Impact of Cephalad vs. Caudal Lumbar Lordosis Correction on Spinal Shape and Outcomes of Complex Deformity Spine Surgery

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INTRODUCTION:

The impact of lumbar lordosis correction by cephalad versus caudal techniques on the surgical outcomes of adult spinal deformity (ASD) remains unclear. This study aims to compare the impact of lumbar lordosis correction by cephalad versus caudal techniques on the surgical outcomes of adult spinal deformity (ASD).

METHODS:

Patients were included if they: (1) underwent ASD surgery, (2) had a UIV of L1 or above, (3) a PI_LL >10 at baseline, and (4) had clinical and radiographic follow-up at 2 years post-operatively. Patients with 3-column osteotomies were excluded. Patients were stratified into two groups: Caudally restored (L4-S1 between 35 and 45, UIV translation <15) (G1), and those with cephalad lordosis based correction (L1-L4) (G2). Comparative analyses were performed on patient demographics, baseline and 2 year radiographic parameters, complications, and PROMs.

RESULTS:

114 patients were included: 69 (G1), 45 (G2) without sig differences in baseline sagittal alignment, age, sex, BMI, comorbidities, and prior spine surgeries. All of G2 had two or more LLIFs above L4. PROMs were similar, except for worse SRS-total in G2 at 2 years (3.8 vs. 3.5, p=0.045). At 2 years, G2 had worse SVA (30.2 vs. 56mm), T1PA (17.7 vs. 22.5), and more kyphotic T10_L2 (-7.8 vs. -13.3°), p≤0.02. G2 had a higher UIV inclination at 6 weeks (-2.5 vs. -13.8°, p<.001), 1 yr (-1.9 vs. -11.2° p=0.007), and 2 yr (-2.5 vs. -9.2°, p=0.03), and were more posteriorly translated at 6 weeks (-9.3 vs. -12.1°), and 2 yr (-9.3 vs. -12.1°) p=0.01 (Figure 1). G2 had a higher rate of implant-related (5.8 vs. 20%) and radiographic complications (1.4 vs. 17.8%), abnormal post-operative neurologic exam (29.2 vs. 65.5%), and reoperation for PJK (1.4 vs. 11.1%) at 2 yr FU, p≤0.02.

DISCUSSION AND CONCLUSION: Patients who underwent cephalad lordosis-based correction of spinal deformity had less optimal spinal alignment and shape with more inclination of the UIV zone and posterior translation of the construct. They also exhibited a higher rate of implant related complications, neurological deficits, and revision for PJK. Great caution should be taken when considering performance of more than 2 LLIF's in the treatment of ASD, especially above L4.

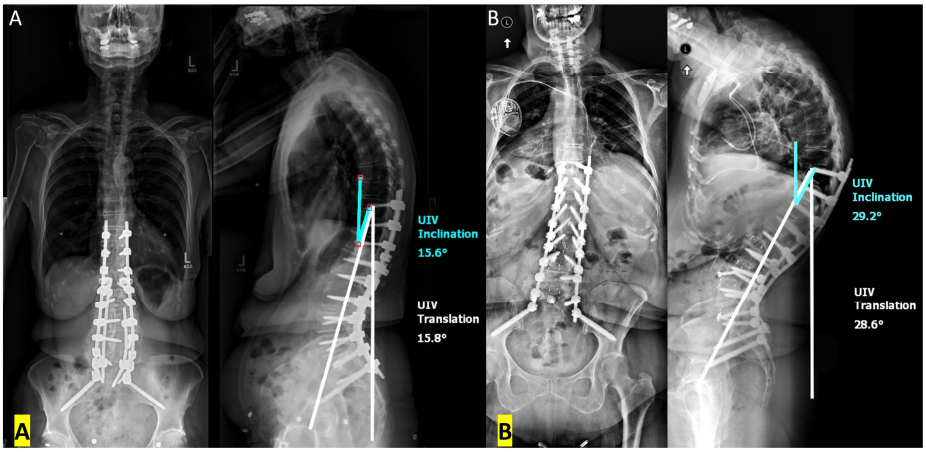

Figure 1: Anteroposterior and Lateral standing radiographs of patients with A) Caudally restored lordosis (L4-S1) (G1) and B) Cephalad restored lordosis with 2 LLIF's (G2). UIV inclination and Translation angles are also displayed.