

# **Posterior Tethering Technique for Correction and Modulation of Early Onset Scoliosis with Thoracolumbar Kyphosis**

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## **Abstract :**

### **Purpose**

The aim of this study is to evaluate the role of the nonfusion instrumented procedure with compression-distraction in facilitating spinal modulation of the wedged peak vertebra, in patients with congenital thoracolumbar kyphosis/kyphoscoliosis according to the Hueter-Volkman law. The authors seek to address the progressive modulation of the most wedged vertebra by analyzing the subjects' pre-operative and latest follow-up sagittal radiograph.

### **Methods**

Ongoing data collection of 14 peak wedged vertebra modulation during surgical management of 13 patients with Type I congenital thoracolumbar kyphosis (5 patients) or kyphoscoliosis (8 patients). Seven syndromic, 4 congenital, and 2 neuromuscular cases. Age at initial surgery averaged 58.6 months, with mean follow-up of 55.6 months (24-78). All were done with Hybrid Rib Construct with clawing fashion through a single posterior approach with at least 4 lengthenings.

### **Results**

Mean preoperative anterior vertebral body height for the peaked deformed vertebrae increased from 6.58 mm to 11.03 mm in the final follow-up with an average increase of 75% ( $P < 0.001$ ). Mean preoperative posterior vertebral body height significantly increased from 12.01 mm to 14.22 mm in the final follow-up, with an average increase of 19.5% ( $P = 0.001$ ). Average preoperative anterior/posterior vertebral body height ratio significantly increased from 54% to 77% in the final follow-up ( $P < 0.001$ ), with ranges of 35-69% and 68-90%, respectively. With respect to Early Onset Scoliosis, average thoracolumbar kyphosis improved from  $57^\circ$  preoperatively to  $21.1^\circ$  in the last follow-up. Average thoracolumbar scoliosis improved from  $52.75^\circ$  preoperatively to  $40.6^\circ$  in the last follow-up. Average spinal length in both sets of patients increased from 232.7 mm preoperatively to 274.8 mm in the last follow-up. Some patients also had a final follow-up 3D CT scan which confirmed the reliability of the X-ray measurements.

### **Conclusions**

Through the distraction-compression model implemented in the surgical management of Early Onset Scoliosis, wedging improves through vertebral modulation, this calls for further studies on the impact of surgical correction of EOS of modulation of the vertebrae.

**Key Words**

Posterior tethering technique, nonfusion technique, early onset scoliosis, thoracolumbar kyphosis, vertebral modulation, Hueter-Volkman law