Vertebral Body Tethering: Outcomes in a Multi-center Prospective Cohort of Adolescent Idiopathic Scoliosis Patients

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INTRODUCTION: Non-fusion surgical interventions for management of adolescent idiopathic scoliosis (AIS) continue to grow in popularity. With this study, we aim to evaluate outcomes in patients who have undergone anterior vertebral body tethering (AVBT).

METHODS: This study evaluated patients with AIS who underwent AVBT between 2019 and 2021 with a device approved through and FDA Humanitarian Device Exemption. Radiographic and clinical data were compared preoperatively and at ≥2-year follow-up.

RESULTS:

94 patients were included in this study, 81% of patients were female. The mean age at surgery was 13.0±1.4 years, height was 156.4 cm, and weight was 46.8 kg. Preoperatively, 69% of patients had closed triradiate cartilage, and 32% of patients were ≥Risser 2. 83 patients had a hand bone age including Sanders 1-3 (41 pts), Sanders 4 (26 pts), Sanders 5-7 (16 pts). Lenke 1 curves were most common (62% of cohort). 43 patients (46%) had preoperative bracing. Preoperative major Cobb was 49±8. 68 patients had bending films, with curve correction of 42±22%. Surgery time averaged 247 min, EBL was 94 mL, and postoperative stay was 3.3±1.1 days. Patients averaged 7.5±1.3 levels tethered, with 15 patients having two tethered curves (16%).

Initial correction at first-erect indicated a major Cobb of 30±7° and 38±7% correction. Success was associated with correction to less than 35° on first erect imaging (88% success vs. 62% successful, p=0.007). At latest follow-up (mean 2.4 years, mean Risser of 3.3), the major Cobb was 27±10, with correction of 43% compared to preop. A total of 75 (80%) of patients had a major Cobb ≤35° at latest follow-up.

A residual curve of >50° was present in 2 patients (2%). 9 patients (10%) underwent reoperation: 7 undergoing tether revision for overcorrection, 1 screw removal, and 1 conversion to posterior fusion. Including reoperations, 17 patients (18%) had complications, with the primary complication being pleural effusion (N=5).

DISCUSSION AND CONCLUSION: At a mean follow-up of 2.4 years, 80% of AVBT patients had a residual curve of <35°. Patients had a mean correction of 43%. 10% of cases required a subsequent surgical procedure with one conversion to spinal fusion. However, in patients with successful intraoperative correction, success rates were higher at 88% compared to those with a failure to achieve adequate intraoperative correction.