Disclosures

- POSNA/Biomet Research Grant:
  - Bioluminescence in vivo mouse model of spine implant-related infection

Topics

- Adolescent Idiopathic Scoliosis
- Early Onset Scoliosis
- Exotic Scoliosis

Adolescent Idiopathic Scoliosis

- Assessment

  - Cobb Angle
  - Risser sign

Adolescent Idiopathic Scoliosis

- Natural History
Progression Risk

Treatment Guidelines

<table>
<thead>
<tr>
<th>Curve severity</th>
<th>Immature</th>
<th>Mature</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 - 30°</td>
<td>Observe q 6 months</td>
<td>Observe PRN</td>
</tr>
<tr>
<td>30 - 45°</td>
<td>Brace / Staple / Observe</td>
<td>Observe PRN</td>
</tr>
<tr>
<td>&gt; 50°</td>
<td>Surgery</td>
<td>Surgery</td>
</tr>
</tbody>
</table>

Schroth Method?

• Katharina Schroth- PT
• Clinic in Germany 1920-1980’s
• Intensive daily therapy originally in inpatient setting x 6 weeks
• Interest in U.S. after 2014 NYT article
• # of Pubmed U.S. publications = 0

Bracing Goals

• Improvement rare
• Goal = Prevent progression
• Success = curve <50 deg at maturity

Brace types

Boston brace  Charleston Brace  SpineCor

BRAIST Study--2013

• NIH funded, randomized
• 18 hrs/day
• Compliance measured
• Stopped early due to success of bracing
  • Braced=72% success vs Observation 48%
Bracing Alternatives

• Anterior Vertebral Stapling or Tethering
  - Less invasive
  - Fusionless
  - Growth modulating

Surgical Goals

• Prevent progression
• Fusion vs. motion preservation
• Include all segments necessary to restore balance but minimize fusion whenever possible

The landscape has changed

• Lower infection rates
• Better spinal cord monitoring
• Better control of blood loss
• Better fixation
• Increasing experience with osteotomies

Are outcomes also better?

Infection Control Methods

• Recent decline in infection rates?
  - Pre-surgical scrubs
  - Iodine solution washes
  - Vanco powder in wound/graft
  - Less variability in antibiotic selection/delivery

In-vivo bioluminescence infection model
Evidence Based Approach?

Failure is not fatal, but failure to change might be
--John Wooden

Are All Screws Constructs Better?

Evidence for All-Screws with Severe AIS

- Screws are superior to hooks (Improved correction by 13 degrees)
- Screws eliminate need for ASF

Screws

- Challenges
  - Pedicles are thin on concave side

- Advantages
  - Rotation control

Role of Osteotomies for Idiopathic curves?

Ponte Osteotomy

- Opens anterior column, hinges on middle column, closes posterior column
Ponte vs. Facetectomies only

• 4 Ponte osteotomies = 23% in flexion ROM, 8% in axial rotation ROM
• Only 1.4° lateral bend per ponte

Surgery - What to Expect

• Avg. hospital stay: 7 days (2002); 4 days (2015)
• Avg. time out of school: 3-4 weeks
• Avg. time to resume activities
  • Walking: day 2
  • Running/Swimming/Biking: 1 month
  • Contact sports: 6-12 months

Early Onset Scoliosis

Growing rods/VEPTR/Shilla/

Problem: law of diminishing returns with each lengthening

M.A.G.E.C Rods

Early Onset Scoliosis – Casting
Exotic Scoliosis

Tools to treat severe/exotic scoliosis

- Halo-gravity traction

- Vertebral Column Resection

Summary

- Prediction of progression can be enhanced with bone maturity studies, not genetic studies.
- Bracing increases chances of avoiding surgery by 24% (vs observation) and is 90% effective if worn >18 hours/day.
- Conservative methods of treatment including PT and casting have become popular again but clear indications and evidence of efficacy are limited.
- Combining modern instrumentation with osteotomies can significantly enhance corrections of severe curves.
- More and more growth preserving techniques are available for spinal deformity control in young patients.

It’s what you learn after you know it all that counts
— John Wooden