Decision Making on Connectors

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GSF
Growing Spine Foundation

USC University of Southern California

Children's Hospital LOS ANGELES
CHILDREN'S ORTHOPAEDIC CENTER

Disclosure

- Consultant: Biomet, Medtronic, Stryker
- Royalties: Textbooks

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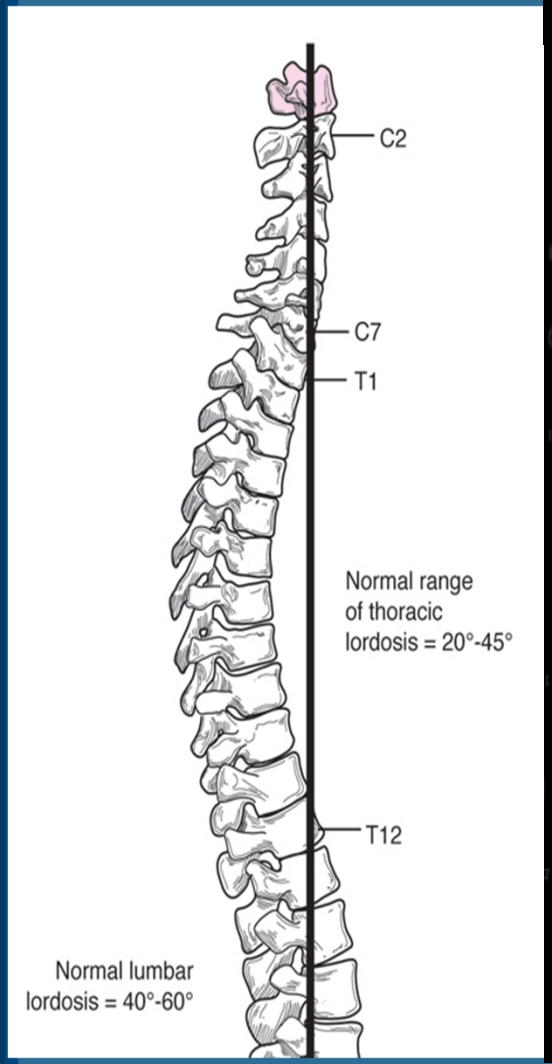
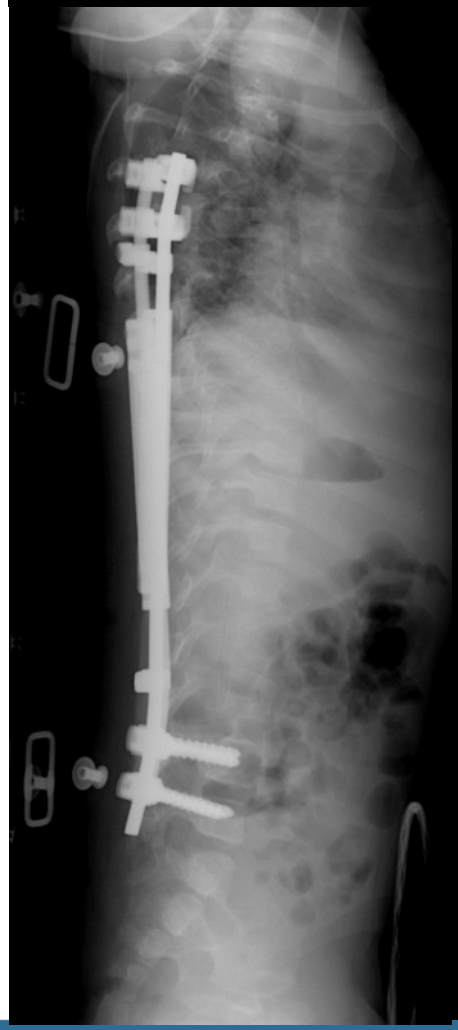
Decision Making on Connectors

1. Sagittal Contour
2. Prominance
3. Strength of Connectors

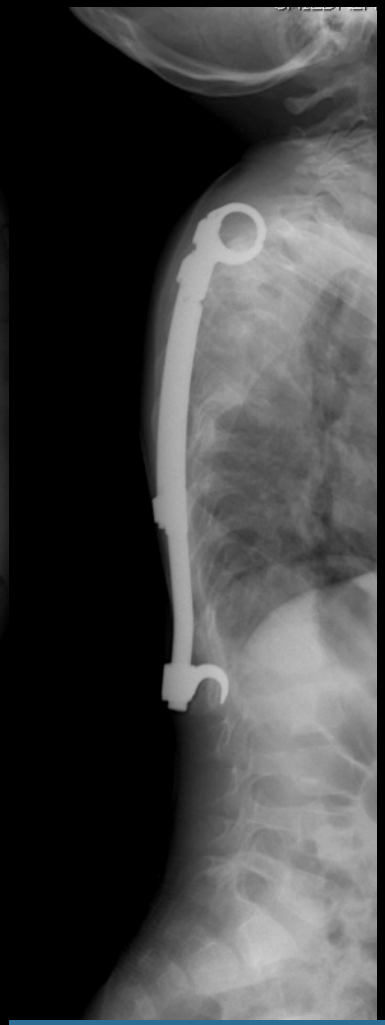
Sagittal Contouring



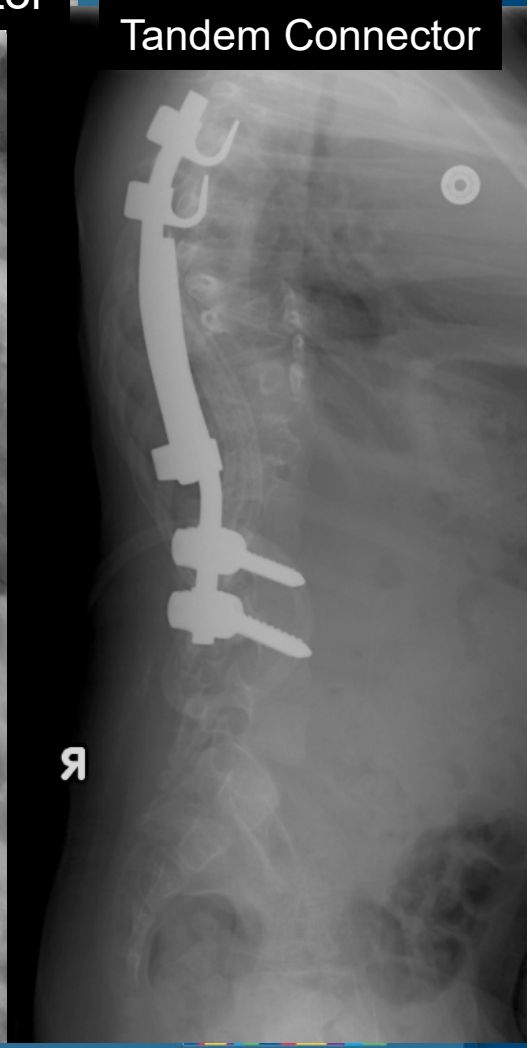
Straight Connector



Curved Connector



Curved Rod Tandem Connector



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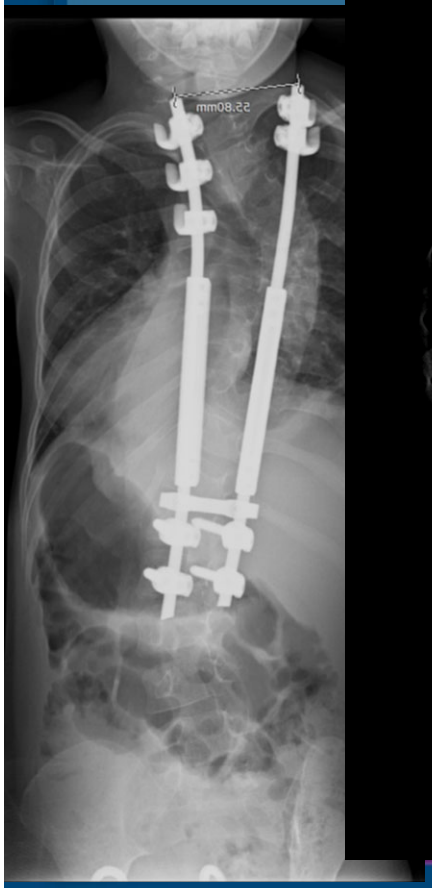
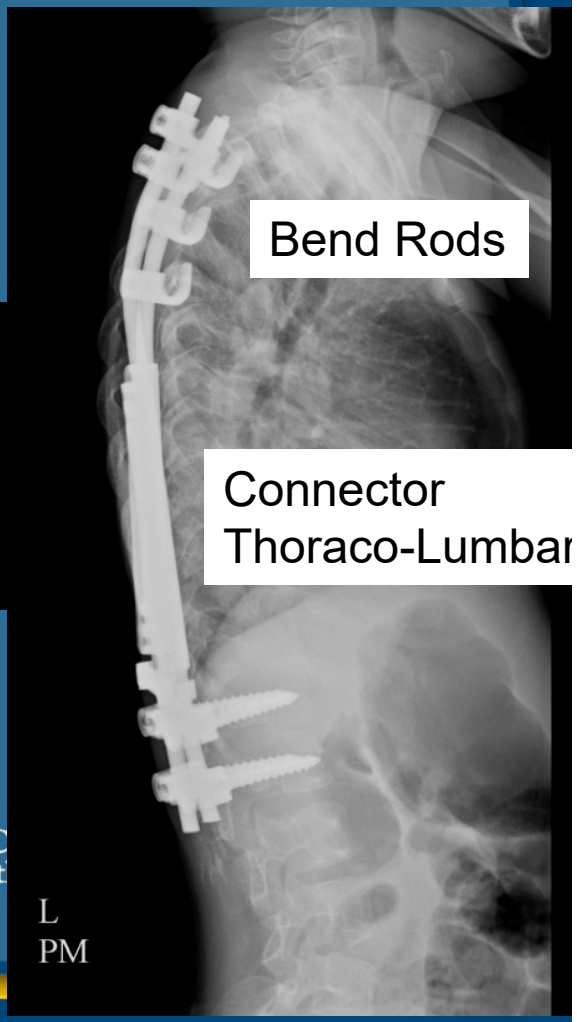
Straight Longitudinal Connector

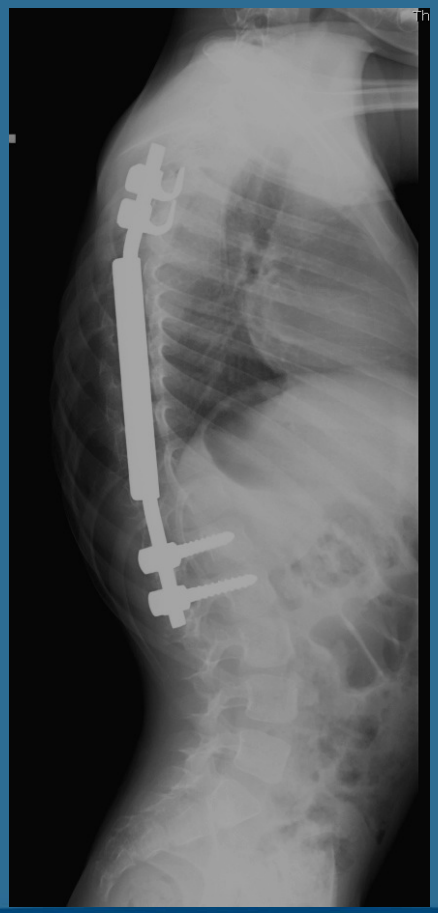


Too Long
Vs.
Few lenthenings



Straight Longitudinal Connector

Post Op



4 yrs post op

Bend Rods

Connector Thoraco-Lumba

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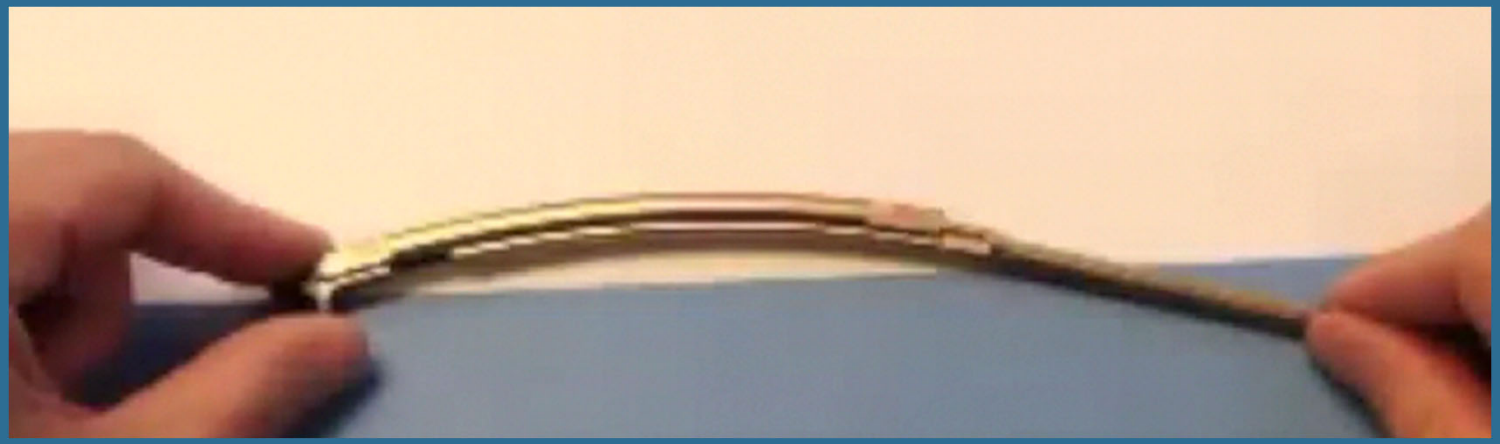
Lengthening Through Curved Rods

- More Posterior Prominence
- More Kyphosis



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Lengthening Through Curved Rods

- More Posterior Prominence
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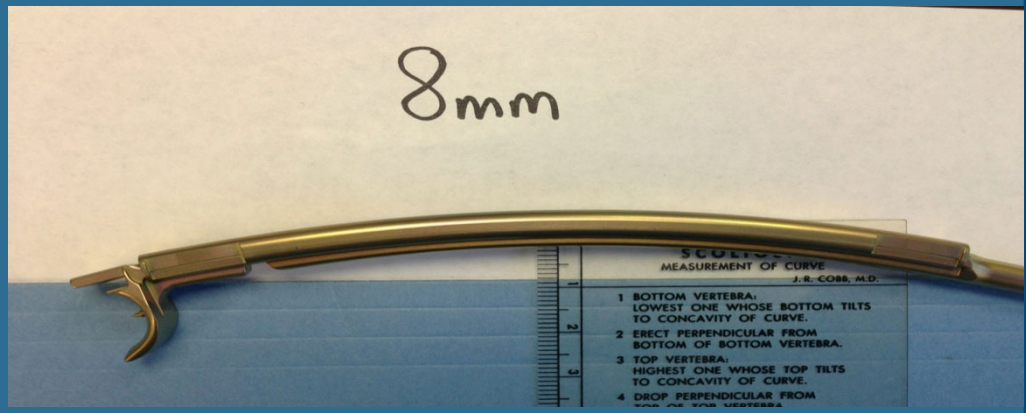

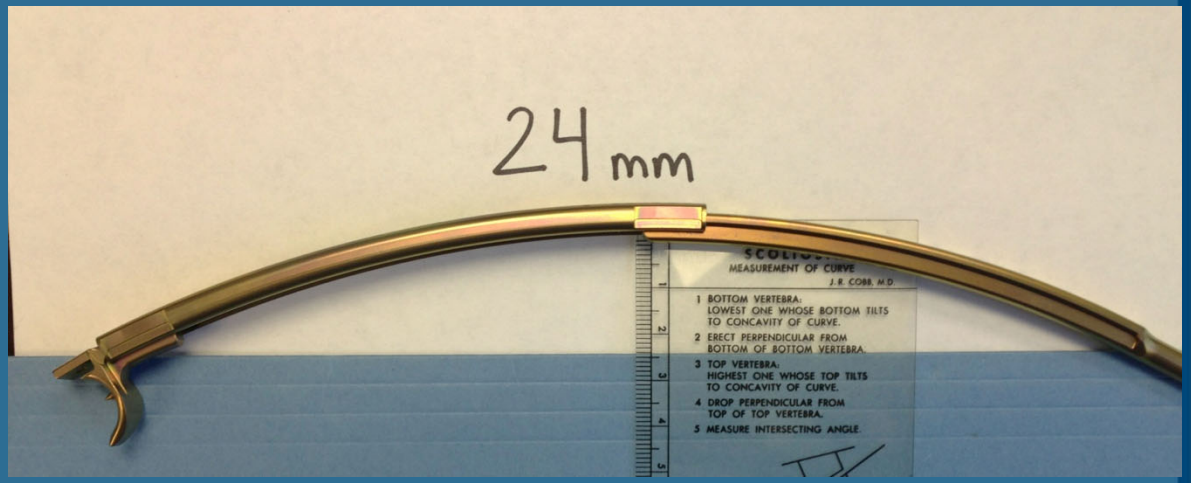

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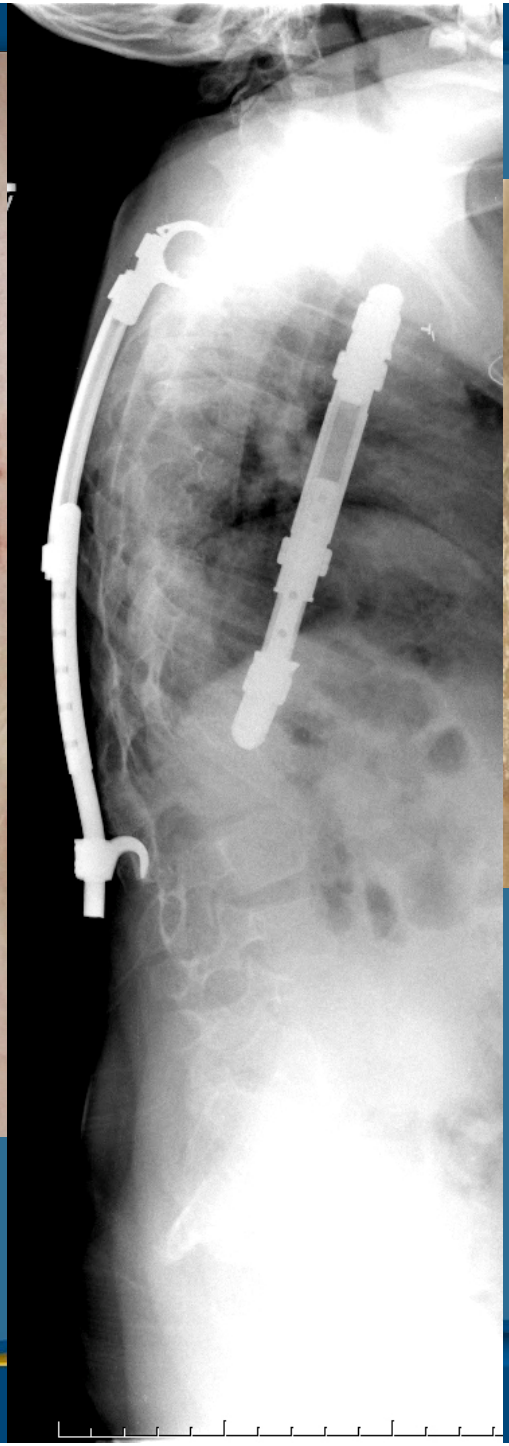

From
Charlie Johnston

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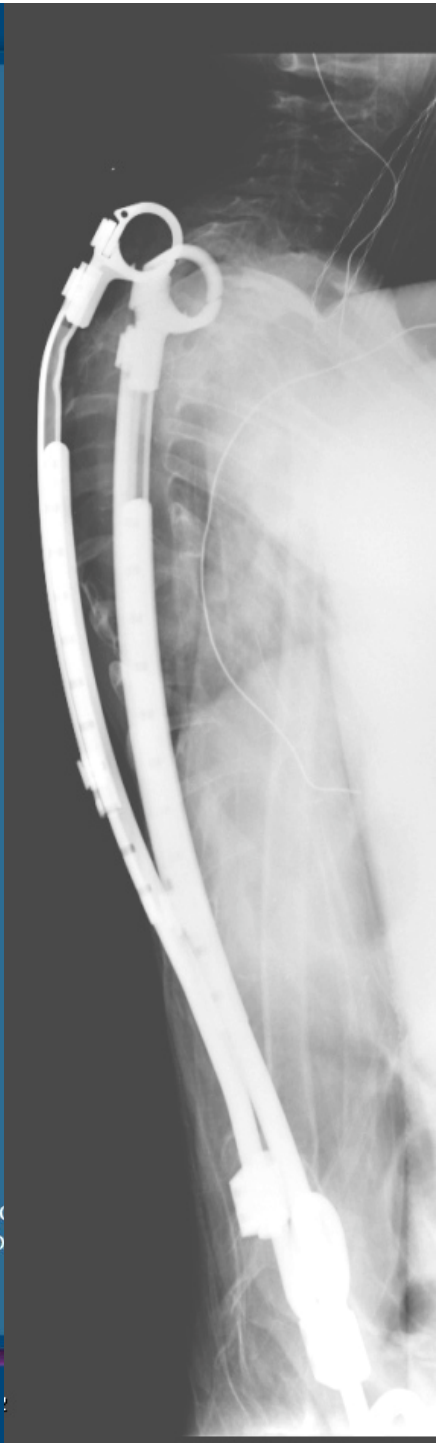
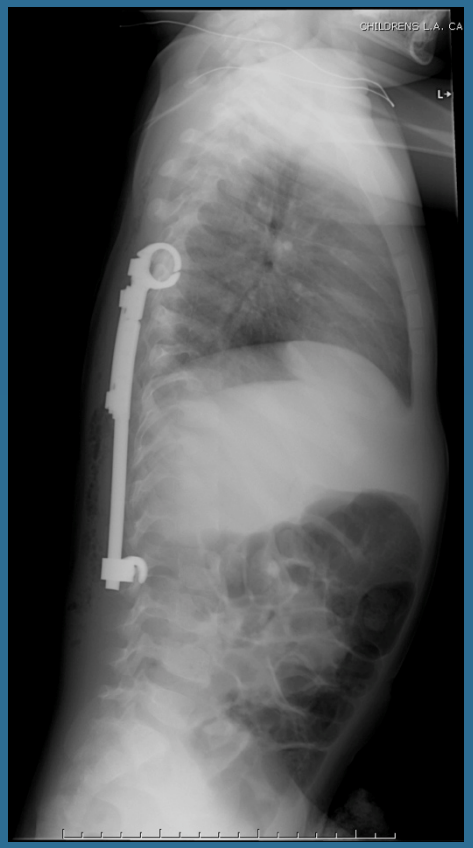
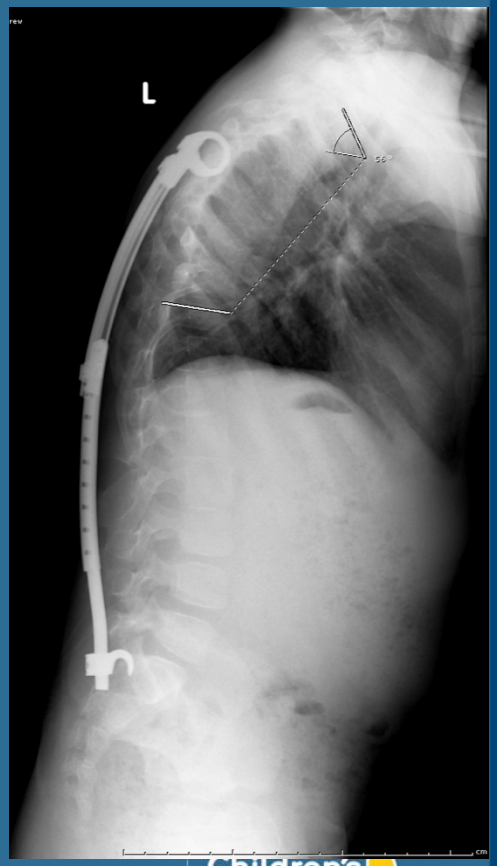


Lengthening Through Curved Rods

- More Kyphosis
- + Sagittal Balance

4 yo | Same Patient | 7 yo





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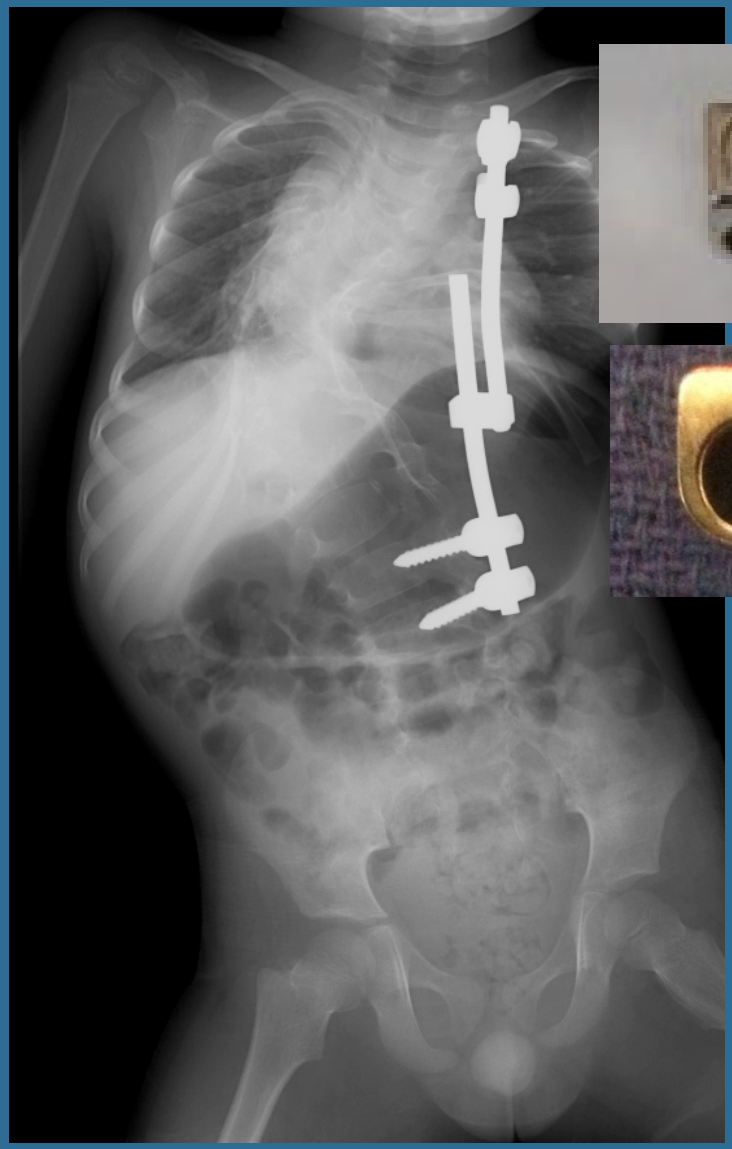
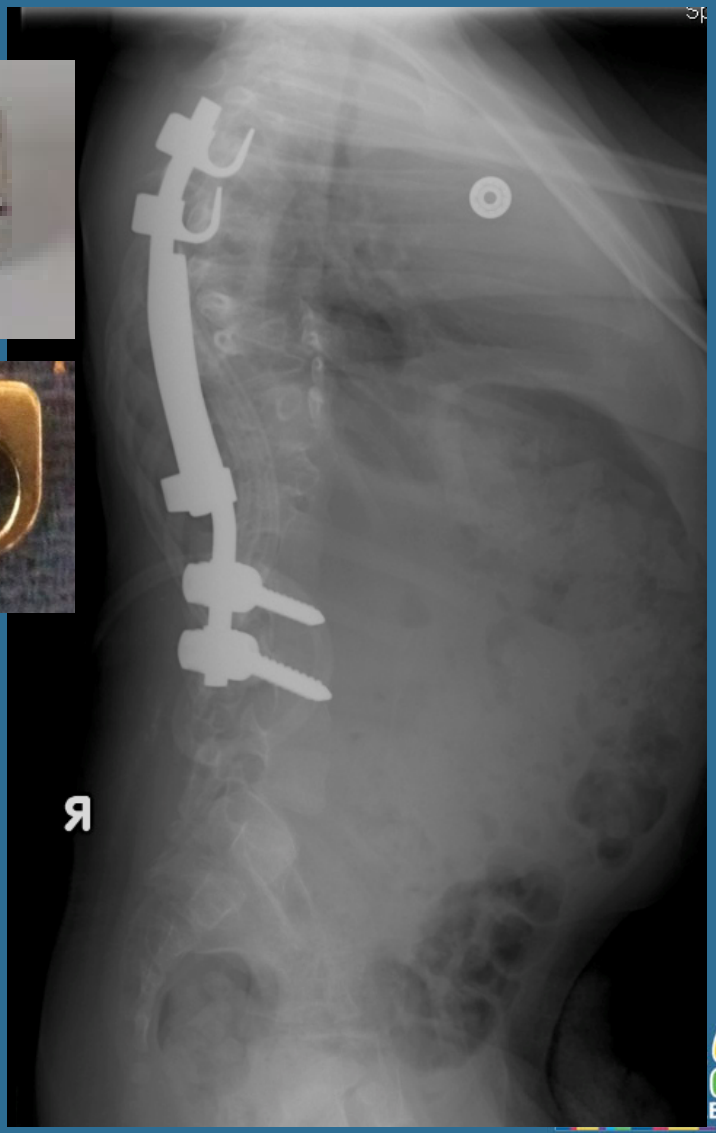
Bent Rods, Tandem Connector





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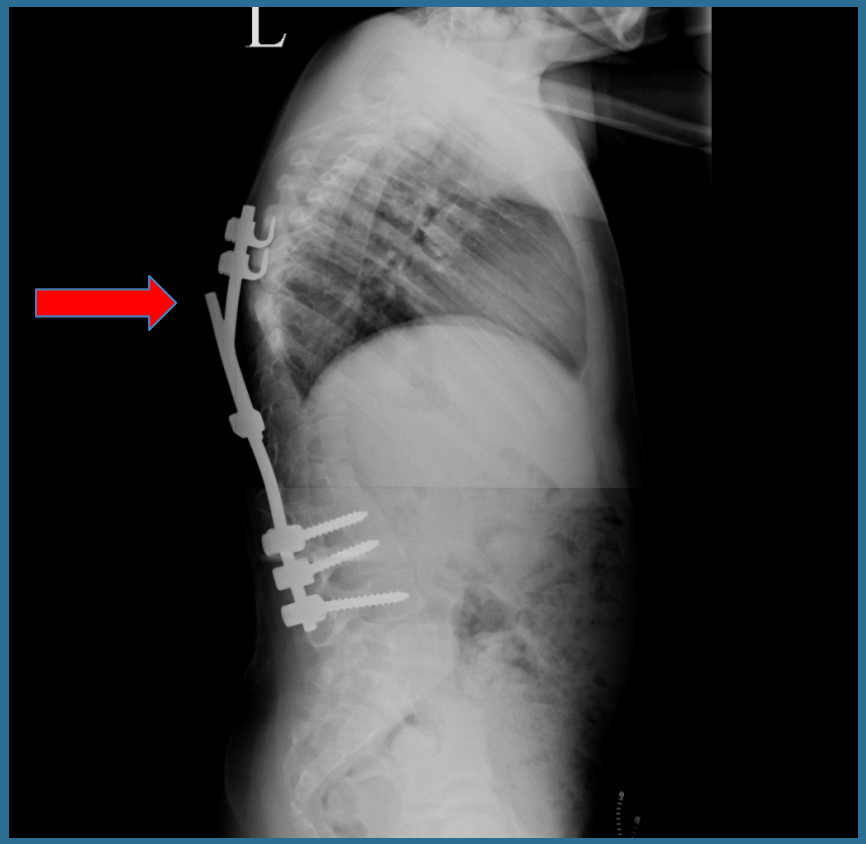
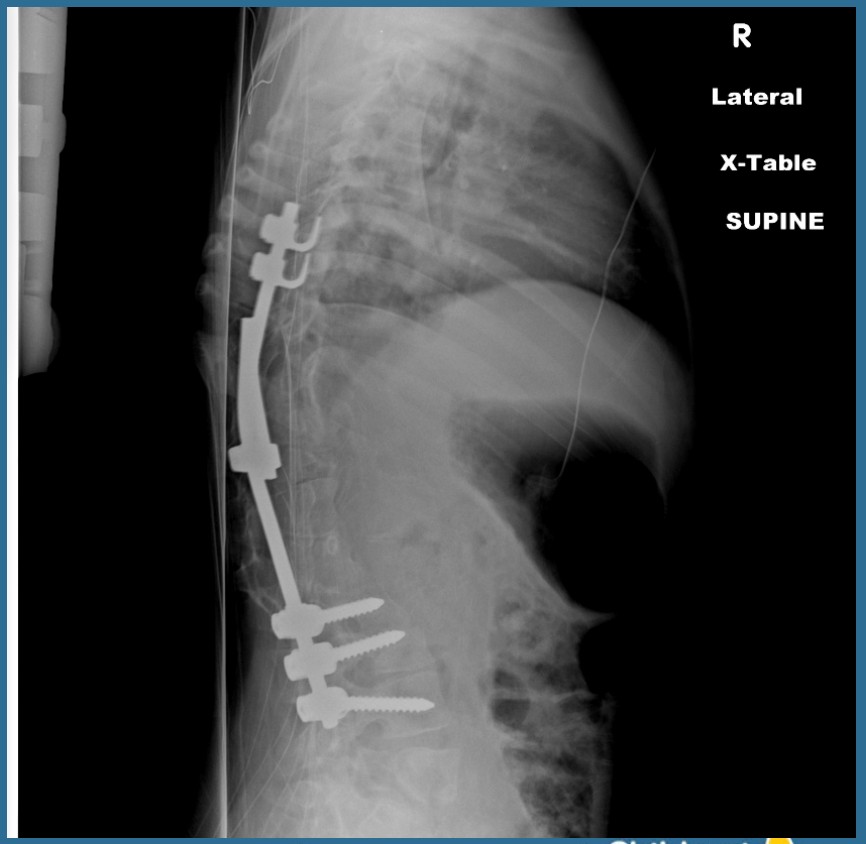
Bent Rods, Tandem Connector

If single connector - use V-lock connector!

BAD -prominent rod



Good - both rods bent



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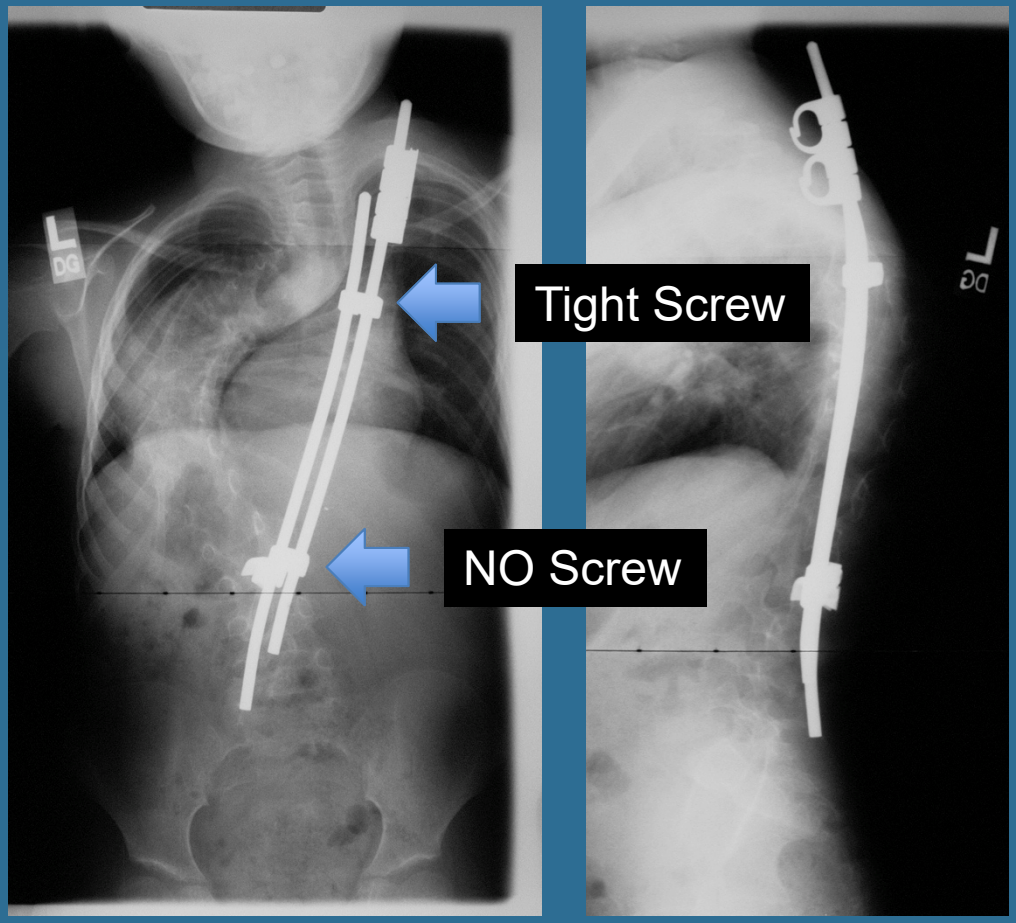
Bent Rods, 2 Tandem Connectors



Benefit - Stronger

Challenge

- **Bigger or two incisions**
- **leave one open without screw**

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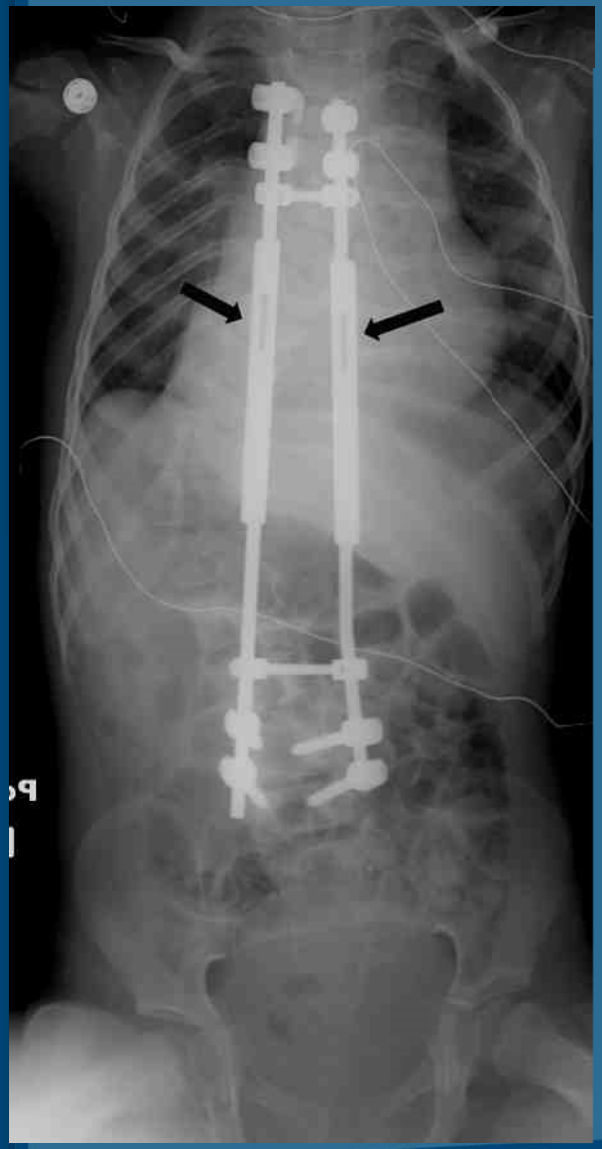
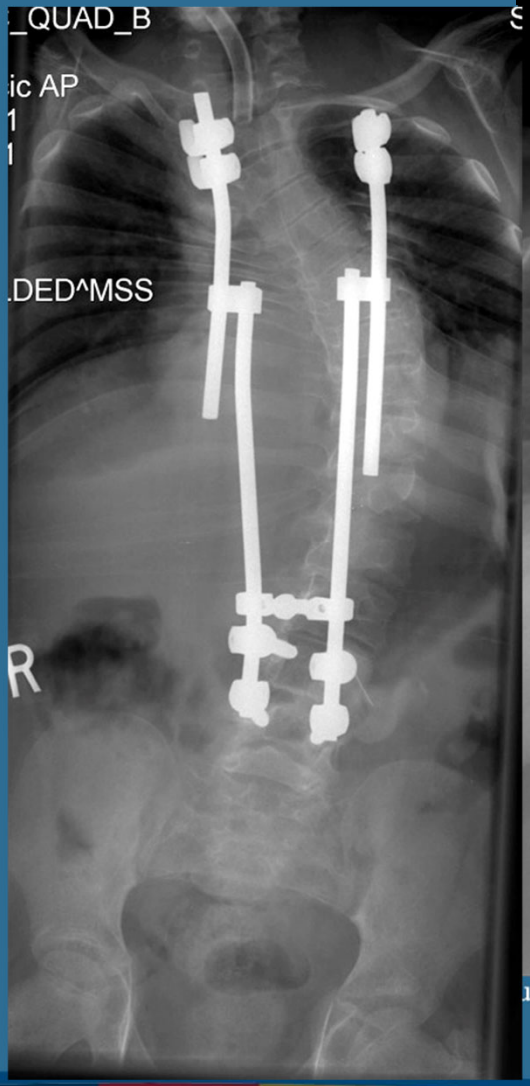
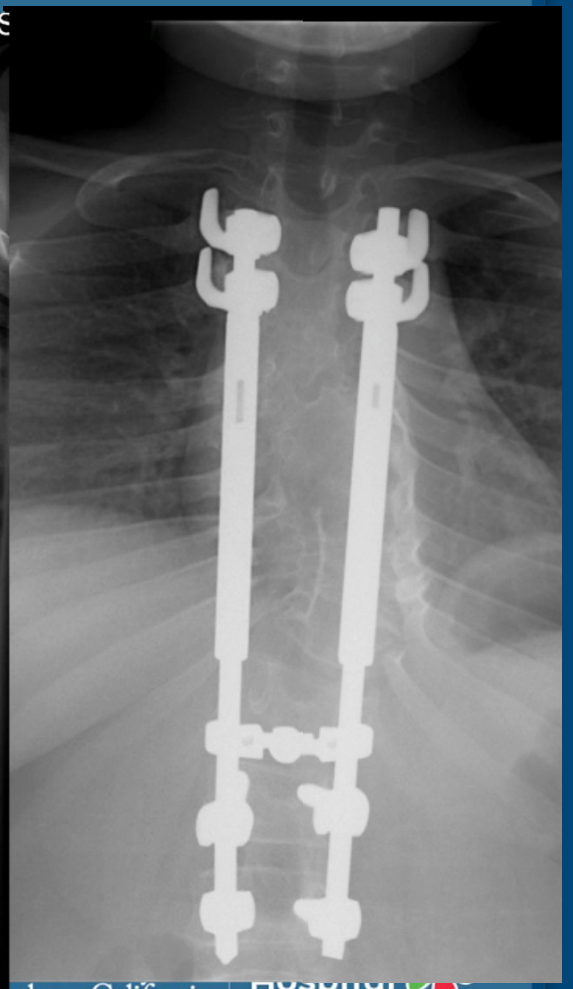
Prominence

Transverse Connectors at top prominent

Current Technique







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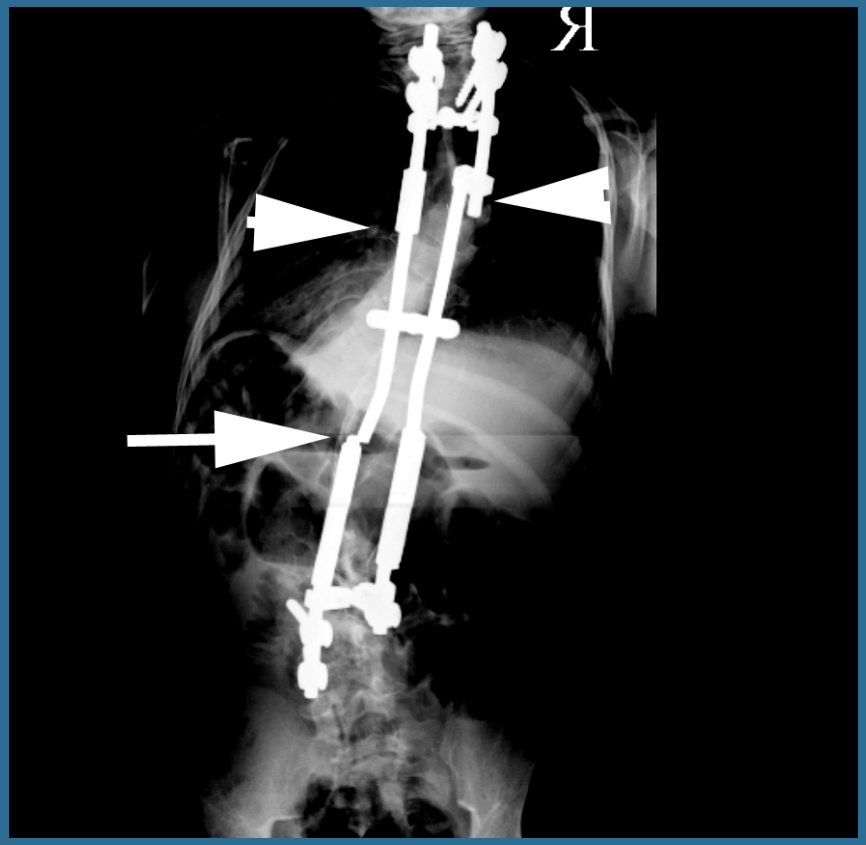
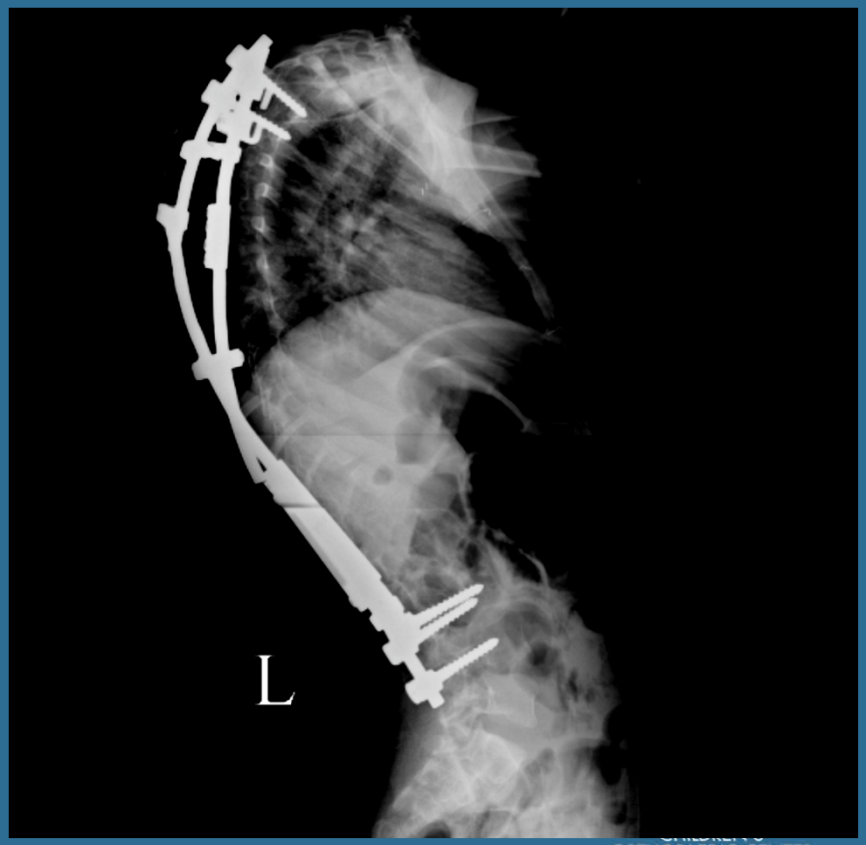
2 Connector Failures and 1 Broken Rod





ORTHOPAEDIC CENTER

Some Connectors in Distraction Based Growing Rods Fail More Than Others

Christopher Lee, BS; Karen S. Myung, MD, PhD;
Behrooz Akbarnia, MD, David L. Skaggs, MD

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Methods

- 30 consecutive patients
- distraction-based growing rods.
- Only connectors subject to distractive forces included.
- minimum 2 year follow-up

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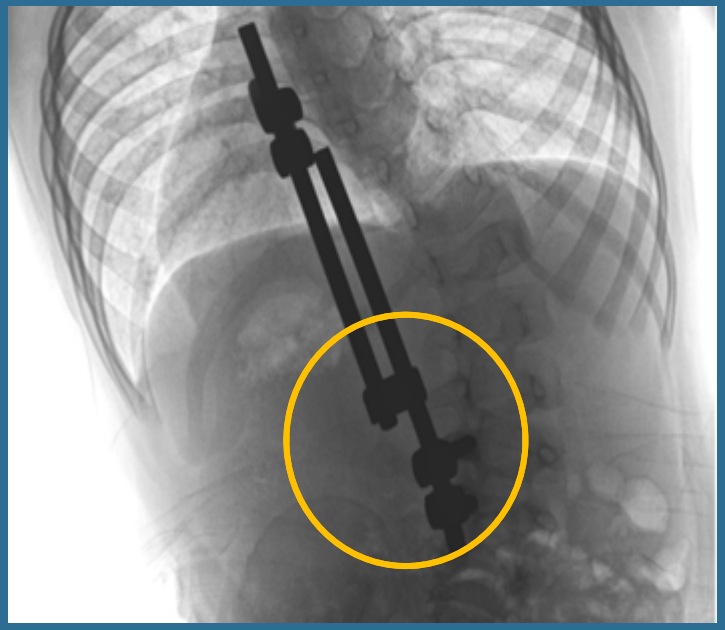
Results

- Total of 12% failure =12/98 connectors:

- Mean time to failure = after 3rd lengthening



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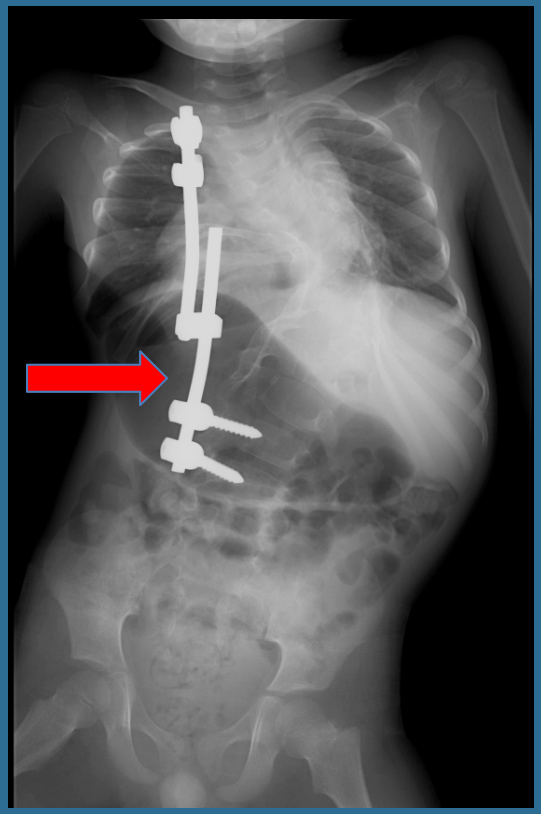
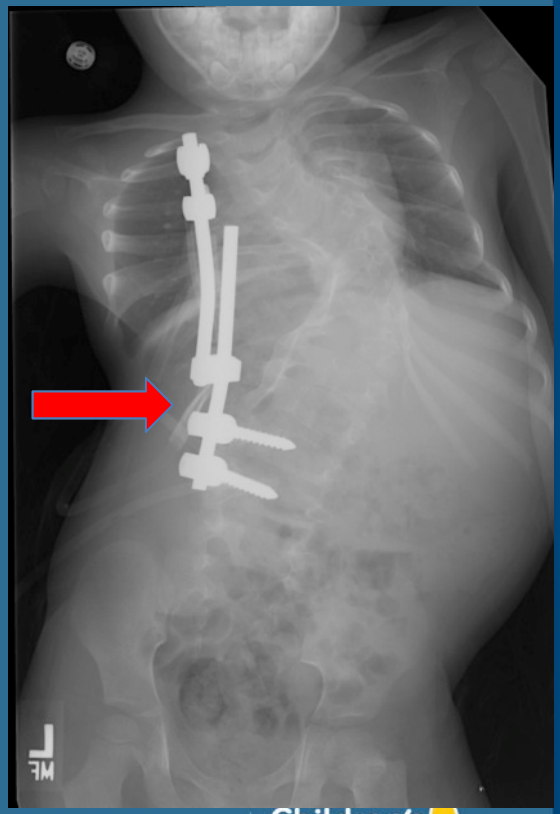
Single Tandem Connector Failure

Pre Op

Post Op



7 months Later



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2 Types of Interface with Rods

Circular Lock
Older design
41% failure rate

V-shape Lock
Previously
patent protected
4% failure rate

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Type of Connector	Failure Rate (n, %)	Connectors
Circular Lock - Medtronic® Wedding Band	7/17, 41%	
Stryker®, Open	3/8, 38%	
V shaped Lock - Medtronic® and Isola®	1/27, 4%	
Longitudinal Medtronic® 2 screws Isola® 1 screws	1/34, 3%	

28% less T1-S1 Growth if connector failure

- Connector Failure = 6.5 mm/yr
- No failure = 9.0 mm/yr
- ($p>0.05$) but underpowered

- Seems logical that if distraction is not present, spine growth not driven

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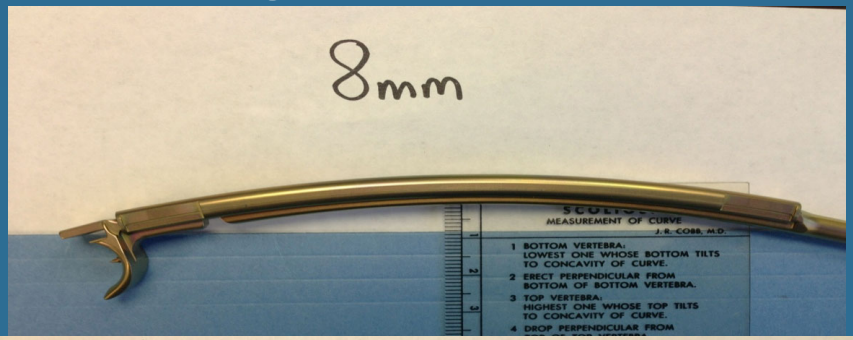
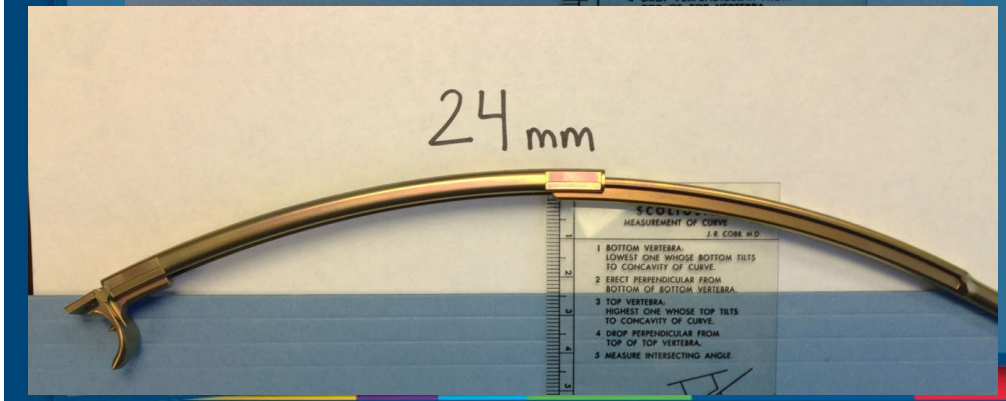
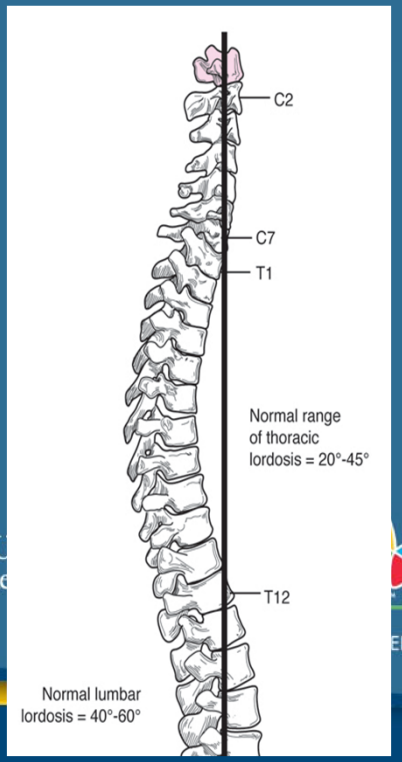
Summary - Sagittal

- Curved Rods/Connectors become prominent and more kyphotic over time
- Straight Connectors – At T-L Junction



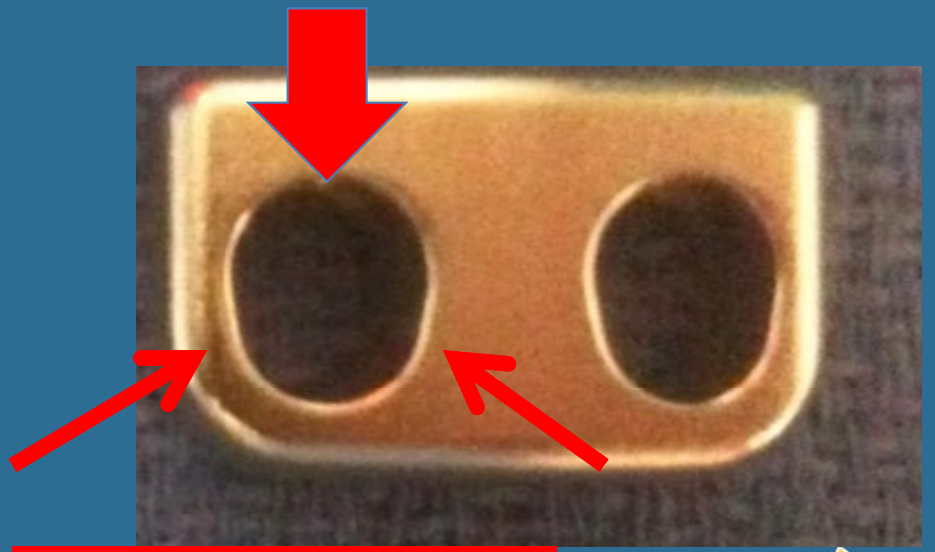




Summary: Connector Failure

Longitudinal
Few Failures

Tandem: V-shape Lock
Rarely fail



3 point fixation

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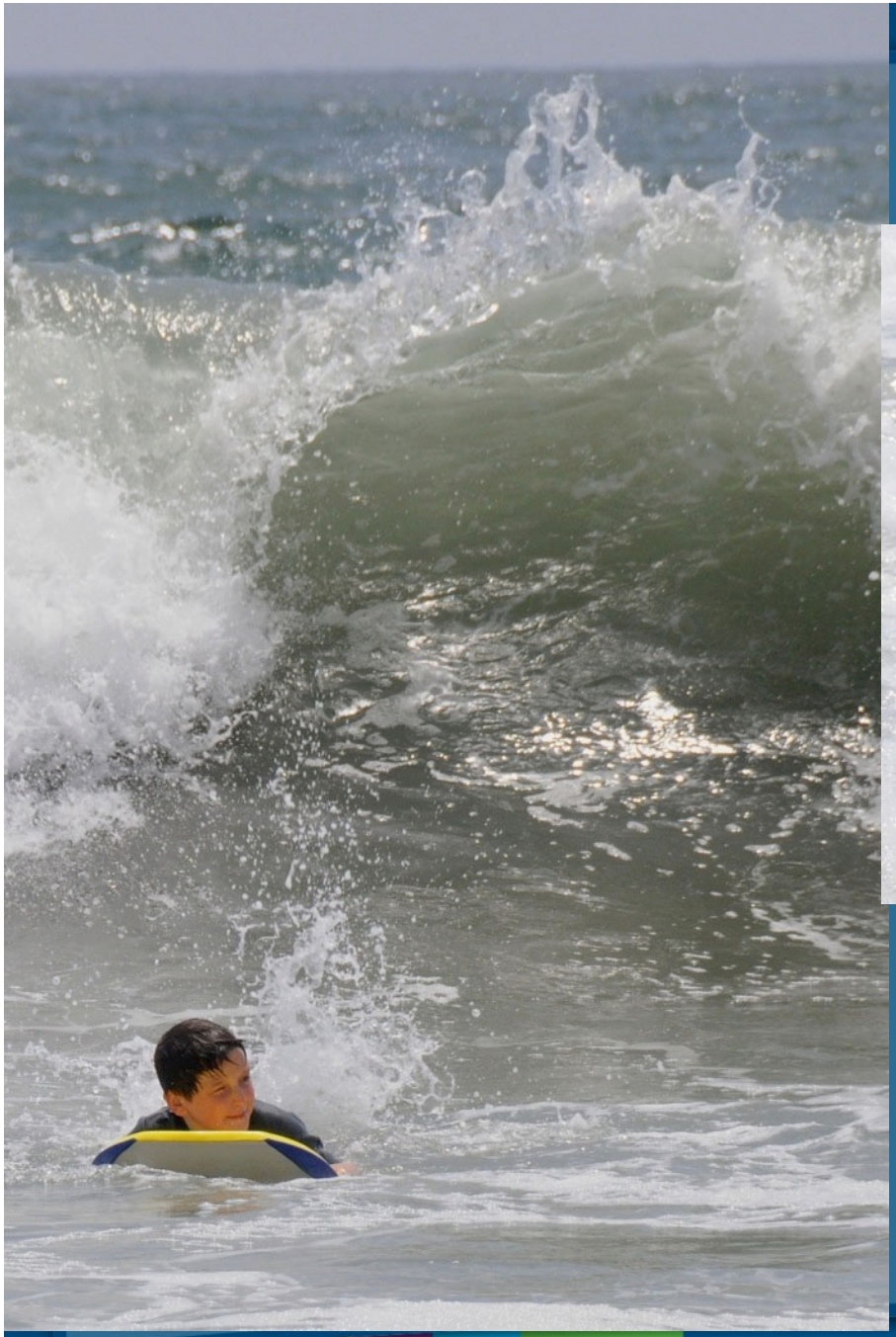
Thank You



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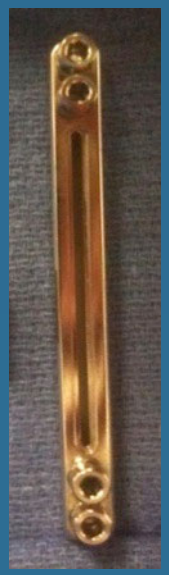
Hypothesis

- Some connectors fail more than others.



better than

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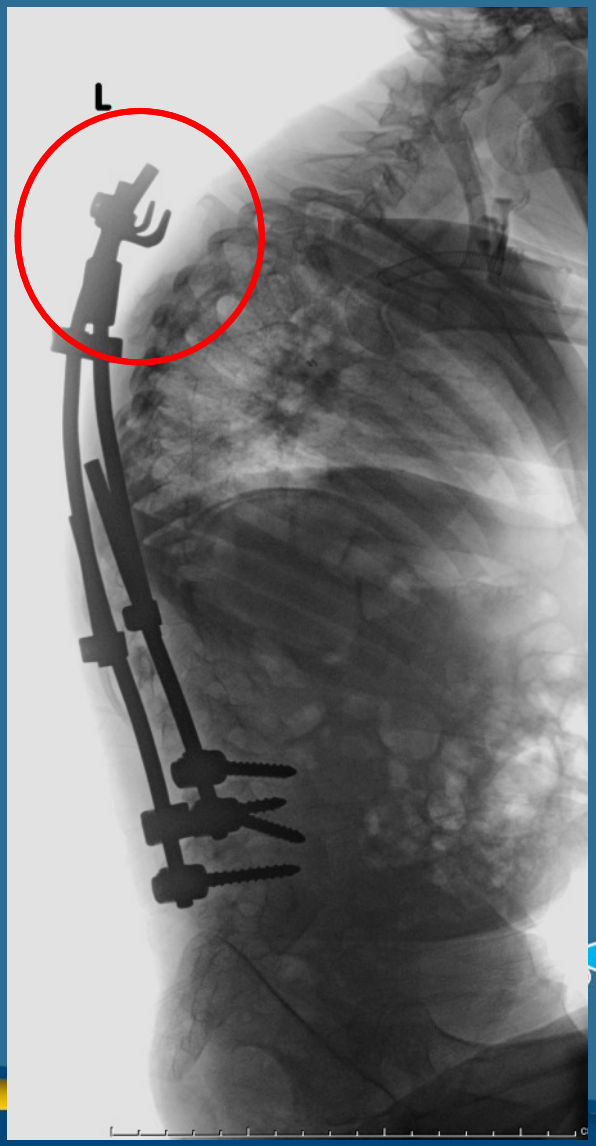
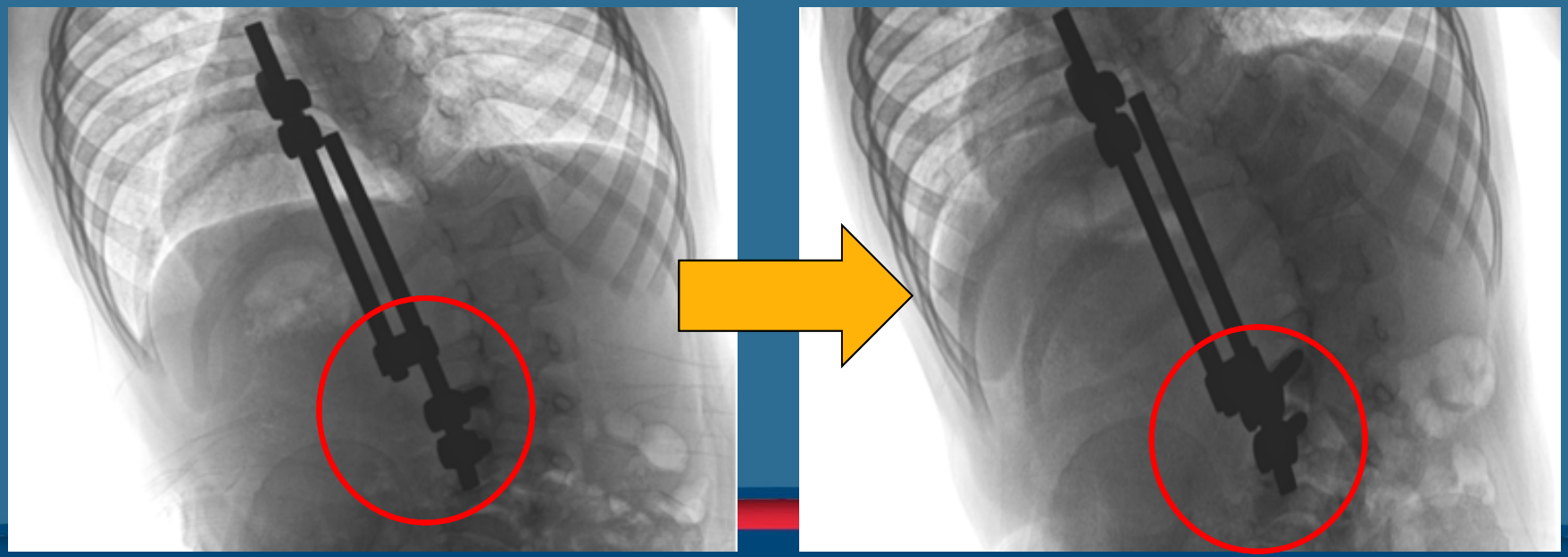
Background

- Distraction-based growing rods have ~2 complications per patient[1]
- No study has examined connector failures in growing rod constructs.



Connector Failures

- Dual-rod connectors vs. single-rod connectors:
  - Dual-rod connectors: 32% failure (6/19 constructs)
  - Single-rod connectors: 43% failure (6/14 constructs)
  - *No difference in failure rates (p=0.38).*



Age of initial instrumentation may matter

- >5 years old: 0 connector failures
- Greater complications in general reported in patients treated with growing rods at younger age[2,3]

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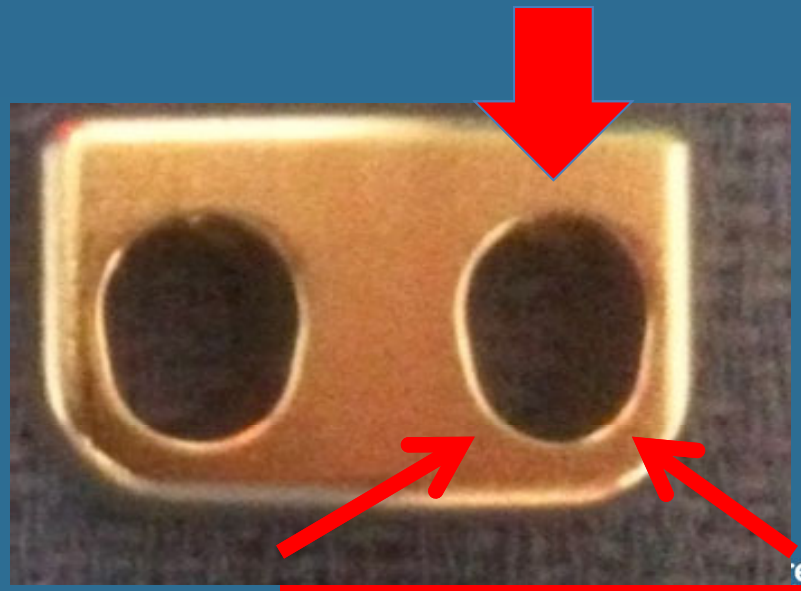
Take Home Lesson:

Use longitudinal connectors or side-to-side connectors with V- locks

V-shape Lock



3 point fixation

Thank You

Jamie - Antarctica, Christmas 2008

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Thank You

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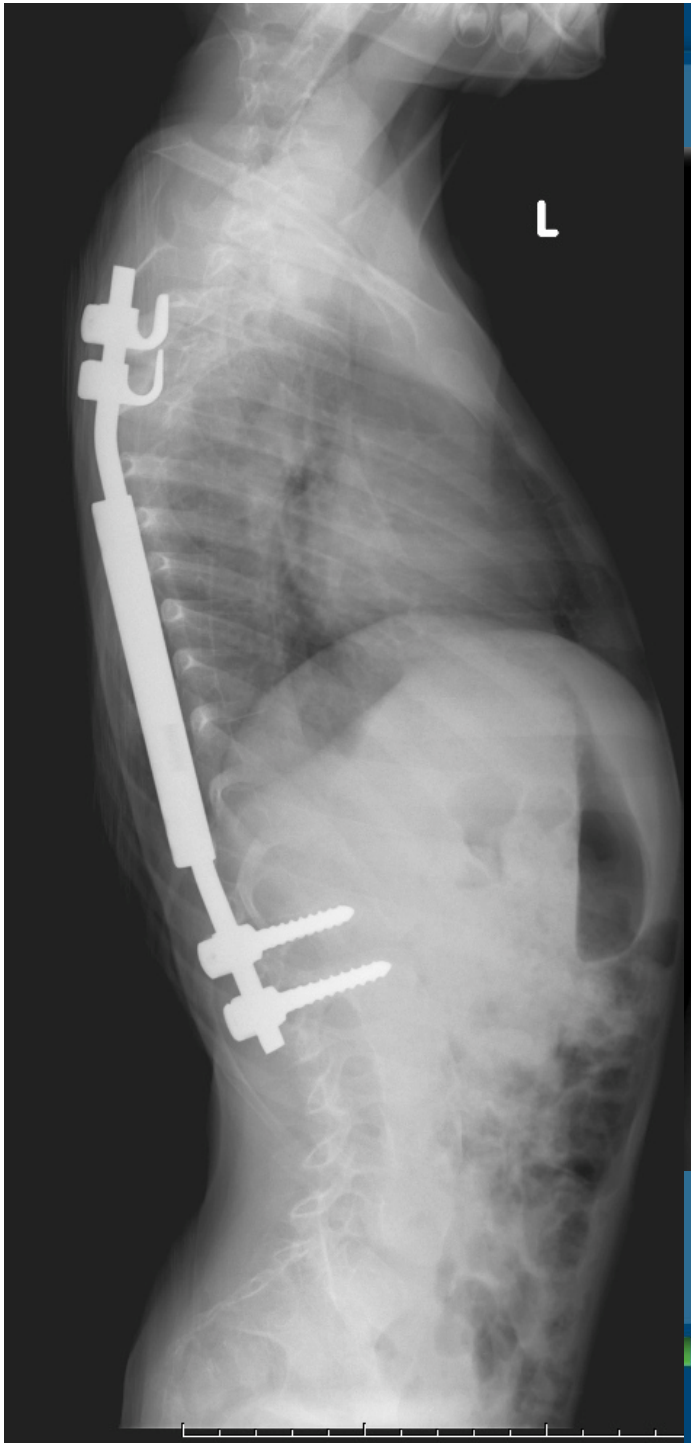
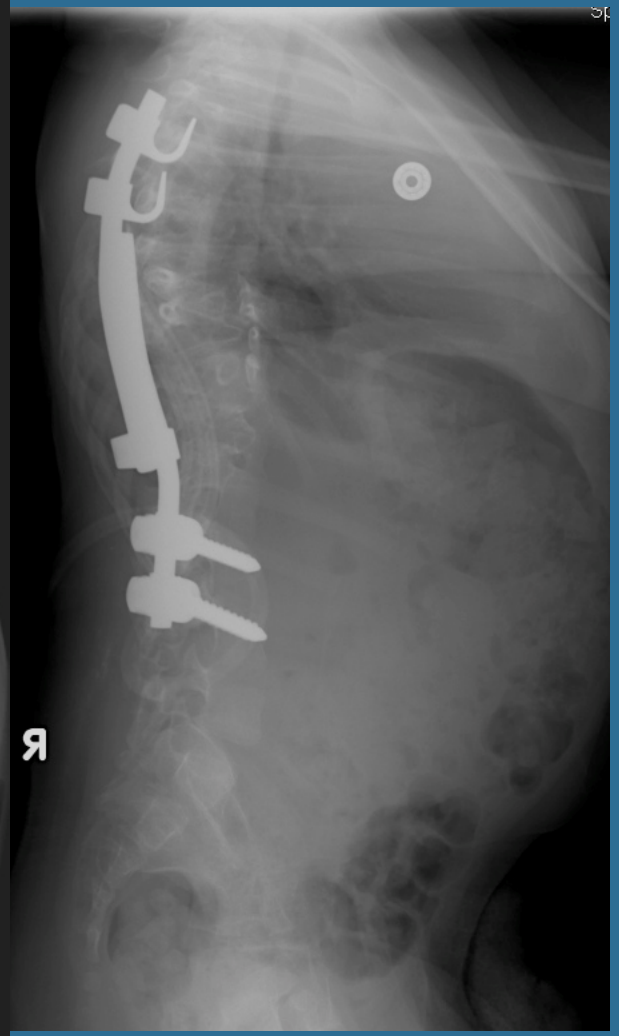
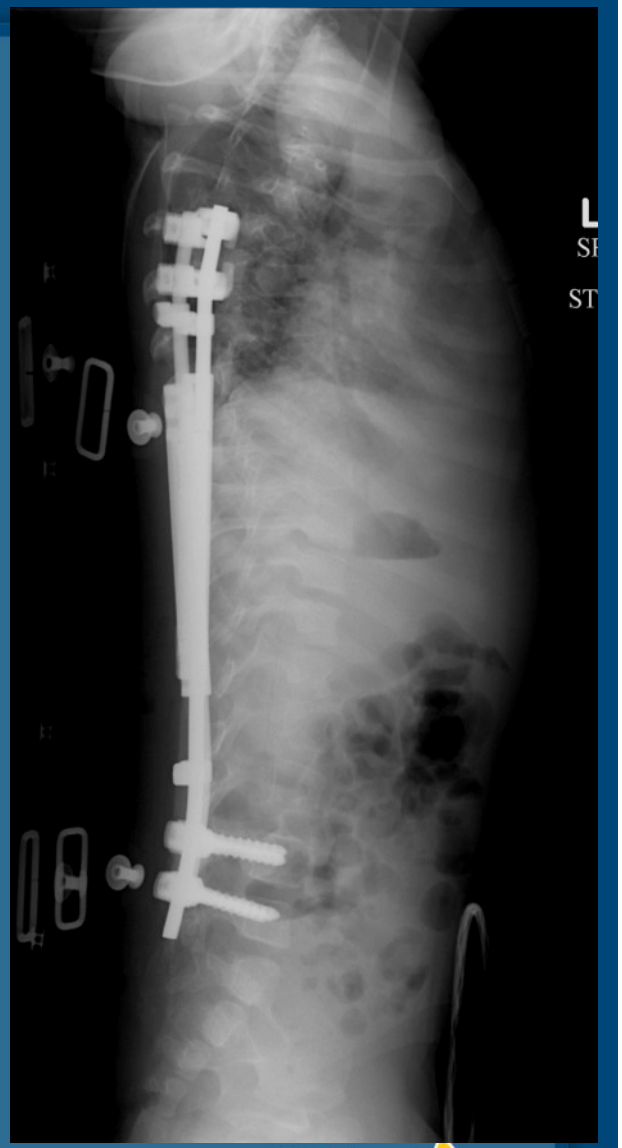
Thank You







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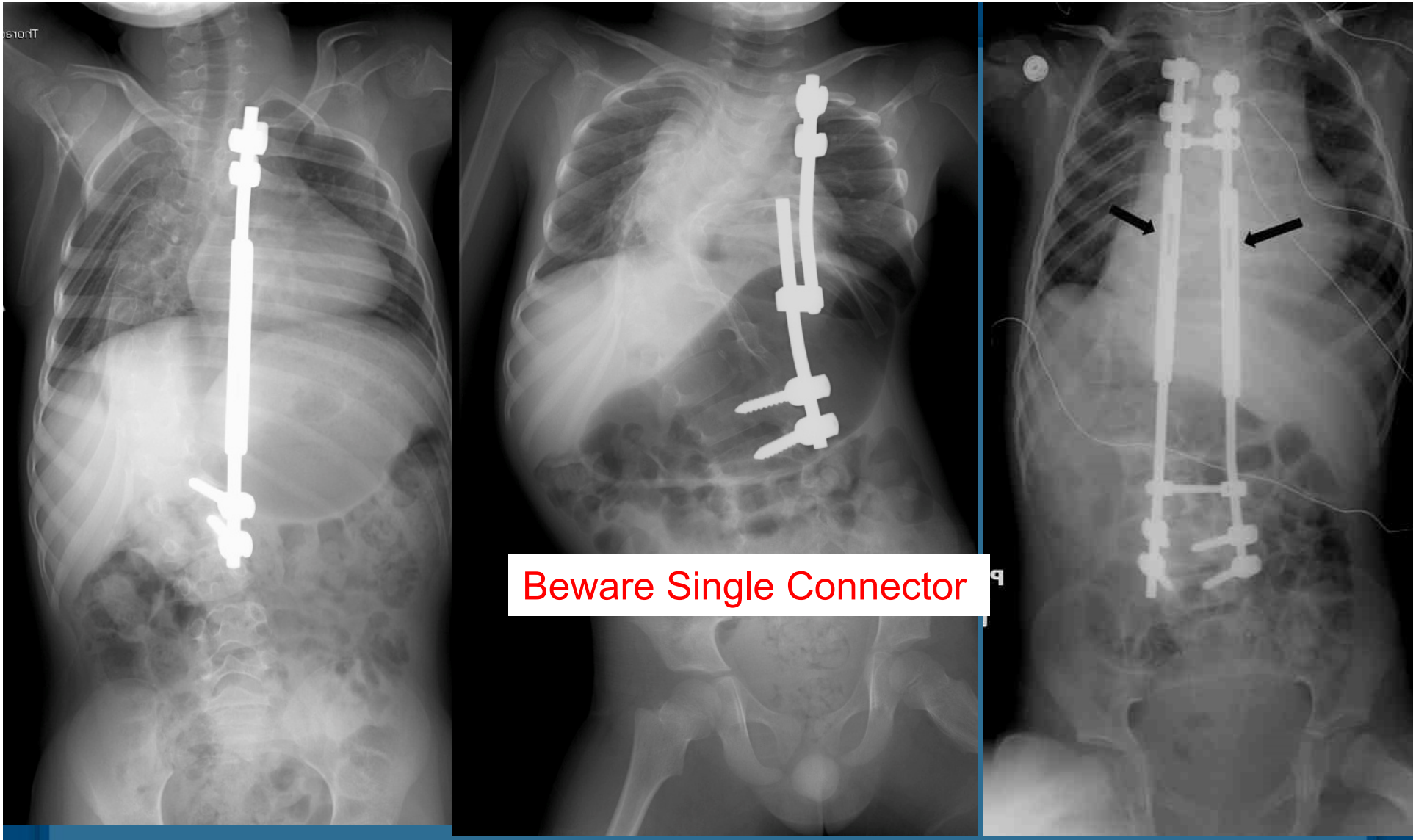

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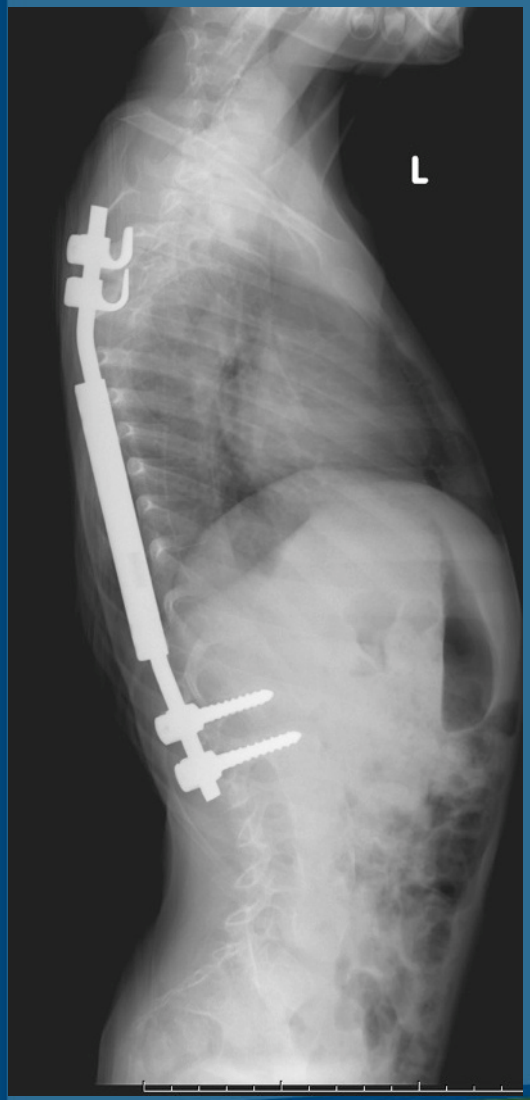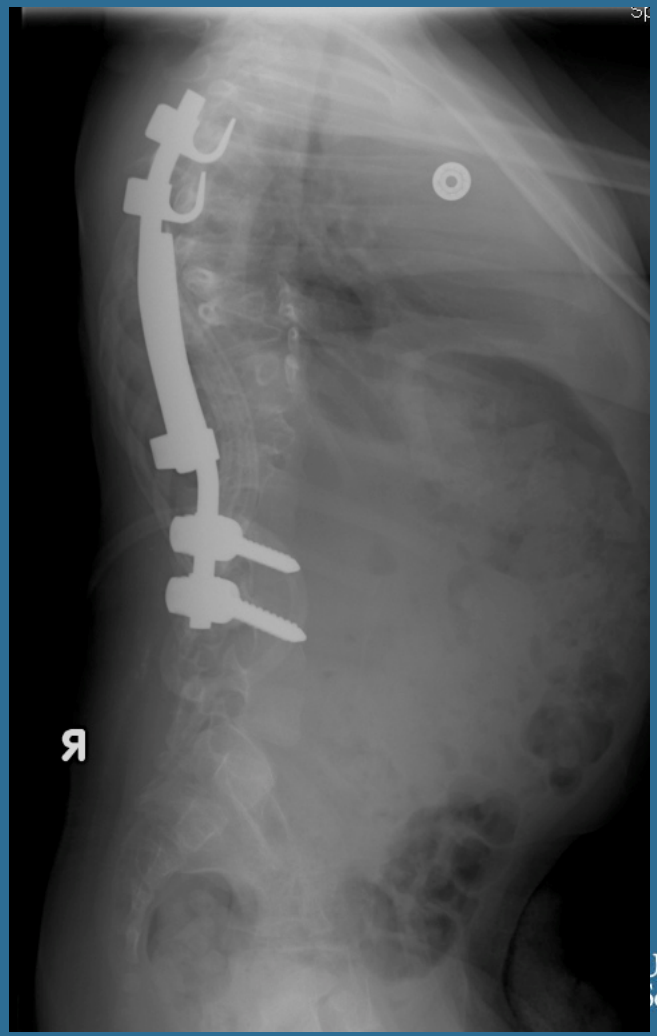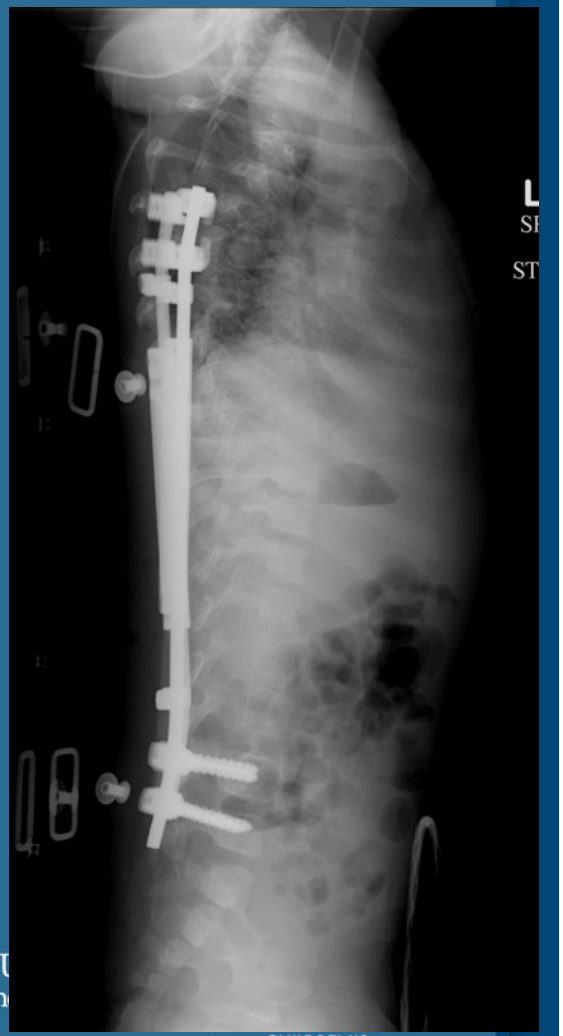
Sagittal Contouring