

Classification of EOS Treatment

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*3rd International Congress on Early Onset Scoliosis and Growing Spine
(ICEOS) November 20-21, 2009 Istanbul, Turkey*



Disclosures

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Relationships Disclosed

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DePuy Spine (a, b, e), K2M (a, b, e)
Ellipse (b), Medtronic (a)

**No Disclosure in Relation to This
Presentation**

(a) Grants/Research Support

(b) Consultant

(c) Stock/Shareholder

(d) Speakers' Bureau

(e) Other Financial Support

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EOS

- Significant variations exist in recommended treatment options for EOS

Sponseller, et al: Submitted to JPO

Vitale et al: submitted to CORR

Salari et al: IMAST 2009



Need to speak the same language

Treatment

1. Non-Surgical
2. Fusion
3. Growth Friendly Techniques

Non-Surgical Treatment

- Casting
- Bracing
- Stretching /exercise

Non-Evidence Based Treatment

Early Fusion = Poor Pulmonary Function

Emans, et al

- 13 pts
- 2.6 years
- 7 vertebrae
- 11 yr f/u
- FVC 62% (34-95%)
- ↓ PFTs with earlier fusion
- ↓ PFTs with more vertebrae fused

SRS, 2004

Goldberg, et al

- 11 patients
- 4.1 years
- 16 year f/u
- FVC 41% (12-67%)

Rare <9 yo

Spine, 2003

Classification of Growth Friendly Techniques

1. Distraction based

- Growing Rods
- VEPTR
- Remote Lengthening (Phenix/ Ellipse)



< age 8 ?

< age 9 ?

All etiologies

Growth Friendly Implant Classification

1. Distraction based

- Growing Rods
- VEPTR
- Phenix



< age 8 ?

< age 9 ?
All etiologies

2. Guided Growth

- Luque-Trolley
- Shilla



< age 9 ?
All etiologies

Growth Friendly Implant Classification

1. Distraction based

- Growing Rods
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All etiologies

Only VEPTR FDA
Approved for Spine*

2. Guided Growth

- Luque-Trolley
- Shilla



< age 9 ?
All etiologies

3. Tension Based

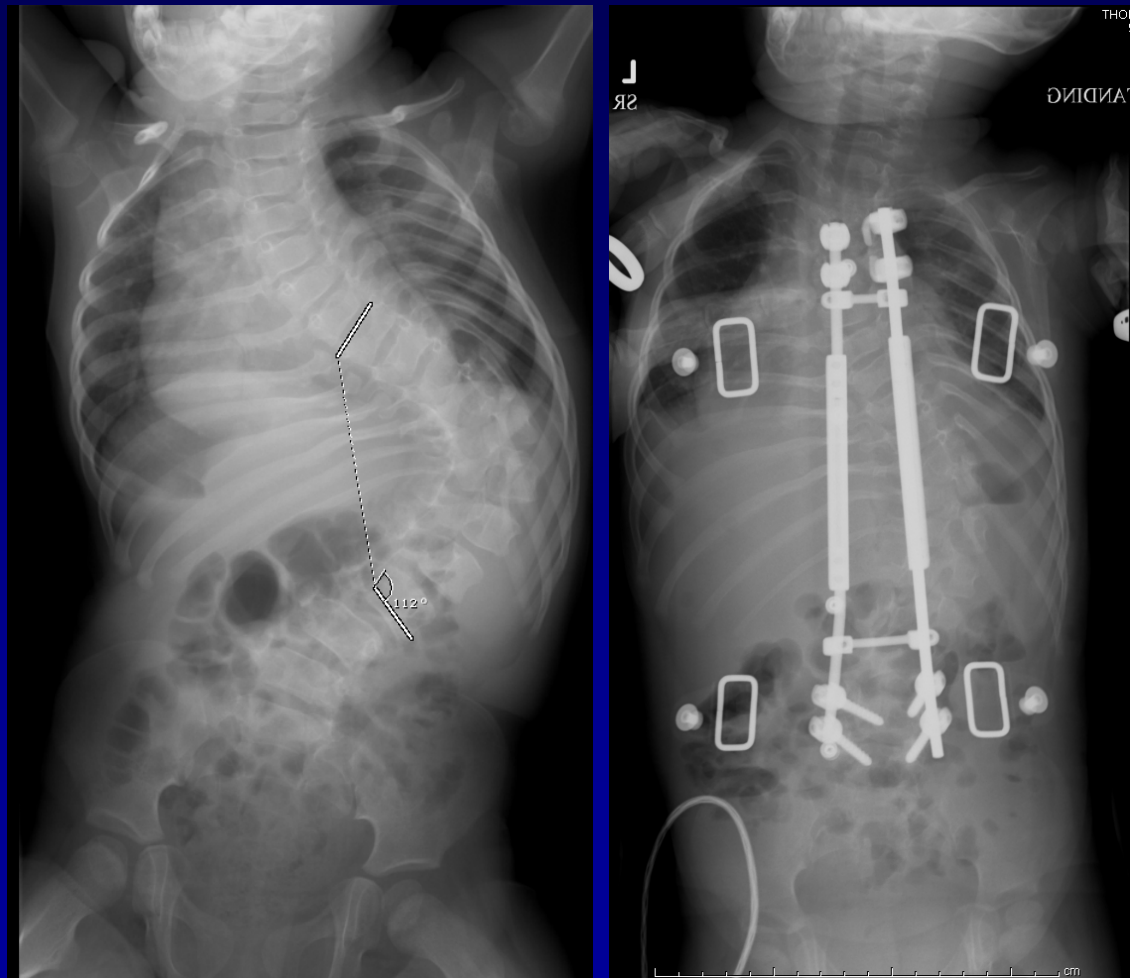
- Tether
- Staple



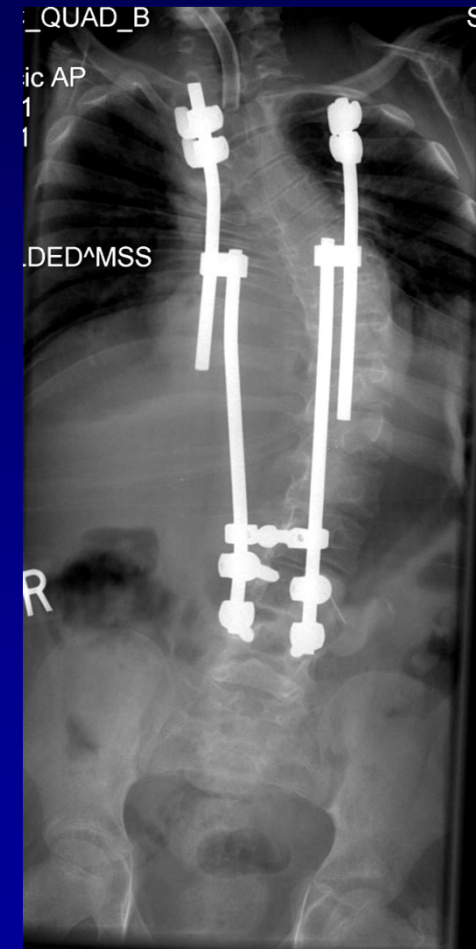
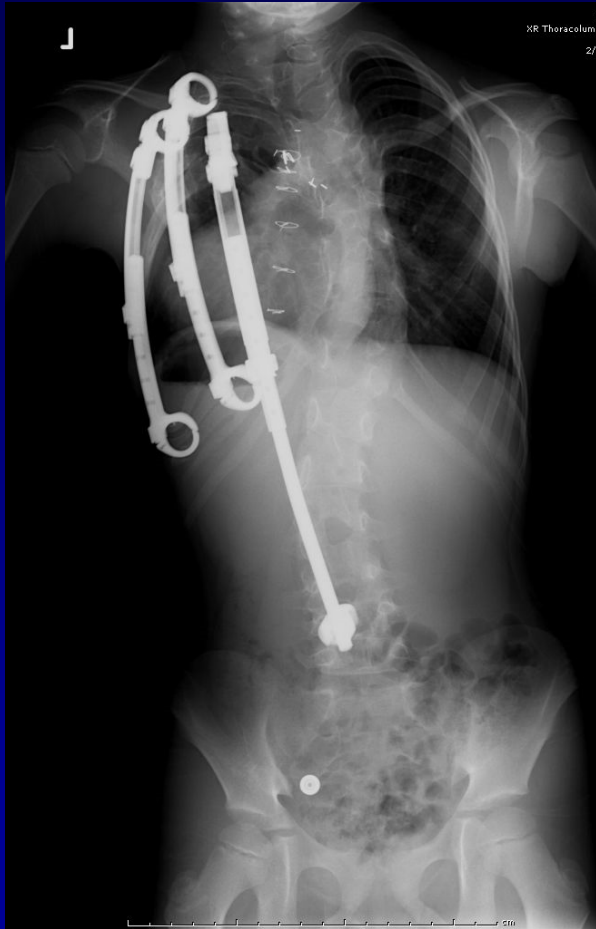
>age 8
Non-congenital

Distraction Based – Traditional Growing Rods

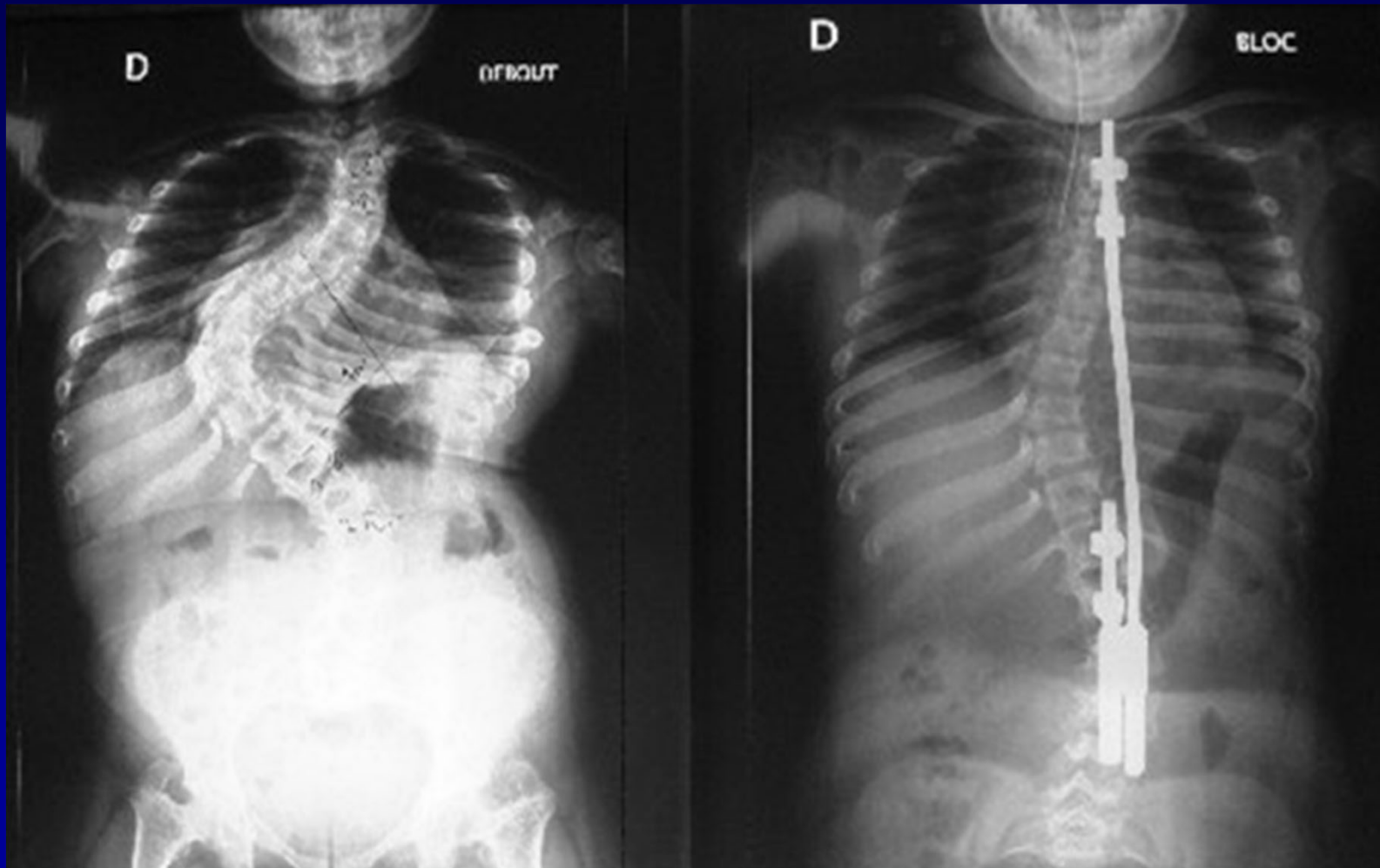
- Spine Anchors
- Surgical Distraction
 - @ 6 months
- Final Fusion



Distraction Based – Rib Anchors +/- thoracotomy



Distraction Based – Non-surgical Distraction - Phenix

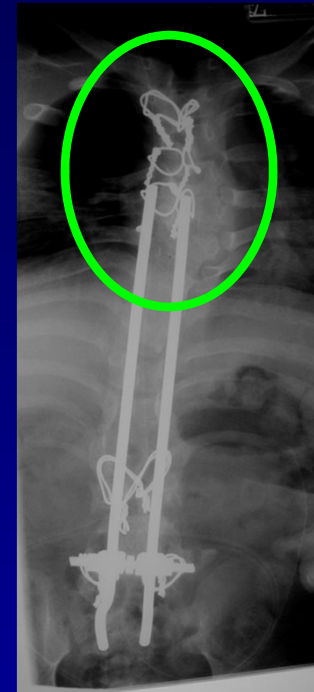


Guided Growth

- Luque Trolley
- Shilla

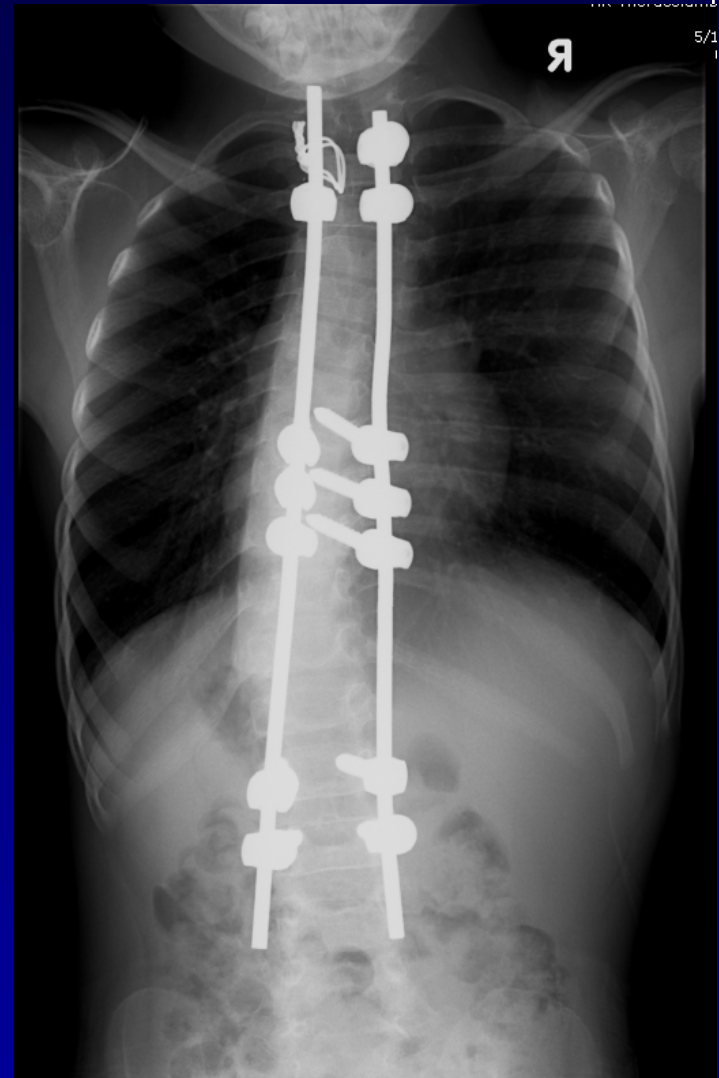
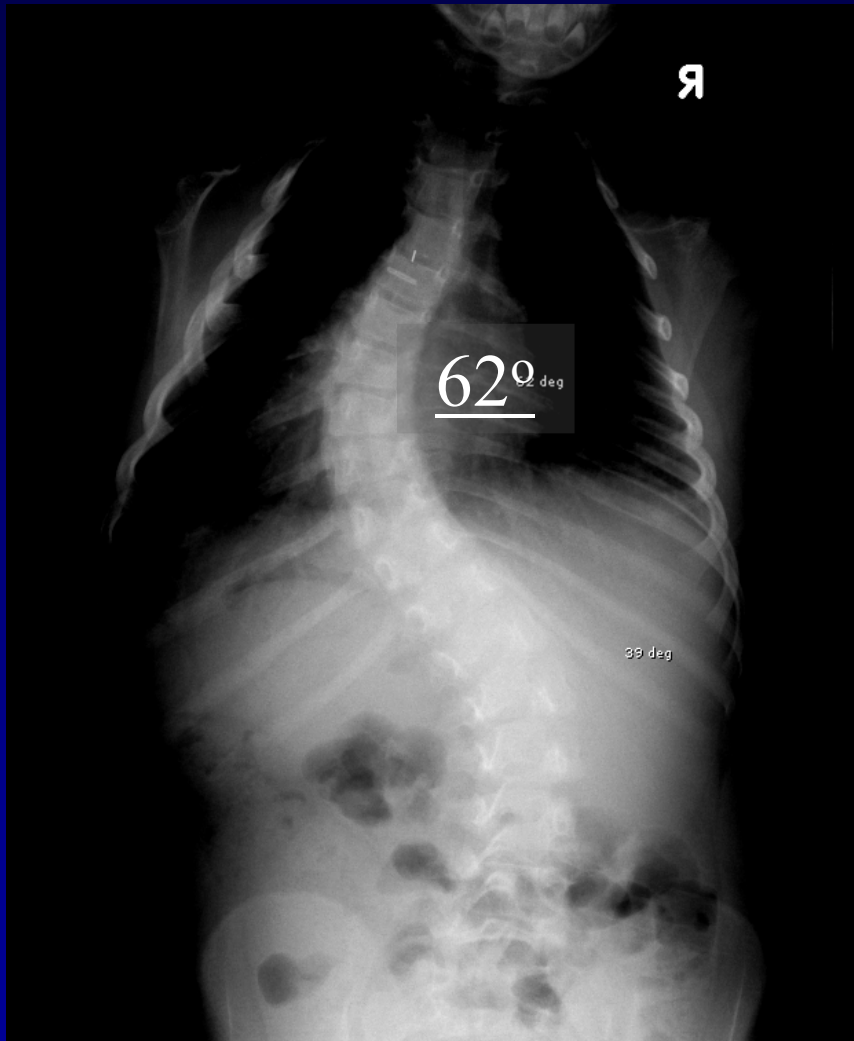
Luque Trolley (no apical fusion)

- 9 pts. 9 years old
- All fused spontaneously
- All required further surgery
- 7/9 instrument failure
- Pre-op curve 50° - Final curve 51°
- Little growth of instrumented area – vague



Shilla

2+10 yrs 62° progressive



Developed by Rick McCarthy

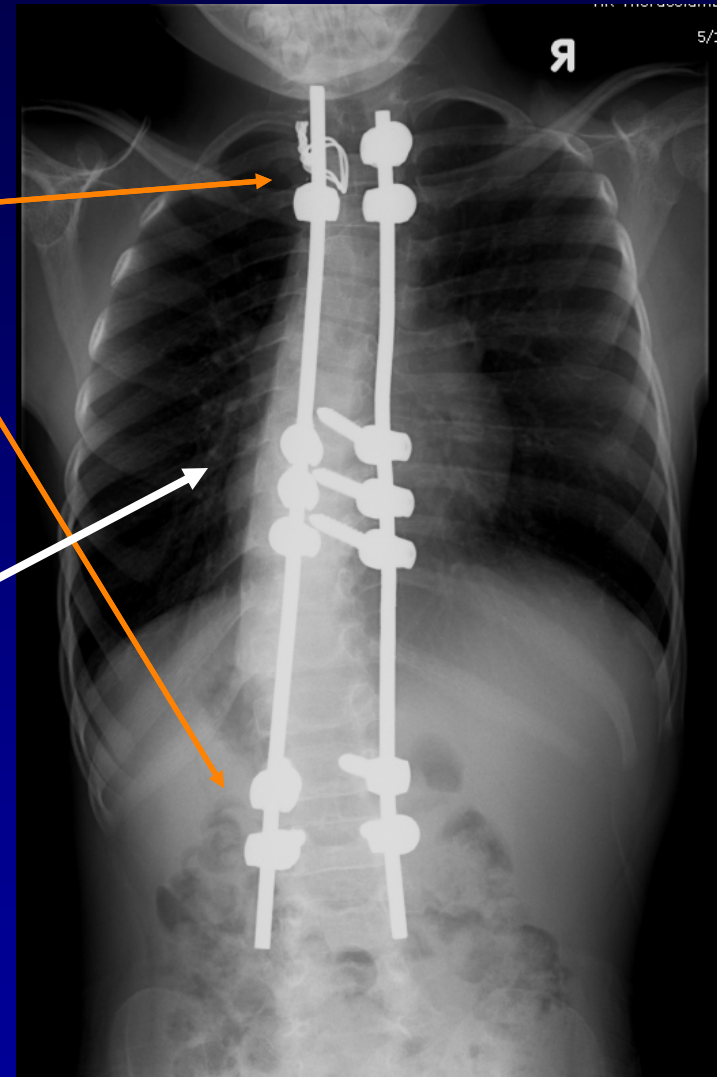
Shilla

Open Screws – no fusion

no bone exposed
allow rod to slide
multiaxial

3 level fusion

compression
distraction
derotation

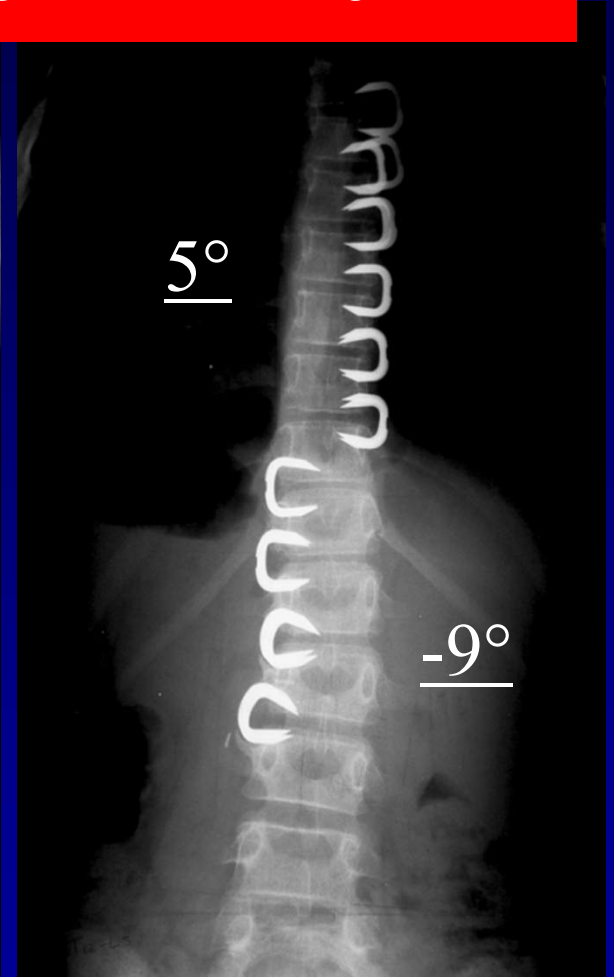
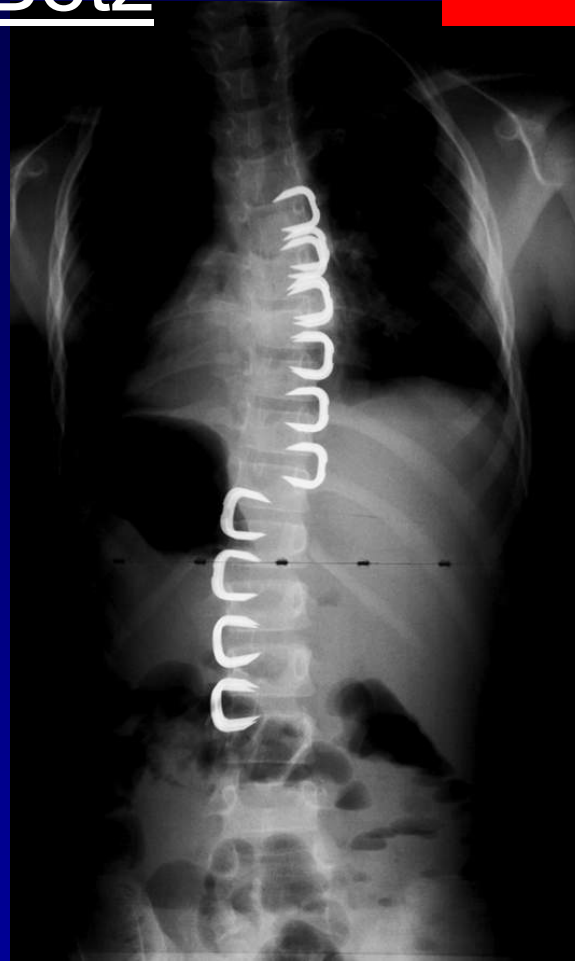
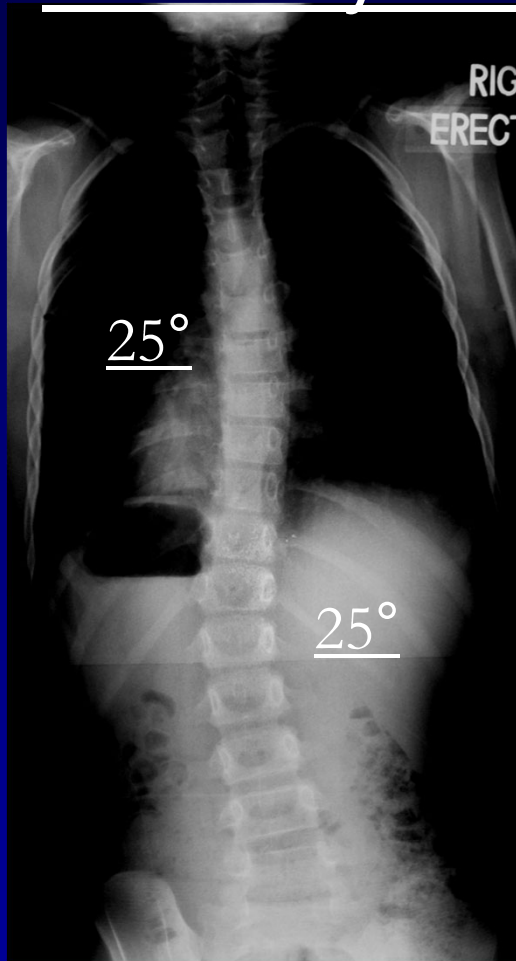


Tension Based Treatment

- Staples
- Tethers
 - Growth Restricting
 - ? “Older” young kids

8 yo female 3 year f/u
Courtesy Dr. Betz

Best for curves $<25^\circ$
With growth remaining

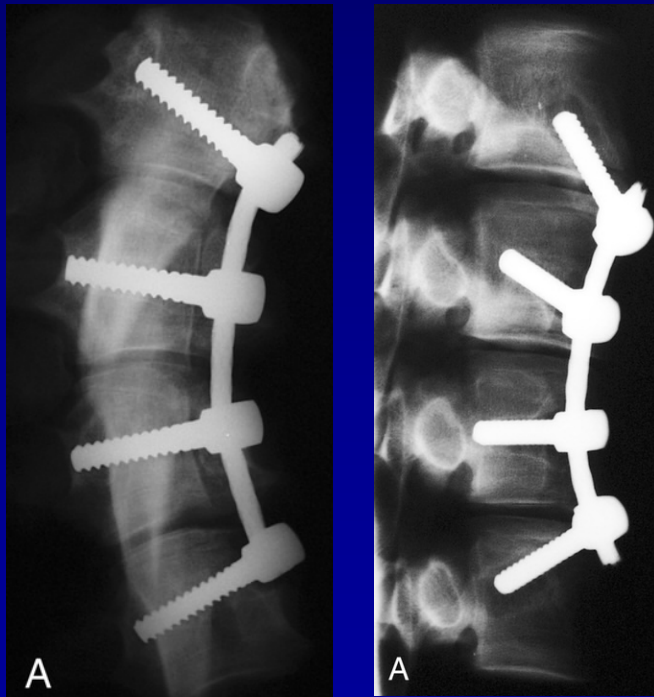


Nov. 2002

March 2005

Tethers

- Animal models
- Problematic
- Future ?



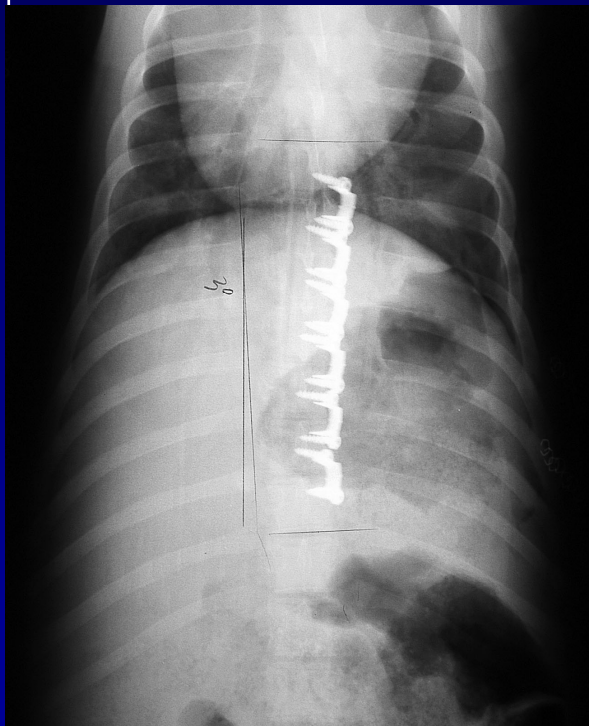
A
Newton, Spine, 2005



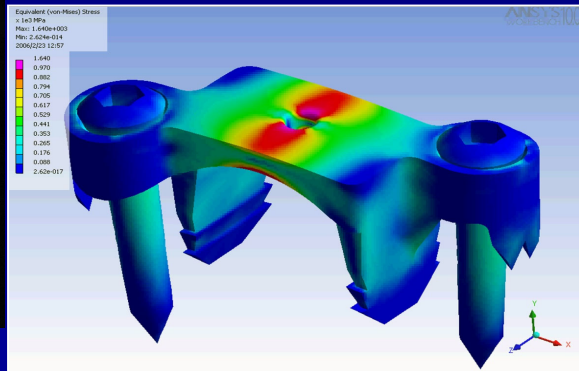
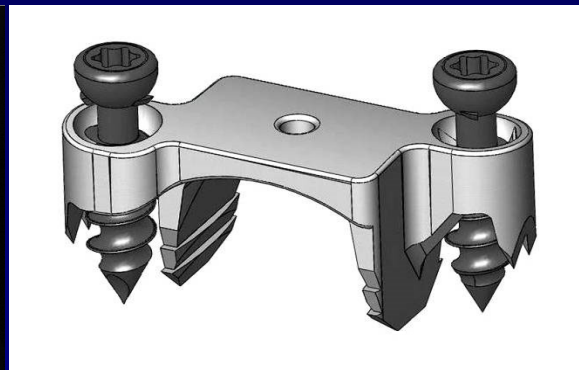
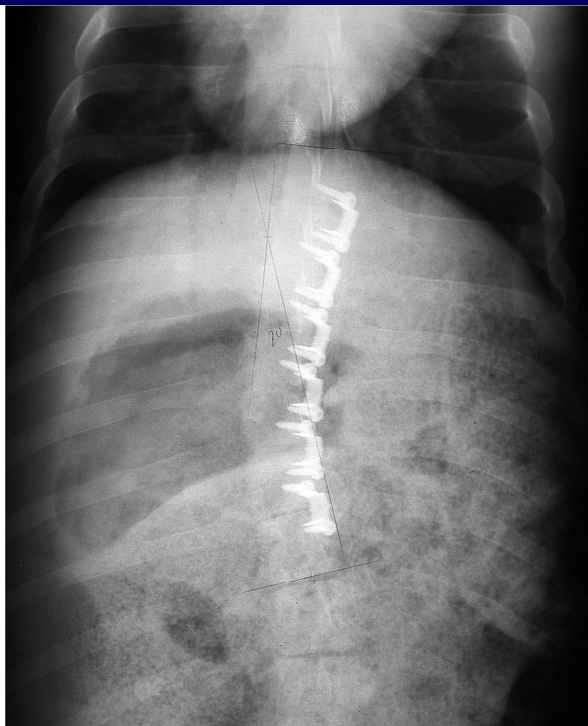
Braun, JBJS, 2006

Wall, 2009

Time = 0



Time = 8 weeks



Curvature increased

Treatment Classification

1. Non-Surgical

Little Published Evidence of Efficacy

1. Casts

2. Braces

2. Intentional Fusion

Evidence of Pulmonary Harm

3. Growth Friendly Implants

Complication Ridden

Best option for young children

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Thank you

