

Classification of EOS Treatment

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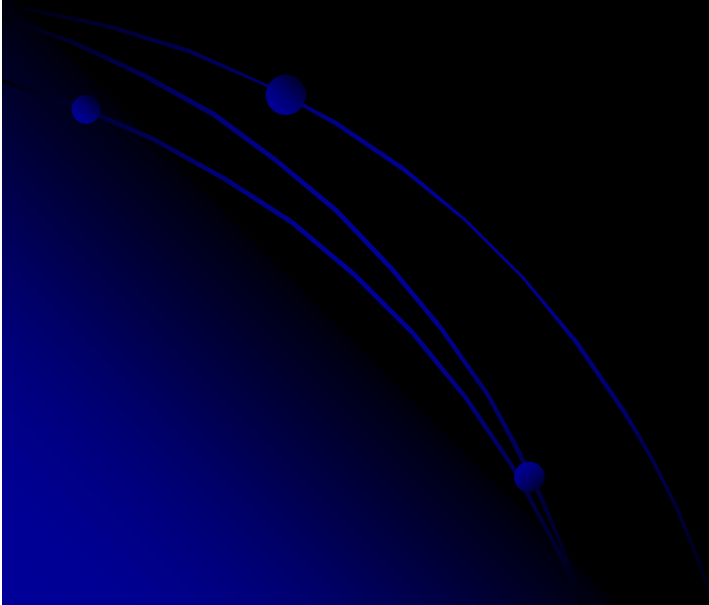
Children's Hospital
Los Angeles

University of
Southern California



Treatment

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



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%)

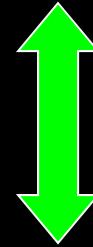
Rare <9 yo

Spine, 2003

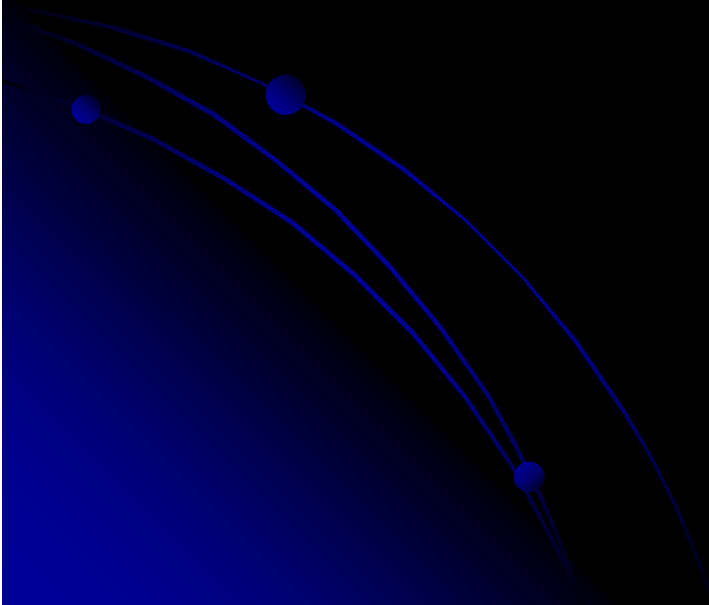
Growth Friendly Implant Classification

1. Distraction based

- Growing Rods
- VEPTR
- Phenix



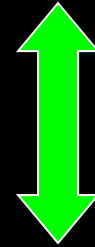
< age 9 ?
All etiologies



Growth Friendly Implant Classification

1. Distraction based

- Growing Rods
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< age 9 ?
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2. Guided Growth

- Luque-Trolley
- Shilla



< age 9 ?
All etiologies



Growth Friendly Implant Classification

1. Distraction based

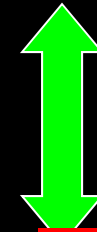
- Growing Rods
- VEPTR
- Phenix

2. Guided Growth

- Luque-Trolley
- Shilla

3. Tension Based

- Tether
- Staple



< age 9 ?
All etiologies

Only VEPTR FDA
Approved for Spine*



< age 9 ?
All etiologies

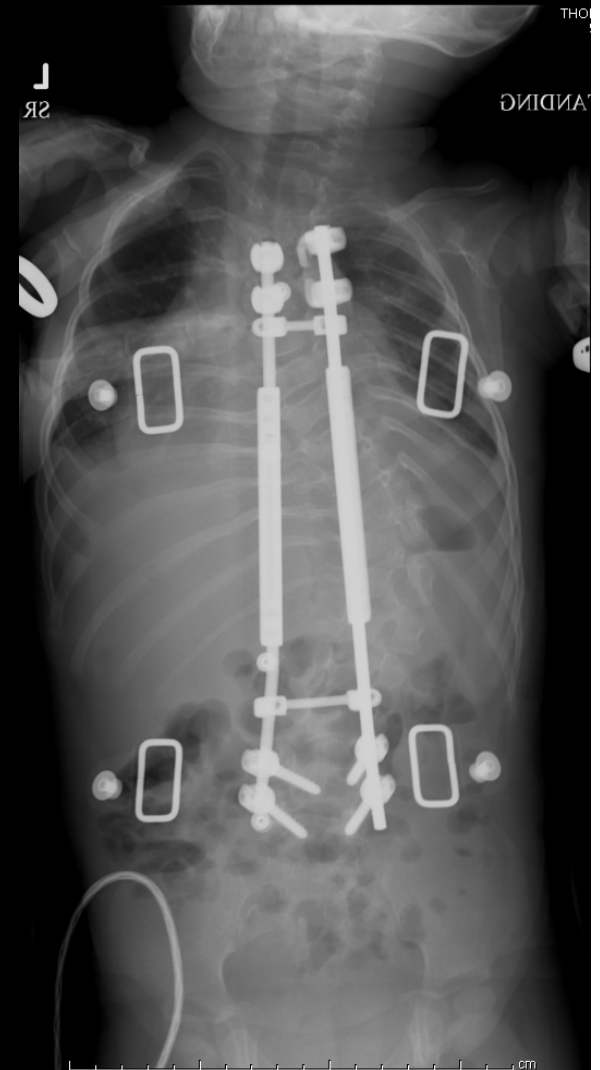
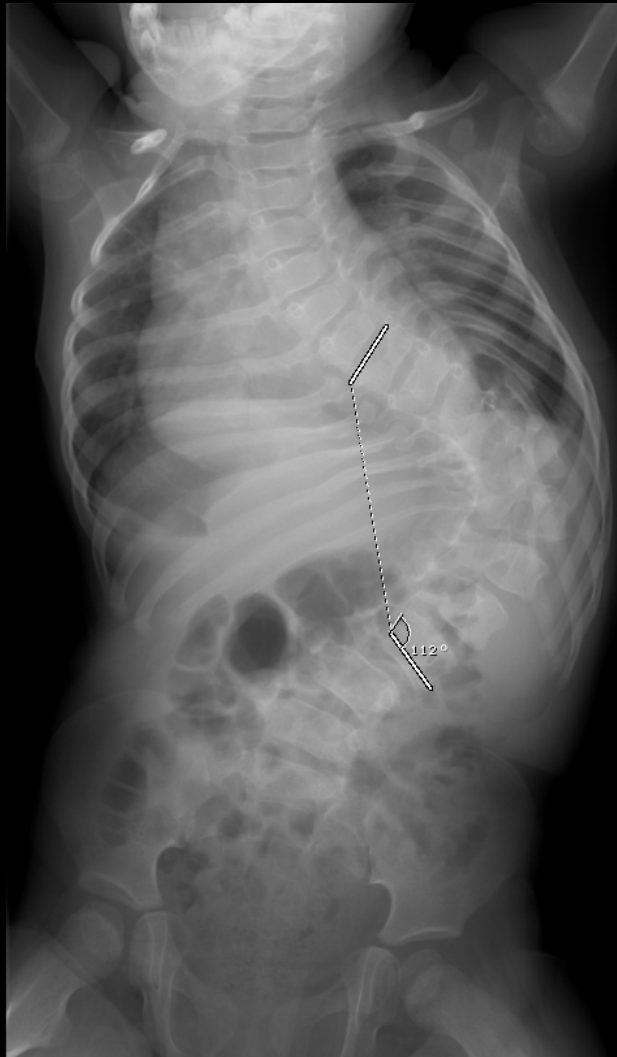


≥ age 8
Non-congenital

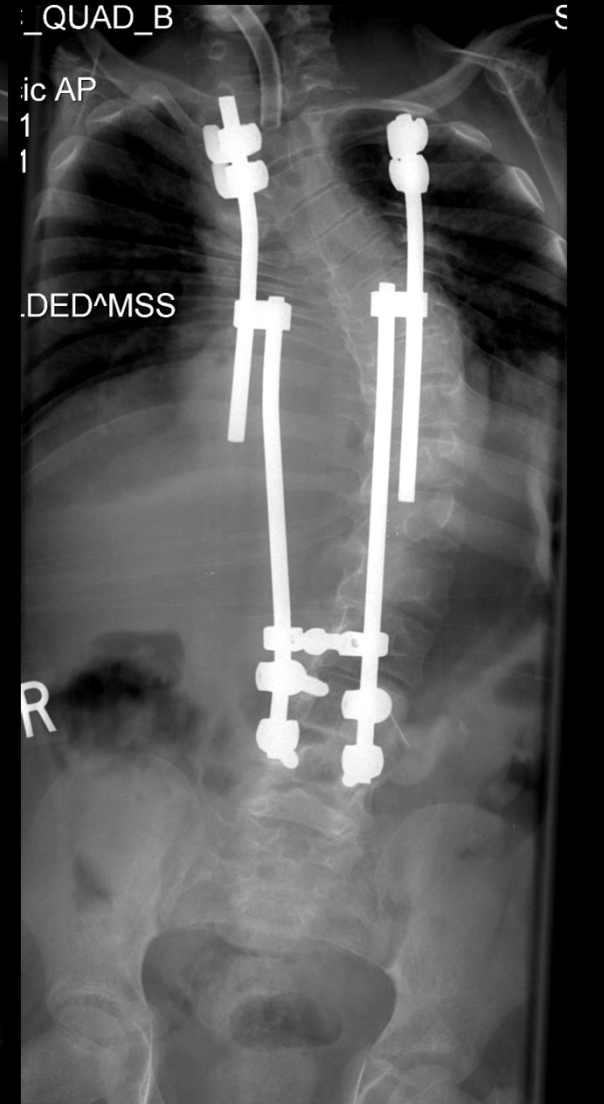
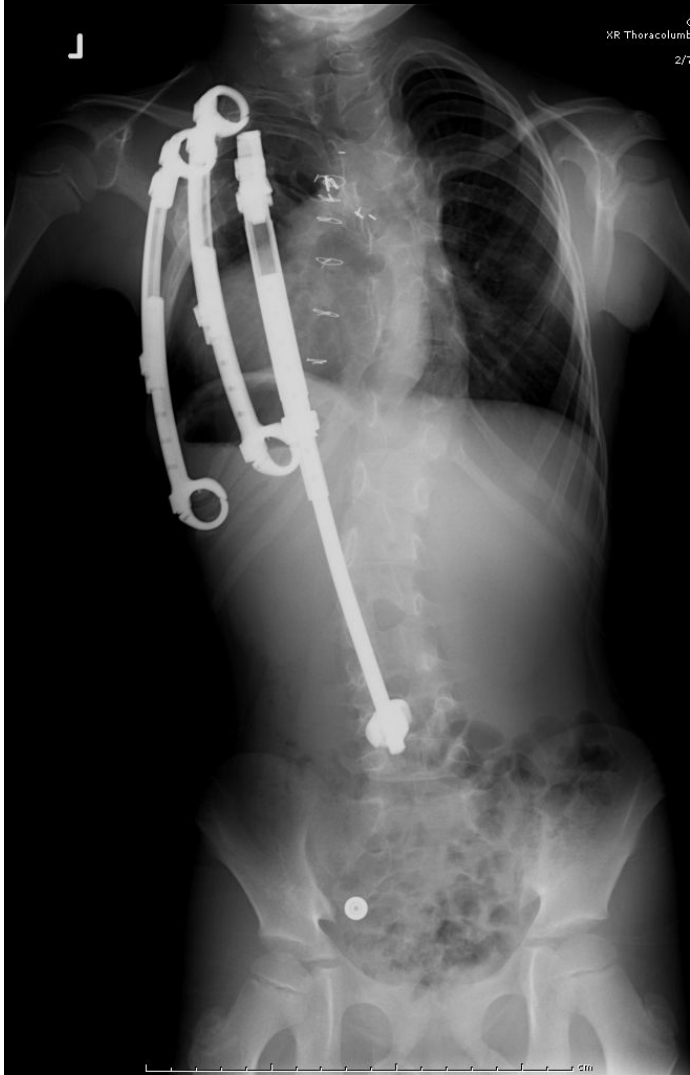


Distraction Based – Traditional Growing Rods

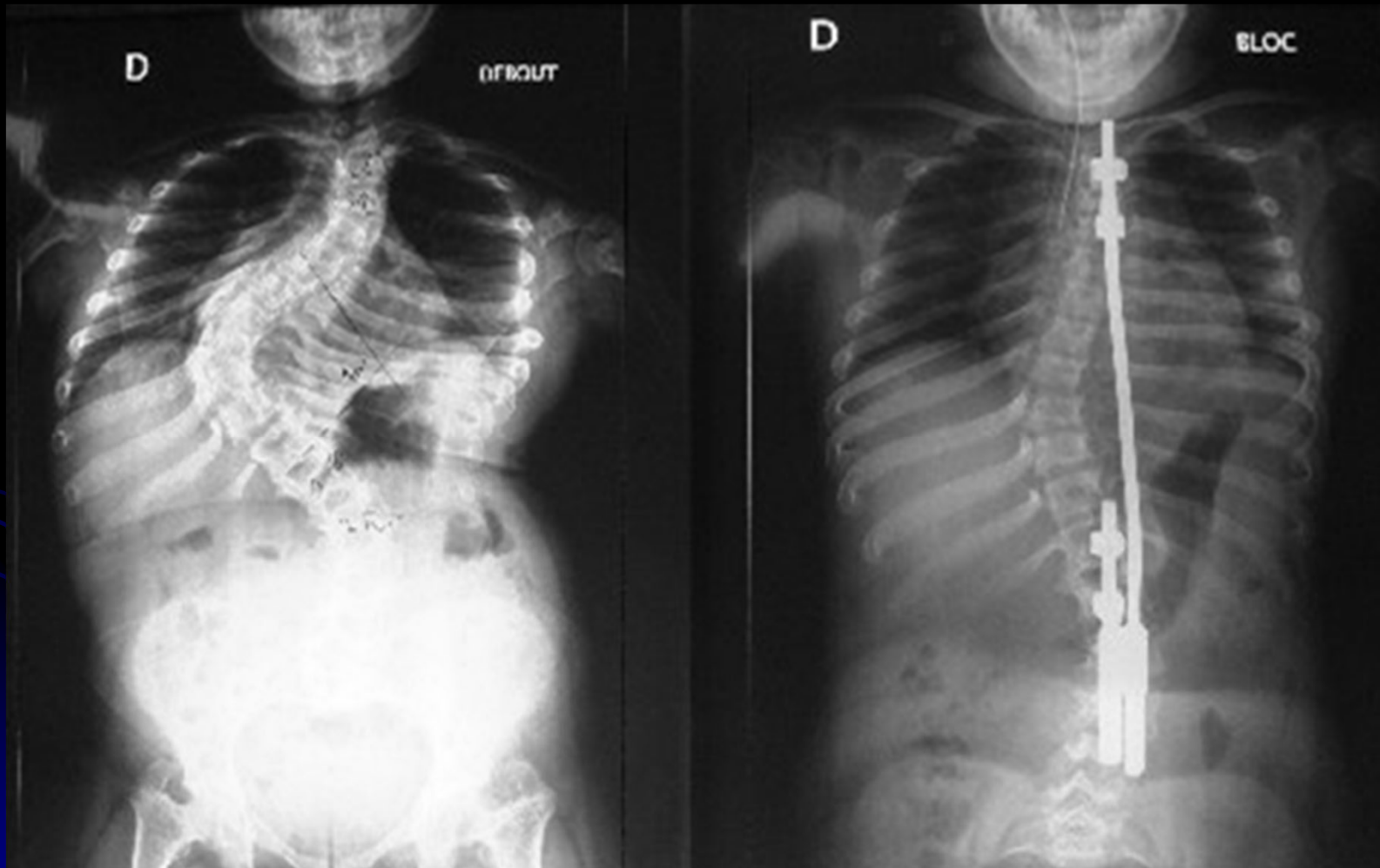
- Spine Anchors
- Surgical Distraction
 - @ 6 months
- Final Fusion



Distraction Based – Rib Anchors +/- thorocotomy

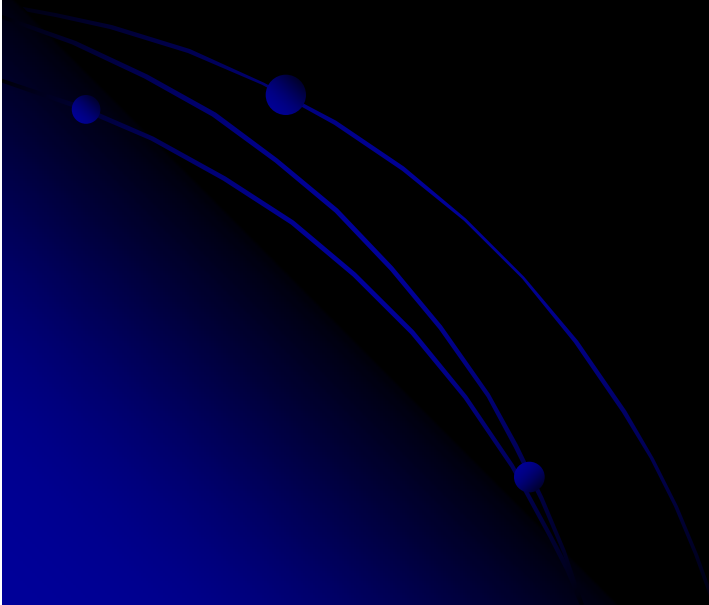


Distraction Based – Non-surgical Distraction - Phenix



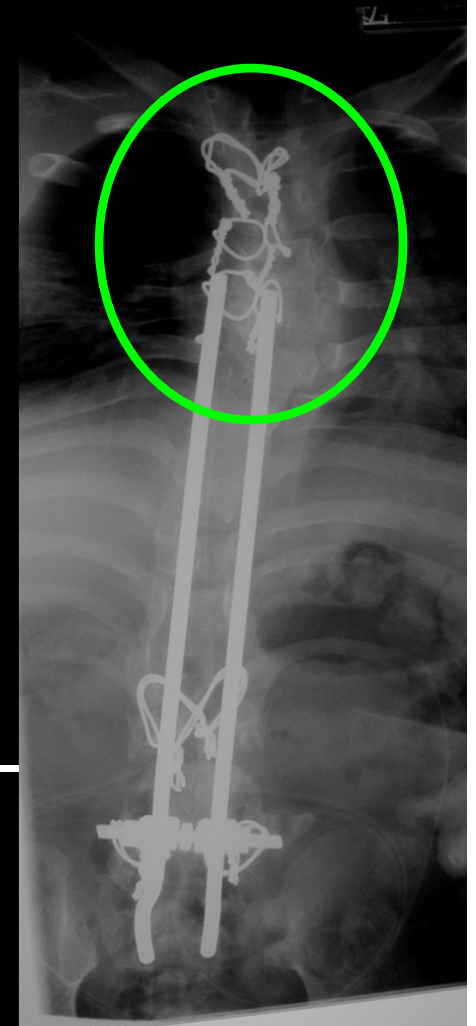
Guided Growth

- Luque Trolley
- Shilla



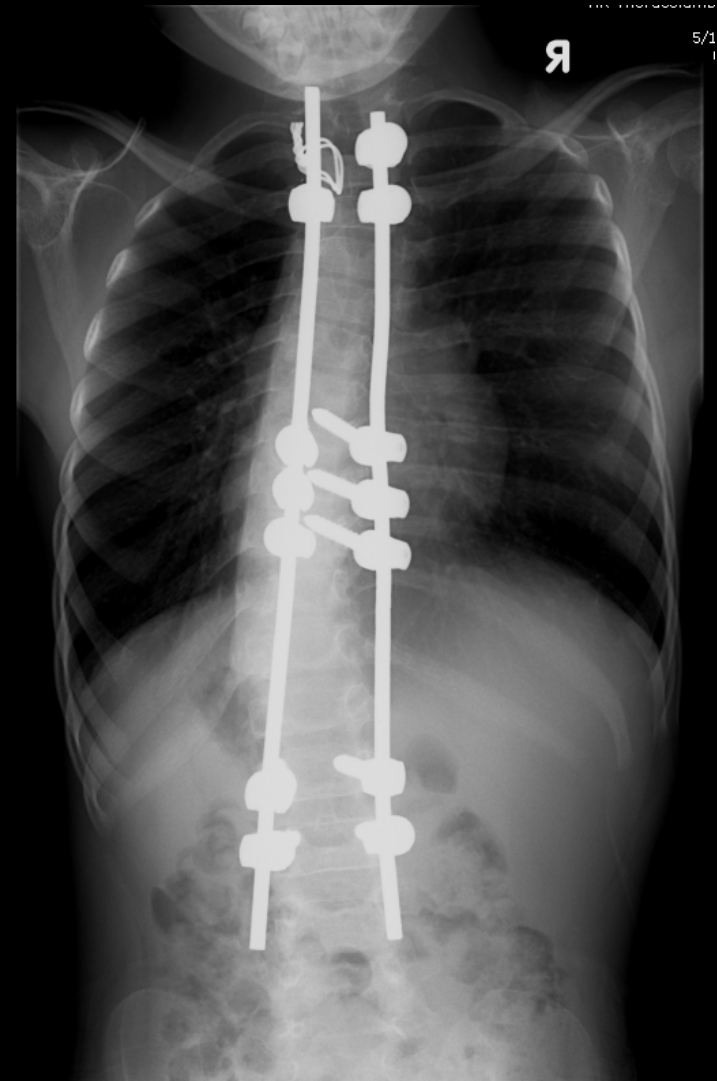
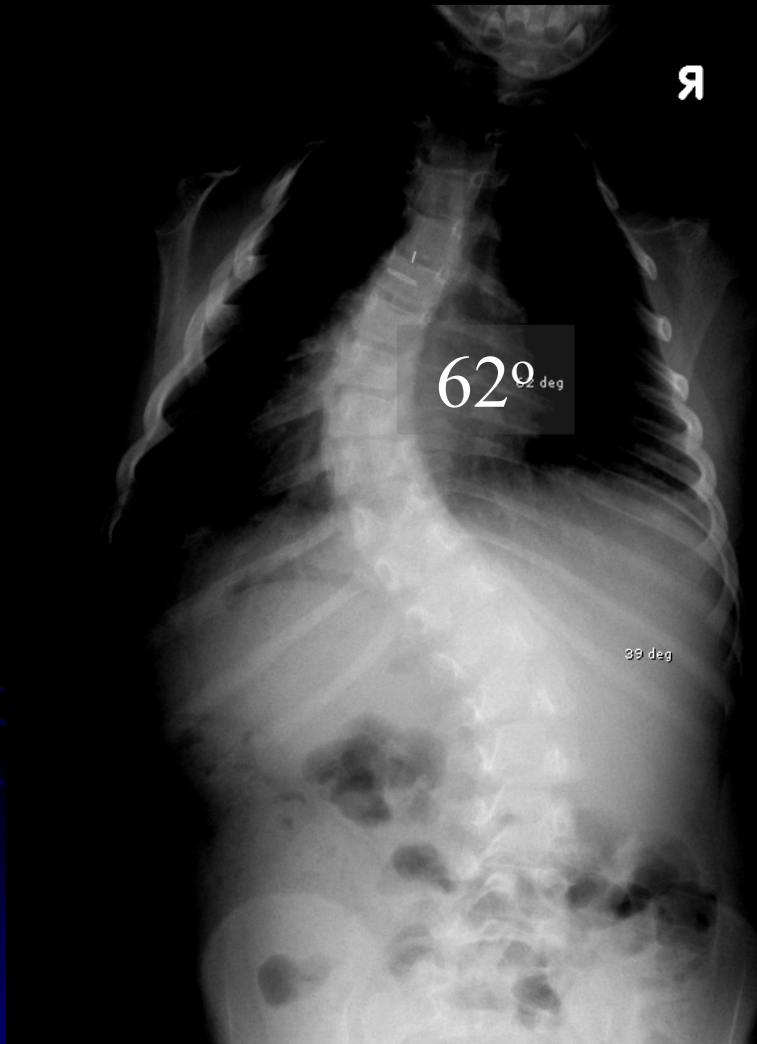
Luque Trolley (no apical fusion)

- 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 -



Shilla

2+10 yrs 62° progressive



Developed by Rick McCarthy

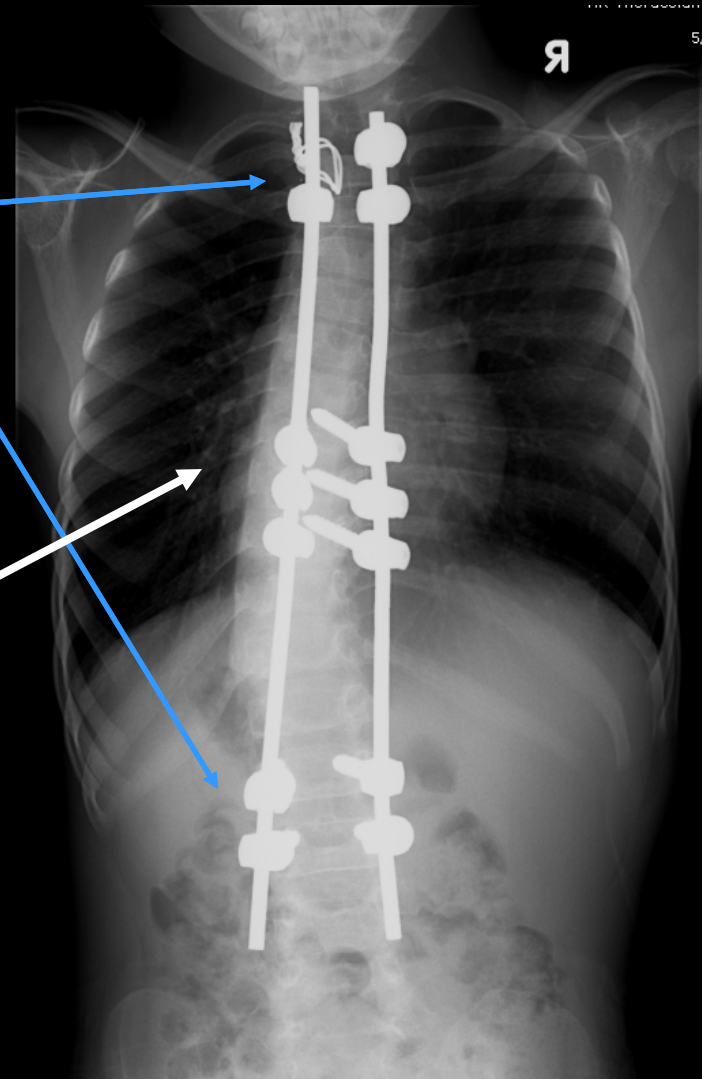
Shilla

Open Screws – no fusion

no bone exposed
allow rod to slide
multiaxial

3 level fusion

compression
distraction
derotation



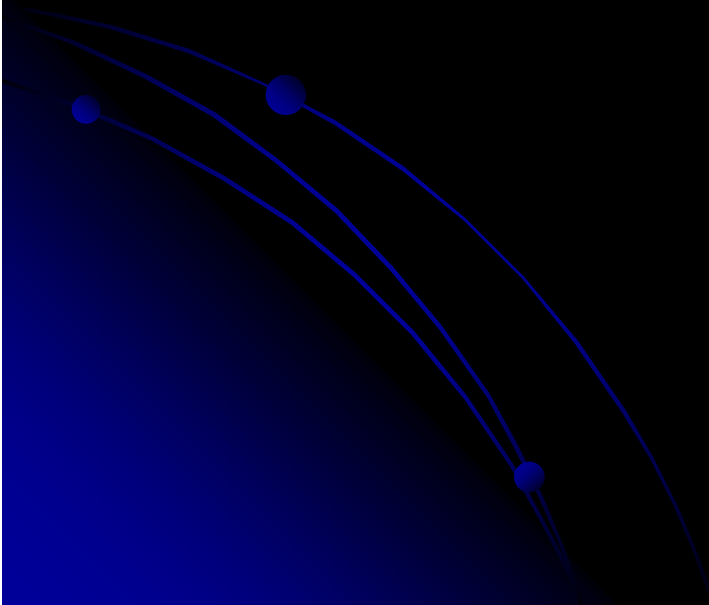
Tension Based Treatment

- Staples

- Tethers

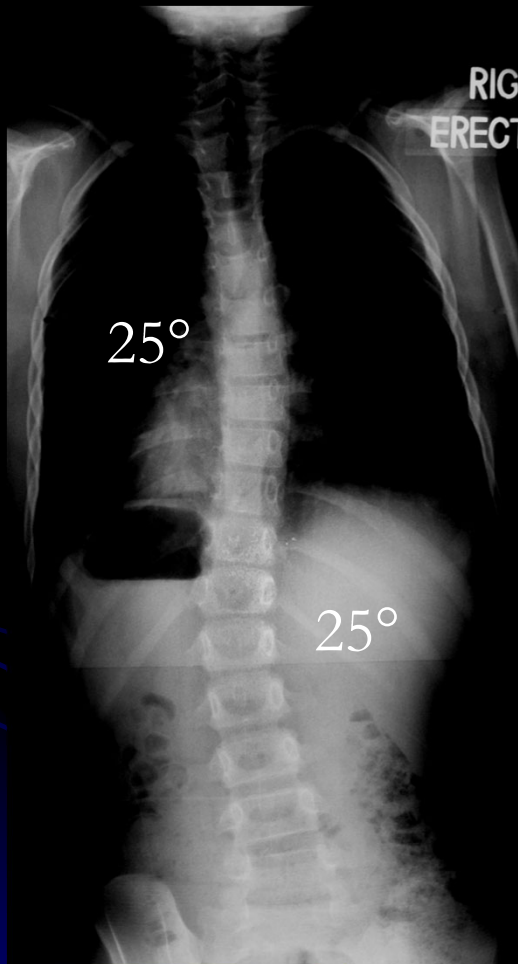
- Growth Restricting

- ? “Older” young kids



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

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



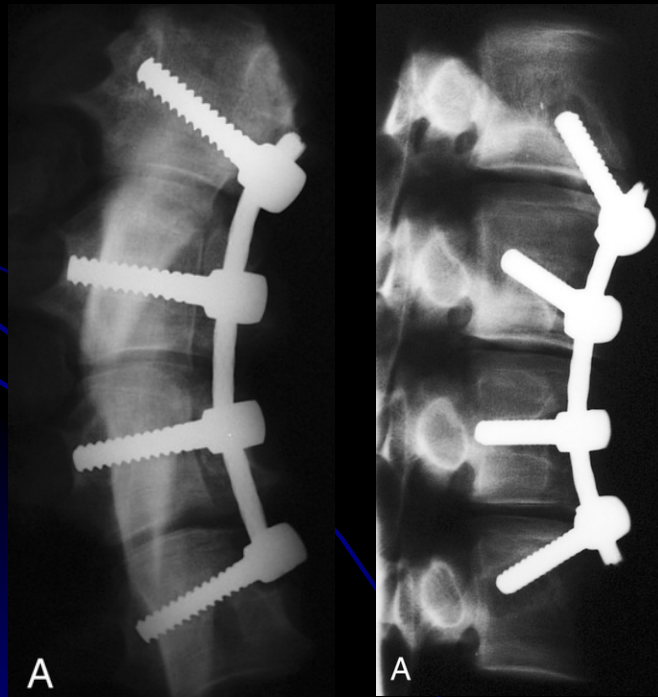
Nov. 2002



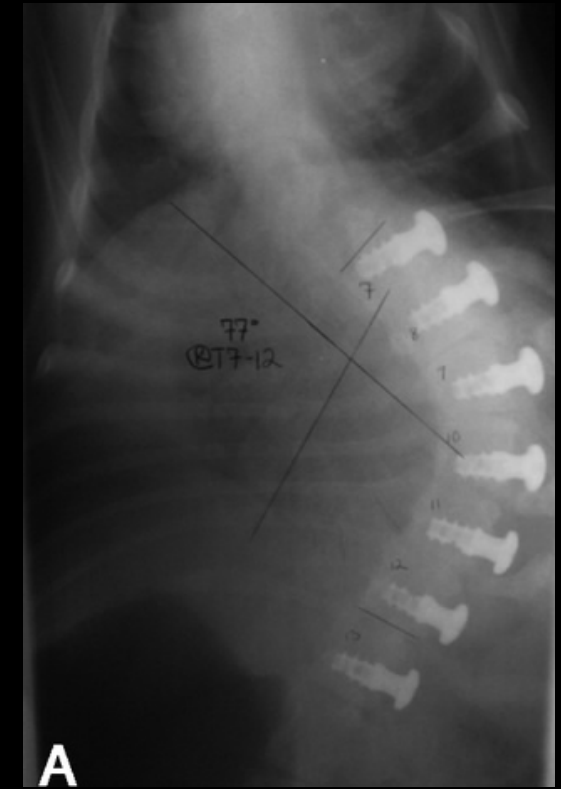
March 2005

Tethers

- Animal models
- Problematic
- Future ?



A
Newton, Spine, 2005



Braun, JBJS, 2006

Treatment Classification

1. Non-Surgical

Little Published Evidence of Efficacy

1. Casts
2. Braces

2. Intentional Fusion

Evidence of Pulmonary Harm

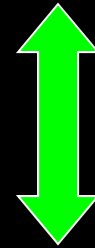
3. Growth Friendly Implants

Complication Ridden
Best option for young children

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Thank
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