Biomechanics of Scoliosis Treatment
A Few Highlights
Oct. 9, 2009

The Basic Geometry Of Idiopathic Scoliosis

- Full Curves
- Fractional Curves
- Inflection Points

Remember...

- Higher curves tend to be less flexible than lower curves (more tightly constrained by rib cage)
- Higher curves are most harmful cosmetically
Beware of High Fractional Curves

- They graduate to nasty full curves
- Especially when we over treat double curves

Most Important Step In I.S. Radiograph Evaluation:

Draw the Central Sacral Line

The Spine, with the CSL on the Radiograph Tells You...

- What to do
- What not to do
The Goal

Move the spine toward the CSL where it ought to be

NOT

Minimize each and every Cobb Angle

Orthotic Forces

• What do they do?
  – Good
  – Bad

The various effects of "corrective" pressures on the thorax are best understood by looking at the orthogonal component vectors

Let's Look First At the Anteriorly-Directed Component of That "Corrective" Pressure Exerted Against the Thorax
External forces used to rotate the vertebra back toward physiological alignment.

Anterior Component of thoracic pad force tends to decrease thoracic kyphosis.

Now Let’s Look At the Medially-Directed Component.

The Medially-Directed Component Has A Second Influence on the Deformity:
- Can be beneficial
- Can be detrimental

Clockwise tilting effect of right thoracic force reinforces the deformity below the apex.
Clockwise tilting effect of thoracic force tends to correct the deformity above the apex.

You May Have Been Taught to Place T-Pads Under the Curve Apex. That Is Wrong.

Now Let’s Look At A Left Lumbar Pad

Abdominal compression causes an increase in intra-abdominal pressure.
Increased intra abdominal pressure pushes the thorax upward and the pelvic floor downward. The result is spine traction.

Passive “Pelvic Tilt” (Decreased Lumbar Lordosis) Induces Active Thoracic Extension (Reduced Thoracic Kyphosis)

The Induced Thoracic Extension May Be Positive Or At Least Not Harmful

Or the Induced Thoracic Extension May Cause Hypokyphosis
Juvenile & Adolescent Idiopathic Scoliosis Patients Are Not Inactive Structures!

Many I.S. Orthotic Designs Assume Correction Relies Entirely Upon A 3-Point Force System Spanning Each and Every Curve.
The Message:
Maximize Patient Benefit
Minimize Patient Harm

Thank You For Your Attention!

Idiopathic Scoliosis
A discussion of how we measure severity of this orthopedic deformity
Prepared by: Marty Carlson
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St. Paul, Minnesota

INFORMAL SCOLIOSIS DISCUSSION GROUP
Host: Marty Carlson
Invitees: Tom Colburn Katie Voss Carol Hentges Tom Gavin
Don Katz Keith Smith Kevin Meade Miguel Gomez
Coronal Balance Summation

1. Validity – Seems to add much to the Cobb Angle but requires a study
2. Practical – YES
3. Repeatable – YES
4. Precision – Probably, but needs reassurance of a study
CBS

Not useful for neuromuscular scoliosis