A wide posterior release improves kyphosis restoration in surgical treatment of adolescent idiopathic scoliosis

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Background
Adolescent Idiopathic Scoliosis is often associated with a thoracic hypokyphosis and surgical treatment aims to normalize kyphosis along with coronal and axial correction. The osseous and ligamentous resistance of the spine often leads to flattening of the rod during derotation at the expense of kyphosis restoration. Whether routine use of a wide posterior osseo-ligamentous release can improve kyphosis has only been sporadically examined.

Methods
We retrospectively included a consecutive cohort of AIS patients undergoing surgical treatment involving the thoracic spine (Lenke 5 excluded) over two consecutive time periods. All patients were treated with facetectomies and a high stiffness construct (high implant density, beam-like cobalt-chromium rods). The first time period served as control group. In the second time period, standard surgical technique was supplemented with a wide posterior release of the lamina, spinous process and supraspinous ligaments (no removal of the inferior facet) at 4-5 levels corresponding to the apex of the thoracic curve. Patients were categorized as preoperatively hypo- or normokyphotic and intraoperative data and 2-year postoperative radiographic data was recorded.

Results

We included 193 patients. Mean age was 15.8±2.3 years and mean Cobb angle was 60±12°. 62 patients were classified as hypokyphotic (global kyphosis ≤ 30°) preoperatively. In the hypokyphotic group, the use of posterior release resulted in an increase in kyphosis from 19±7° to 38±11° vs. 24±8° to 32±8° in the control group (p=0.018). 18% vs 42% were hypokyphotic at two-year follow-up.
In the preoperatively normokyphotic group, the two-year kyphosis was 47±8° vs. 46±10° in the posterior release and control group respectively.
Two-year major coronal Cobb angle was 28±9° vs. 26±9° (p=0.206).
Intraoperative blood loss was 600 ml vs 700 ml in the posterior release and control group, respectively.

Conclusion

The use of a posterior osseo-ligamentous release results in an increased kyphosis restoration in preoperatively hypokyphotic patients without increasing blood loss. We recommend this technique in surgical treatment of hypokyphotic AIS patients.