no significant differences in spine length gain compared to less than 4 distractions per year.

Hypothesis: Distraction of the MCGR more than 3 times a year will result in greater rod and spine length gains.

Design: Retrospective review of multi-center prospective data.

Introduction: Maximizing spine lengthening is paramount in growing rod treatment of EOS patients. The MCGR has revolutionized growing rod treatment for EOS by allowing awake outpatient distractions. Distractions can be performed more frequently to better mimic normal spine growth. However, the best distraction frequency to generate most length gain has not been determined. The aim of this study is to determine the distraction frequency that will achieve the most spine and rod lengthening.

Methods: MCGR patients with at least 1-year follow-up were queried from a multi- center EOS database. Parameters evaluated included coronal and sagittal (maximum kyphosis) Cobb angle changes, rod length gains expected and achieved, T1-12 and T1-S1 length gains, and distraction frequency and amount. Patients were divided into two groups: (1) MCGR distractions on average 4 or more times a year; (2) distractions on average 3 or less times a year. Correlation to rod and spine length gains was studied.

Results: A total of 119 patients (57.1% females) were included in this study. There were no significant differences in target rod lengthening per year (11.3Â±6.5mm and 11.4Â±6.1mm versus 10.1Â±3.1mm and 10.1Â±3.1mm for right and left rods, respectively). No differences were also noted in the coronal (44.5Â±17.5 degrees vs 46.3Â±17.9 degrees) and sagittal (44.8Â±25.8 degrees vs 45.2Â±22.2 degrees) Cobb angles. For group 1, there was statistically significant increases in accumulative rod lengthening (13.1Â±6.6mm vs 6.6Â±4.7mm for the right rod, p=0.008; and 13.4Â±6.0mm vs 7.4Â±4.7mm for the left rod, p=0.004) at 2-year follow-up. Similarly, the T1-12 (201.1Â±24.1mm vs 189.8Â±26.1mm), and T1-S1 (321.8Â±47.4mm vs 294.2Â±33.1mm) length gains were greater in group 1 but not statistically significant.

Conclusion: This is the largest MCGR cohort for study of distraction frequencies. Although increased distractions lead to more rod lengthening, this does not translate into greater overall spine and thoracic length gains.

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Paper #29

Does the Type of Proximal Anchor Used During Distraction-Based Surgeries for Patients With Non-Idiopathic EOS Affect Spine Length?

Yehia ElBromboly, Charles Johnston, Anna McClung, Amer Samdani, Michael Glotzbecker, Tricia St. Hilaire, Jennifer Hurry, Padhye Kedar, Tara Flynn, Ron El-Hawary

Summary: At minimum 5 yr f/u, distraction-based surgeries (Spine-based (SB) & Rib-based (RB)) are an effective way to increase spine length for non-idiopathic EOS. Spine length is greater for spine based implants pre-operatively and this length is maintained to the 15th lengthening; however, if normalized to pre-op spine length, rib-based implants achieved greater percentage of increase in spine length beyond the 10th lengthening surgeries.

Hypothesis: Distraction-based surgeries will increase spine length in patients with non-idiopathic EOS; however, there may be differences in the outcome based on the proximal anchor choice (SB & RB).

Design: Retrospective, comparative multi-center.

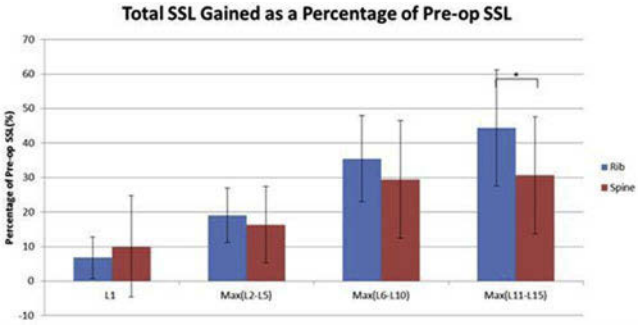
Introduction: It is unclear whether the choice of proximal anchor affects the spine length achieved with distraction-based surgeries. Since distraction may produce kyphosis, spine length should be assessed in the sagittal plane using the sagittal spine length (SSL - curved arc length of the spine in the sagittal plane). Our purpose was to determine if the choice of proximal anchor in distraction-based surgeries will affect final spine length.

Methods: Patients with non-idiopathic EOS treated with distraction-based systems (min 5 yr f/u, 5 lengthenings). Radiographic analysis pre-op, post-implant (L1) and after each lengthening (L2-5, L6-10, L11-15). Primary outcome was T1-S1 SSL.

Results: 126 patients- 69 RB (52 congenital, 8 syndromic, 9 neuromuscular) and 57 SB (15 congenital, 30 syndromic, 12 neuromuscular) with pre-op age 4.6 yrs, scoliosis 75°, kyphosis 48°. After initial correction with implantation surgery*, scoliosis remained constant (58° at L11-15) and kyphosis increased over time (38° at L1 to 60° at L11-15*).

Pre-op SSL was higher in the SB group (295mm) when compared to the RB group (252mm)*. This difference was maintained after initial implantation (SB 320mm vs. RB 267mm)* and at final f/u (SB 369mm vs RB 344mm)*. As pre- op SSL differed between groups, maximum SSL gains per interval were also normalized to pre-op SSL. There was no difference between groups at L1, L2-5, L6-10; however, at L11-15, RB=44% increase vs SB=31% increase as compared to pre-op SSL* (Fig 1) (*p<0.05).

Conclusion: At minimum 5 year follow up, distraction-based surgeries increased spine length for patients with non- idiopathic EOS; regardless of proximal anchor choice. Rib-based anchors may protect against potential law of diminishing returns.



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Paper #30

Congenital Spine Deformity with Fused Ribs Treated with Proximal Rib- vs. Spine-Based Growing Constructs

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Summary: 179 patients with congenital rib fusions treated with rib-based or spine-based constructs and minimum 2-year follow-up were reviewed. 19 patients were treated with proximal spine-based and 160 with proximal rib-based devices. Patients treated with growing rods achieved equivalent SAL to those treated with rib-based devices, while also achieving greater