Is Performing a Definitive Fusion for Scoliosis in Juvenile Cerebral Palsy (CP) Patients a Good Long-term Surgical Option?

Burt Yaszay, MD; Paul Sponseller, MD; Roland Howard, MD; Suken Shah, MD; Firoz Miyanji, MD; Amer F. Samdani, MD; Peter Newton, MD
Disclosures

- K2M/Stryker – Consultant, Royalties, Speaker Bureau
- Depuy Synthes - Consultant, Speaker Bureau
- Nuvasive - Consultant, Royalties, Speaker Bureau
- Biogen – Consultant
- Orthopediatrics – Royalties
- Globus - Royalties

This study was supported in part by grants to the Setting Scoliosis Straight Foundation in support of Harms Study Group research from DePuy Synthes Spine, EOS imaging, K2M, Medtronic, NuVasive and Zimmer Biomet.
Introduction

- Management of juvenile CP patients with large scoliosis is a challenge.
Introduction

- When observation with or without a brace is no longer an option, surgeons frequently choose surgery

Growing Construct

Definitive fusion
Purpose

• The purpose of the study is to present a series of juvenile CP scoliosis patients that underwent early definitive fusion with minimum 5 years of follow-up.
Methods

- A retrospective review of a multi-center database of patients with CP scoliosis was conducted.

- Patients ≤10 years who had a definitive fusion for their scoliosis and minimum 5 years follow-up were included.

- Preoperative and postoperative demographic and radiographic changes were evaluated with descriptive statistics. Repeated measures ANOVA were utilized to compare outcome scores.
Results

• **20 patients were identified**
  - Average age 9 years (8-10yrs)
  - All patients were skeletally immature
  - 85% had spastic CP with GMFCS level 5

• **Surgical Approach**
  - Posterior spinal fusion only: 18 patients
  - Anterior only fusion: 1 patient
  - Anterior/Posterior fusion: 1 patient

• **Construct Type**
  - 3 patients had unit rods with wires while the rest incorporated pedicle screws.
  - 16 (80%) were instrumented to the ilium, 2 to L4, 1 to L5, and 1 to S1.
## Radiographic Data

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>1st postop</th>
<th>5 years postop</th>
<th>Pre vs 5yr p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Curve Magnitude</td>
<td>84 ± 20</td>
<td>28 ± 12</td>
<td>31 ± 16</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>T2-T12 Kyphosis</td>
<td>41 ± 27</td>
<td>34 ± 13</td>
<td>31 ± 14</td>
<td>0.094</td>
</tr>
<tr>
<td>Pelvic Obliquity</td>
<td>32 ± 14</td>
<td>8 ± 6</td>
<td>10 ± 6</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

No significant differences between postop time points (p>0.05)
Results

- **12 patients had 30 total complications**
  - 7 major, 23 minor
  - Majority were gastrointestinal or respiratory related

- **There were no unplanned revisions or deaths in this cohort.**

- **Two patients had minor instrumentation-related complications**
  - 1 patient had a unilateral broken rod that did not require further treatment.
  - 1 patient had loss of fixation of an iliac screw
# Results – CPChild & HUI

<table>
<thead>
<tr>
<th>Area</th>
<th>Preoperative</th>
<th>5 years postop</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Care</td>
<td>36 ± 13</td>
<td>45 ± 13</td>
<td>0.052</td>
</tr>
<tr>
<td>Positioning, Transferring &amp; Mobility</td>
<td>29 ± 13</td>
<td>44 ± 14</td>
<td>0.004</td>
</tr>
<tr>
<td>Comfort &amp; Emotions</td>
<td>78 ± 12</td>
<td>89 ± 13</td>
<td>0.019</td>
</tr>
<tr>
<td>Communication &amp; Social Interaction</td>
<td>45 ± 32</td>
<td>36 ± 29</td>
<td>0.25</td>
</tr>
<tr>
<td>Health</td>
<td>49 ± 16</td>
<td>55 ± 13</td>
<td>0.21</td>
</tr>
<tr>
<td>Overall QOL</td>
<td>64 ± 22</td>
<td>64 ± 26</td>
<td>1</td>
</tr>
<tr>
<td>Total Score</td>
<td>48 ± 11</td>
<td>57 ± 13</td>
<td>0.047</td>
</tr>
<tr>
<td>HUI3 Overall Utility Score</td>
<td>-0.25 ± 0.084</td>
<td>-0.12 ± 0.26</td>
<td>0.154</td>
</tr>
</tbody>
</table>
Conclusions

- Performing a definitive fusion in skeletally immature patients with CP results in improved coronal deformity, pelvic obliquity, and CPCHILD outcomes scores that remain stable at the 5-year mark.

- Definitive fusion is a viable treatment in these skeletally immature patients.