

	Spine-Based Devices	Rib-Based Devices	P-value
# Lengthening Surgeries	6.1 (1-14)	7.9 (1-21)	0.05
# All Surgeries	7.9 (2-18)	11.2 (2-30)	0.003
# of Revision Surgeries	1.7 (0-7)	2.3 (0-12)	0.28
Preop Mean Major Cobb Angle	66 (25-97)	66 (22-112)	0.97
Mean Preop Kyphosis	51.5 (15-120)	40 (6-91)	0.10
Total Change in T1-T12	5.3 (-4.5-22.4)	3.4 (-3.01-11.7)	0.33
Initial Implant Change T1-T12	3.4 (-0.49-18)	1.0 (-3.8-6.0)	0.19
Lengthenings Change T1-T12	2.1 (-6.1-5.7)	2.3 (-4.6-10)	0.88
Improvement in Cobb Angle	24.8 (-18-66)	11.3 (-31-88)	0.02
Improvement Kyphosis	16.7 (-31-62)	-7.3 (-63-74)	0.002
Final Fusion Change* T1T12	0.75 (-0.7-2.4)	1.4 (-2.1-6.2)	0.36

improvement to their spine deformity, as measured by postoperative kyphosis, and Cobb angle.

Hypothesis: We hypothesized that there would be improved thoracic height and Cobb angle in patients with congenital fused ribs treated with proximal rib anchors (rib-based growing devices) compared to constructs with proximal spine anchors (spine-based devices).

Design: Retrospective comparative study.

Introduction: Treatment for severe early-onset spinal deformity with rib fusions includes growing spine devices with proximal rib or spine anchors. The results of treatment, however, have not been compared between spine-based vs. rib-based proximal anchors.

Methods: 179 patients with congenital rib fusions treated with rib-based or spine-based constructs and minimum 2-year follow-up were included. 19 patients were treated with proximal spine-based and 160 with proximal rib-based devices. We evaluated change in T1-T12 and T1-S1 height, coronal Cobb angle, kyphosis and number of lengthening/revision surgeries.

Results: Kyphosis increased in the rib-based group over the study period ($p < 0.0001$), but did not change in the growing rod group. Major Cobb angle decreased in both the spine-based and rib-based group ($p < 0.0004$, $p < 0.001$), although spine-based patients had decreased Cobb at latest follow-up (0.007). Excluding the initial implantation surgery, there was a mean 2.3 cm increase in T1-T12 height from a mean of 8 lengthening surgeries in the rib-based group (0.29 cm per lengthening) compared to 2.0 cm increase over 6 lengthening surgeries (0.3 cm per lengthening) in the spine-based group. Patients with rib-based constructs had a mean of 11.3 total procedures, whereas spine-based patients had a mean of 7.7 surgeries. A subanalysis was performed excluding the 4 patients with both rib and spine anchors without any change in the findings.

Conclusion: Patients underwent a mean of 7 lengthenings prior to final fusion or cessation of lengthenings with modest 2 cm increase in T1-T12 height. Proximal spine anchors may help to control kyphosis and improve Cobb angle correction for congenital scoliosis with rib fusions.

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Paper #31

The Oxford 5 year observational study on 35 patients with Magnetically Controlled Growing Rods (MCGR)

Adil Ahmad, Thejasvi Subramanian, Pavlos Panteliadis, James Wilson-Macdonald, Dominique Rothenfluh, Colin Nnadi



Summary: MCGR controls scoliosis progression and allows growth. Functional activity also improves generally. Primary infection rates are low. The overall unplanned return to theatre rates are still high but the psychosocial benefits are obvious.

Hypothesis: To evaluate performance and safety of a device in preventing scoliosis progression.

Design: Observational study of 35 (17 male and 18 female) consecutive patients with early onset scoliosis (EOS) from December 2011 to December 2016. Average age was 7.4 years (2-14). Average follow up was 30 months (5-57 months). Distractions took place in clinic at set time points and the tail-gating technique (TGT) was used.

Introduction: Magnetically controlled growing rods (MCGR), for the treatment of early-onset scoliosis (EOS), utilises a system of non-invasive spinal lengthening.

Methods: Observational study of 35 (17 male and 18 female) consecutive patients with early onset scoliosis (EOS) from December 2011 to December 2016. Average age was 7.4 years (2-14). Average follow up was 30 months (5-57 months). Distractions took place in clinic at set time points and the tail-gating technique (TGT) was used.

Results: Average coronal Cobb angle pre-op was 52° vs 38° at last follow up. Average Thoracic kyphosis (TK) pre-op was 44° vs 41° at last follow up. In a similar fashion the average T1-T12 Height was 127mm vs 143mm, average T1-S1 Height was 222mm vs 243mm. Sagittal balance improved from 18mm pre-op to 12mm and coronal balance improved from 16mm to 12mm. Increase in weight and standing height were 60% and 16% respectively. Activity Scale for Kids scores increased across all domains. Thirteen cases needed revising including 6 of which became infected. There were actuator pin failures in 6 cases and 8 cases with other complications. Metallosis was identified in 2 cases. There were no primary infections or neurological deficits. Altogether there were 14 unplanned returns to theatre.

Conclusion: MCGR controls scoliosis progression and allows growth. Functional activity also improves generally. Primary infection rates are low. The overall unplanned return to theatre rates are still high but the psychosocial benefits are obvious.

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Paper #32

Early onset scoliosis treated by Magnetically Controlled Growing Rods: Mid- to long-term follow-up and analysis of 5 graduates

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Summary: This is a prospective study of early onset scoliosis (EOS) patients treated with the magnetically controlled growing rod (MCGR) at up to 6 years follow-up with particular attention to the MCGR graduates at