

Longitudinal Outcomes Following Thoracic and Thoracolumbar Spinal Fusion for Adolescent Idiopathic Scoliosis.

Introduction

When selecting the lowest instrumented vertebrae (LIV) of spinal fusions for adolescent idiopathic scoliosis (AIS), surgeons must balance deformity correction and stability with sparing spine mobility. Guidelines for LIV selection remains controversial, resulting in vastly different LIVs between surgeons for similar preoperative curves. Differences in longitudinal outcomes between patients with various LIVs is not well described in published literature. The purpose of this study is to evaluate postoperative LSTOA, lumbar Cobb angles, flexibility and patient reported outcomes for AIS patients undergoing thoracic and thoracolumbar fusion in a longitudinal fashion.

Method

Patient demographics, as well as preoperative and postoperative parameters were retrieved from the AIS arm of the Harms Study Group database, a multicenter, prospective longitudinal database. Patients with Lenke 1-6 B and C deformities were included. Patients were stratified into 2 groups: thoracic LIV (T-LIV) if the LIV was L1 or cranial, and lumbar LIV (L-LIV) if the LIV was L2 or caudal. Outcome variables included postoperative LSTOA, lumbar Cobb angles, flexibility, and SRS-22 scores at 1yr, 2yrs and 5 year. The data was analyzed with chi-squared tests, t-tests, and generalized linear models.

Results

A total of 286 patients were included (T-LIV: 102, L-LIV: 184). There was no difference in age or gender between groups. Longitudinal analysis of postoperative parameters demonstrated larger LSTOA and lumbar Cobb angles in the T-LIV group compared to the L-LIV group ($p < 0.01$); however, there was no significant change in the difference between groups overtime (group \times time interaction), nor progression of LSTOA or lumbar Cobb angles during the postoperative period. Postoperatively the T-LIV group demonstrated greater forward, right and left bending flexibility compared to the L-LIV group ($P < 0.01$). There was no significant change in the difference between groups overtime (group \times time interaction). Forward flexion did not change overtime during the postoperative period; however, both right and left flexion improved between 1 year and 5 years postoperative in the total cohort ($P < 0.01$). There was no clinically meaningful difference in postoperative SRS pain, activity, self-image, mental health, satisfaction sub-scores, or SRS total score between groups.

Conclusion

Compared to thoracolumbar spinal fusion, thoracic fusion preserves more flexibility postoperatively at the expense of greater residual coronal plan deformity of the lumbar spine. However, the residual deformity does not progress postoperatively, and postoperative SRS scores are similar between groups. Therefore, limited lumbar fusion may be acceptable in a significant portion of patients with AIS, however further investigation is needed for appropriate patient selection.