## Fractional Curve Behavior Following Adult Idiopathic Scoliosis (AdIS) Correction: Impact of Curve Severity on Postoperative Outcomes

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## INTRODUCTION:

Despite being a potential common cause of poor functional outcomes, few studies have assessed lumbosacral fractional curves (FC) behavior in adults. In particular, little is known about the temporal progression of FC in adults undergoing AdIS surgery and its impact on postoperative outcomes. METHODS:

Adult idiopathic scoliosis patients with preop coronal plane deformity (thoracic/thoracolumbar [TL]/lumbar cobb  $\geq$ 45 or lumbosacral cobb  $\geq$ 25, and PI-LL  $\leq$ 25) undergoing TL fusion with UIV  $\leq$ T12 and LIV L1-L4 were included if they had baseline and 2-year outcomes data available. Patients were stratified by 6-week postop FC severity, calculated as the cobb angle between LIV and S1. Comparative analyses were performed on demographics, spinopelvic alignment, patient-reported outcome measures (PROMs), and complications. Univariate and multivariate analyses were performed to identify the impact of age on FC behavior.

## RESULTS:

Among 72 patients, 29 had SMALL (bottom 40%) and 29 (top 40%) had LARGE FC. Mean age (SMALL=38.3 vs LARGE=34.8), sex (83% vs 72%), and frailty (1.8 vs 1.6) were similar (all p>0.05). Across all patients, 6W postop FC was significantly improved from baseline but changed minimally up to 2Y postop (**Figure 1**). Compared to SMALL cohort, LARGE cohort had larger baseline and 2Y postop FC. SMALL cohort noted a relative rise in FC 2Y postop (1.77 to 4.20°, p=0.006) while LARGE cohort noted no significant change (12.21 to 10.49, p=0.683). Preop and 2Y postop spinopelvic parameters (PT, PI-LL, SVA, AP inclination, cobb angles; all p>0.05) and PROMs (ODI, SRS-22 Total, SF-36 PCS; all p>0.05) were similar, with the exception of LSDI (18.7 vs 25.4, p=0.035) which was higher in the LARGE cohort 2Y postop. Complications, including significant curve progression, extension of fusion, and revision, were also similar (all p>0.05). Univariate and multivariate analyses, after controlling for sex and frailty, showed no association between age and 6W postop FC or change in 6W to 2Y postop FC (all p>0.05).

## DISCUSSION AND CONCLUSION:

In adult idiopathic scoliosis patients, postop FC severity slightly worsens in patients with smaller curves and improves in patients with larger curves, irrespective of age. FC severity was not associated with postop outcomes aside from perceived lumbar stiffness. Residual FC in adults caudal to TL fusions may not be as concerning as previously thought.



Figure 1. Preoperative to 2-year postoperative radiographs demonstrating fractional curve behavior in adults undergoing scoliosis surgery. Superior endplates of the lower instrumented vertebrae and S1 are marked in red and the degree of fractional curves (FC) between the two endplates are provided at the bottom.