THE ROLE OF TRADITIONAL GROWING RODS IN THE ERA OF MAGNETICALLY-CONTROLLED GROWING RODS FOR THE TREATMENT OF EARLY-ONSET SCOLIOSIS

Eric S. Varley, Burt Yaszay, Jeff B. Pawelek, Greg M. Mundis Jr., Matthew E. Oetgen, Peter F. Sturm, Behrooz A. Akbarnia, Growing Spine Study Group

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DISCLOSURES

**Eric Varley, DO** (This individual reported nothing to disclose); Submitted on: 04/04/2018

**Burt Yaszay, MD** (San Diego, CA) Submitted on: 04/11/2018
- AAOS: Board or committee member
- DePuy, A Johnson & Johnson Company: Paid consultant; Paid presenter or speaker; Research support
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- Harms Study Group: Research support
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- POSNA: Board or committee member
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- Spine Deformity: Editorial or governing board
- Stryker: Paid presenter or speaker

**Behrooz A Akbarnia, MD** (San Diego, CA) Submitted on: 04/27/2018
- DePuy, A Johnson & Johnson Company: IP royalties
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**Peter F Sturm, MD** (Cincinnati, OH) Submitted on: 05/17/2018
- AAOS: Board or committee member
- DePuy, A Johnson & Johnson Company: Paid consultant
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- Pediatric Orthopaedic Society of North America: Board or committee member
- Scoliosis Research Society: Board or committee member

**Jeff Pawelek** (San Diego, CA) Submitted on: 04/02/2018
- Growing Spine Subcommittee, Scoliosis Research Society: Board or committee member
- San Diego Spine Foundation: Board or committee member

**Gregory Michael Mundis, MD** Submitted on: 04/03/2018
- DePuy, A Johnson & Johnson Company: Paid presenter or speaker
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**Matthew Oetgen, MD** Submitted on: 04/10/2018
- AAOS: Board or committee member
- Pediatric Orthopaedic Society of North America: Board or committee member
- Scoliosis Research Society: Board or committee member
Surgical Treatment of EOS – 3 General Strategies

1. Growth Guided (Shilla)
2. Tension Based (Tether, Staple)
3. Distraction Based
   - Magnetically Controlled Growing Rods (MCGR)
   - Traditional Growing Rods (TGR)
   - VEPTR
**BACKGROUND**

**MCGR**
Rapid Adoption in EOS Treatment

- Fewer surgical procedures
- Outpatient lengthenings

*Courtesy of Paul Sponseller, MD*
Role of traditional growing rods (TGR) remains unclear in the era of MCGR technology

Contraindications to MCGR have not yet been established in the literature

MCGR may not always be the best distraction-based treatment option for some EOS patients
To describe the surgeon rationale and clinical profile of patients treated with TGR in the MCGR era in an effort to define the utility of TGR and possible contraindications of MCGR.
Retrospective review of multicenter EOS registry
1. ID first MCGR surgery performed in all U.S. based institutions
2. ID all TGR surgery *AFTER* first MCGR surgery performed

Patient data collected
- Demographics
- Etiology of Scoliosis
- Co-Morbidities
- **Radiographic Parameters**
- Surgeon Rationale for TGR

Descriptive comparisons
- Between the MCGR and TGR groups based on clinical and radiographic data to identify differences between groups

- Spinal height (T1-S1)
- Thoracic height (T1-T12)
- Lumbar Lordosis (L1-S1)
- Maximum Kyphosis
Retrospective review of multicenter EOS registry

1. ID first MCGR surgery performed in all U.S. based institutions
2. ID all TGR surgery **AFTER** first MCGR surgery performed

Patient data collected
- Demographics
- Etiology of Scoliosis
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- **Surgeon Rationale for TGR**

Descriptive comparisons
- Between the MCGR and TGR groups based on clinical and radiographic data to identify differences between groups

All surgeons were surveyed to explain clinical rationale for using TGR instead of MCGR for each case in the series
# RESULTS

## Demographics & Etiology

<table>
<thead>
<tr>
<th></th>
<th>TGR</th>
<th>MCGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (152 total)</td>
<td>25 (16%)</td>
<td>127 (84%)</td>
</tr>
<tr>
<td>Index Age (years)</td>
<td>6.9 (2.8 - 13.8)</td>
<td>7.5 (2.7 to 11.7)</td>
</tr>
<tr>
<td>Follow up (years)</td>
<td>1.4 (0.1 - 3.1)</td>
<td>1.6 (0.02 – 4.0)</td>
</tr>
<tr>
<td>Etiology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congenital = 10 (40%)</td>
<td></td>
<td>Neuromuscular = 65 (51%)</td>
</tr>
<tr>
<td>Idiopathic = 7 (28%)</td>
<td></td>
<td>Idiopathic = 25 (20%)</td>
</tr>
<tr>
<td>Syndromic = 6 (24%)</td>
<td></td>
<td>Syndromic = 22 (17%)</td>
</tr>
<tr>
<td>Neuromuscular = 2 (8%)</td>
<td></td>
<td>Congenital = 15 (12%)</td>
</tr>
</tbody>
</table>
## RESULTS

### SURGEON RATIONALE

<table>
<thead>
<tr>
<th>TGR INDICATIONS</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyphosis</td>
<td>11</td>
</tr>
<tr>
<td>Spinal Height</td>
<td>6</td>
</tr>
<tr>
<td>MRI/Pacemaker</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
</tr>
</tbody>
</table>

### INDICATION FOR TGR

- **Maximal Kyphosis**
  - TGR: 71.2°
  - MCGR: 55.2°

- **Short Trunk**
  - TGR: 88.7 cm
  - MCGR: 115.3 cm
INDICATION FOR TGR

- **MRI/Pacemaker**
  - MRI (MCGR artifact concern) \( n=3 \)
  - Pacemaker \( n=1 \)

- **Other**
  - Behavioral Problem/ Unable to remain still for lengthening: \( n=1 \)
  - Parents wary of new technology: \( n=1 \)
  - Excessive chest wall penetration of spine \( n=1 \)
  - Cost effectiveness considering growth remaining \( n=1 \)
SURGEON RATIONALE for TGR in MCGR Era

- Congenital (stiffer curves?)
- Sagittal Plane Profile (maximal kyphosis)
- Spinal Height (adequate space for 70 mm actuators)
- MR imaging (MCGR artifact)
- Other (patient/parent specific)

Future research targeted at the utility of TGR in MCGR era.