Idiopathic Scoliosis

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Diagnosis is the key to successful treatment
Etiology

• The exact pathophysiologic mechanism for scoliosis is unknown.
• A genetic factor has been implicated in the development and progression of scoliosis.

Etiology

• If both parents have idiopathic scoliosis, their children are 50 times more likely to require scoliosis treatment compared with the general population.

Back Pain

• Back pain is fairly prevalent in healthy children and adolescents.

• When children or adolescents seek medical care for back pain, it is highly likely that underlying pathology will be identified.
Back Pain

• Common causes of back pain include nonspecific pain or muscle strain, herniated disk, spondylolysis, scoliosis, and Scheuermann's kyphosis.

Idiopathic Scoliosis

Idiopathic or degenerative scoliosis is the cause of:

- 600,000 physician visits annually
- 30,000 children put in braces
- 38,000 spinal fusion surgeries

(Source: National Scoliosis Foundation)
Elevated Shoulder
Spinal curve
Prominent scapula
Uneven waist
Asymmetrical arm to flank distances

Important physical exam findings in scoliosis
HEALTHY SPINE
A healthy spine is straight.

SYMPTOMS OF SCOLIOSIS
A spine affected by scoliosis curve to the side.

Torso appears to lean

Waist may appear uneven or hips elevated

One or both shoulder blades protrude

When bending over, shoulders are uneven

Misshaped rib cage

A curvature may be seen in the mid back (thorax) ...

... Or it may be seen in the lower back (lumbar).
Adolescent Idiopathic Scoliosis Management

• *It is important to monitor the curves with x-rays until approximately 15 years of age in girls, and 18 years of age in boys. When curves reach 25-30 degrees, we consider bracing. Surgery may be indicated in curves over 40-45 degrees.*

• Illinois Spine and Scoliosis Center

• http://www.myissc.com/spine_problems/scoliosis/idiopathic_scoliosis.htm
When bending forward

Normal

A child with scoliosis
Normal spine

Deformity from scoliosis
Scoliosis is a lateral deviation in the frontal plane associated with rotation.
Adolescent Idiopathic Scoliosis

A typical case would be a young patient whose parents have noticed excessive spine curvature or the patient complaining of back pain.
Question

Does this child present with an idiopathic scoliosis?
Classification of Scoliosis

Structural or Nonstructural

1. Structural curves are fixed, nonflexible, and fail to correct with bending.

2. Nonstructural curves are not fixed but flexible and readily correct with bending.
Radiographic Examinations for AIS

The physician takes a series of X-rays and measurements and if AIS is diagnosed, begins a treatment plan as follows:

Observe (via X-ray) curves less than 30°

Brace curves in the 30°–40° range

Perform surgery if curves exceed 40°
AIS Management

Notice that each decision point rests on a 10° increment—including between observation and major spinal surgery. Well, 10° is also the commonly discussed margin of error for measuring scoliotic curves.
Question?

Can you name the radiographic view and examination?
Scoliometry

• A scoliometer measures the angle of trunk rotation, not vertebral rotation.

• Readings are taken in the sitting, forward bending position, so it is recommended as it provides stable posture and eliminates limb discrepancy.

Scoliometer
• Scoliometer measurements, following the methodology proposed in this study, showed good correlation with the Cobb angle, the gold standard measurement. It had good intra- and interrater reliability and was sensitive in detecting curvatures greater than 10º Cobb using a referral criterion of 5º ATR, indicating its potential for screening individuals with idiopathic scoliosis.

A scoliosis brace is usually worn under clothing and is one method used to try to improve the exaggerated curvature of the spine as seen in scoliosis.
Adolescent Idiopathic Scoliosis (AIS)

Presently, AIS is diagnosed and then treated almost entirely by a time lapse series of x-rays which form the basis for measuring the patient’s curve magnitude (the only caveat being that brace treatment is thought to be effective only in patients who are still growing).
Scoliosis is an inherited disease.

After four years of development, testing DNA samples from more than 9,000 patients, tracking billions of genotypes and making trillions of calculations, a company announced that it has found the specific, genetic markers for scoliosis.
How accurate is the Axial Biotech ScoliScore?

- Based on data from over 6,500 AIS patients:
  - Sensitivity of ScoliScore is 90% (87–93)
  - Specificity of ScoliScore is 88% (86–90)
- Sensitivity and specificity were confirmed in two clinical trials, with each trial including over 400 scoliosis patients
Scoliscore

- **Indications** Adolescent Idiopathic Scoliosis
- Ages 9 to 13 years
- Self reported Caucasian males and females (North American, South American, European, Eastern European, Middle Eastern)
- Mild Curve (10° - 25° Cobb angle)
<table>
<thead>
<tr>
<th>Progression</th>
<th>Brace Start</th>
<th>Correction</th>
<th>Brace End</th>
<th>Post-Op</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 yrs. - 26° Risser 0</td>
<td>12 yrs. - 30° Risser 0</td>
<td>13 yrs. - 31° Risser 0</td>
<td>14 yrs. - 44° Risser 3</td>
<td>14 yrs. Risser 4</td>
</tr>
</tbody>
</table>

**High Risk for Progression:**
ScoliScore™ is 194
Clinical Question

Should this young girl be referred for Scoliscore or traditional management with radiographic examinations, bracing, and then surgical intervention?
Scoliotic spine

Spinal fusion

Steel rods help support the fusion of the vertebrae

Bone grafts are placed to grow into the bone and fuse the vertebrae
Diagnosis is the key to successful treatment
Suggested Reading

• Horne JP, Flannery R and Usman S.
• Adolescent Idiopathic Scoliosis: Diagnosis and Management. American Family Physician: Volume 89, Number 3, February 1, 2014.
Thank you in different languages.