

final surgery. Deformity control is consistent as is spine length gain. Further correction at final surgery for graduates are limited.

**Hypothesis:** Deformity control and length gain is consistent at the mid- to long-term follow-up of MCGR treatment.

**Design:** Prospective study.

**Introduction:** The literature is limited regarding the mid- to long-term follow-up as well as those who have reached skeletal maturity for MCGR use. The aim of study as such is to analyze patients with minimum 4-year follow-up and specifically MCGR graduates to determine effectiveness of distractions, complication rates, and curve behavior up to and beyond final surgery.

**Methods:** This was a prospective study of EOS patients treated with MCGRs since December 2009. Patients with minimum 4 years follow-up were recruited. Parameters under study included the coronal and sagittal Cobb angle, T1-12, T1-S1 and instrumented lengths, body height gains, and the expected and achieved distraction length gains measured from the MCGR. Graduates were studied pre-, immediately post- and 2-years post-final surgery. Relationship between onset of rod exchanges with changes in rate of lengthening was studied.

**Results:** A total of 10 patients with mean age of 6.3 years at diagnosis and 6.1 years of follow-up were studied. An average of 40.1 distractions were performed for each patient. The greatest Cobb angle correction occurred at the initial implantation surgery and was well controlled thereafter. Consistent gains in T1-12, T1-S1 and instrumented segment were observed. Mismatch between the expected and achieved rod lengthening was observed and increased with usage. Rate of lengthening reduced after the 1st year of use but improved back to initial rates after rod exchanges which occurred at mean 2.3 years after initial implantation. Complication and reoperation rates are high and are usually due to rod distraction failure and proximal foundation problems. Five MCGR graduates (4 final fusion, 1 rod explant without fusion) were studied. Only mild further improvements in all radiological parameters were observed pre- and post-final surgery.

**Conclusion:** Control of the spinal deformity with consistent spine length gains are observed. Further correction during final surgery is usually limited. Rod explant without fusion may be possible.

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**Paper #33**

**Magnetic Spinal Growth Rods (MCGR) with and without Preoperative Traction for the Treatment of Severe Scoliosis**



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**Summary:** Large rigid curves can be treated with MCGR and preop traction with equivalent correction to smaller flexible curves and maintain correction over time.

**Hypothesis:** Preop traction will allow equivalent initial postop Cobb angle correction in patients with severe scoliosis undergoing MCGR vs smaller flexible curves.

**Design:** Retrospective cohort study of a prospectively collected database. **Introduction:** MCGR has improved the surgical treatment of Early Onset Scoliosis decreasing infections by 1/3, but hardware complications are common with a 27.8-46.7% revision rate in under 2 years. Thus the timing

and decision of when to use MCGR remains difficult. In this paper we will detail our experience with MCGR, preop traction and larger stiffer curves. **Methods:** MCGR patients radiographs and xrays reviewed for Sagittal and major Coronal Cobb, T1-S1 height and medical records for demographics, prior treatments and complications.

**Results:** 12 revision patients were excluded. 30 patients were included and divided into preop traction vs no traction. Traction group had larger, rigid curves and 50% were syndromic scoliosis. Non-traction group had smaller flexible curves and 61% were neuromuscular scoliosis. Postop change in T1-S1 and postop Cobb and Cobb correction were not significant. Ave follow-up was 576 vs 438 days in the traction vs nontraction groups. 13% of patients experienced complications with an average 15.6 month follow-up.

**Conclusion:** We had larger ave preop Cobb angles and ave correction in both groups vs literature review of 177 MCGR patients ave preop Cobb 65°, 36° postop, and absolute correction 29°. Traction provides an additional 18% correction compared to flexibility films. Postoperatively neither group lost correction over time and traction patients continued to gain correction despite having more rigid curves preop.

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**Paper #34**

**Treatment of Severe Early Onset Scoliosis using Distraction Based Spinal Instrumentation**



*A matched comparative study*

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**Summary:** Severe EOS can be treated as effectively with distraction instrumentation in comparison to less severe EOS.

**Hypothesis:** Severe EOS deformity will derive as much benefit from distraction based surgical treatment as non-severe EOS.

**Design:** Multicenter retrospective review.

**Introduction:** We aimed to characterize the severe EOS population, and compare outcomes of severe vs. matched non-severe EOS controls.

**Methods:** A retrospective review identified 111 children (mean age 5.8 years; 14 congenital, 23 idiopathic, 36 neuromuscular, and 38 syndromic) with severe EOS (major curve >90 degrees, aged less than 11 years) (SG) who had been treated using distraction based spinal instrumentation with min 2-year FU and at least 3 lengthenings (Table). From the same database, 111 controls (CG) (matched for age at surgery, gender, diagnosis, and construct) were retrieved with min 2-year FU. 103 in both groups underwent index procedure using traditional growing rods and 8 with magnetically controlled growing rods. 20 children in the severe and 10 in the control underwent preoperative halo traction (p=0.053). Avg number of lengthenings was 7.3 in both groups.

**Results:** Major coronal curve avg 102° in SG and 67° in the CG and was corrected to 57° and 40° at final FU (p<0.001; Table). Spinal length (T1-S1) increased a mean of 56 mm in the SG and 27 mm in the CG post index surgery (p<0.001) and 61 mm vs. 59 mm from index to final follow-up (p=0.84). Surgical complications were more common in the SG (73%; 81/111) than in the CG (57%; 63/111) (p=0.011). 4

	Preop Cobb	Flexibility film Cobb	Absolute correction flexibility film	Percent correction flexibility film	Post traction Cobb	Postop Cobb	Ave Correction	Most recent Cobb	Change in Cobb Postop vs most recent
Traction n= 12	90° (69-114°)	78° (60-100°)	13° (3-59°)	14%(3-29)	59° (40-86°)	46° (31-57°)	45°(17-59°)	44°(28-65°)	-4°(13-9°)
No traction n= 18	77° (59-113°)	46° (19-66°)	32° (5-70°)	40% (7-66)	na	34° (18-50°)	44° (19-74°)	40° (17-63°)	5° (-5-17)
P Value	0.027	0.000	0.002	0.000	na	0.421	.743	.838	0.019