



## **Does a Thoracolumbar Sacral Orthosis Affect Axial Rotation in Adolescent Idiopathic Scoliosis Patients?**

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### **Background**

Modern brace design aims to correct spinal deformity in the coronal, sagittal, and axial planes through personalized brace construction. However, limited data is available confirming if axial changes actually occur when patients are treated with a thoracolumbar sacral orthosis (TLSO).

### **Methods**

A consecutive cohort of patients diagnosed with AIS who underwent bi-planar, low-dose x-rays with subsequent 3D reconstructions at both pre-brace and inbrace was assessed retrospectively for inclusion. All patients were prescribed a full-time, 3D CAD/CAM, de-rotational TLSO. Axial rotation magnitude and direction were compared at each vertebral level between pre-brace and in-brace images to detect where changes occurred according to major curve location (Thoracic (T1- T11) and Lumbar (T12-L5)). Magnitude was calculated as the absolute value of the difference between in-brace and pre-brace. Direction of axial rotation was termed "amplification" or "de-rotation" defined as an increase in magnitude toward the initial direction or a change in the opposite direction regardless of magnitude, respectively.

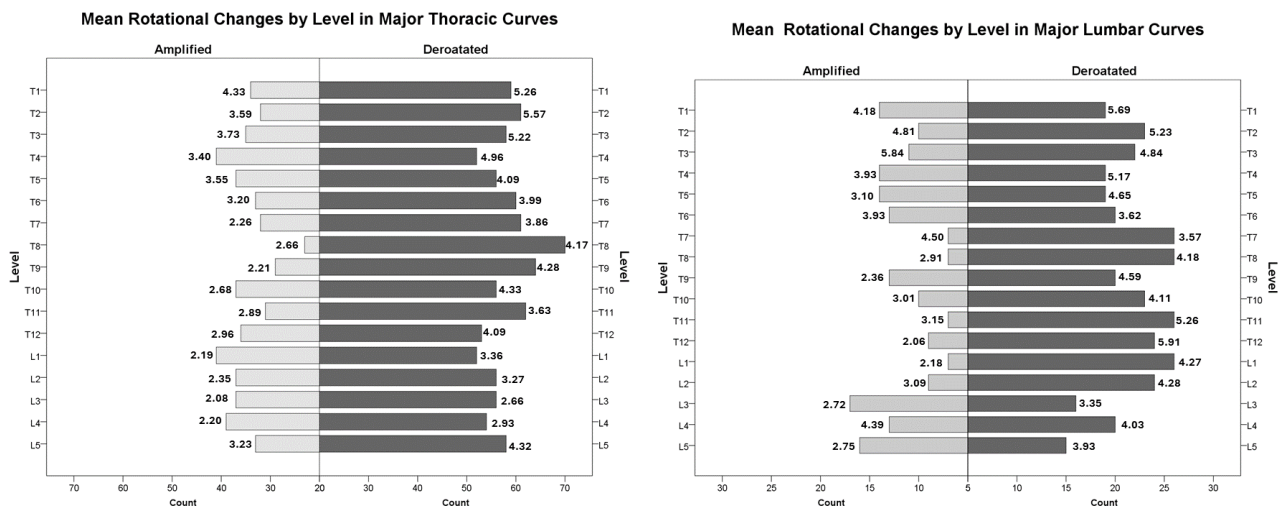
### **Results**

We included 126 consecutive patients, 91 (72%) were females and 93 (74%) had main thoracic curves. Pre-brace major Cobb angle was  $32\pm 8^\circ$  and in-brace Cobb angles reduced to  $23\pm 8^\circ$ . Overall and within groups, there was a greater proportion of de-rotation compared to amplification at every level. For thoracic curves, the highest frequency of de-rotation occurred at T8-T9 with the largest changes in magnitude occurring at T1-T4 (Figure 1). For lumbar curves, the highest frequency of de-rotation occurred at T7-T8, T11 and L1, with the highest magnitude of de-rotation occurring at T12 (Figure 1).

### Conclusion

A TLSO does influence axial rotation in patients with adolescent idiopathic scoliosis while in-brace. Although de-rotation primarily occurs around the apical regions, changes can be observed throughout the length of the spine regardless of curve type.

**Figure 1:** Changes in apical rotation between pre-brace and in-brace measurements. Thoracic n=93, Thoracolumbar n=33



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