

Background:

Current radiographic thresholds have shown inconsistent correlation with clinical outcomes. However, it has not been determined at what point in presenting deformity does sagittal correction tremendously improve clinical outcomes following cervical deformity surgery. Hypothesis: There are baseline thresholds in cervical parameters that, when exceeded, require surgical correction to achieve ideal clinical outcomes. Study Design/Setting: Retrospective cohort study of a single-center cervical deformity (CD) database

Methods:

CD patients with baseline (BL) and 2-year (2Y) data included. Parameters assessed: C2 slope (C2S), C2-C7 Lordosis, C2-C7 SVA (cSVA), T1 Slope (T1S), TS-CL. Outcomes: Virk et al Good Clinical Outcome (GCO): [Meeting 2 of 3: 1) an NDI>20 or meeting MCID, 2) mJOA \geq 14), 3) an NRS-Neck \leq 5 or improved by 2 or more points from baseline]. Binary logistic regression assessed each parameter to determine if correction was more likely needed to achieve GCO. Conditional inference tree (CIT) run machine learning analysis generated baseline thresholds for each parameter, above which, correction was necessary to achieve GCO.

Results:

Included: 105 CD patients. There were 57 (54%) of patients achieving GCO by 2Y. Correction was necessitated when baseline C2S was above 20° (OR: 6.8, [1.6-28.9]; p=.01) and when baseline C2-C7 Lordosis was below 10° (OR: 16, [2.4-107.5]; p=.004). Patients presenting with a cSVA above 20 mm more often achieved clinical success when corrected (74.2% vs. 0.0%, p<.001). A baseline T1 slope above 23° was 16 times more likely to reach GCO with correction than those below this threshold (p=.005). 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 C2S threshold versus the remaining cohort, these patients more likely met GCO when corrected in either parameter (OR: 22.5, [3.3-152.0]; p=.001).

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.

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