

Evolving Treatment Options for EOS: Is Growth Modulation of the Spine the Answer?

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Disclosure



Royalties
Investment
Medical Advisor



R01 Grant

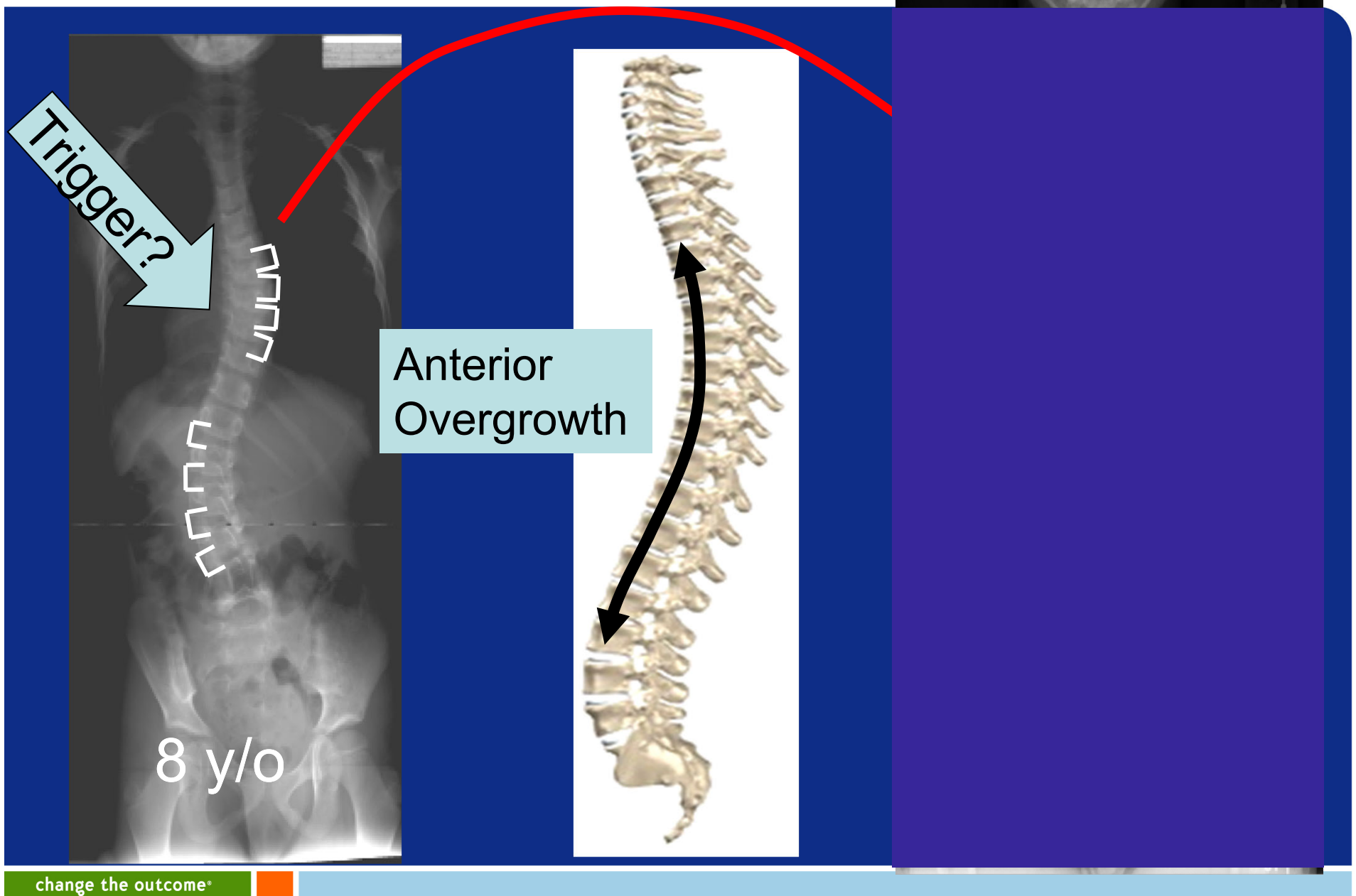
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Growth Strategies

1. Grow Rods
2. Shilla
3. Staples and Tethers



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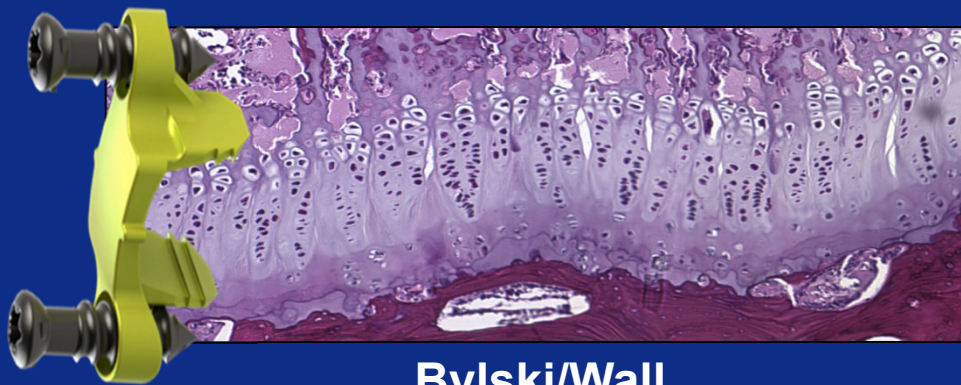
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JC Cheng
JBJS Br '03

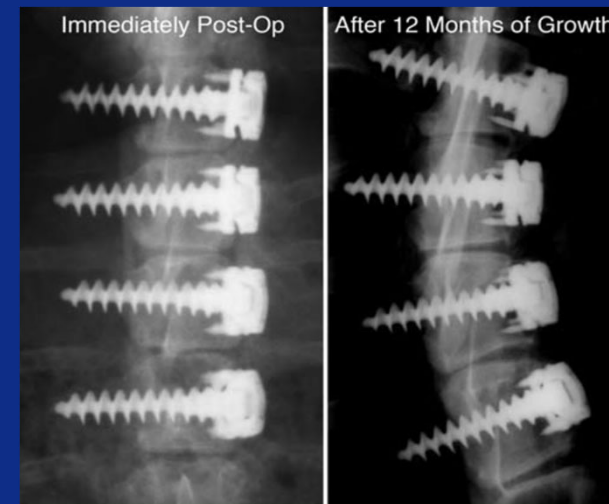


Does Growth Modulation Work in the Spine of Animals?

- Animals:
 - Tethering (Newton, Braun)
 - Staples (Betz, Wall)
 - Other Devices/Techniques



Bylski/Wall



Newton

Other Investigators

- Zhou/Zhang/Sucato/Johnston 2014
- Burke JG 2014
- Liu J, 2014
- Zhang W 2014
- Sanchez-Marquez JM 2013
- Roth AK 2013
- Driscoll/Parent/Aubin/Moreau/Sarwark 2013
- Schwab/Lafage 2013
- Caballero A 2011
- Aronsson/Stokes 2011
- Accadbled F 2010
- Dodge/Bowen 2010
- Fok/Carey J 2010
- Zheng GQ 2009

Does it work in animals?

☐ Yes

☐ No

☐ Maybe

Does it work in animals?

☒ Yes

☐ No

☐ Maybe

Is Growth Modulation the Answer in any Scoliosis?

- Adolescent Idiopathic Scoliosis

Betz et al

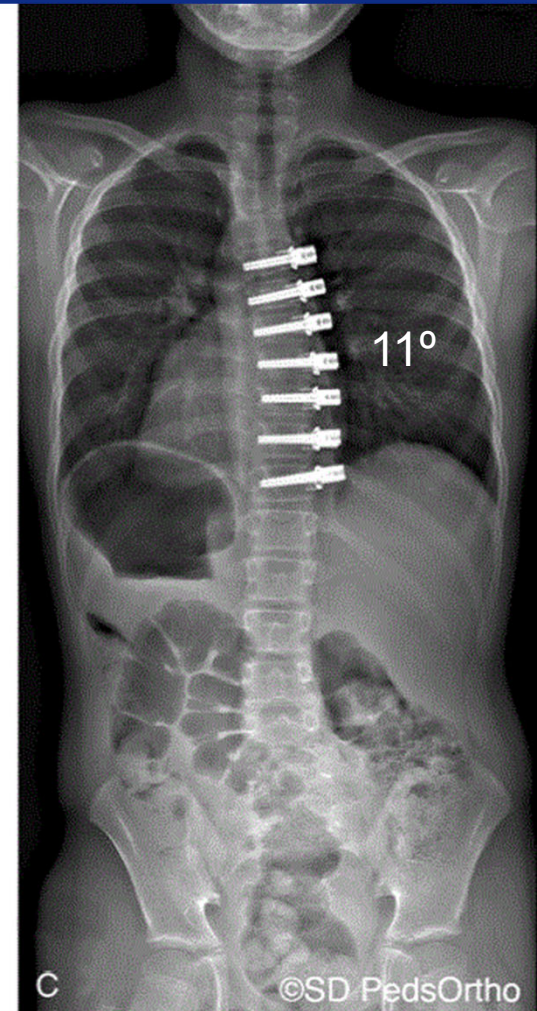
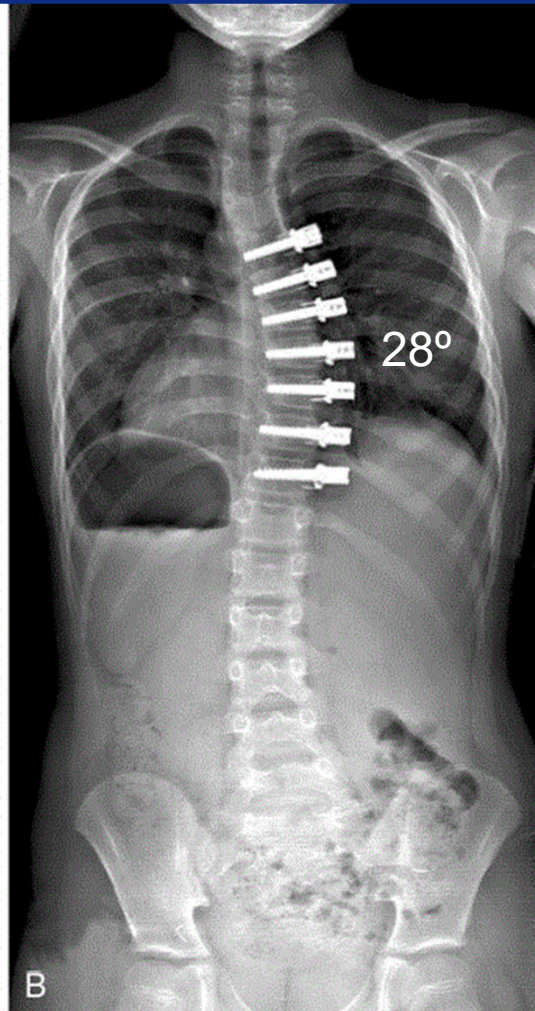
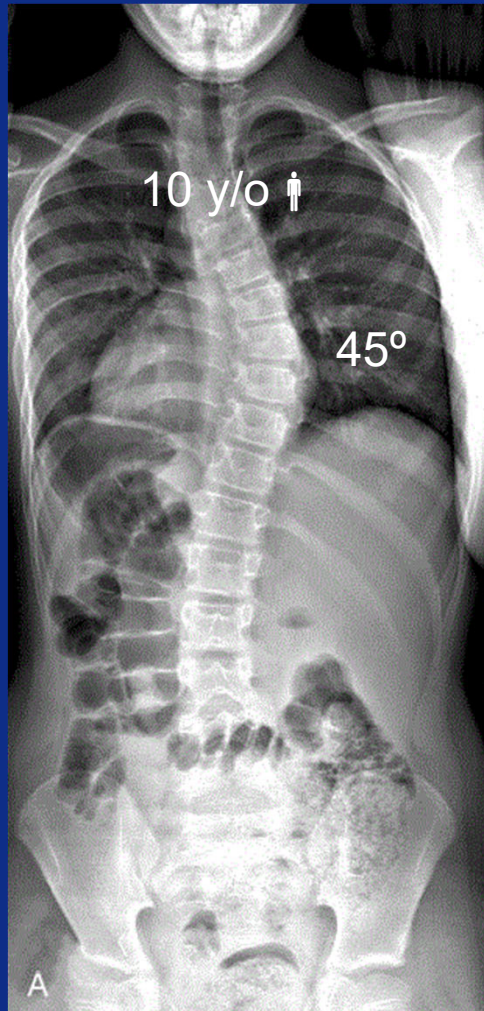
- Thoracic Curves

- $< 35^\circ$ 80% Success

- $> 35^\circ$ 75% Failure



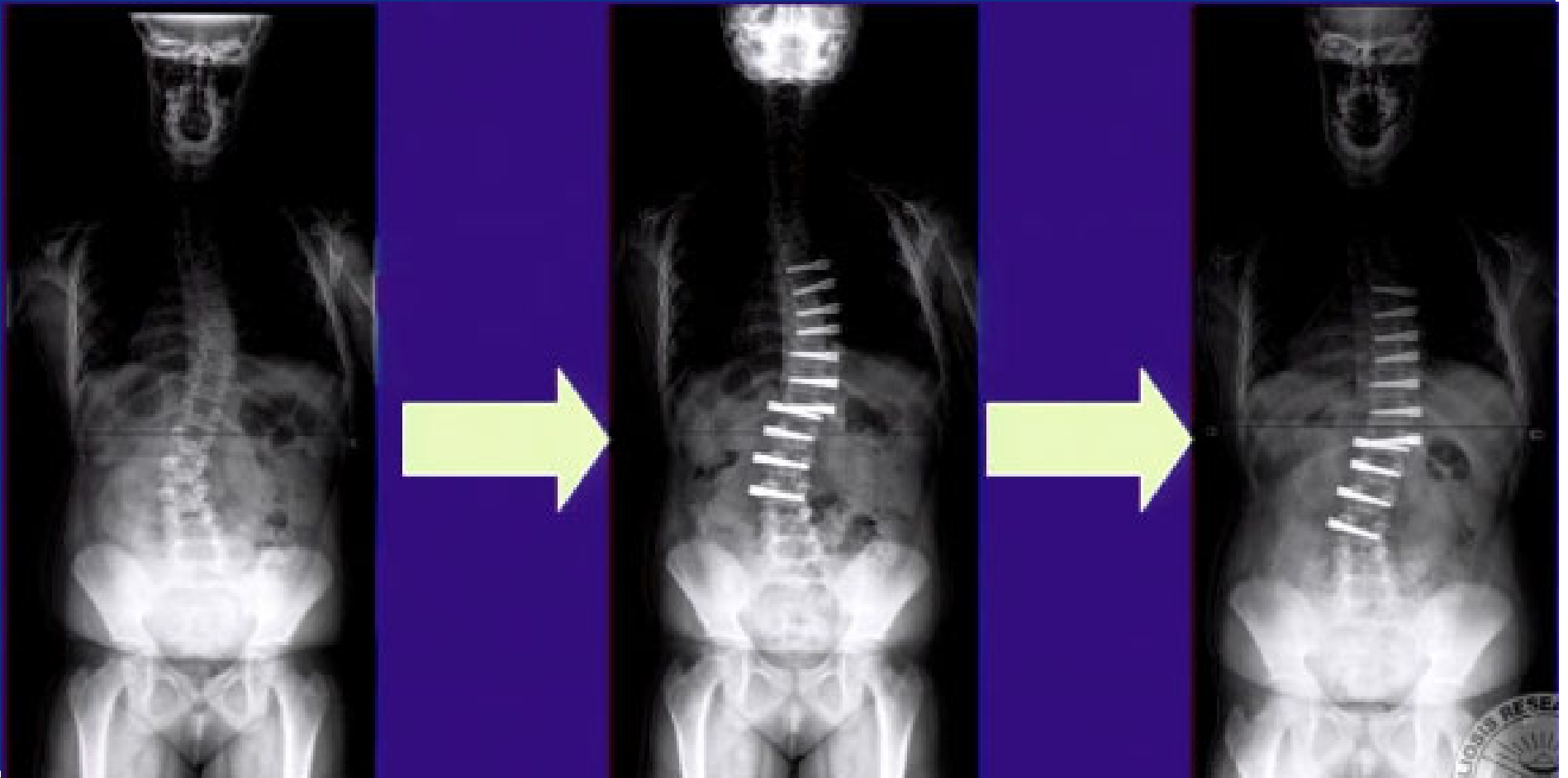
Newton Tether



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Braun SRS 2012

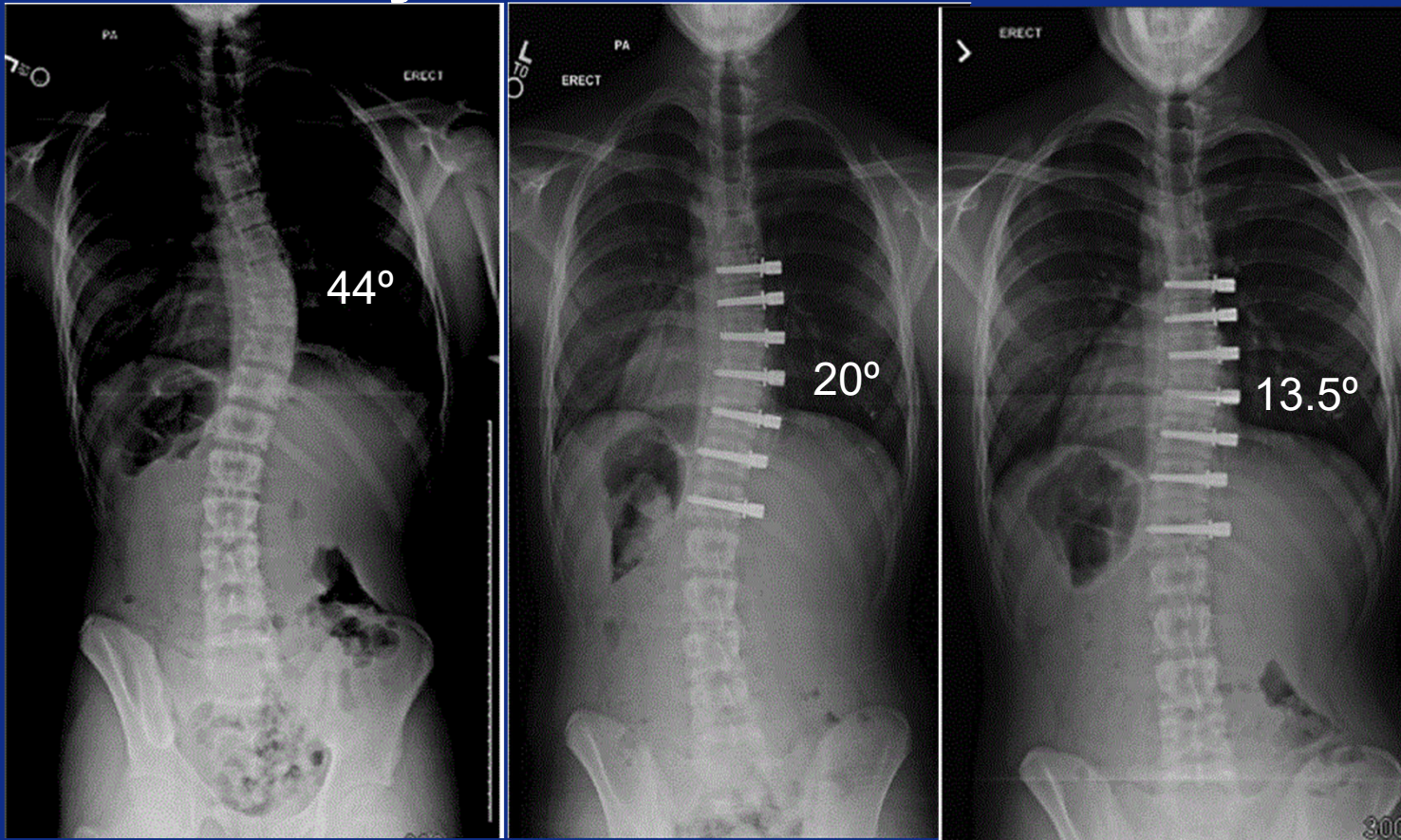


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Samdani 2014, *Spine*

2 yr mean results



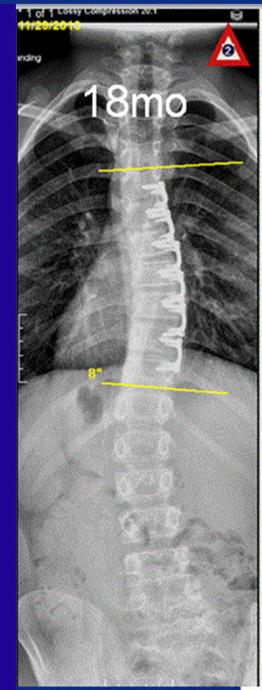
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Samdani 2 yr Results

- 11 patients
- Age = 12.3 yrs
- Risser mean = 0.6
- Mean tether span = 7.8 levels
- T5-L2
- Surgical time = 6hrs $\Rightarrow$ 5½ hrs
- Mean T Cobb: 44° $\Rightarrow$ 20° $\Rightarrow$ $\Rightarrow$ $\Rightarrow$ 13.5° (70%)

Wall/Bylski Clip



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Answer

☐ Yes

☐ No

☒ Maybe

Answer for EOS?

- ☐ Yes
- ☐ No
- ☐ Maybe

JIS (Crawford/Lenke 2010)

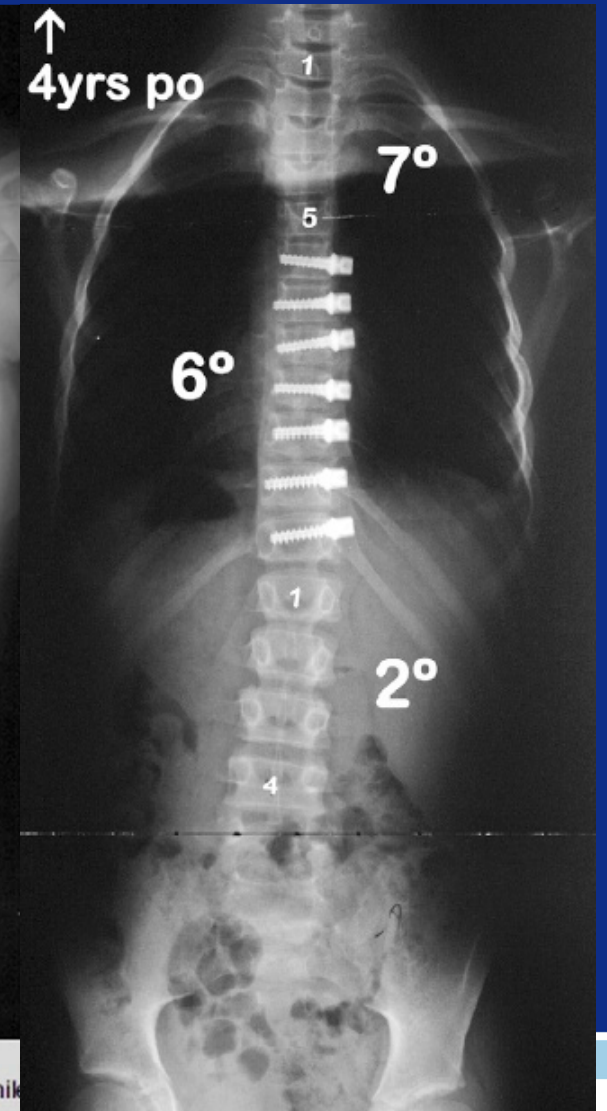
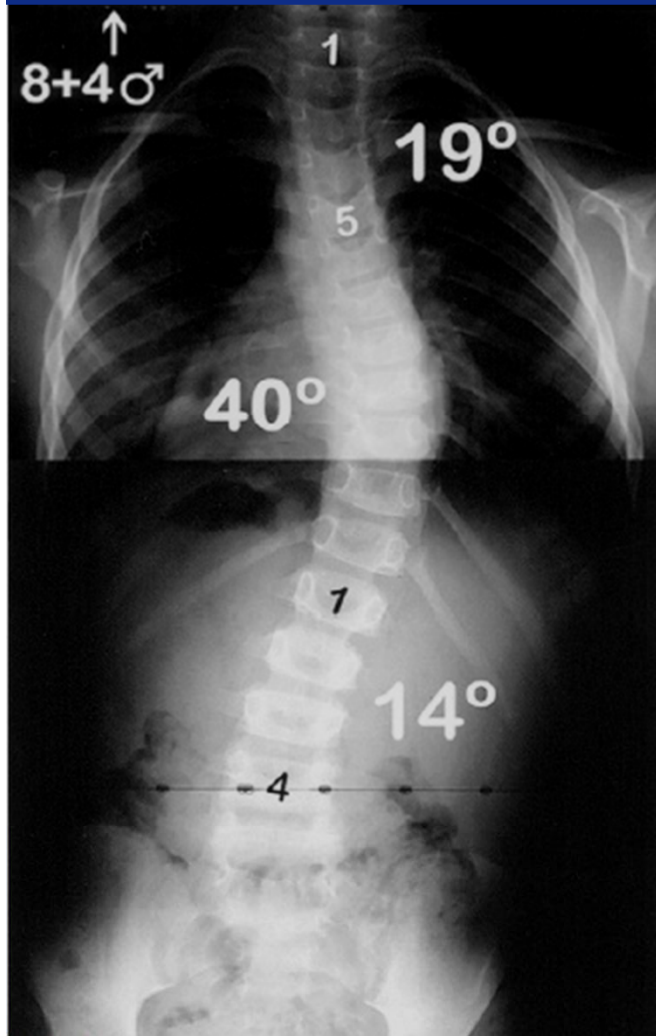


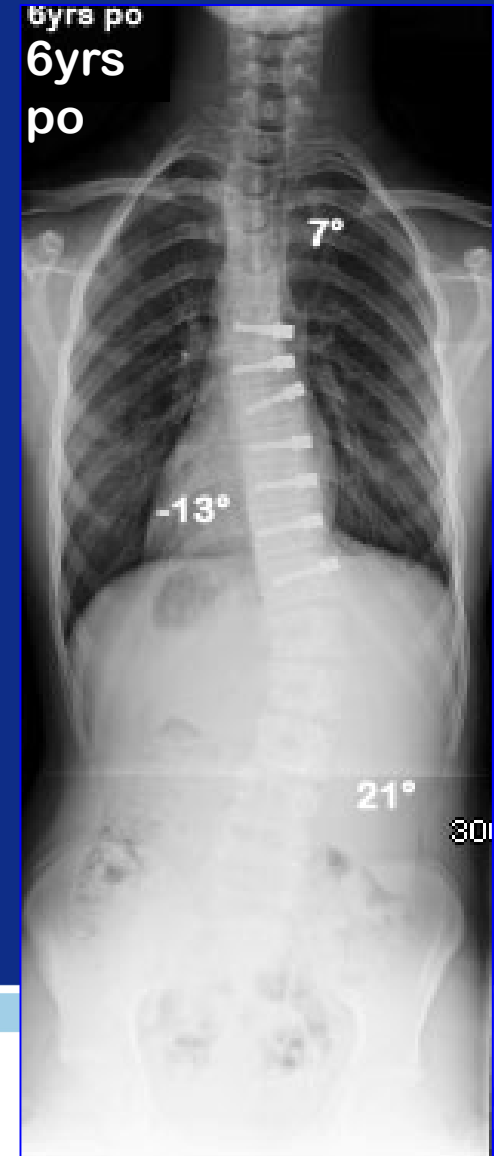
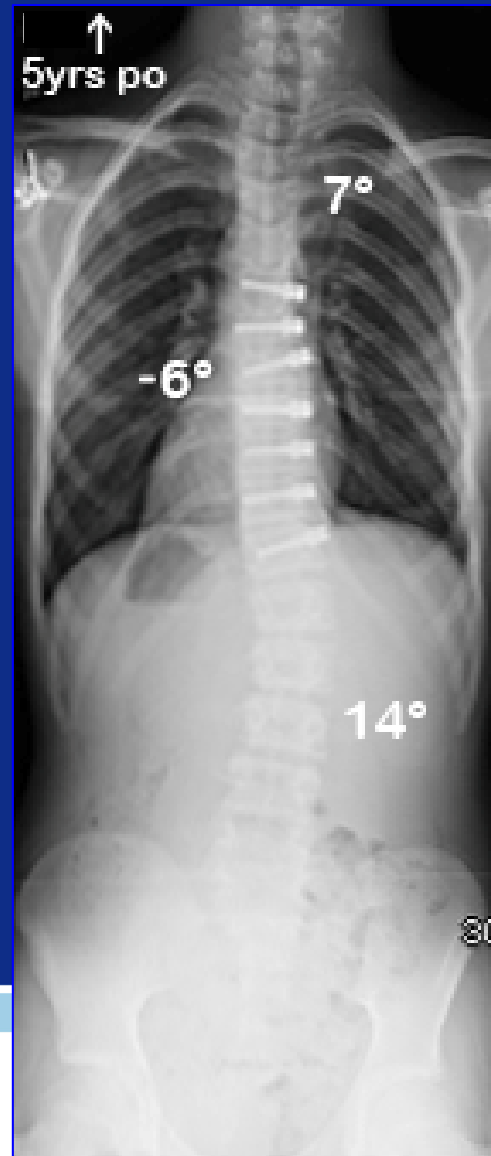
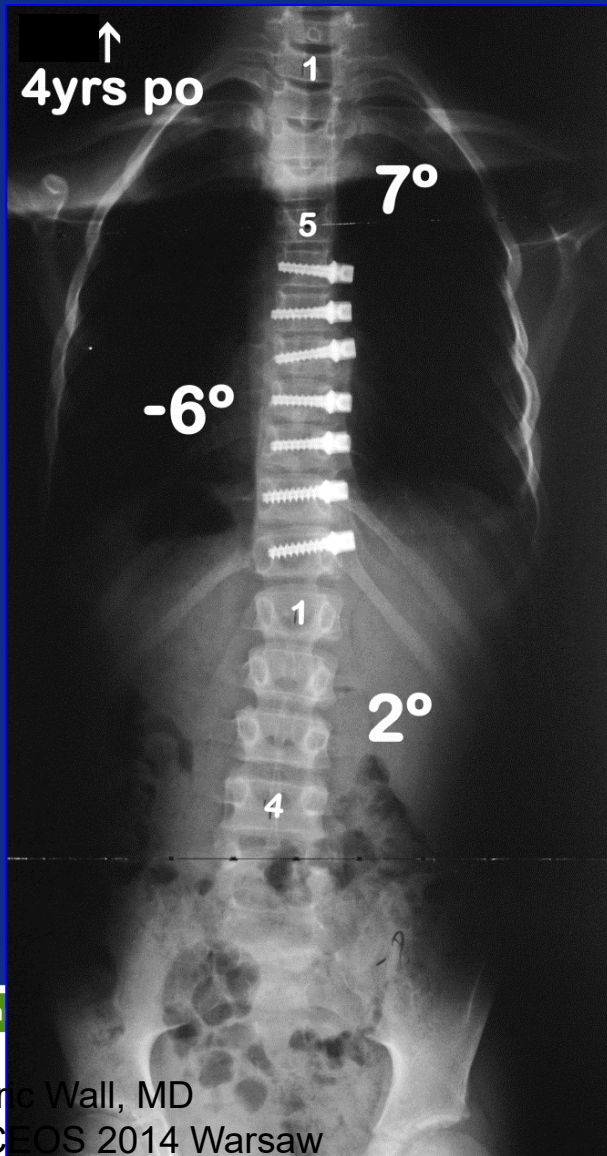
Fig. 2-A

Fig. 2-B

Posteroanterior (Figs. 2-A through 2-G) and lateral (Figs. 2-H through 2-M) radiographs demonstrating a 40° main thoracic juvenile idiopathic scoliosis curve, with the apex at the T9-T10 disc, that progressively corrected over forty-eight months after anterior tethering of T6 to T12. Thoracic kyphosis and lumbar lordosis are maintained within the normal range. Bending radiographs at forty-eight months (Figs. 2-F and 2-G) demonstrate some limited flexibility through the instrumented segments.

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4 TO 6 YEARS POSTOP



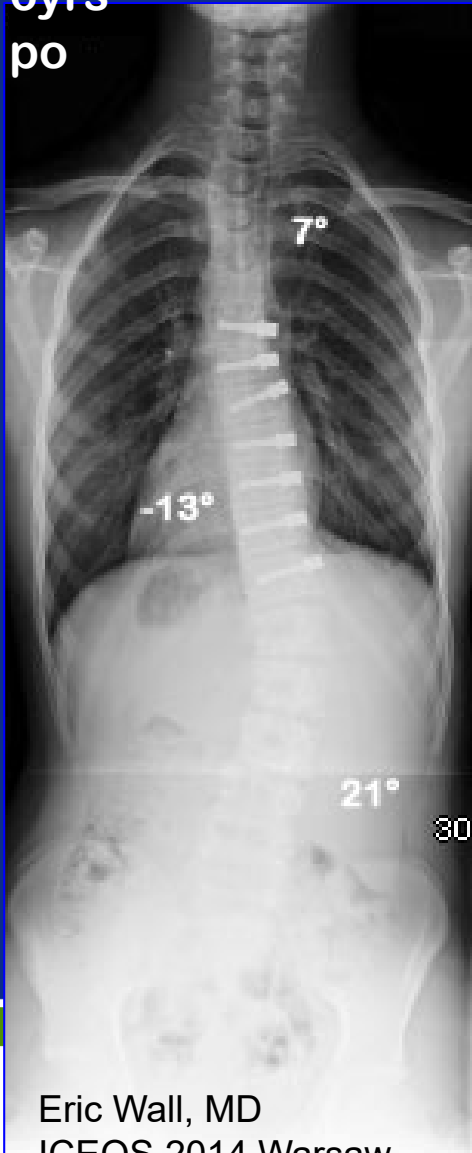
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POST TETHER REMOVAL

6yrs
po



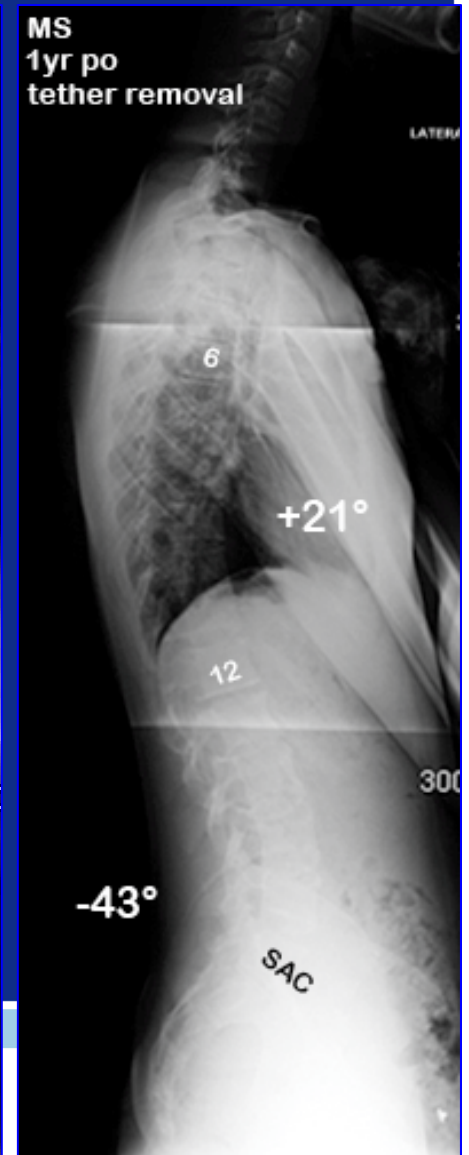
MS
1yr po
tether removal



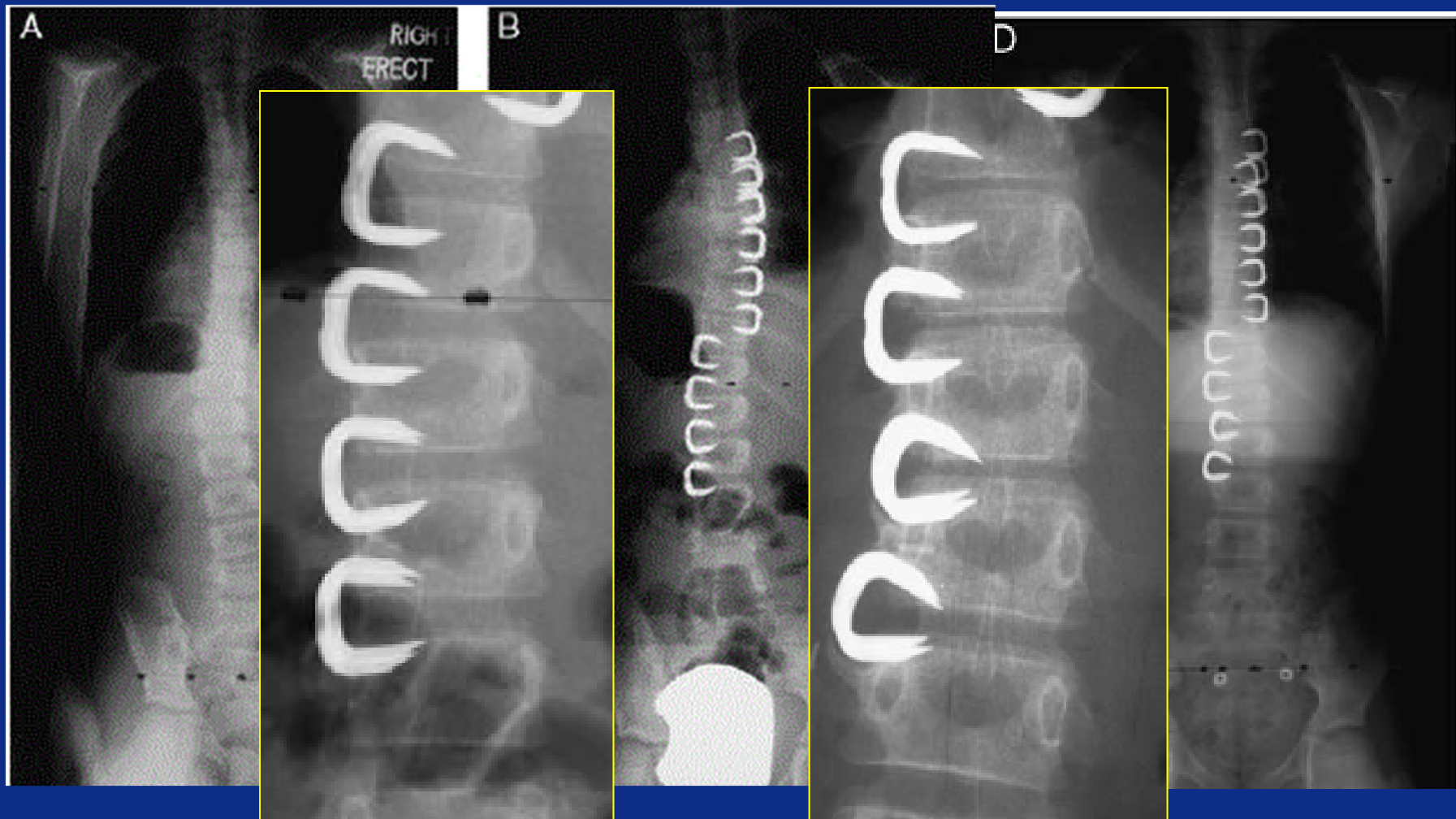
6yrs
po



MS
1yr po
tether removal

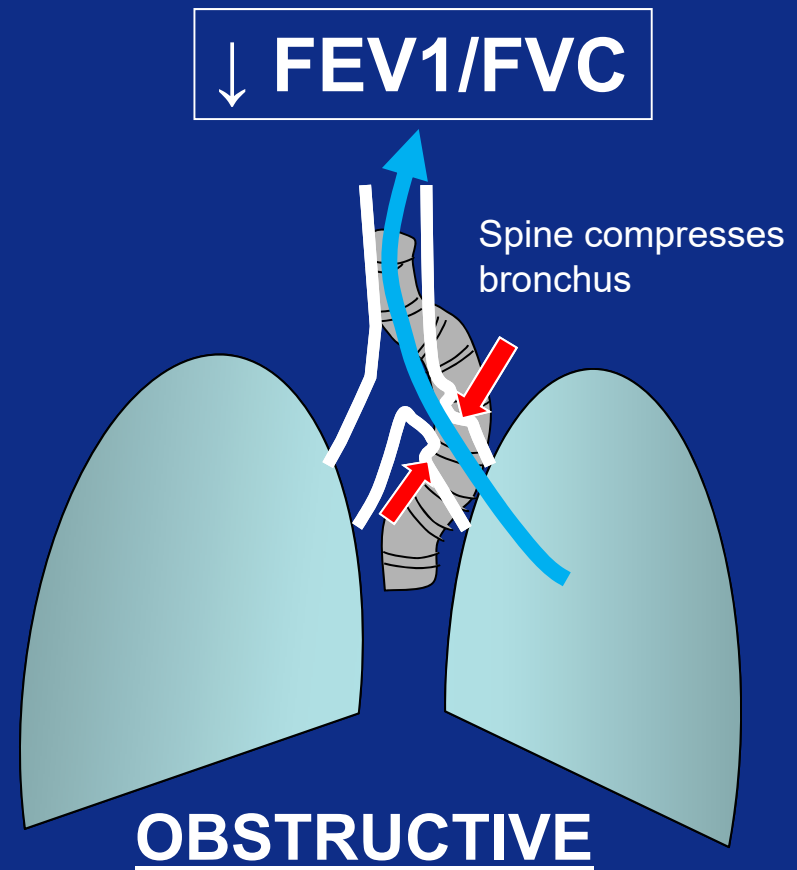
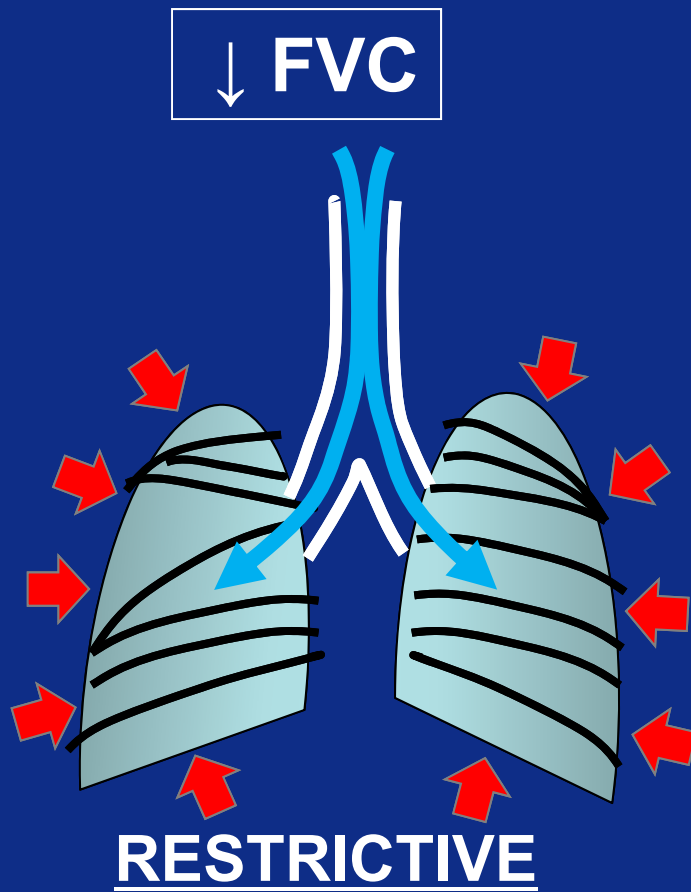


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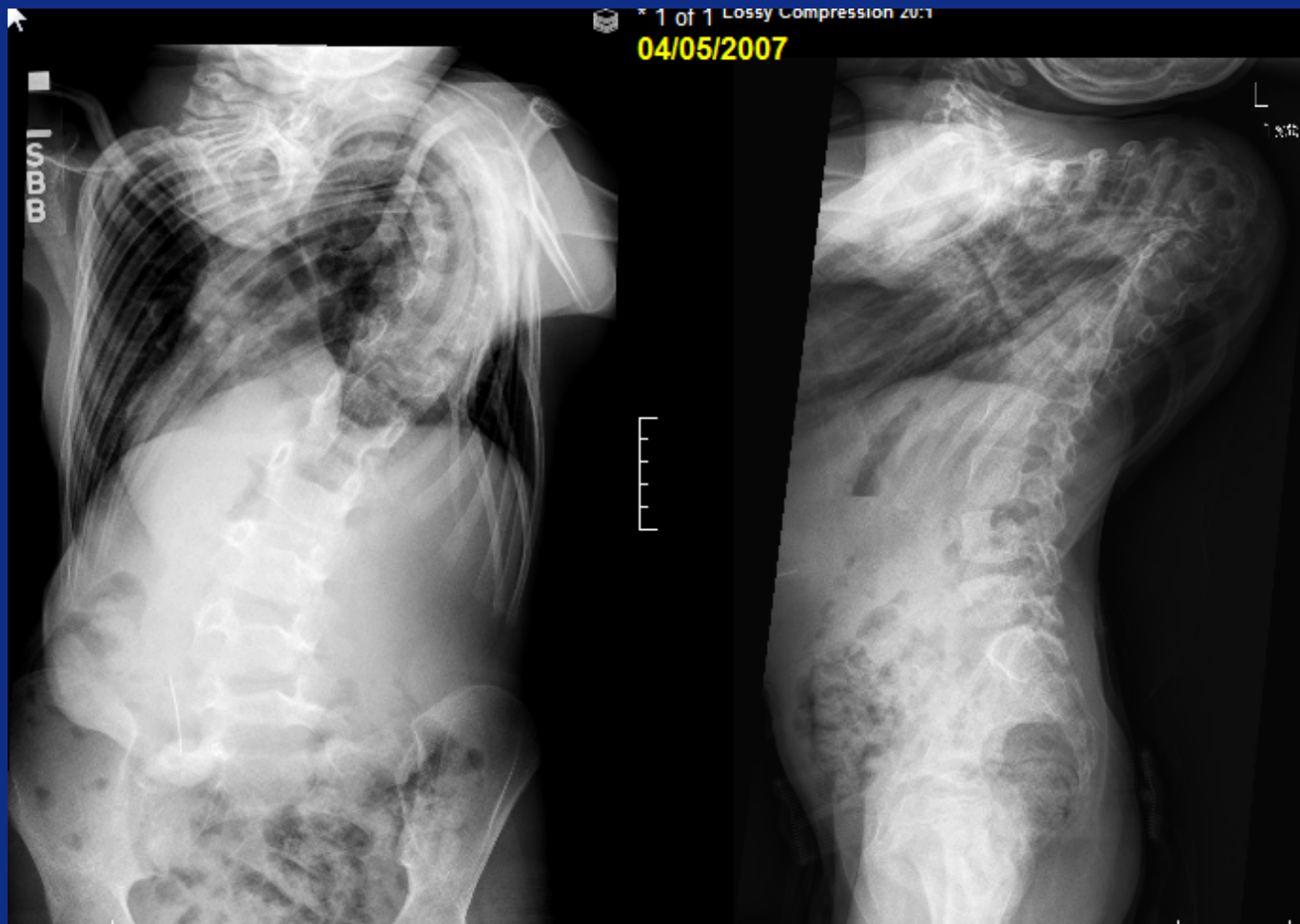


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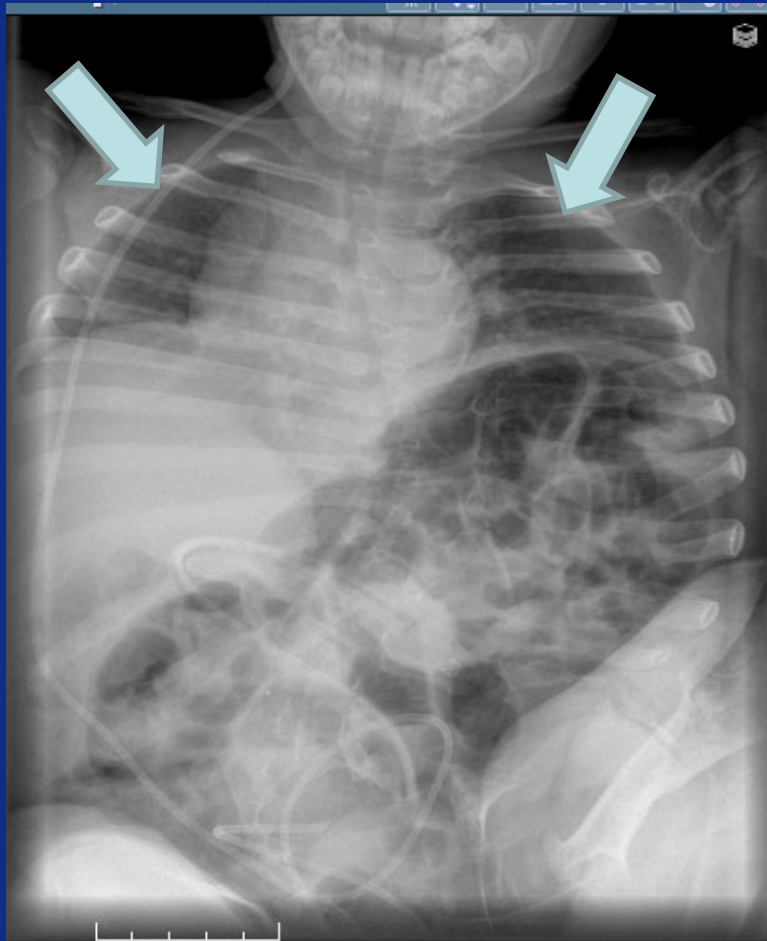


Initial



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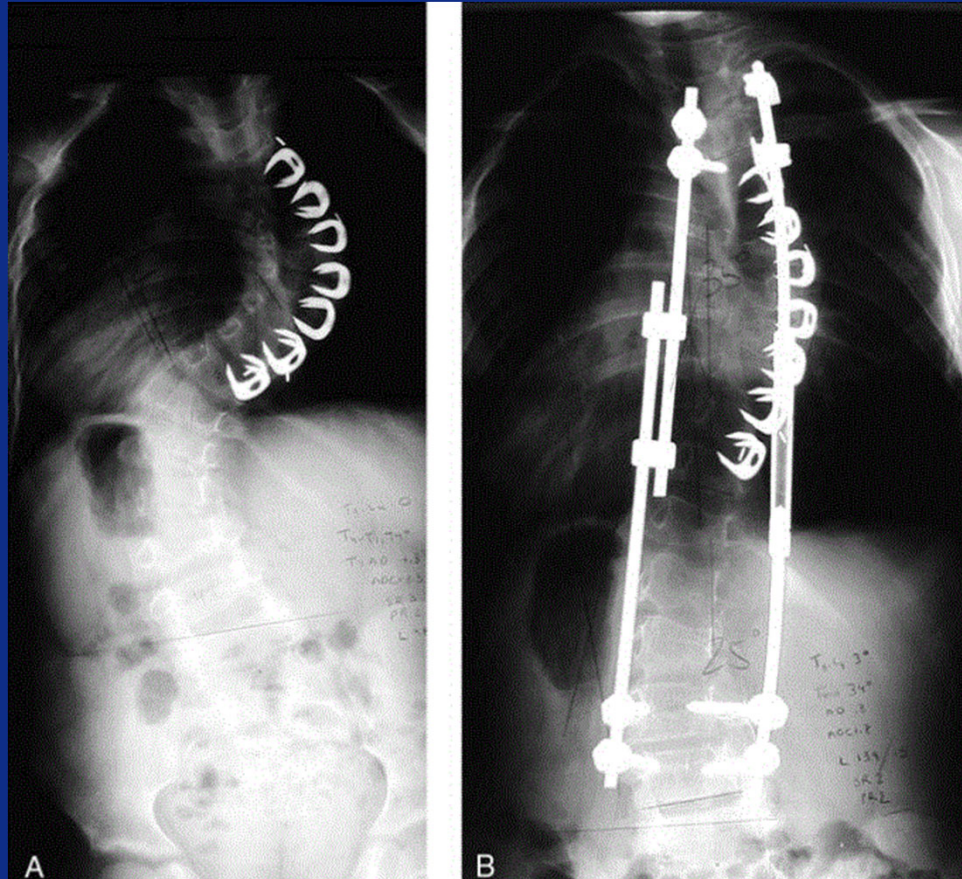
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Pulmonary Function EOS?

- Karlin/Campbell; Jarcho-Levin Syndrome
JBJS 2014
 - Asst Vent Rate improved
- Yoon, W; Magnetic Rods in EOS, *Spine* 2014
 - ↑FVC, ↑FEV1

Neuromuscular?

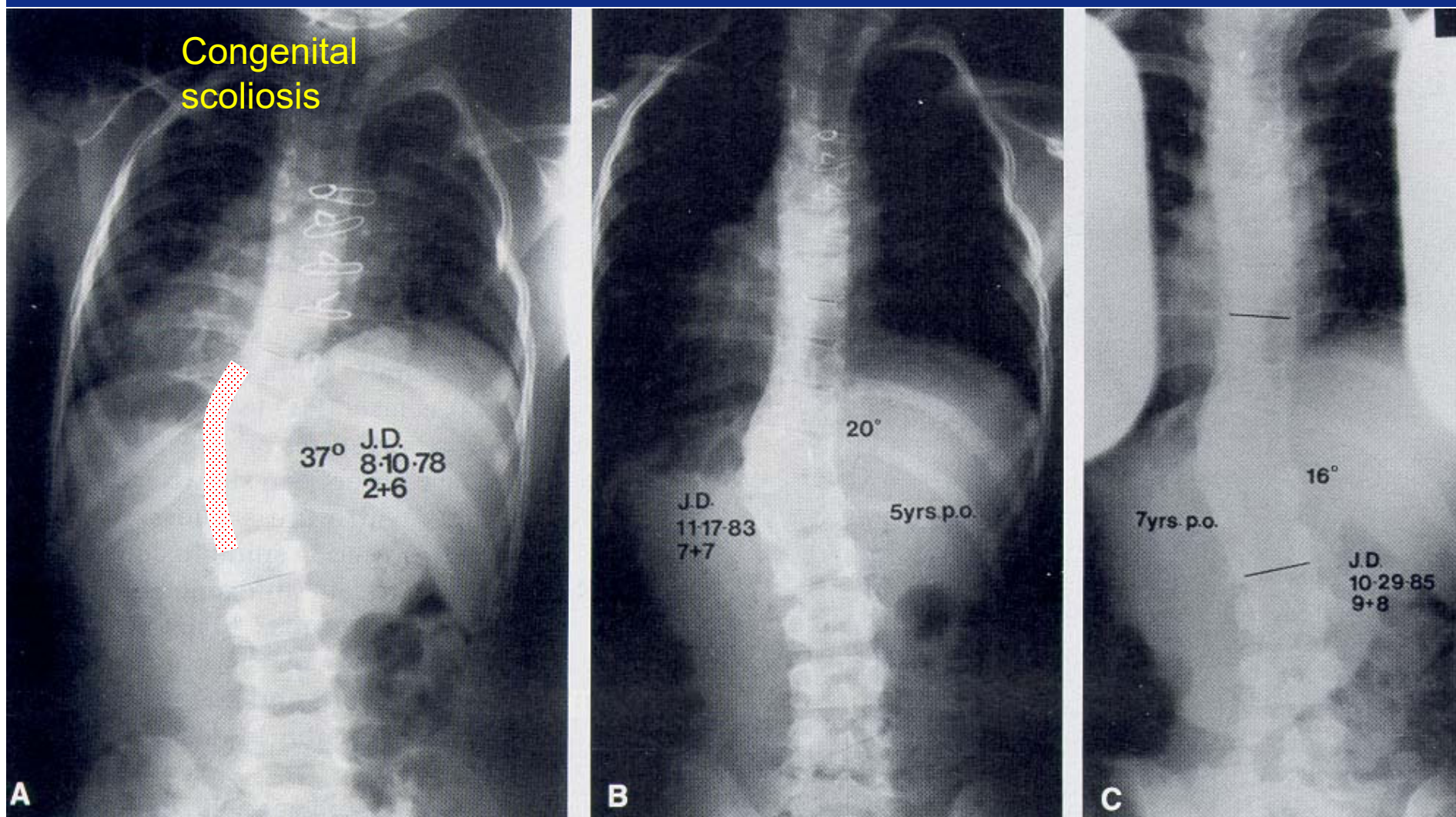
☑ No



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O'Leary/Sturm, 2011, *JPO*



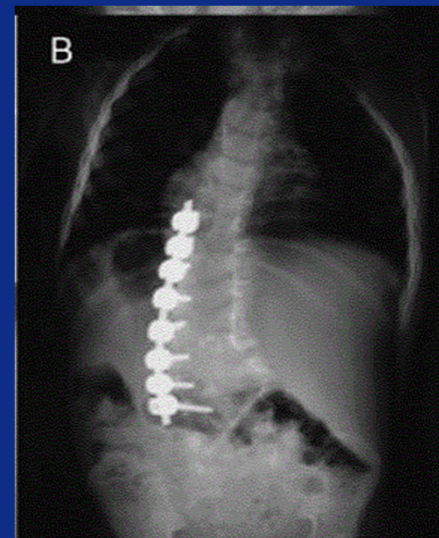
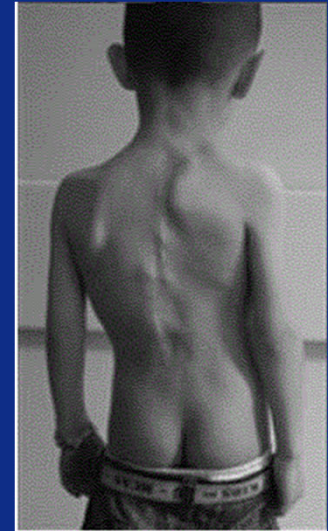
Winter, *JPO*, 1981

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Congenital

☑ Maybe



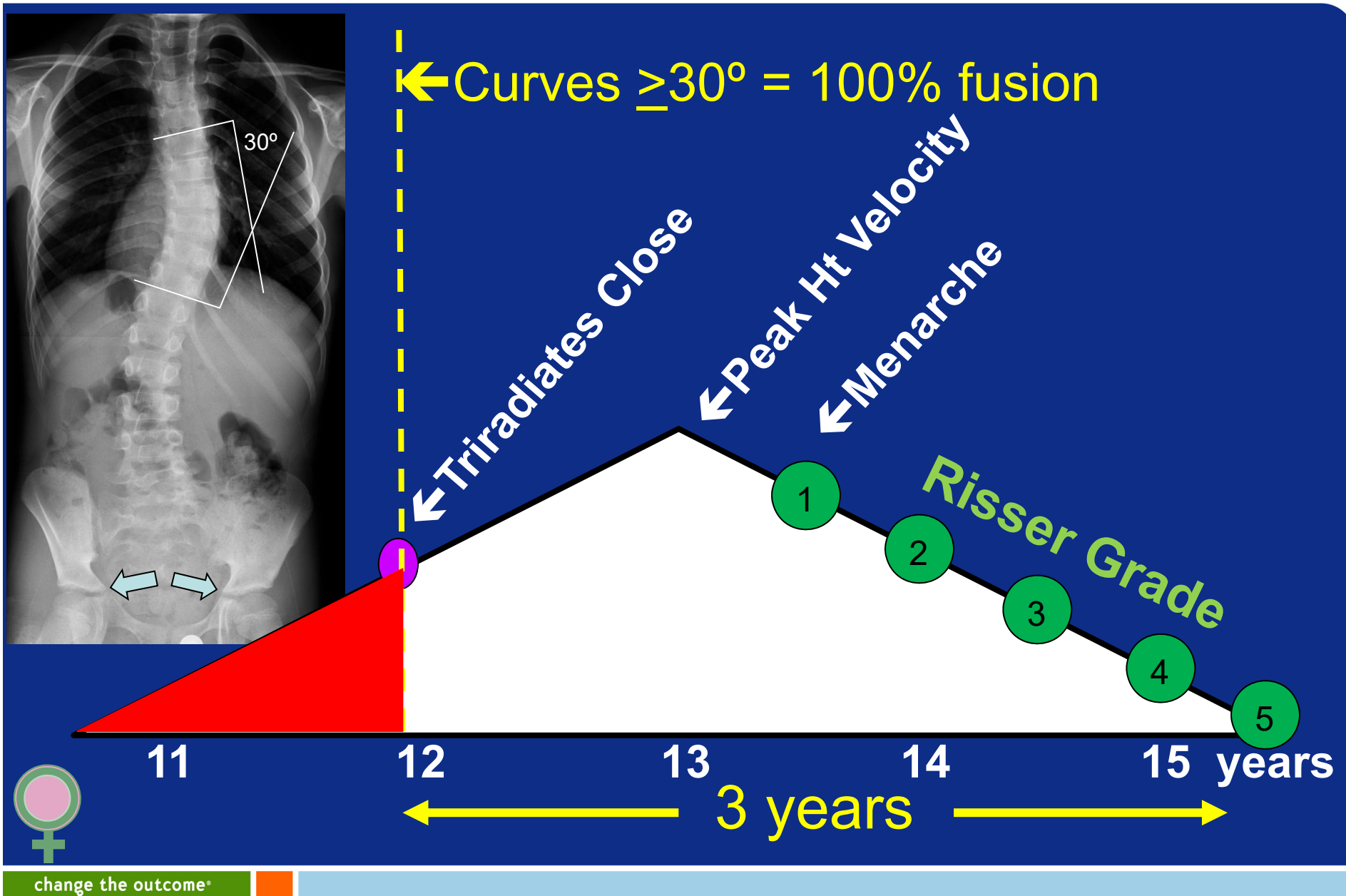
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Demirician

Answer for EOS?

- ☐ Yes
- ☒ No (If pulmonary issues)
- ☒ Maybe



Best Potential Indications

- 3 years of growth remaining
- Curves 30°-60°
- 50% Flexible
- Kyphosis < 40°
- Lenke 1a, 1b
- 9+ years

Volunteerism

George Thompson

Alain Dimeglio

Greg Redding

Jose Herra-Soto

Viral Jain

Tim Hresko

Peter Sturm

Alvin Crawford

Mark Ericson

Bob Campbell

Courtney Brown

Rick McCarthy

Muharrem Yazici

Jo-Chen Son Hing

Behrooz Akbarnia

Laural Blakemore

Ralf Stüecker

Randall Betz

Thank you from Cincinnati

