

Title: The Perseverance of Optimal Realignment Through Transient Perioperative Complications on the Path to Long-Term Success in Adult Cervical Deformity Surgery

Hypothesis: Optimal realignment endures similar rates of perioperative complications but ultimately achieves long-term, durable outcomes.

Study Design: Retrospective

Introduction: Healthcare policies and reimbursement are focused on 90-day outcomes. However, it is not known whether these outcomes reflect those who achieve long-term success.

Methods: Outcomes: distal junctional kyphosis(DJK) and failure(DJF), and *Virk* et al Good Clinical Outcome (GCO): [Meeting 2 of 3: 1) an NDI>20 or meeting MCID, 2) mJOA >=14), 3) an NRS-Neck<=5 or improved >=2]. Great Outcome defined as GCO without severe DJK or reoperation. Optimal radiographic outcome defined by cSVA (<40mm) AND TS-CL (<15°) upon correction. Multivariate analysis controlling for baseline T1 Slope, cSVA, baseline disability and frailty, was used to assess complications. Cost per QALY were calculated for each time point by 2Y.

Results: 113 ACD pts included, grouped as 43 “optimal radiographic” (O) and 70 “not optimal” (NO). NO group presented with higher cSVA and T1 slope at baseline, but no differences in surgical details or hospital stay. Adjusted analysis showed O group suffered equivocal comps within 90 days. O group developed less radiographic DJK, DJF (4% vs 21%, p=.010) and reoperations (19% vs. 41%, p=.015). Patients meeting optimal radiographic criteria more often met Great Outcome (57% vs. 26%, p=.030). Adjusted cost-utility analysis determined there were no differences in overall cost, but O group had greater improvement between three months to two years. This improvement, combined with a slightly decreased cost, translated to a better cost-utility by 2Y (\$69,573.06 vs. \$99,637.94, p<.001).

Conclusion: Despite similar perioperative courses, patients who were optimally realigned experienced significantly less mechanical junctional failure by two years, leading to a better cost-utility overall compared to those with suboptimal realignment. Accordingly, transient perioperative complication risk should not preclude surgical intervention and healthcare policy efforts should instead target the long-term for outcome measures in adult cervical deformity surgery.

Figure/Table (Max 1): JPEG

Table. Cost-Utility Trend Analysis

	Did Not Meet Optimal Outcome	Met Optimal Outcome	p-value
Three Months			
Utility Gained	.111	.097	.431
M3QALYs	.033	.026	.431
M3 Cost Per QALY	\$1,462,721.588	\$1,658,337.21	.257
Six Months			
Utility Gained	.173	.187	.867
M6QALYs	.090	.098	.867

M6 Cost Per QALY	\$447,361.52	\$381,263.24	.193
One Year			
Utility Gained	.179	.194	.646
Y1QALYs	0.111	0.127	.646
Y1 Cost Per QALY	\$268,743.12	\$233,114.52	.312
Two Years			
Overall Cost	\$39,642.23	\$34,714.37	.124
Utility Gained	0.206	0.279	.479
Y2QALYs	0.411	0.503	.479
Y2 Cost Per QALY	\$99,637.94	\$69,573.06	<.001