Traditional Growing Rods Versus Magnetically Controlled Growing Rods in Early Onset Scoliosis: *A Case-Matched Two Year Study* 

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### **Presenter's Disclosures**

<u>Author</u>	<u>Disclosure</u>
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- d. Speakers' Bureau
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- Studies have shown repeated traditional growing rod (TGR) lengthenings can significantly increase the risk of complications
- Bess et al, JBJS, 2010





- Magentically controlled growing rods (MCGR) were developed to lengthen rods non-invasively
- Pre-clinical studies showed promising results
- Akbarnia et al, Spine, 2012





- Early clinical results of using MCGR:
  - Safe and effective
  - Significant reduction in the number of surgical procedures
- Cheung et al, Lancet, 2012



 The purpose of this study was to perform a case-matched comparison of MCGR and TGR patients with 2 years of follow-up

#### TGR



#### MCGR



# METHODS

- Retrospective review of MCGR patients who met the following criteria:
  - < 10 years old</p>
  - Major curve >30°
  - **T1-T12 <22 cm**
  - No previous spine surgery
  - > 2-year follow-up



- 17 MCGR patients met the inclusion criteria
- 12 of 17 patients had complete data available for analysis



## METHODS

- Each MCGR patient was matched to a TGR patient by:
  - Etiology (per C-EOS)
  - Gender
  - Single vs. dual rods
  - Pre-op age (+/-10 months)
  - Pre-op major curve (+/- 20°)
- Etiologies were classified per C-EOS (Vitale):
  - Idiopathic
  - Congenital/Structural
  - Neuromuscular
  - Syndromic
- One male MCGR patient was matched to a female TGR patient since a male-male match could not be performed



### **METHODS**

#### Spinal growth calculation: "Annual T1-S1 Growth"

#### Annual T1-S1 Growth (mm/year)

#### $\Delta$ in T1-S1 from post index to latest F/U

Length of follow-up





#### MCGR patients:

- Mean age = 6.8 years
- Mean follow-up = **2.5** years
- Follow-up was greater for TGR patients by 1.6 years

### Distribution of etiologies:

- 4 neuromuscular
- 4 syndromic
- 3 idiopathic
- 1 congenital





		<b>Pre-op</b> (mean)	<b>Initial Post-op</b> (mean)	>2 YR Post-op (mean)
Major Curve	MCGR	59° 43	<mark>3%</mark> 32° <mark>-2</mark>	<mark>5%</mark> 38°
	TGR	60° 47	7% 31° -2	<mark>7%</mark> 41°
T1-S1 Spinal Length	MCGR	270 mm 🛆	<mark>18</mark> 295 mm Δ1	<mark>.5</mark> 307 mm
	TGR	264 mm	<b>41</b> 311 mm Δ3	36 347 mm





- Curve correction was similar between MCGR and TGR throughout treatment
- Mean T1-S1 increase after index surgery was greater in TGR compared to MCGR
- Annual T1-S1 growth was 7.1 mm/year for MCGR and 10.6 mm/year for TGR patients



# **RESULTS (Procedures)**

	Total # of Surgeries	Total # of Lengthenings	Total # of Revisions
MCGR	17	137	<b>5</b> (42% of patients)
TGR	69	49	8 (67% of patients)







# First patient in US, 8+11 boy



SAL ratio= 0.81. Lumbar lordosis= 69°. Thoracic kyphosis= 77°

### MAY 2013: Post-op X-Rays



Major Cobb (T6-L1)= 55°, T1-T6= 35°, L1-L4= 16° T1-T12 height= 183 mm, T1-S1 height= 312 mm



### Pre-Operation



### Post-Operation





- In this small yet carefully matched series, major curve correction was similar between MCGR and TGR patients throughout treatment
- MCGR patients had 52 fewer surgical procedures than TGR patients
- While curve correction was similar, annual T1-S1 growth was 3.5 mm/year greater in TGR patients compared to MCGR patients



# **THANK YOU**



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