Incorporation of Frailty Based Realignment Target Goals for Cervical Deformity Surgery in Adults Can Mitigate Mechanical Complications and Improve Perioperative Course

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INTRODUCTION: Given the high prevalence of frailty in adults undergoing cervical deformity surgery, along with frailty drastically influencing recovery patterns, adjusting realignment goals can be of value. Assessing patient specific goals accounting for frailty, can lead to greater rates of optimal outcomes in ACD.

METHODS: Patients with good outcomes in ACD were stratified based on mFI into not frail and frail. ANCOVA used to control for baseline deformity, levels corrected, and age to assess radiographic alignment on earliest postoperative imaging.

Cervical deformity defined as: patients that met radiographic evidence of cervical deformity, defined previously as meeting at least one of the following radiographic parameters: C2-C7 lordosis <-15°, TS-CL >35°, segmental cervical kyphosis >15° across any 3 vertebrae between C2-T1, C2-C7 SVA >4cm, McGregor's slope >20°, or CBVA > 25°, measured with preoperative radiographs were included.

Robust outcomes defined as meeting all of the following parameters at 1Y and 2Y: 1) no DJF or mechanical failure, 2) met Virk et al. good clinical outcome, NRS-Neck ≤5 or improvement ≥2 points from BL], 3) improved in ≥1 Ames modifier, and 4) no worsening in Ames modifier.

Logistic regression analysis followed by conditional inference tree (CIT) run forest analysis generated categorical thresholds. Multivariate analysis controlling for age, baseline deformity, and history of revision compared outcome rates and logistic regression generated odds ratios for the continuous score. Thirty percent of the cohort was used as a random sample for internal validation.

RESULTS: 343 ACD patients were included (Age 59.6±12.4yrs, 46% females, BMI 28.6 ± 7.1kg/m2). Baseline HRQL's were NDI 53±19, ODI 48.5±17.5, mJOA 13.2 ± 2.6, Swal 89 ± 22, EQ-5D 0.54 ± 0.21. Baseline frailty categories: 146 (42.6%) Not Frail, 197 (57.4%) Frail. Overall by 2Y, 8.5% (29) developed DJK, 2.6% (9) DJF, 0.9% (3) mechanical failure, 8.2% neurological complications, 10.2% (35) underwent reoperation, and 13.1% met good clinical outcomes. When assessing the cohort as a whole, improvement in Ames modifiers had correlation with development of DJK, DJF, good outcomes, but not reoperation.

DISCUSSION AND CONCLUSION: Consideration of chronological age, in addition to physiological age, may be beneficial in management of operative goals to maximize clinical outcomes while minimizing junctional failure. This combination enables the spine surgeon to fortify a surgical plan for even the most challenging patients undergoing adult cervical deformity corrective surgery.