (p= 0.885; p= 0.073). Groups 2 and 3 had a statistically higher blood loss than group 1 (p=0.001), and group 3 had a statistically higher blood loss than group 2 (p= 0.006). Radiographic analysis showed a statistically significant difference (p<0.001) in both early and late change in C2-C7 lordosis between the ACDF group (-7.0° and -8.0°) and the PCF groups (C7: +8.3° and +6.6°; T1/T2: +6.6° and +5.5°). Overall revision rates were 10.3%, 10.3%, and 11.0% (p = 0.788) for groups 1, 2, and 3, respectively. There were no significant differences in final NDI (p=0.215), VAS-n (p=0.660), or VAS-a (p=0.190) scores between groups. There were no significant differences in overall NDI (p=0.968), VAS-n (p=0.356), or VAS-a (p=0.900) score changes between cohorts. The rate of pseudoarthrosis was 4.9% in Group 1, 2.6% in Group 2, and 8.2% in Group 3 (p= 0.198). ASD was noted in 1.9% of patients in Group 1, 2.6% of patients in Group 2 and 1.4% of patients in Group 3 (p= 0.251).
DISCUSSION AND CONCLUSION:
Our study demonstrates no statistically significant differences in the rate of reoperation, final/change in patient outcome score, rate of pseudarthrosis, or rate of ASD between cohorts in which the CTJ was instrumented or not instrumented. Anterior procedures ending at the CTJ demonstrated better restoration of lordosis than posterior procedures ending at the CTJ. Our study suggests similar clinical and radiographic outcomes, regardless of inclusion of the CTJ. The ideal lowest instrumented vertebra must be tailored to each patient on an individualized basis.