What is the Amount of Coronal Correction Required in Adult Spinal Deformity Patients to Achieve Optimal Outcomes in Patients with Varying Degrees of Sagittal to Coronal Deformity?

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INTRODUCTION:

Adult spinal deformity (ASD) is a debilitating condition that is increasing in prevalence as the elderly population continues to grow. Surgery has been shown as an effective treatment modality for correcting malalignment, however, the extent of coronal correction needed for favorable outcomes is still unclear.

METHODS:

Operative ASD patients with coronal deformity of greater than 2cm in C7PL were included. Good Outcome (GO) at two years was defined as: no major mechanical complications, reoperations, and [meeting either: 1) Substantial Clinical Benefit for Oswestry Disability Index (ODI) (change >18.8), or 2) ODI <15 and Scoliosis Research Society Total>4.5]. (36007130) A coronal to sagittal deformity ratio based on C7-PLA to SVA was established and patients were ranked into tertiles (T1-T3) based on this ratio, with 1st (T1) being the lowest coronal to sagittal deformity primarily using C7 plumb line (C7PL) and for a secondary analysis max Cobb Angle. ANOVA was used to assess difference baseline (BL) characteristics. Multivariate logistic regression was used to determine whether postoperative C7PL was associated with the likelihood of having good outcomes. Conditional inference tree analysis (CIT) was used to determine threshold cutoff values for target coronal alignment in C7PL.

RESULTS:

A total of 244 patients were included (age 62.1±13.5yrs, 77% female, BMI 27.4±5.8kg/m^2, CCI 1.72±1.6). T1 had moderate coronal and high sagittal, T2 had high coronal with high sagittal, and T3 had high coronal and moderate sagittal deformity (Table 1). Some 45% of T1, 38% of T2, and 49% of T3 met GO, with 44% of the total cohort meeting GO. Increasing C7PL postoperatively in T2 and T3 was associated with decreased likelihood of good outcomes (T2 OR: 0.52 [0.319-0.835], p=0.007) (T3 OR: 0.654 [0.489-0.875], p=0.004). There was no significant coronal target value for T1 that determined GO. Greater than 3.9cm change from BL in C7-PL was associated with GO in T2 (62% vs. 26%, p=0.001), while correction to <3.9cm C7-PL was associated with GO (60% vs. 24%, p=0.017).

DISCUSSION AND CONCLUSION:

Adult spinal deformity patients may present with a complex combination of coronal to sagittal deformity that poses a challenge to surgeons in deciding optimal realignment goals. When looking at patients who had an optimal restoration of sagittal alignment, this analysis suggests as the degree of coronal to sagittal deformity increases, the optimum coronal alignment target is further from midline in those that have significant coronal malalignment. Patients with a severe coronal to sagittal deformity may warrant less correction in order to achieve positive clinical outcomes.