Ahead of the Curve: Comprehensive Treatment for Scoliosis

1 – 1:45 p.m.

John Thometz, MD
I have no relevant financial relationships to disclose.
Objectives

• Understand the natural history of scoliosis

• Understand advances in imaging

• Understand current treatments for spinal curvatures
Every valley shall be exalted, and every mountain and hill shall be made low: and the crooked shall be made straight. Isaiah 40.4

Orthopaedics—“straight child”
Andry 1741
History - Tribal method
Hippocrates’s method of correction-Gravity 400 B.C.

Forcible maneuvers are “all stupid”

“Principally practiced by those physicians who seek to astonish the mob”
The Scamnum
Surgery

Forcible correction with plaster body jacket

Jacket applied, after 3-5 days daily lengthening of turnbuckle until optimal position for surgery

1920
↓
Fusion
↓
Supine 6-9 months
↓
Casting 10-12 months

Steindler 60% pseudoarthrosis failure to achieve fusion

Fig. 139. Risser hinged turnbuckle jacket (74)
Evaluation of the Spine

Standing exam
- Shoulder height asymmetry
- Pelvic height asymmetry
- Flank crease asymmetry
- Kyphosis/lordosis

Significant scoliosis can occur with level shoulders

Beware balanced double curves
Trunk Rotation-Forward Bend Test

Check Thoracic, Thoracolumbar AND Lumbar

Check Sagittal View! (R/O Scheuermann’s)

Refer if angle trunk rotation over 7 degrees on Scoliometer

There is an APP for everything…
I Phone Scoliometer
Careful Neuro Exam to R/O Neuro Causes Especially in Younger Patients (<10 yrs)

- Syrinx / Arnold-Chiari
- Tethered cord / Spinal cord tumor
Radiographic Evaluation

Cobb Angle = curve magnitude

Risser Sign = skeletal maturity
EOS

- Decreased radiation via slot scanning technology
- EOS system
- 3-D representation
- Low dose X-ray of spine - 1/10 of typical X-ray
- Greater clarity
Surface Topography Laser Scanning

Follow minor curves with no radiation with precise reproduction of back anatomy with laser scanning

• Quick data acquisition
• Reproducible and reliable
3D Measurements

Utilize surface scan to follow curvature rather than X-ray
Laser Surface Topography
Push Play
<table>
<thead>
<tr>
<th>Cobb Angle</th>
<th>At-Risk Population (%)</th>
<th>Female-to-Male Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;10°</td>
<td>2.0–3.0</td>
<td>1.4:2.1</td>
</tr>
<tr>
<td>&gt;20°</td>
<td>0.3–0.5</td>
<td>5.4:1</td>
</tr>
<tr>
<td>&gt;30°</td>
<td>0.1–0.3</td>
<td>10:1</td>
</tr>
<tr>
<td>&gt;40°</td>
<td>&lt;0.1</td>
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Table 15–3. PREVALENCE OF ADOLESCENT IDIOPATHIC SCOLIOSIS (AGES 10–16 YEARS)

Adolescent Idiopathic Scoliosis
Risk for Curve Progression

Curves over 20 degrees in patients less than 10 - 100% progression
Indications for Bracing

- Curves 25 degrees to 45 degrees
- Risser 0, 1, 2
  (skeletally immature)
Conservative Care
Bracing for Scoliosis

- Most commonly, curve progression is prevented. Brace does not eliminate scoliosis!
- Goal is to prevent progression, especially to surgical magnitude-success rate in compliant patients about 80%.

Night-time brace effective for smaller curves (20-30 degrees)
Percent of Patients Who Did Not Show Progression Relative to Hours of Brace Wear

<table>
<thead>
<tr>
<th>Hours per day of brace wear</th>
<th>Non-progressive</th>
<th>Progressive</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;12 hrs/day</td>
<td>82%</td>
<td>18%</td>
</tr>
<tr>
<td>7 to 12 hrs/day</td>
<td>61%</td>
<td>39%</td>
</tr>
<tr>
<td>&lt; 7 hrs/day</td>
<td>69%</td>
<td>31%</td>
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</tbody>
</table>
Surgical Correction

Natural History:

Curves 50 degrees & greater progress significantly over time

(45 degrees in growing adolescent)

O-arm is an intra-operative CT scan to check satisfactory position of pedicle screws.
Patient Assessment

Work Up:

- Blood work
- Anesthesiology
- Hematology
- Neurosurgery
- Pulmonary
- Cardiology
- CT / MRI
- Genetics
- Special Needs
- Peri-op needs
- Etc
The “team” approach.
Advanced Imaging
Infantile Scoliosis
Thoracic Insufficiency Syndrome

Inability of thorax to support normal lung growth

Fused ribs and congenital scoliosis

↓ space available for lung

Campbell, JBJS, 2003
Thoracic Insufficiency Syndrome

Inability of the thorax to support normal lung growth or respiration (Campbell). TIS common in congenital scoliosis. Windswept chest deformity.
Infantile Scoliosis often treated with casts to control curvature.

Treatment may last for years
VEPTR Applications:

- Growth of congenital spine
- Increase chest volume in patients with fused ribs
- Control of collapsing neuromuscular curves
Case History - Infantile Scoliosis (Marfan’s)
Brace Therapy
Relentless curve progression in spite of brace
VEPTR - Rib to Spine attachment

Vertical Expandable Prosthetic Titanium Rib - internal splint which must be lengthened in OR every 6 months during growth
MAGEC
MAGEC

- Magnet applied to surface rotation gives compression or distraction
MAGEC Video
Push Play
Congenital Scoliosis (secondary to bony malformations)

Bar

Hemivertebra
Congenital Scoliosis Patient Evaluation

- Urinary Tract Abnormalities: 20% (6% life threatening)
- Cardiac: 15%
- Neurologic
Zebra Fish
A Striking Resemblance to Human Scoliosis
Contact Information

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