Neural Axis Abnormalities in Early Onset Scoliosis Patients Can Be Detected With Limited MRI Sequences

Rajan R. Murgai BS¹, Benita Tamrazi MD², Kenneth D. Illingworth MD¹, David L. Skaggs MD, MMM¹, Lindsay M. Andras MD¹
¹Children’s Orthopaedic Center, Children’s Hospital Los Angeles, Los Angeles, CA, USA
²Division of Radiology, Children’s Hospital Los Angeles, Los Angeles, CA, USA
Background

• Neural axis abnormalities in 20-47% of EOS patients → routine spine MRI screening\(^1\)

• MRIs are expensive, lengthy, and often require general anesthesia
Repeated exposure to general anesthesia may be associated with neurocognitive damage\textsuperscript{2,3}.
Objective

To determine if neural axis abnormalities in EOS patients can be detected with limited spine MRI sequences
Methods

• Retrospective review

• Consecutive EOS patients with MRI of cervical, thoracic, and lumbar spine in 2017

• 50 EOS patients
Methods

- Individual sequences of previously reviewed MRIs were read by an attending pediatric neuroradiologist blinded to full report

- Findings compared to full MRI report
Results – Demographics

• **Etiology:**
  – 19 congenital
  – 19 idiopathic
  – 10 neuromuscular
  – 2 syndromic

• **Age:**
  – Mean: 6 years
  – Range: 9 months – 10 years

• **27 females, 23 males**
Results

Sagittal T1 + Sagittal T2 images were 100% sensitive and specific for the detection of neural axis abnormalities.
Results

• Full spine MRI (all sequences):
  – Mean duration: 66 minutes
  – General anesthesia in 62% of MRIs
  – Mean anesthesia duration: 90 minutes

• Limited sequence MRI (Sagittal T1+ T2)
  – Mean duration: 21 minutes
  – 68% shorter than full MRI (p<.0001)
## Results: Neural Axis Abnormality Prevalence

10 patients (20%) neural axis abnormalities

<table>
<thead>
<tr>
<th>Etiology</th>
<th>Prevalence (%)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital</td>
<td>26%</td>
<td>5/19</td>
</tr>
<tr>
<td>Neuromuscular</td>
<td>20%</td>
<td>2/10</td>
</tr>
<tr>
<td>Idiopathic</td>
<td>16%</td>
<td>3/19</td>
</tr>
<tr>
<td>Syndromic</td>
<td>0%</td>
<td>0/2</td>
</tr>
</tbody>
</table>
Results – Neural Axis Abnormalities

- 4 fatty filum
- 2 low lying conus medullaris
- 2 syrinx
- 1 cerebellar tonsillar ectopia w/ syrinx
- 1 low lying conus medullaris w/ syrinx
Limited MRI vs Full Sequence MRI

Not detected on Limited MRI

- 11 segmentation anomalies
- 6 non-neural axis abnormalities
  - 3 kidney abnormalities
  - 1 pectus excavatum
  - 1 femoral head dislocation
  - 1 hepatic cyst
Conclusions

• Limited sequence MRIs with sagittal T1 + T2
  – 100% sensitivity and specificity for the detection of neural axis abnormalities
  – 68% reduction in MRI duration
  – Significant reduction in anesthesia time
