

Preventing Distal Junctional Kyphosis: Choosing a Stable End for the Lowest-Instrumented Vertebra is Protective Following Adult Cervical Deformity Surgery

Objective: Placement of the LIV at a stable end vertebra has protective effects against distal junctional kyphosis.

Methods: CD patients with 2-year (2Y) data included. High risk in need of SEV defined by increasing baseline deformity and frailty, worsening osteoporosis despite optimization, or existing DJK requiring reoperation. Components of SEV: LIV inclination angle $> -10^\circ$, LIV at or distal to the SSV, LIV > 210 HUs. Patients stratify by those meeting SEV and those not. Means comparison assessed differences based on presence of SEV. SEV further tested against those fused past thoracic apex (T10). Multivariate regression controlling for age and baseline deformity determined odds ratios for developing DJK by 2Y.

Results: 120 included, 20.6% developed DJK and 6.3% developed DJF. A total of 41 patients met SEV. Patients meeting SEV had averaged difference in NDI of 1-19 vs 4.5 for those not meeting SEV ($p < .05$). No SEV had greater likelihood of DJK (0% vs 40%, $p < .05$). The rates of having total complication rates was overall lower for SEV patients (16.7% vs 40%, $p < .001$). Patients fused past T10 had increasing rates of complications over at 2 years compared to SEV (25% vs 16.7%, $p = .045$). SEV had 72% less likelihood of DJK within 2 years (OR: .28, $p < .05$), 97% less likely to develop DJF (OR .03, $p = .018$), and 98% less likely to undergo reoperation within 2 years (OR: .016, $p < .001$). Those fused past T10 had 2x higher chances of DJK occurrence (OR 2.43, $p < .05$) and 23% more likely for reoperation compared to SEV patients (OR 1.23, $p = .022$).

Conclusion: Lowest-instrumented vertebra plays a consequential role in the outcomes following cervical deformity surgery. Careful consideration in choosing a stable end vertebra during surgical planning can pay marked long-term dividends following adult cervical deformity surgery.