At What Point Does Degenerative Become Deformity: When Sagittal Correction Influences Clinical Improvement in Adult Cervical Deformity Surgery

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INTRODUCTION: Seemingly, there should be a point at which degeneration across multiple levels results in malalignment and sagittal correction improves outcomes following fusion of adult cervical deformity (ACD). The objective of this study is to determine baseline thresholds in cervicothoracic parameters that, when exceeded, more often meet ideal clinical outcomes with sagittal correction.

METHODS: ACD patients with two-year data were included. Parameters assessed: C2-slope, C2-C7, cSVA, T1-slope, TS-CL. Outcomes: *Virk* et al Good Clinical Outcome (GCO): [Meeting 2 of 3: 1) NDI>20 or meeting MCID, 2) mJOA≥14, 3) NRS-Neck≤5 or improved by 2+]. Binary logistic regression assessed each baseline parameter to determine if correction was more likely needed to achieve GCO. Conditional inference tree-run analysis generated baseline thresholds for each parameter, above which, correction was more often seen when achieving GCO. Multivariable logistic regression controlling for age, baseline deformity and disability identified associations between thresholds and meeting GCO.

RESULTS: Included: 105 ACD patients. There were 54% of patients achieving GCO. Correction was necessitated when baseline C2-slope was above 20° (OR: 6.8, [1.6-28.9]; p=.01) and when baseline C2-C7 was below 10° (OR: 16, [2.4-107.5]; p=.004). Patients presenting with a cSVA above 20mm more often achieved clinical success when corrected (74.2% vs. 0.0%; p<.001). TS-CL more likely required correction to reach GCO when above 26° at baseline (OR: 7.0, [1.7-29.1]; p=.007). When assessing patients above both the cSVA and C2-slope threshold versus the remaining cohort, these patients more likely met GCO when corrected in either parameter (OR: 22.5, [3.3-52.0]; p=.001).

DISCUSSION AND CONCLUSION: Our study highlighted the importance of correction and the threshold at which it dramatically impacts clinical success. These new thresholds delineate patients obtaining superior benefit for sagittal correction and may better increase the utility gained from surgical intervention for cervical deformity.

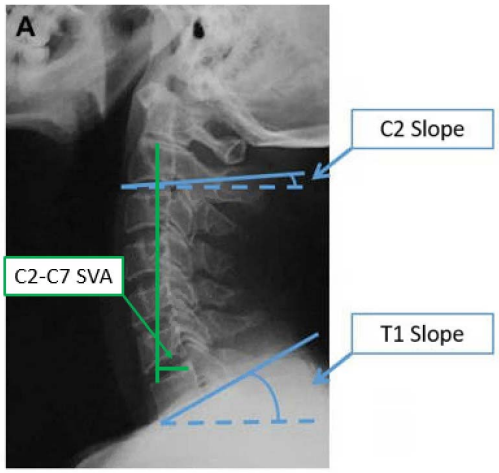

Table 3. Thresholds Necessitating Sagittal Correction to Achieve Good Clinical Outcome

Cervical Parameter	Threshold	Odds Ratio for Needing Correction to Achieve Good Clinical Outcome	p-value
T1 Slope	above 23°	16	.005
TS-CL	above 26°	7	.007
C2-C7 Lordosis	below 10°	16	.004
C2-C7 SVA	above 20 mm	-	<.001
C2 Slope	above 20°	6.8	.010