Unilateral Thoracic Nerve Resection Causes Rib Cage Torsion and Idiopathic-Like Thoracic Scoliosis

Xiaobin Wang, M.D., PhD
Hong Zhang, M.D.
Dan Sucato, M.D., MS

Texas Scottish Rite Hospital for Children
Dallas, Texas

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• AIS: Thoracic apical rotational hypokyphosis
Hypothesis

• The rib cage torsion causes the apical rotational hypokyphosis in AIS

• Neurogenic thorax imbalance is the initiating cause of idiopathic scoliosis
Purposes

• To test whether the thoracic nerves resection can initially induce the rib cage torsion and cause apical rotational hypokyposis idiopathic-like scoliosis in immature pig model.
• Unilateral thoracic nerve root resection (n=6)
• Unilateral thoracic nerve root resection with unilateral muscle stripping (n=5)

• Bilateral nerve root resection (n=6)
Methods

8-level thoracic nerve resection from T7-T14 on the right side

- Seventeen one-month-old pigs
- The animals were killed at 17 weeks
- The radiographs and axial CT images of the spine were obtained
Methods

Thoracic Deformity Parameters
- RH: rib hump
- RVAD: rib vertebral angle difference
- ARSD: apical rib spread difference
- AVB-R: apical vertebral body-rib ratio
- RLD: rib length difference

Spine Deformity Parameters
- Coronal Cobb
- Sagittal kyphosis
- Apical vertebral rotation
**Unilateral Thoracic Nerve Resection**

<table>
<thead>
<tr>
<th>Post op.</th>
<th>2 weeks</th>
<th>4 weeks</th>
<th>6 weeks</th>
<th>8 weeks</th>
<th>12 weeks</th>
<th>17 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apical Lordosis T11-T14</td>
<td>34°</td>
<td>32°</td>
<td>22°</td>
<td>11°</td>
<td>7°</td>
<td>-9°</td>
</tr>
</tbody>
</table>
Unilateral Thoracic Nerve Resection
Bilateral Thoracic Nerve Resection

Post op.  2 weeks  4 weeks  6 weeks  8 weeks  12 weeks  17 weeks

Lordosis T8-T13

10°  -6°  -12°  -25°  -35°  -50°
Bilateral Thoracic Nerve Resection
Scoliosis Cobb Angle

Unilateral Group

Bilateral Group
Conclusions

- Unilateral thoracic nerve resection induced rib cage torsion toward the operative side resulting in idiopathic-like thoracic hypokyphosis scoliosis in an immature pig model.

- Neurogenic thorax imbalance may be the initiating cause of the idiopathic scoliosis.
Thank You