Early Results Of The Shilla Growth Guidance Technique For Early Onset Scoliosis

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Author Disclosure Information

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Growth-sparing Surgical Techniques
New Growth Modulation Technology

Forces Applied

Posterior implants

Anterior implants

Concavity Distraction

Convex Tether

Active Growth & correction

Passive
Classification of Growth Friendly Techniques (Non-fusion Techniques)

- **Distraction Based Systems**<br>  <8 y, all etiology<br>  Growing Rod<br>  VEPTR<br>  MCGR

- **Posterior Guided Growth**<br>  <9-10 y, all etiology<br>  Shilla<br>  Luque trolley

- **Compression Based Systems (Tether)**<br>  >8 y, congenital Ø<br>  Stapling<br>  Tethers

Skaggs, Witale et al
Posterior Guided Growth
<9-10 yr, all etiologies

Shilla
Shilla growth guidance technique is one of the growth friendly techniques that are described to control the development of the deformity without impairing the spinal growth, in the treatment of early onset scoliosis (EOS).

Growth Guidance Technique - Shilla

Apical translation
Concavity Distraction
Convexity Tether
Apical Fusion Derotation

Shilla Construct
Proximal gliding pedicle screw
Apical fixed pedicle screw
Distal gliding pedicle screw
Fixed pedicle screw
Gliding pedicle screw
Purpose

- In the spine surgery directing the growth
  - The purpose is to increase
    - the length of the spine
    - the movability of the spine
    - the thoracic function of it
  - and to decrease
    - the number of surgeries
    - risks

- In our study, we aimed to present the early results of the Shilla in patient with insufficient conservative surgical treatments having EOS

Spinal Growth Modulation: Shilla

Locked pedicule screws to apical vertebra

- The rotation is corrected, the rods are locked, and fusion applied

Un-locked pedicule screws to distal and proximal vertebra are applied

- They are fixed subperiostally and rods are left movable inside

Growth guidance pedicle screw:
- Fusion Ø (≈2 segments)
- Preserved facet joints and subperiostal tissue
- As multiaxial sliding rod

Locked pedicule screw:
- Fusion + (≈3 segment)
- Compretion, Distraction, Derotation

Richard McCarthy
Method

- 7 patients (6 F, 1 M)
  - Open triradiate cartilage, Risser ≥2
  - AP Cobb angle ≥50°
  - Age 10.2 (10-11)
  - Failed Previous treatment
- Etyology
  - Idiopathic (3)
  - Congenital (2)
  - Neuromuscular (Tumor) (1)
  - Down syndrome (1)
- Preoperative X-ray, MRI, and 3DCT
- Neuromonitorisation (SSEP and MEP)
- Surgery 3.5 h
- Postoperative 3 m with TLSO brace
- Length of the hospital stay 5.6 d (4-7)
- FU @ 7.2 m (1.5-14)
# RESULTS

<table>
<thead>
<tr>
<th>Coronal Cobb (Major Curve)</th>
<th>Coronal Cobb (Minor Curve)</th>
<th>Sagittal (Kyphosis) Cobb</th>
<th>Sagittal (Lordosis) Cobb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>69.4° (54-100°)</td>
<td>60° (18°-53°)</td>
<td>63.8° (33°-87°)</td>
</tr>
<tr>
<td>Last control</td>
<td>28.7° (7.5°-50°)</td>
<td>20.9° (7°-28°)</td>
<td>30.5° (15°-44°)</td>
</tr>
<tr>
<td>Correction</td>
<td>58.6%</td>
<td>65.2%</td>
<td>52.2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>Sex</th>
<th>Etiology</th>
<th>Risser / Y Cartilage</th>
<th>Age of Surgery time (y)</th>
<th>Duration of Surgery (h)</th>
<th>Hospital stay (d)</th>
<th>FU (m)</th>
<th>AP-Preop Cobb</th>
<th>AP-Postop Cobb</th>
<th>LAT-Preop Cobb (K/L)</th>
<th>LAT-Postop Cobb (K/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>Congenital</td>
<td>0 / Open</td>
<td>10</td>
<td>3.45</td>
<td>7</td>
<td>5</td>
<td>34°/66°</td>
<td>27°/38°</td>
<td>51°/0°</td>
<td>32°/6°</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>Down Syndrome</td>
<td>0 / Open</td>
<td>10</td>
<td>3</td>
<td>7</td>
<td>12</td>
<td>55°/18°</td>
<td>35°/15°</td>
<td>33°/21°</td>
<td>15°/17°</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>Idiopathic</td>
<td>1 / Open</td>
<td>11</td>
<td>6</td>
<td>4</td>
<td>14</td>
<td>100°</td>
<td>50°</td>
<td>87°/62°</td>
<td>44°/39°</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>Neuromuscular</td>
<td>1 / Open</td>
<td>10</td>
<td>6.15</td>
<td>4</td>
<td>13</td>
<td>25°/57°</td>
<td>24°/28°</td>
<td>67°/66°</td>
<td>34°/39°</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>Idiopathic</td>
<td>0 / Open</td>
<td>9.8</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>54°/52.5°</td>
<td>22°/28°</td>
<td>68°/70°</td>
<td>33°/44°</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>Idiopathic</td>
<td>0 / Open</td>
<td>9</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>46°/71°/33°</td>
<td>27°/26°/8°</td>
<td>54°/67°</td>
<td>36°/41°</td>
</tr>
<tr>
<td>7</td>
<td>F</td>
<td>Congenital</td>
<td>1 / Open</td>
<td>12</td>
<td>5.30</td>
<td>6</td>
<td>1.5</td>
<td>53°/80°</td>
<td>35°/21°</td>
<td>79°/61°</td>
<td>21°/39°</td>
</tr>
</tbody>
</table>

10.25  4.1 (1-6.15)  5.6 (4-7)  7.2 (1.5-14)
EOS (Congenital Scoliosis)
F / Age @ 10 y

Pre-op

FU @ 5 m
EOS (Idiopathic Scoliosis)
F / Age @ 9+8 y

Pre-op

FU @ 3 m
EOS (Idiopathic Scoliosis)
F / Age @ 9 y

Pre-op

FU @ 3 m
Results

- Problems due to repetitive surgeries constitute important problems

- With the application of Shilla technique in convenient patients
  - *The spine growth may be maintained*
  - *The apical vertebra rotation can be corrected*
  - *The number of repetitive surgeries can be decreased*

- The limitations of our study
  - *The number of patients was less.*
  - *The application was in a relatively late age*
  - *The follow-up period was short*

- The Shilla technique needs to be evaluated using a higher number of patients with a longer follow-up period