Current Use in Growth-Friendly Implants: A Ten-Year Update

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Introduction

• Study of growth-friendly implants JPO 2010, on data from 1994-2007

• Little published on treatment trends since MCGRs in the U.S.

• Sought to characterize current practices
  – age at first surgery
  – construct type
  – Diagnosis
  – Cobb angle
  – lengthening intervals
Hypotheses

1 – Age at first surgery increased 2007-2017 recognizing importance of auto-fusion

2 – Lengthening intervals have increased to minimize burden

3 – C-EOS distribution categories have changed with CP and MM representing decreasing percents of all diagnoses
Methods

- GSSG & CSSG databases studied 2007-17
- Constructs studied as either TGR, MCGR, VEPTR, or growth guidance
- Diagnoses categorized using C-EOS
Methods

- Data available for 1339 undergoing index surgery
- Lengthening intervals available for 614 patients
- Definitive treatment data available for 182 patients
Results

- MCGRs comprise > 80% of implants by 2016
- All other implants types down to < 10% each by 2016
  - Growth Guidance least at all times
Results

- Steady increase in age at first surgery, from mean = 6.1 yrs in 2007 to mean = 7.7 yrs in 2017.
Results

- Preop Curve:
- Relatively stable, mean = 75°
Results

MCGR preop Cobb angles stabilized at similar magnitudes to TGR
Results

- More variation in curve sizes for VEPTR and guided growth
Results

- Lengthening intervals available for 614 pts and compared to prior study
- TGRs and VEPTRs stable at 6-9 months since 2008
- MCGRs stable at 3-4 months
Results

- Definitive treatment for 182 pts, of whom 159 (87%) had final fusions
- Mean age at final fusion stable at = 12.3 yrs
Results

- % idiopathic has increased steadily
- % CP and MM stable 2-7%

Percent of All Diagnoses Vs. Year for 1339 Patients, 2007-2017

$R^2 = 0.56$, $p = 0.008$
Conclusions

- Treatment in EOS has largely shifted toward MCGR
- Mean age at first surgery has increased from 6.1 to 7.7yrs
- Final fusions are performed in ~87% of patients at a mean age of 12.3 yrs
- Percent idiopathic has increased, but percent myelo and CP have not changed and remain low
Thanks
Acknowledgements

With thanks to additional contributors from the Complex Spine Study Group (CSSG) for the recent addition of their patients, which improved and changed several conclusions in our study.
Disclosures

• As stated in program
## Results

Preoperative demographics of 1339 pts undergoing initial growth-friendly instrumentation from 2007-2017

<table>
<thead>
<tr>
<th></th>
<th>TGR (n=397)</th>
<th>MCGR (n=371)</th>
<th>VEPTR (n=489)</th>
<th>Guided Growth (n=85)</th>
<th>p-value (ANOVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (yrs)</strong></td>
<td>6.7 ± 2.6</td>
<td>7.7 ± 2.5</td>
<td>5.9 ± 2.9</td>
<td>7.4 ± 2.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Primary Curve (degs)</strong></td>
<td>75 ± 22</td>
<td>74 ± 20</td>
<td>68 ± 24</td>
<td>69 ± 19</td>
<td>&lt;0.001</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>N (%)</th>
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</thead>
<tbody>
<tr>
<td><strong>Female</strong></td>
<td>230 (58)</td>
<td>206 (56)</td>
<td>255 (52)</td>
<td>48 (56)</td>
<td>0.37</td>
</tr>
<tr>
<td><strong>Etiology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congenital</td>
<td>98 (25)</td>
<td>44 (12)</td>
<td>172 (35)</td>
<td>13 (15)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Neuromuscular</td>
<td>72 (18)</td>
<td>102 (28)</td>
<td>58 (12)</td>
<td>25 (30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Syndromic</td>
<td>95 (24)</td>
<td>73 (20)</td>
<td>66 (14)</td>
<td>17 (20)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Idiopathic</td>
<td>132 (33)</td>
<td>149 (40)</td>
<td>190 (39)</td>
<td>29 (35)</td>
<td>0.27</td>
</tr>
</tbody>
</table>
Results

• >100 MCGRs placed in 2015 and 2016

• Decrease seen from 2016-2017 likely because data was not back from all sites at time of database queries