Can "Final Fusion" Procedure be Avoided at Skeletal Maturity After GR?

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“Final fusion” is a common endpoint to growing rod treatment (GR) for early onset scoliosis (EOS).

Recent literature suggests that the rate of autofusion after growing rods is high, which can lead to difficulty obtaining further correction at definitive fusion (Cahill 2010).
Hypothesis

- Final fusion may not be necessary for a subset of EOS patients who have reached skeletal maturity with good alignment
  - Risser 3-4
  - No fractures in prior 2 years
  - “Diminishing returns”; ≤1 cm at last distraction
  - No implant problems

- Aim: characterize patients who completed GR but received no final spinal fusion (NF).
Methods

- Growing Spine Study Group database identified 160 patients with GR who reached skeletal maturity.
- 137 patients had final fusion (FF)
- 23 patients did not have a final fusion surgery (NF).
- Radiographs and clinical records were compared
## Methods

### Patient Diagnoses

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>NF</th>
<th>FF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idiopathic Scoliosis</td>
<td>7</td>
<td>33</td>
</tr>
<tr>
<td>NM Deformity</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>Congenital Deformity</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Genetic or Syndromic Deformity</td>
<td>6</td>
<td>52</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>23</td>
<td>137</td>
</tr>
</tbody>
</table>
Results: Patient Characteristics

Groups comparable in:

- **Age** at start: 7.4 ± 3.8 years (NF group) vs. 6.1 ± 3.4 years (FF group), P=0.80

- **Gender** (47% in NF group were female vs. 58% in FF group were female, P=0.34)

- **Diagnoses** (p=0.24)
Results: Surgical Characteristics

Also comparable in:

- **Number of lengthening** procedures: $6.4 \pm 3.5$ (NF) vs. $5.6 \pm 3.9$ (FF), $P=0.36$

- Overall **treatment time** (from index to last procedure): $7.8 \pm 3.5$ years (NF) vs. $7.6 \pm 3.4$ years (FF), $P=0.79$
Results:
Radiographic Outcomes

- **Correction of major curve**
  - NF group: 46% correction
  - FF group: 37% correction
  - No significant difference in curve correction (P=0.23)

- **Increase in trunk height (T1-S1 length)**
  - NF group: 30% (11.5cm)
  - FF group, 25% (9.5 cm)
  - Trunk height gain in NF significantly higher (P<0.01)
Of the 23 patients in the NF group, **13 patients** (57%) had a minimum of 2 year clinical followup after their last surgery (**mean 3.3 years**, range 2 to 7 years)

All patients had their rods retained. There were **no rod fractures** and no evidence of **pseudarthrosis**.
Discussion

- Patients who did not receive a final fusion had:
  - equivalent final coronal correction
  - trunk height
  - no rod fractures or known pseudarthrosis

- “No final fusion” at maturity is a viable option for select patients treated with GR who have satisfactory final alignment

- Further followup of non-fusion patients required to better understand long term implications
Thank you
EOIS 95° at age 6. Rods fractured multiple times
## End of the saga

<table>
<thead>
<tr>
<th>Age 6</th>
<th>Age 14</th>
<th>Age 15</th>
<th>Age 16</th>
</tr>
</thead>
</table>

Construct stable for 3 yrs at maturity. No final fusion planned
Another story - IIS

6 yrs
14 yrs
17 yrs

No Final Fusion