# Ponte vs VCR Osteotomies in EOS

## Alternate Title: VCR in EOS: Are you Crazy!?

*Brandon A Ramo, MD*

TEXAS SCOTTISH RITE HOSPITAL FOR CHILDREN®

# REMATCH!!!

*Ramo IPOS
Top Gun 2017

*Disclaimer: I have never served in our Armed Forces but respect and appreciate those who do and have borrowed this uniform from one of them, with no offense intended

Cahill, daily, circa 2017


EVERLAST

Spine
DEFORMITY
SPINE Volume 38, Number 2, pp 119–132


TEXAS SCOTTISH RITE HOSPITAL FOR CHILDREN

# Complications After 147 Consecutive Vertebral Column Resections for Severe Pediatric Spinal Deformity

*A Multicenter Analysis*

Lawrence G. Lenke, MD,* Peter O. Newton, MD,† Daniel J. Sucato, MD, MS,‡ Harry L. Shufflebarger, MD,§ John B. Emans, MD,‖ Paul D. Sponseller, MD,¶ Suken A. Shah, MD,** Brenda A. Sides, MA,* and Kathy M. Blanke, RN*

13.7 year average age; 63/147 were revisions.
Excellent radiographic correction: example KS group sagittal Cobb of 104 to 47

Complications:
86 patients with a complication; 67 intraop, generally IONM change or excessive EBL>2L

39/147 (29%) had an intra-op neuromonitoring event.

Spine
DEFORMITY
SPINE Volume 38, Number 2, pp 119–132


# Complications After 147 Consecutive Vertebral Column Resections for Severe Pediatric Spinal Deformity

*A Multicenter Analysis*

Lawrence G. Lenke, MD,* Peter O. Newton, MD,† Daniel J. Sucato, MD, MS,‡ Harry L. Shufflebarger, MD,§ John B. Emans, MD,‖ Paul D. Sponseller, MD,¶ Suken A. Shah, MD,** Brenda A. Sides, MA,* and Kathy M. Blanke, RN*

TEXAS SCOTTISH RITE HOSPITAL FOR CHILDREN®

- "This surgical procedure should remain one of last resort when no simpler method of spinal reconstruction will suffice."
- However, radiographical and clinical corrections along with outcomes are quite dramatic, and the VCR procedure has produced a viable alternative to other techniques for the correction of severe fixed pediatric spinal deformities.

# SCOPE OF THE DISCUSSION?

43/2,315 patients between 2 databases = 1.86%

Age 6.1 ± 3.0 years

Diagnoses: congenital 56%
myelomeningocele 19%
post-tubercular 14%
other 11%.

kyphosis 56%, scoliosis 23% and kyphoscoliosis 21%

Paper #20

**Vertebral Column Resection for Early-Onset Scoliosis: Indications, Utilization and Outcomes**

*Anna McClung, Gregory Mundis, Jeff Pawelek, Nima Kabirian, Sumeet Garg, Burt Yaszay, Oheneba Boachie-Adjei, James O. Sanders, Paul Sponseller, Francisco Javier Sánchez Pérez-Grueso, William Lavelle, John Emans, Charles Johnston, Behrooz Akbarnia, Children's Spine Study Group, Growing Spine Study Group*

# ICEOS 2017

Table 1
Radiographic parameters

| | Pre-op | Post-op | p-value |
|---|---|---|---|
| Major Curve(°) (Largest curvature in either plane) | 82±25 | 23±16 | <.001 |
| Coronal Curve(°) | 53±29 | 18±17 | <.001 |
| Sagittal Curve(°) | 71±32 | 24±17 | <.001 |
| T-DAR (Total Deformity Angular Ratio) | 23±11 | 8±5 | <.001 |
| Spinal Height (T1-S1, cm) | 22.0±5.4 | 24.0±5.3 | <.001 |
| Thoracic Height (T1-T12, cm) | 13.1±3.9 | 14.1±3.7 | .001 |

# SO HOW'D IT GO?

Complication rate: 33% pts

- Neuro/IONM change 57%
- wound 29%
- medical 11%

6/13 had preop deficits
8/13 IONM wave changes only
4/13 had IONM changes + deficit
2/13 had no wave changes but a postop deficit

All patients with a postop deficit had a complete or partial recovery

Paper #20

**Vertebral Column Resection for Early-Onset Scoliosis: Indications, Utilization and Outcomes**

*Anna McClung, Gregory Mundis, Jeff Pawelek, Nima Kabirian, Sumeet Garg, Burt Yaszay, Oheneba Boachie-Adjei, James O. Sanders, Paul Sponseller, Francisco Javier Sánchez Pérez-Grueso, William Lavelle, John Emans, Charles Johnston, Behrooz Akbarnia, Children's Spine Study Group, Growing Spine Study Group*

# ICEOS 2017

Table 1
Radiographic parameters

| | Pre-op | Post-op | p-value |
|---|---|---|---|
| Major Curve(°) (Largest curvature in either plane) | 82±25 | 23±16 | <.001 |
| Coronal Curve(°) | 53±29 | 18±17 | <.001 |
| Sagittal Curve(°) | 71±32 | 24±17 | <.001 |
| T-DAR (Total Deformity Angular Ratio) | 23±11 | 8±5 | <.001 |
| Spinal Height (T1-S1, cm) | 22.0±5.4 | 24.0±5.3 | <.001 |
| Thoracic Height (T1-T12, cm) | 13.1±3.9 | 14.1±3.7 | .001 |

Chan P, Andras LM, Nielsen E, Sousa T, Joiner E, Choi PD, Volo VT, Skaggs, DL.

# Comparison of Ponte Osteotomies and 3-Column Osteotomies in the Treatment of Congenital Spinal Deformity.

J Pediatr Orthop. 2017 Aug 2 Epub ahead of print.

Retrospective review 1996 to 2013.

Patients treated with multiple Ponte osteotomies (PO group) were compared with those managed with 3-column osteotomies (HV/VCR group).

49 patients [17 PO, 32 HV/VCR (26 HV, 6 VCR)].

For the PO group, mean age was 14 years, and they had an average of 4 ponte osteotomies and 11 levels fused. Mean total DAR was 25

The HV/VCR group had a mean age of 7 years and 5 levels fused. Mean total DAR was 28

**Patients had a mean of 54.1% correction of coronal deformity in the PO group and 54.4% in the HV/VCR group (P=0.78).**

**Signal changes were observed less frequently with PO (1/17) and HV (1/26) than with VCR (4/6), P=0.001.**

**Revision rates were 17.6% (3/17) in the PO group and 37.5% (12/32) in the HV/VCR group (P=0.35).**

# VCR in EOS : Yes It Can be Done

- 4 children (age 2.5-5.2)
- Predominantly done for Kyphosis
  - Scoli (mean 69, range 50-99)
  - Kyphosis (mean 126, range 87-151)
- Improved to 61 kyphosis and 29 scoliosis
- 2 complications (both reop)
- 3 growing rod constructs
- no neuro deficits
- Spectacular Results!

Eur Spine J (2014) 23:198–208
DOI 10.1007/s00586-013-2924-0

ORIGINAL ARTICLE

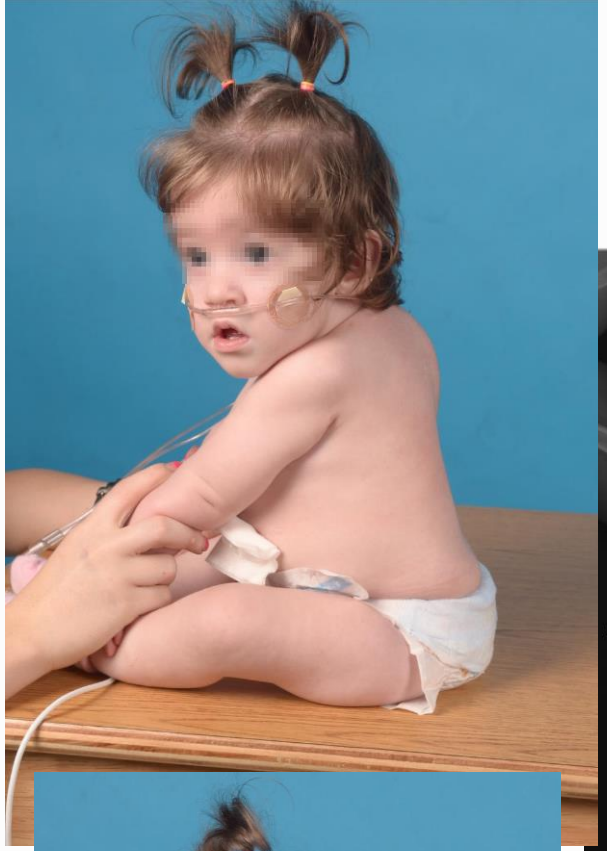
**Posterior vertebral column resection in early onset spinal deformities**

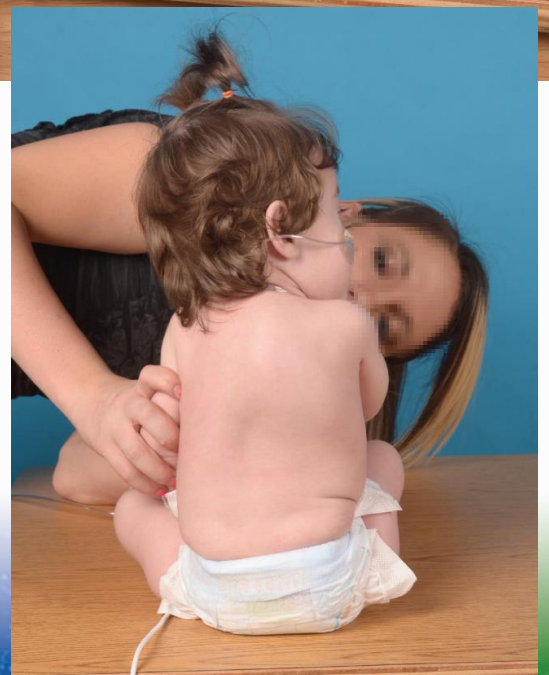
D. Jeszenszky · D. Haschtmann · F. S. Kleinstück · M. Sutter · A. Eggspühler · M. Weiss · T. F. Fekete

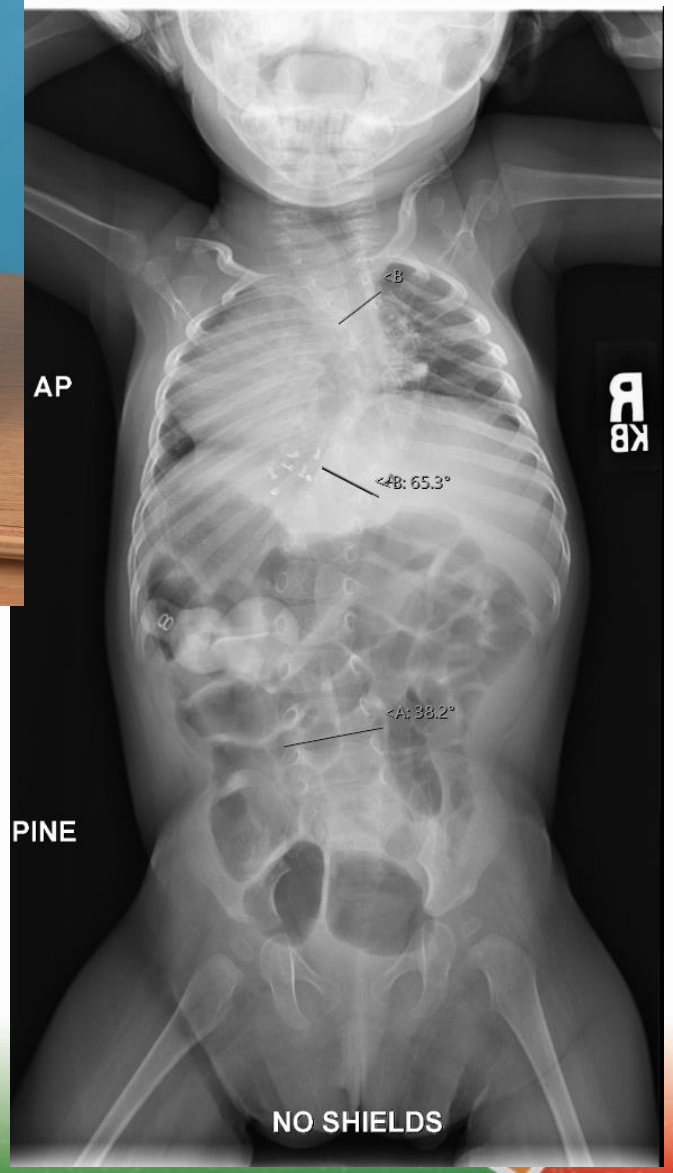
# When there's no (or not much) data, go with case examples

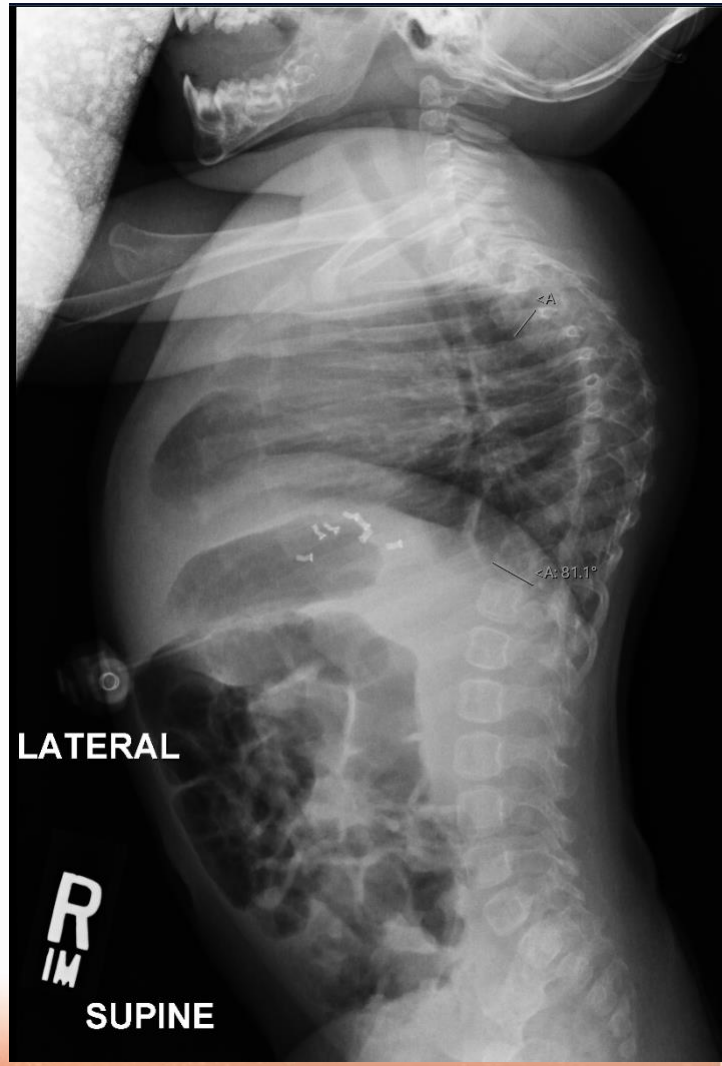
TEXAS SCOTTISH RITE HOSPITAL FOR CHILDREN

Presented at 11 months with unknown syndrome, complex medical problems including G-tube

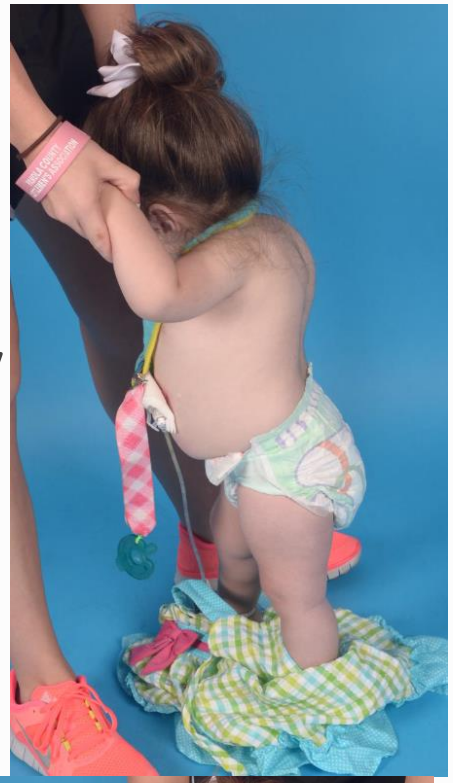




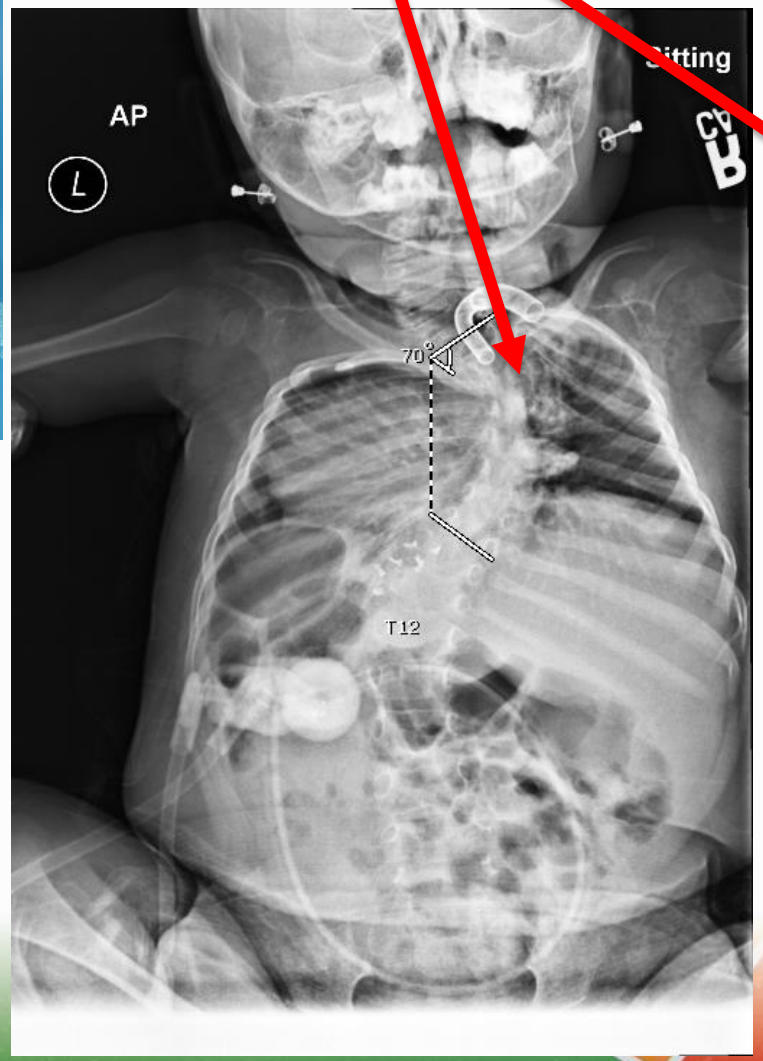


- Now 22months
- **tracheostomy** requiring ventilation by age 21 months.

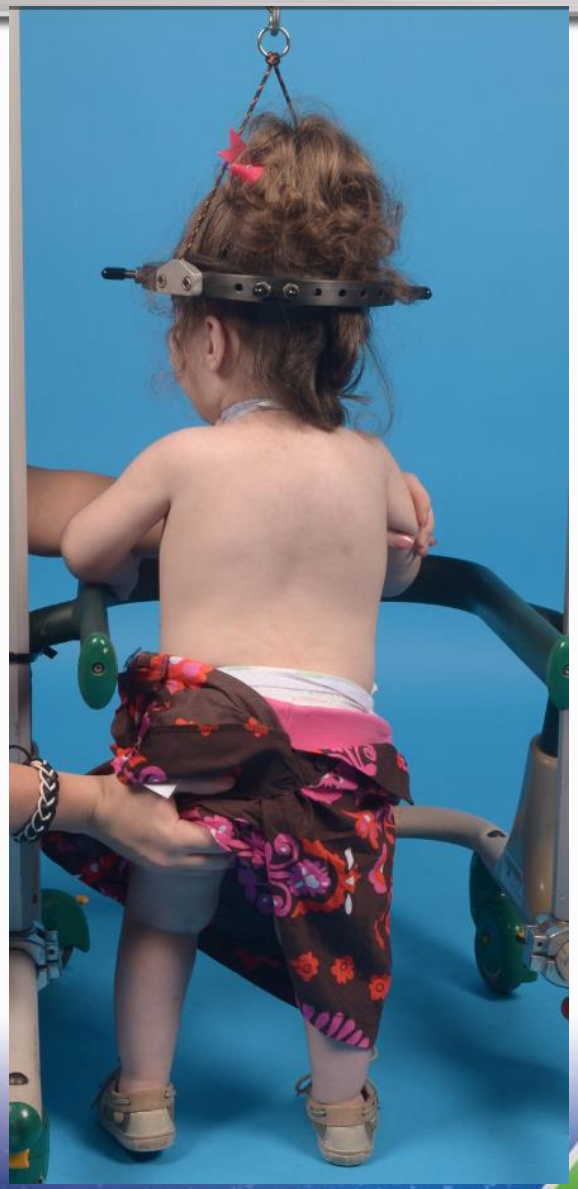


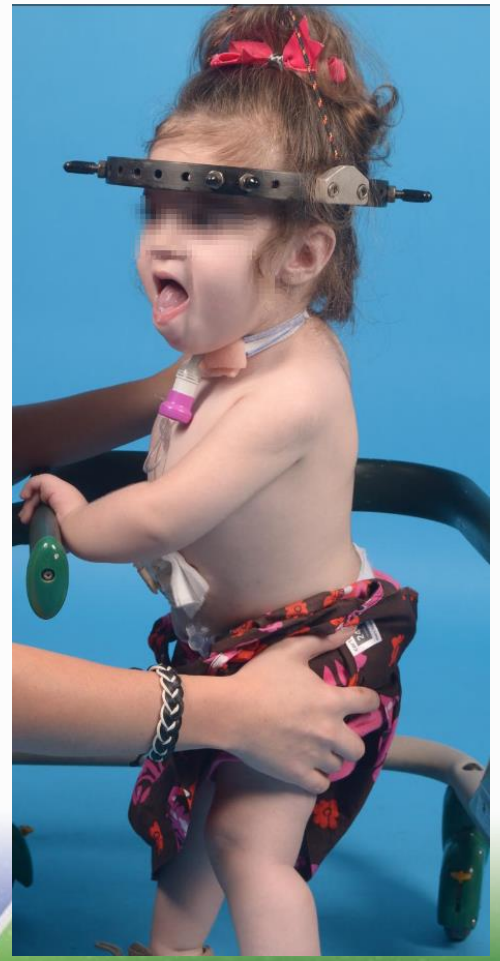
Just cut here?

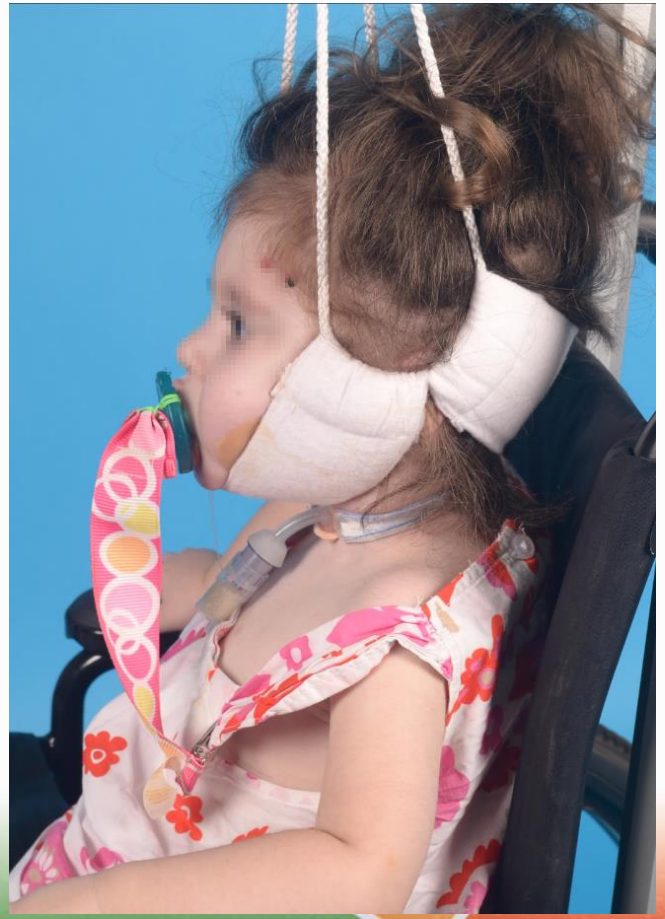



# 22 months in traction

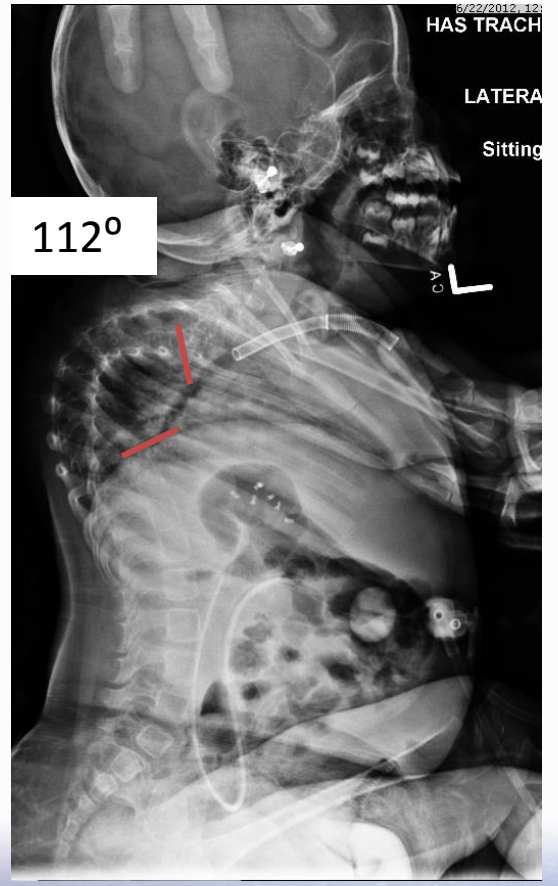
Halo pins got loose….





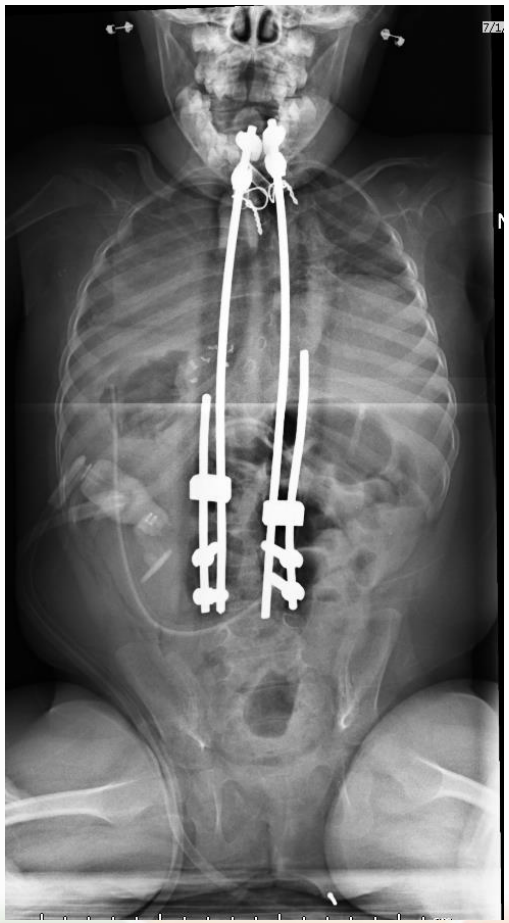


Age 22 months




112°

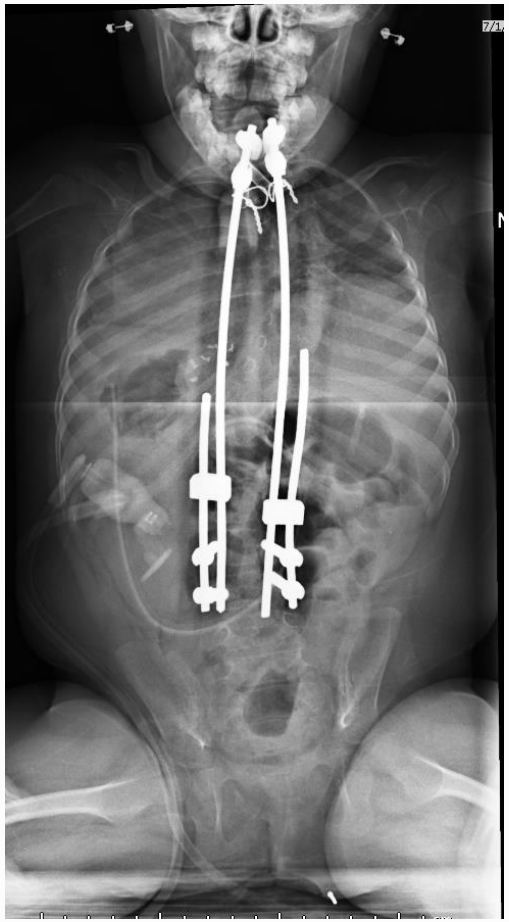
Age 25 months

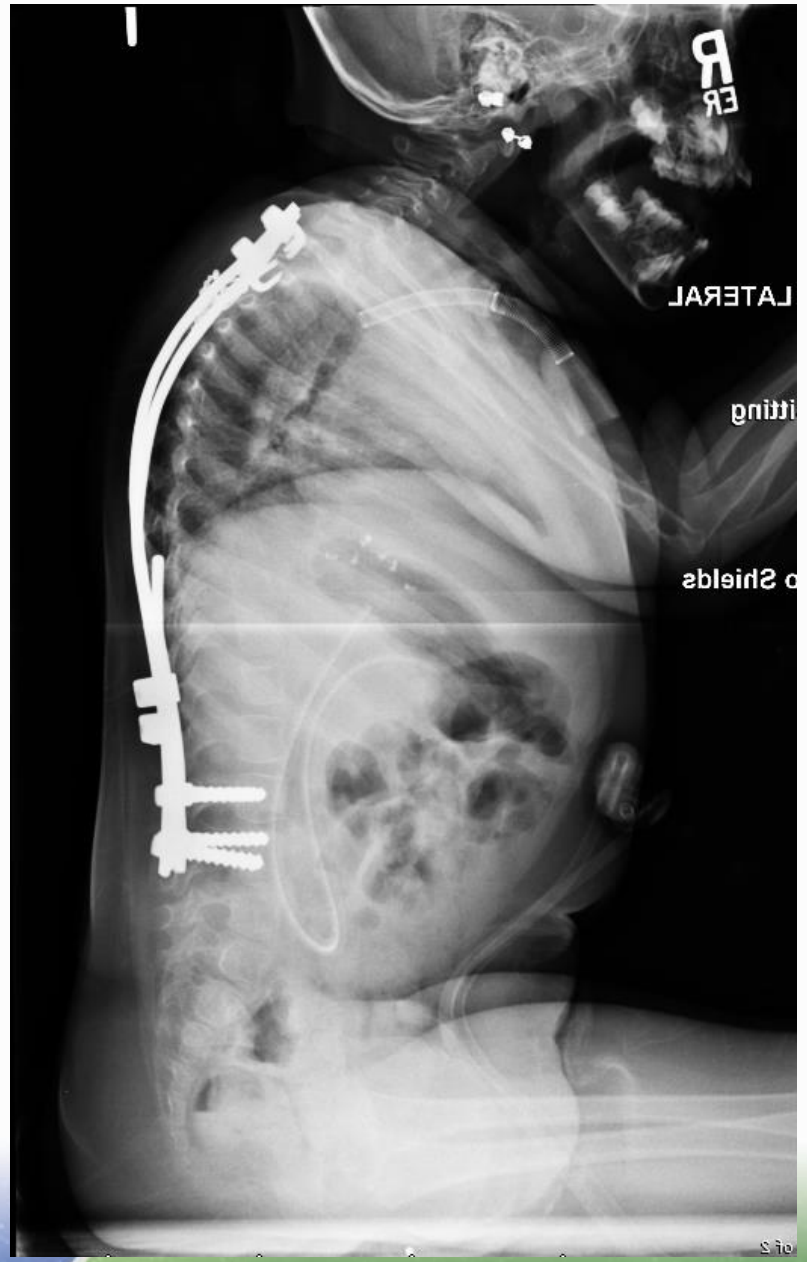



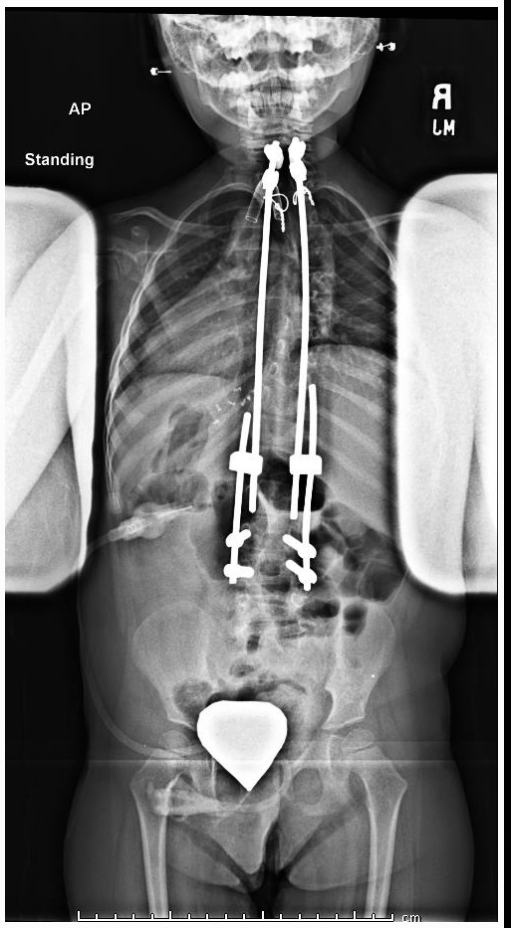
**Age 30 months**

Age 2+6

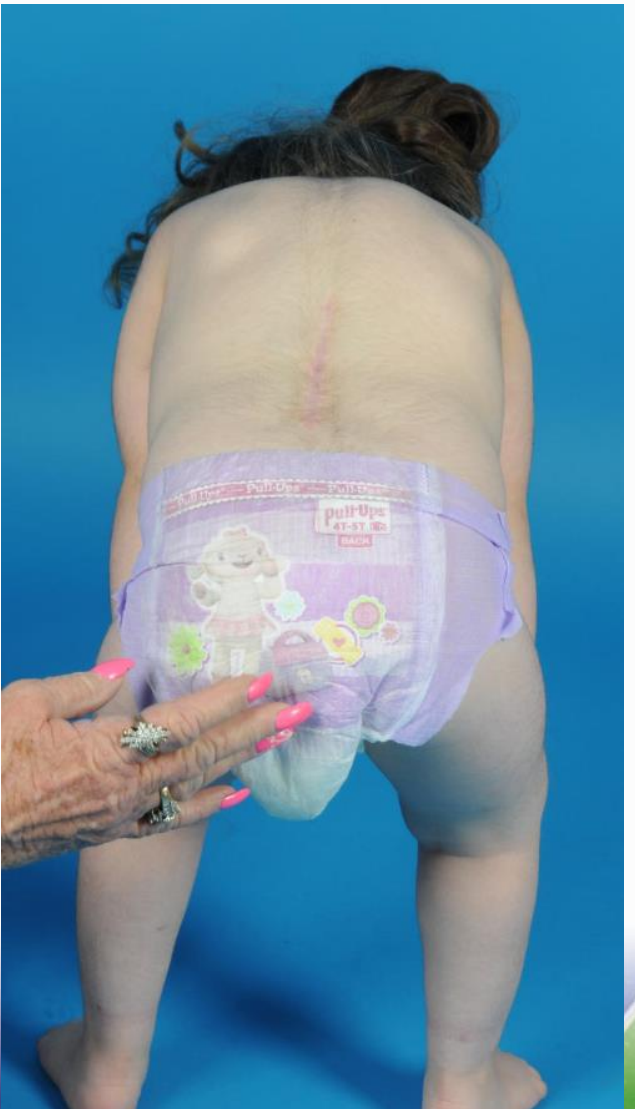
Age 4+0

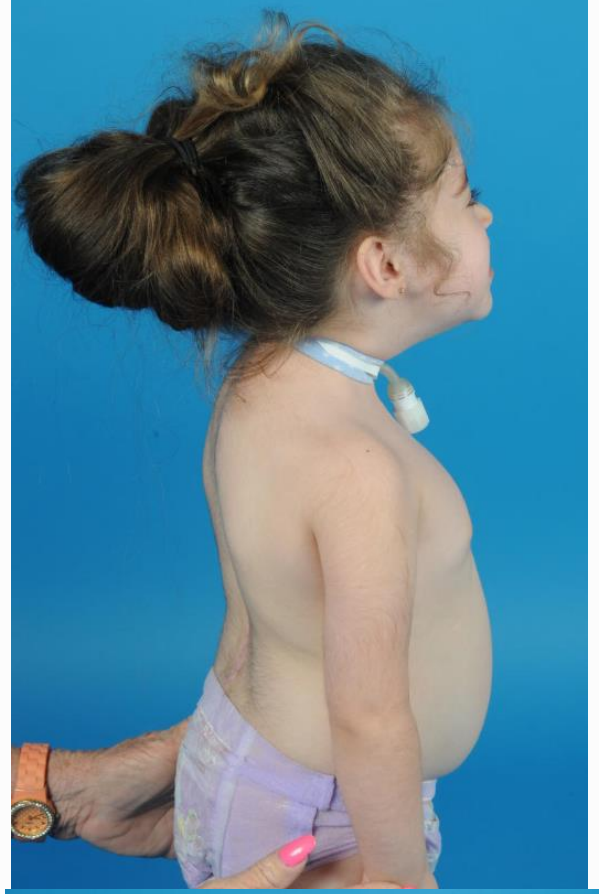


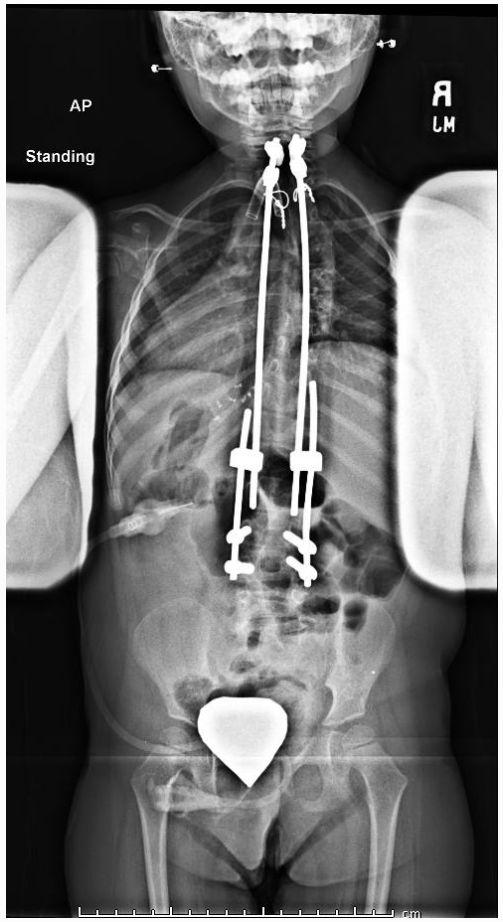



Age 4+0









- MRSA!

MRSA!!!

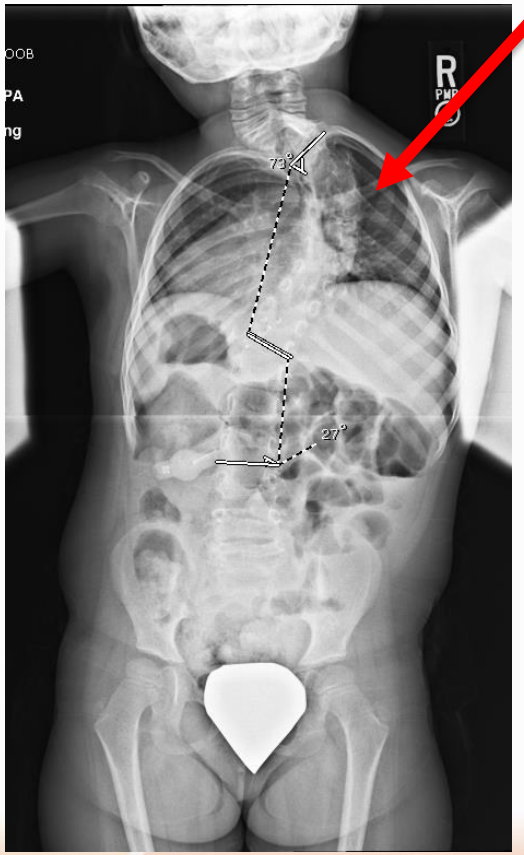
Just cut here?

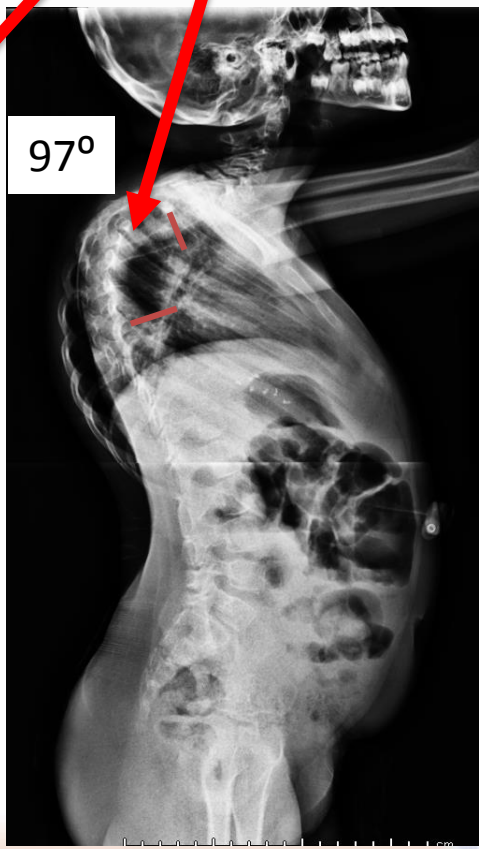
Age 4+0

Age 4+10

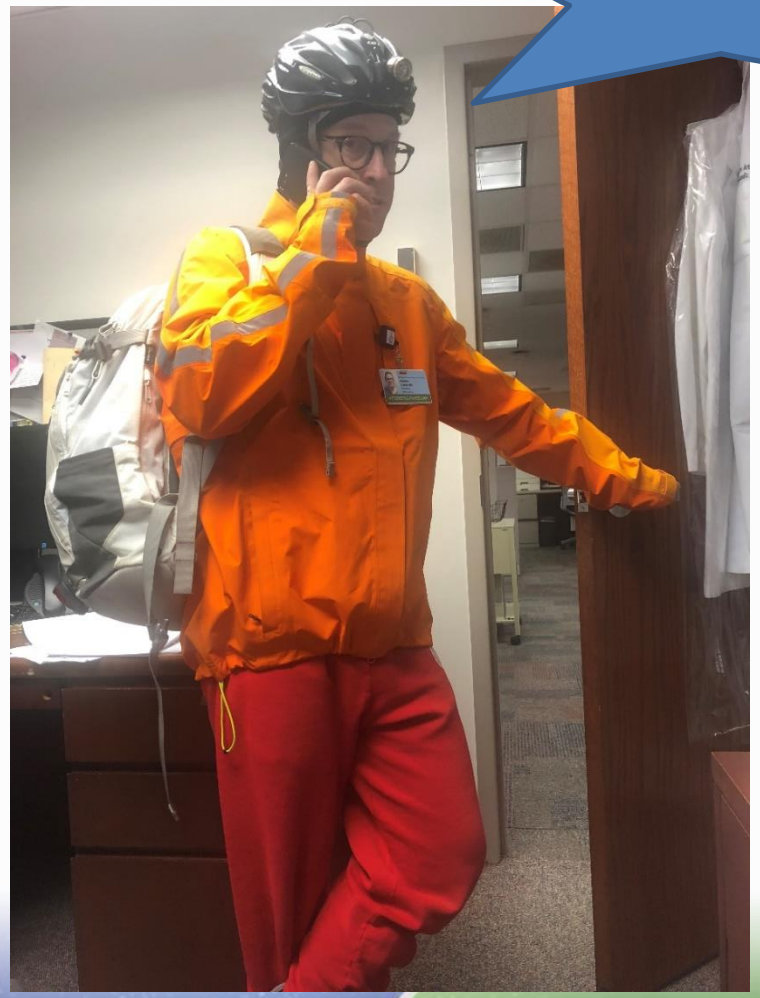


Age 5+10



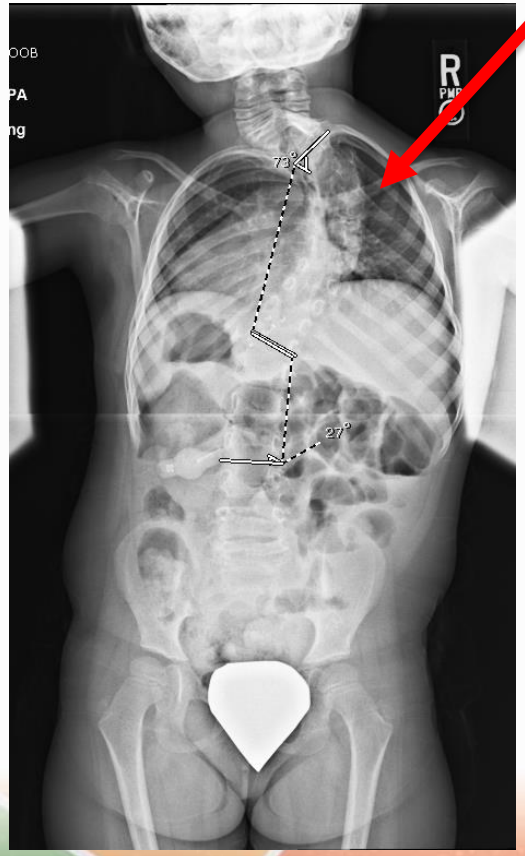



Yes, it’s very simple, just cut there!



Just cut here?

Age 5+10





Stop!, please Dr Cahill, aren't there any other options besides cutting my spine in half?!?

# Alphabet Soup: Sagittal Balance Correction Osteotomies of the Spine—What Radiologists Should Know

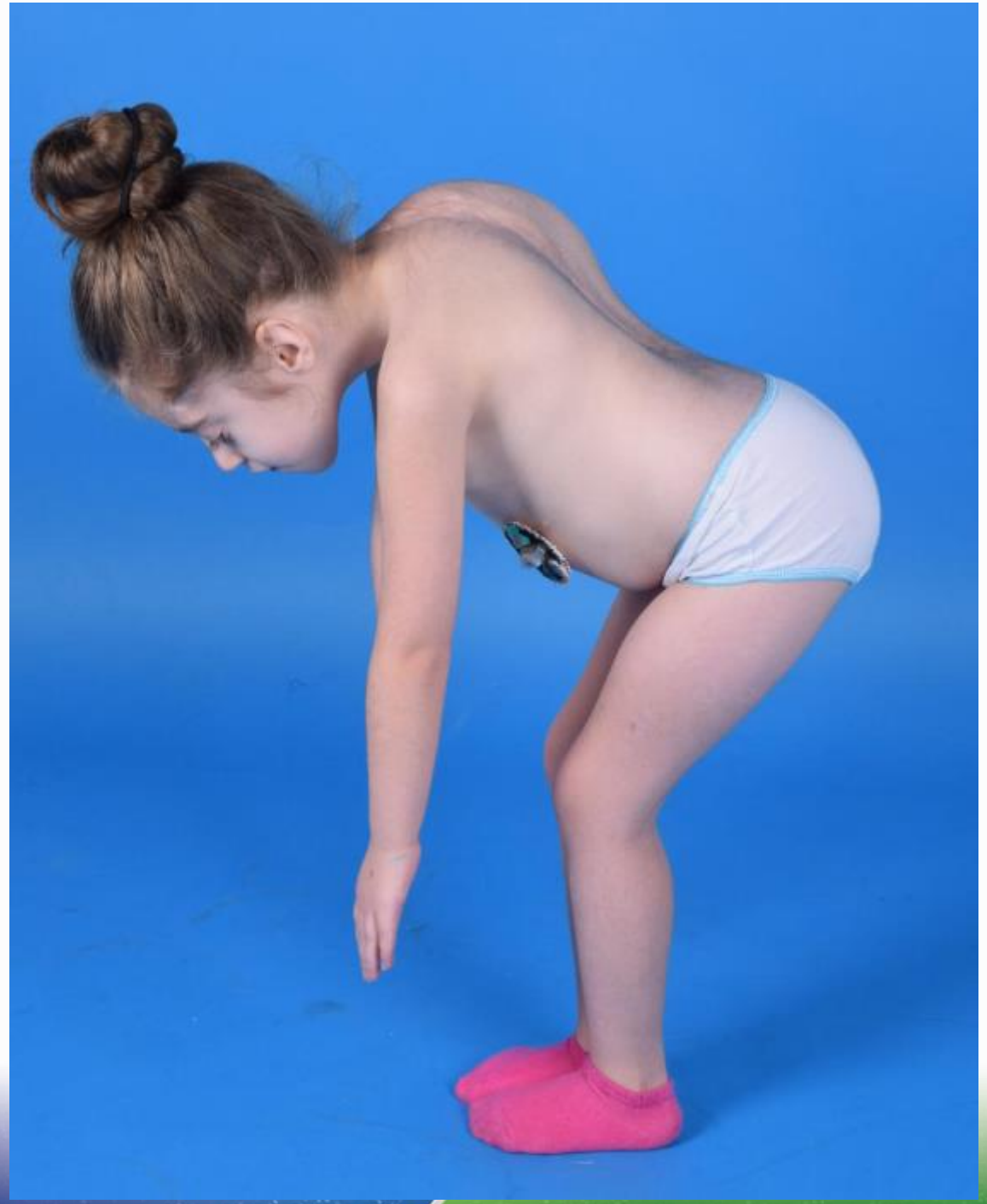
T. Takahashi, D. Kainth, S. Marette, and D. Polly

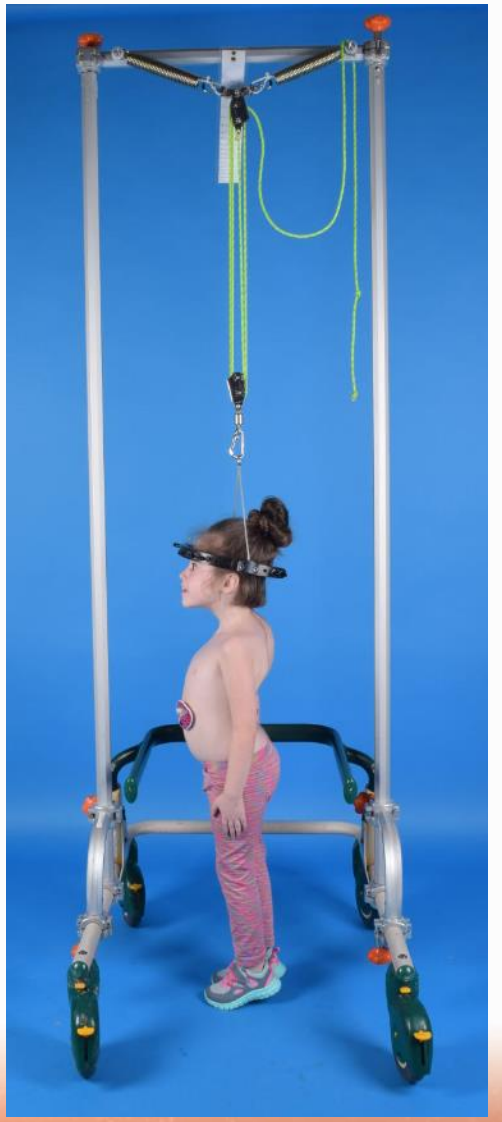
AJNR Am J Neuroradiol 39:606–11 Apr 2018 www.ajnr.org

TEXAS SCOTTISH RITE HOSPITAL FOR CHILDREN

**Summary of sagittal balance-correction osteotomy**

| | SPO/Ponte | PSO Category | VCR |
|---|---|---|---|
| Schwab grade | 1 and 2 | 3 and 4 | 5 and 6 |
| Resection area | Posterior element only | Included part of vertebral body | Entire vertebra |
| Indication | Long, gradual, rounded kyphosis, eg, Scheurmann kyphosis | Sharp, focal kyphosis with fixed disc space, ie, SPO not applicable | Sharp, focal kyphosis at thoracic vertebra<br>Hemivertebra resection<br>Vertebral tumor resection |
| Need disc space mobility? | Yes | No | No |
| Sharp angular kyphosis correction? | No | Yes | Yes |
| Thoracic spine correction? | No | No | Yes |
| Kyphotic curvature correction | ~10°/level | 30°–40°/level | 45°–70° |
| Indicated SVA (cm) | >6–8 cm but <10 cm (positive SVA) | >10–12 cm (very positive SVA) | |
| Mean neurologic/overall complication rate (%)[27] | 2.1/40.4 | 9.1/38.5 | 14.3/39 |



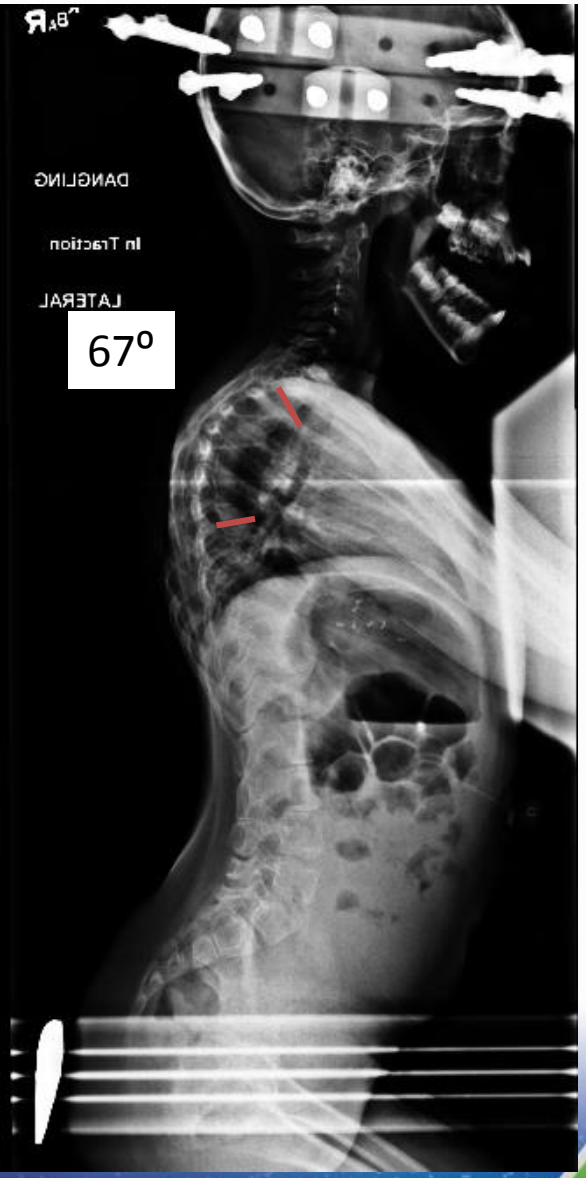


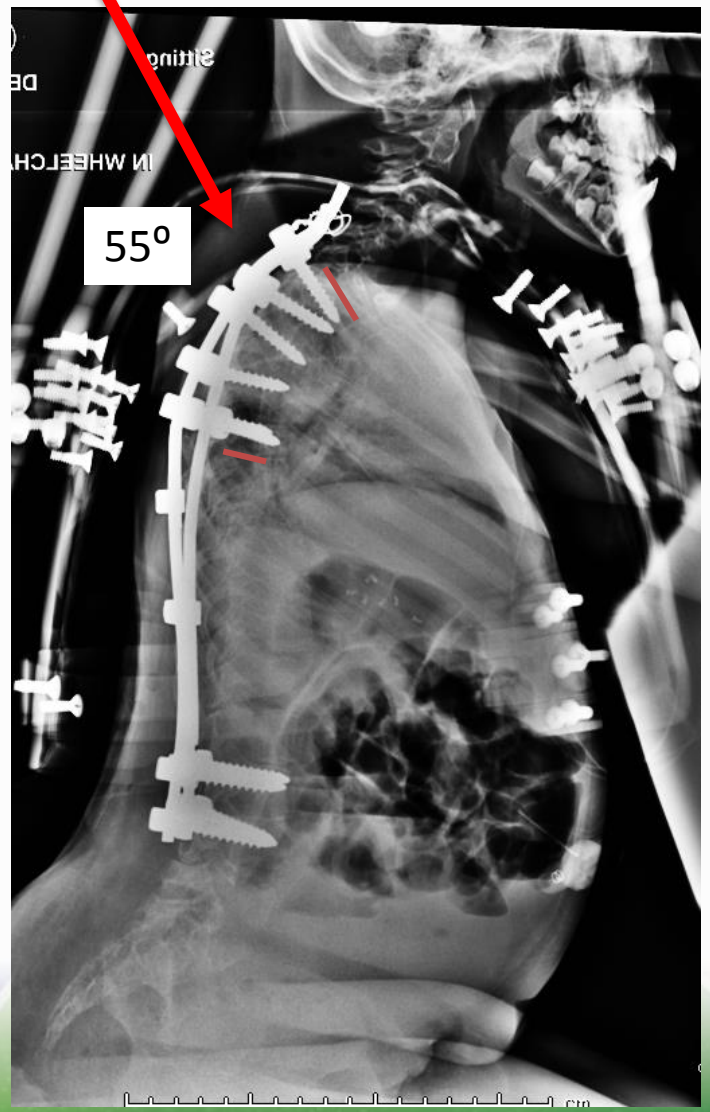
Age 6+5 back in halo

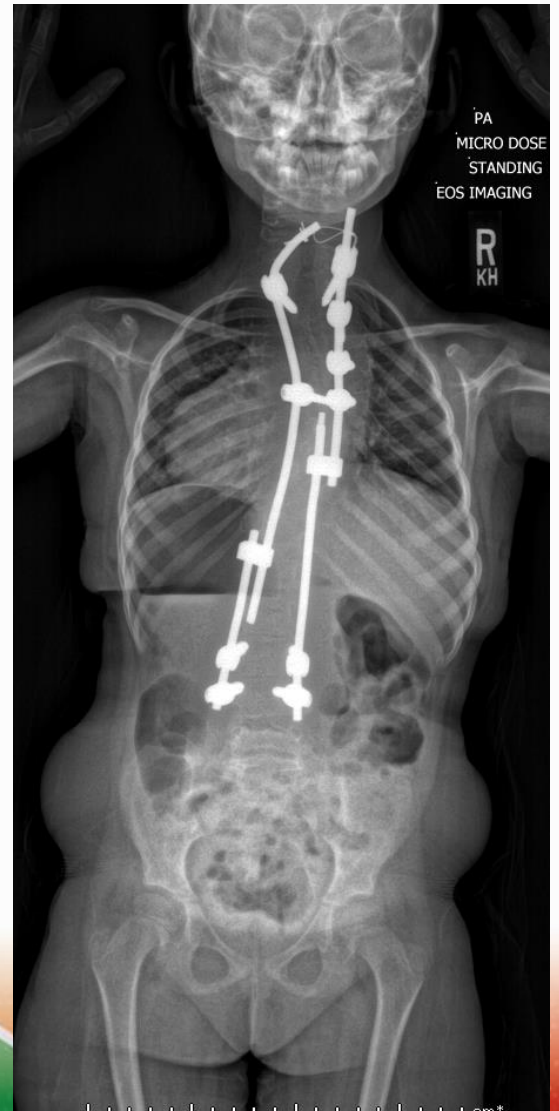
4 level Ponte osteotomies to correct focal kyphosis at time of GR implant

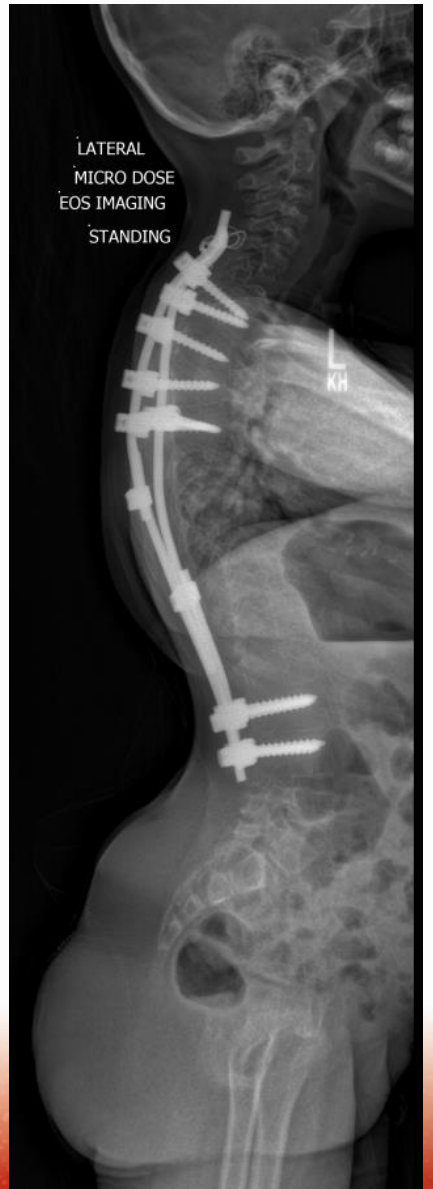
Age 6+6

Age 7+3

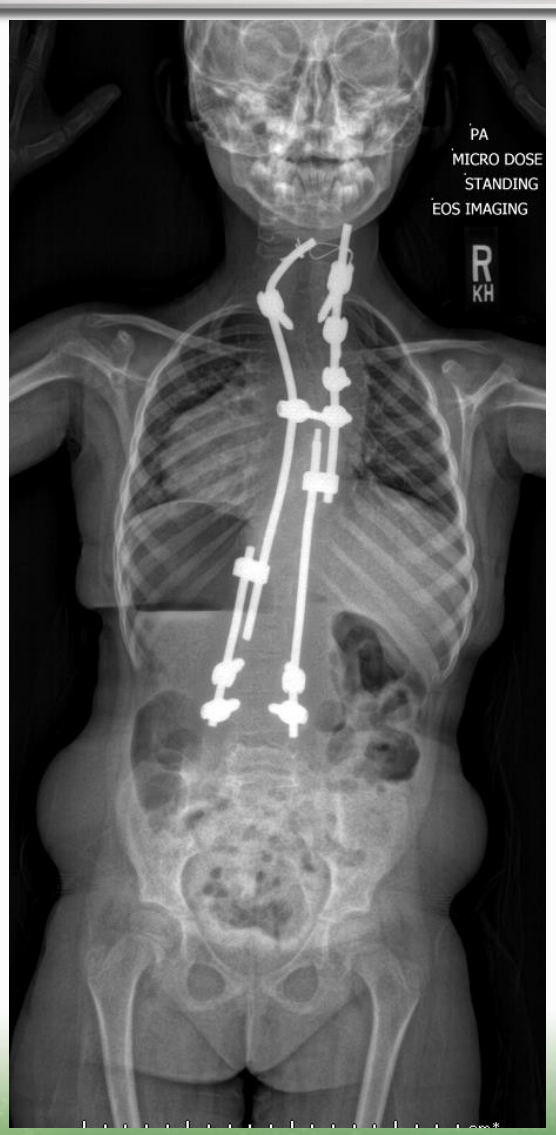


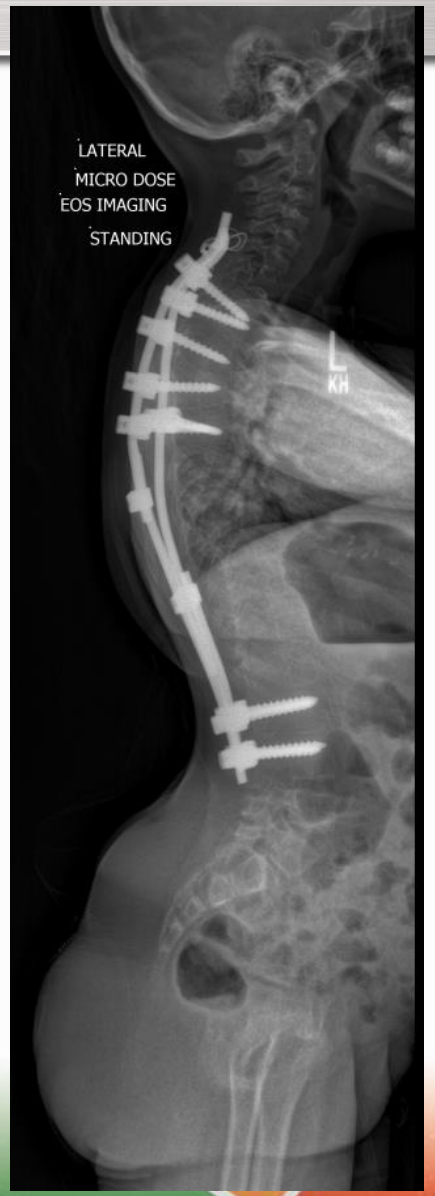



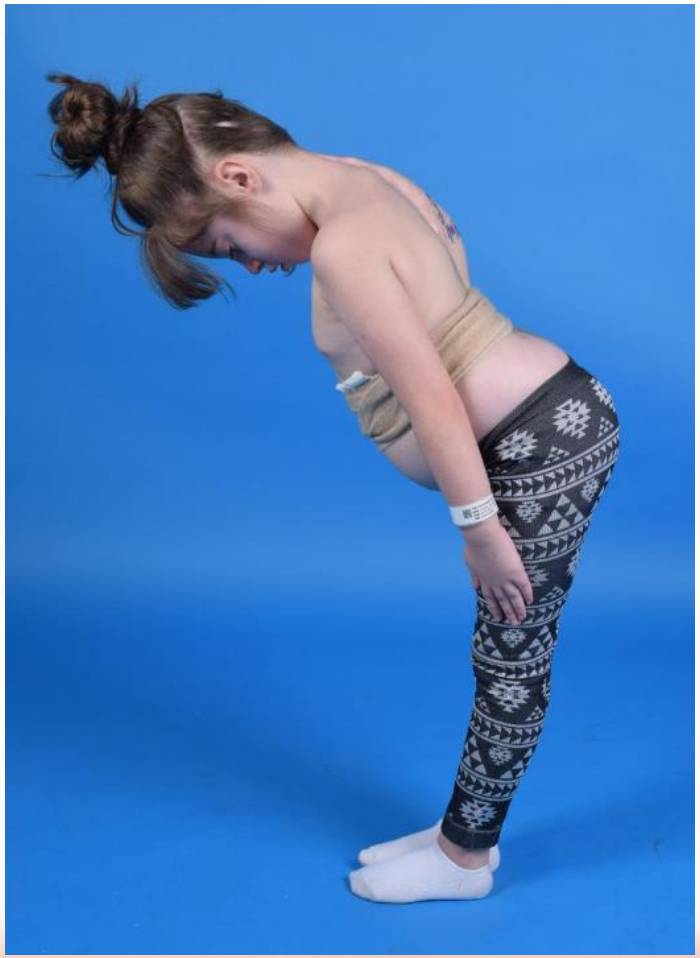



# Battle shall continue….



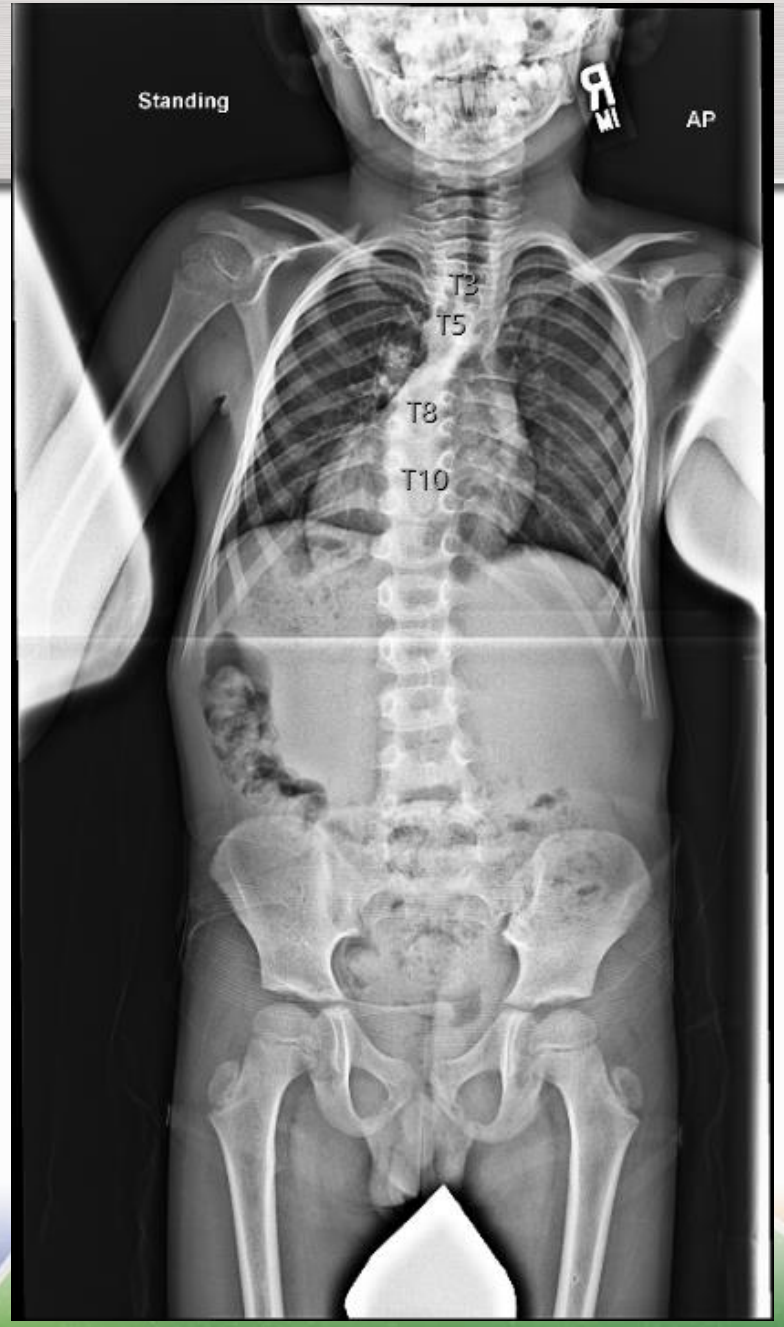



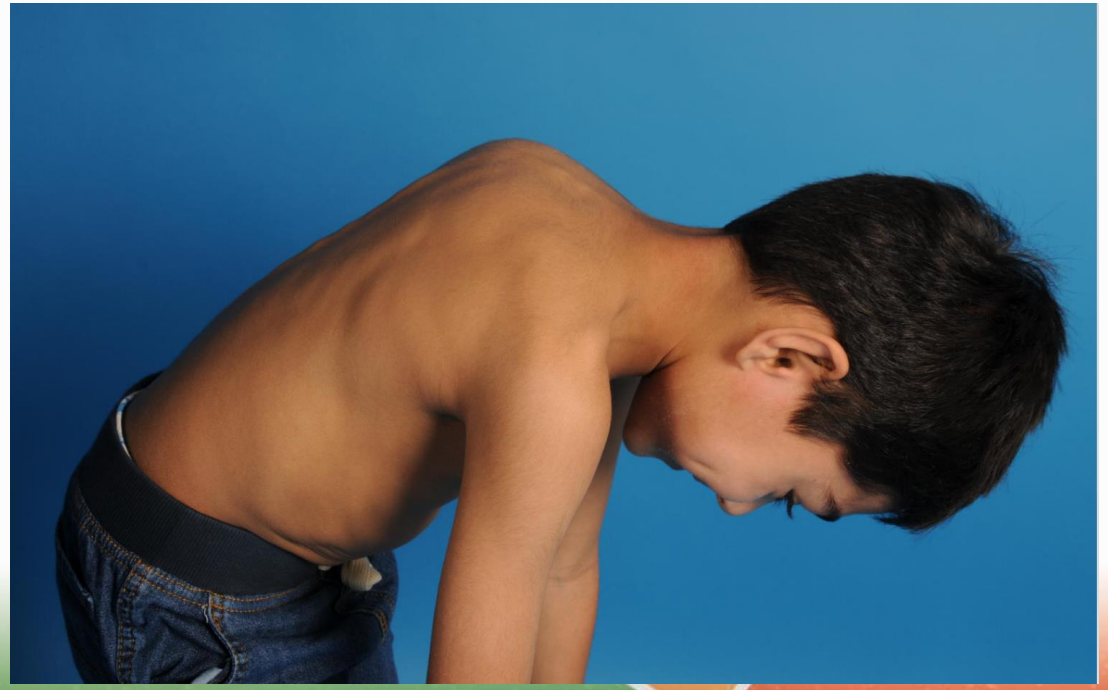
# Not a “dramatic” result but when less is more……

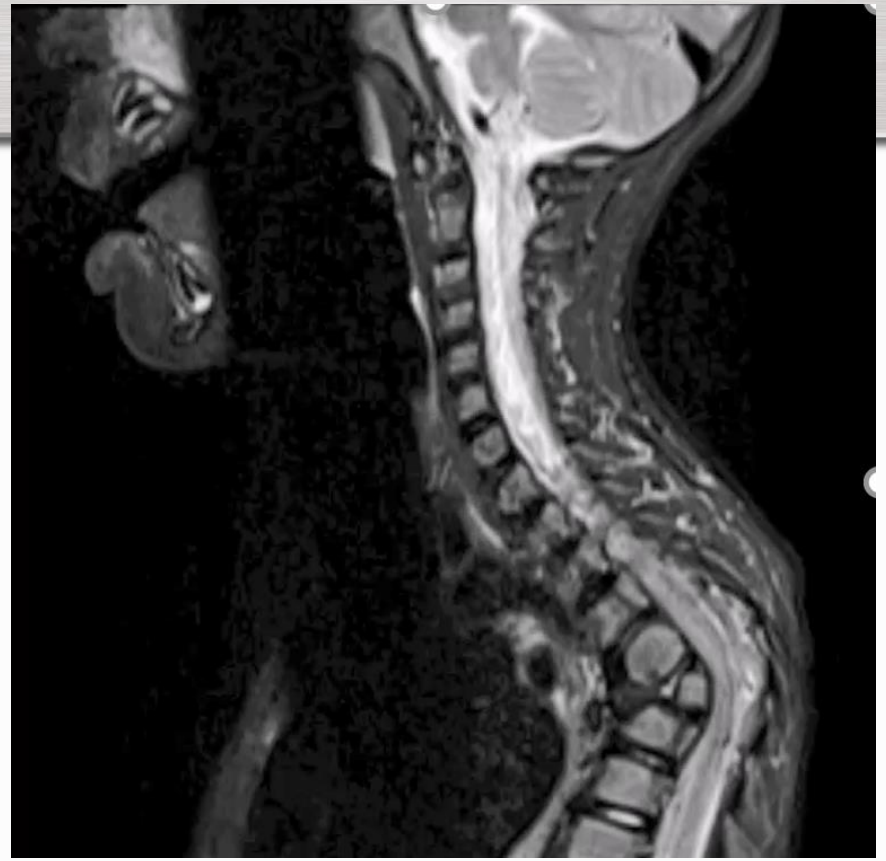
# Age 5+6

VCR recommended by outside surgeon

Family not comfortable with risks (appropriately) described

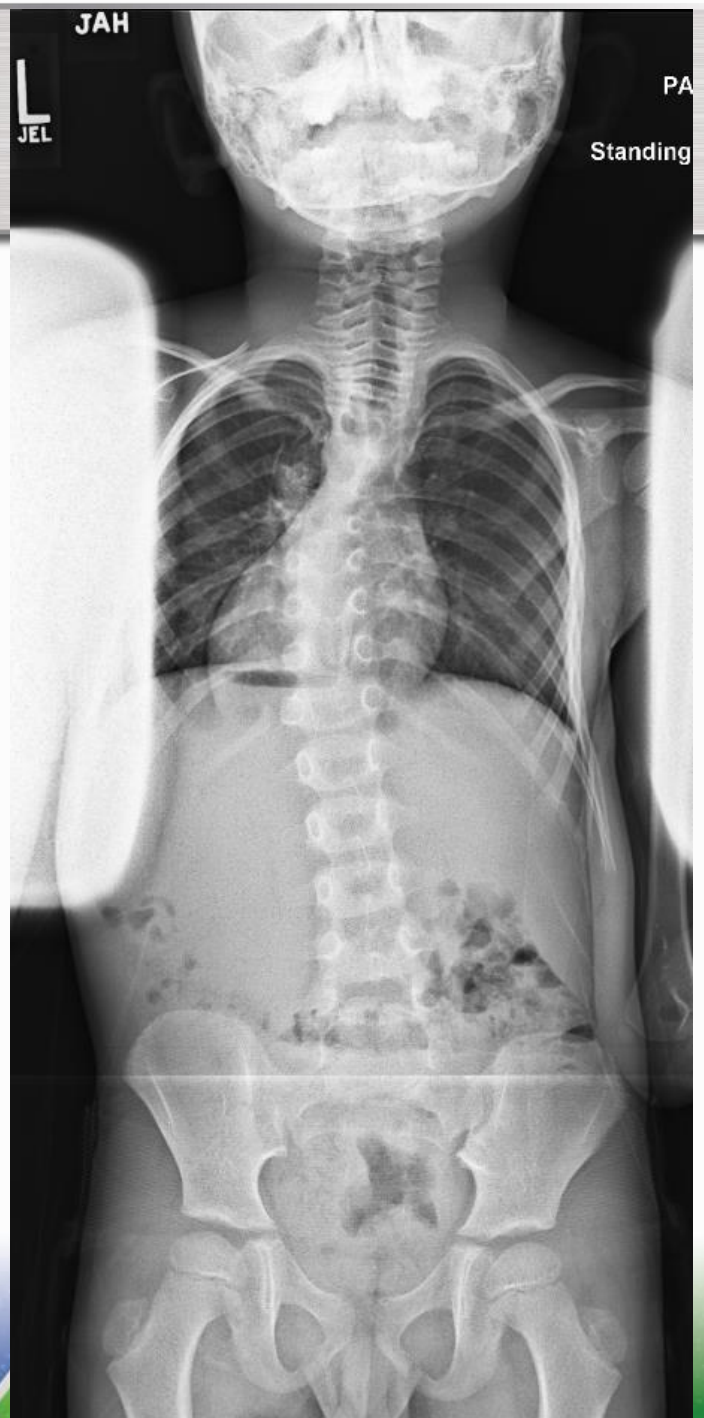


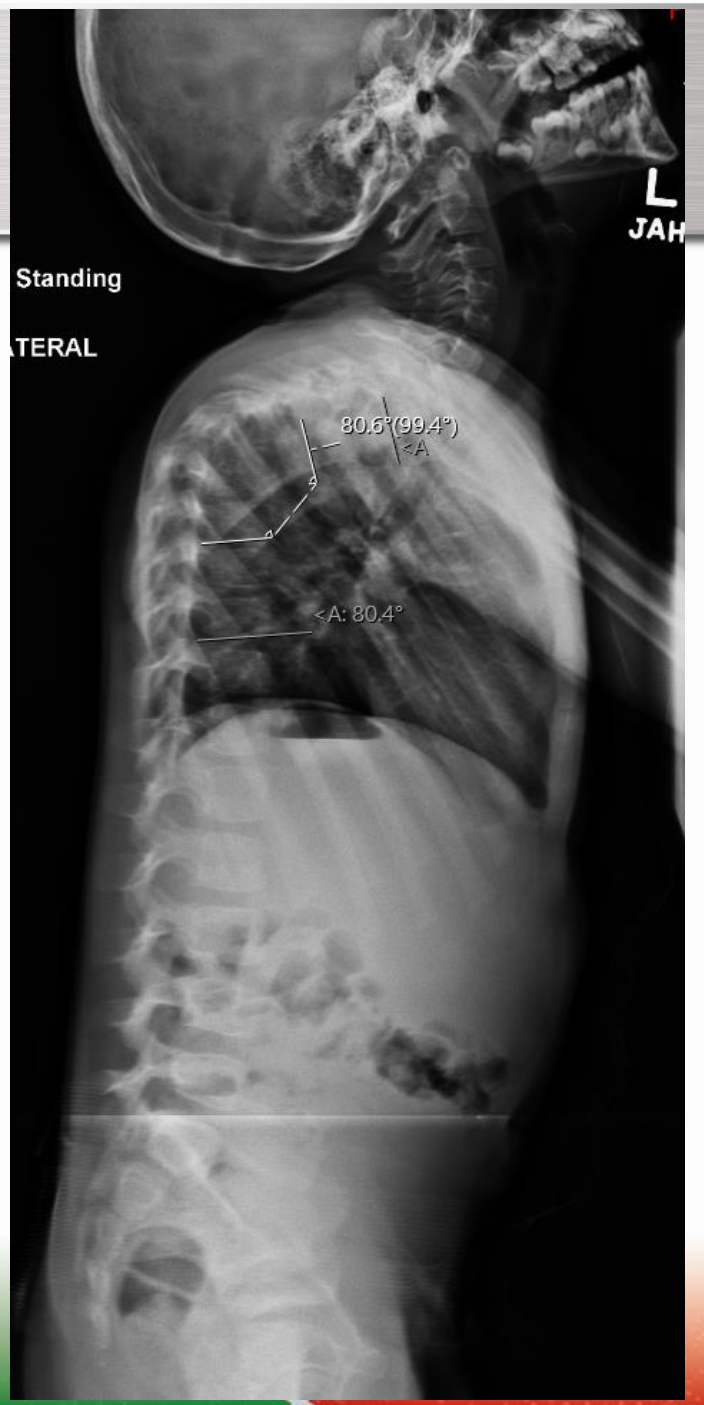





# Age 6+1

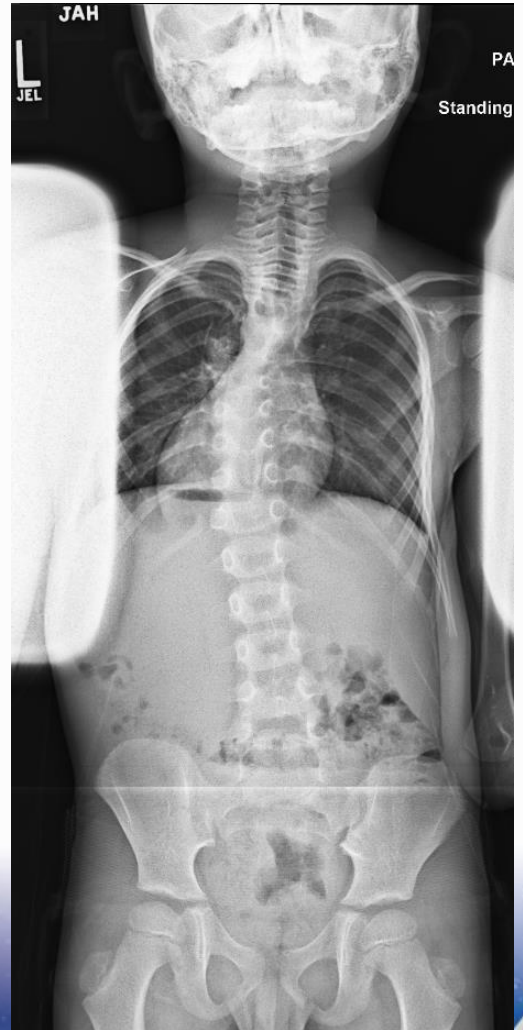
# Age 6+2



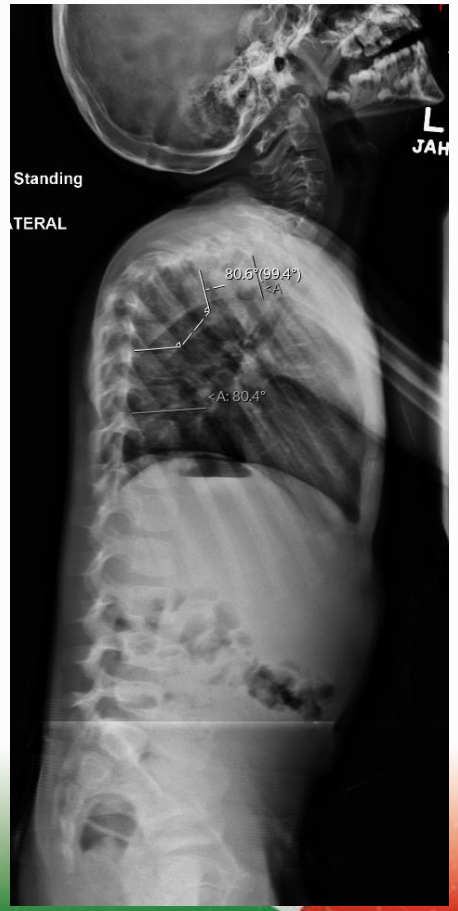



# Age 8+1

# 4.5 years postop, age 9+6, family pleased

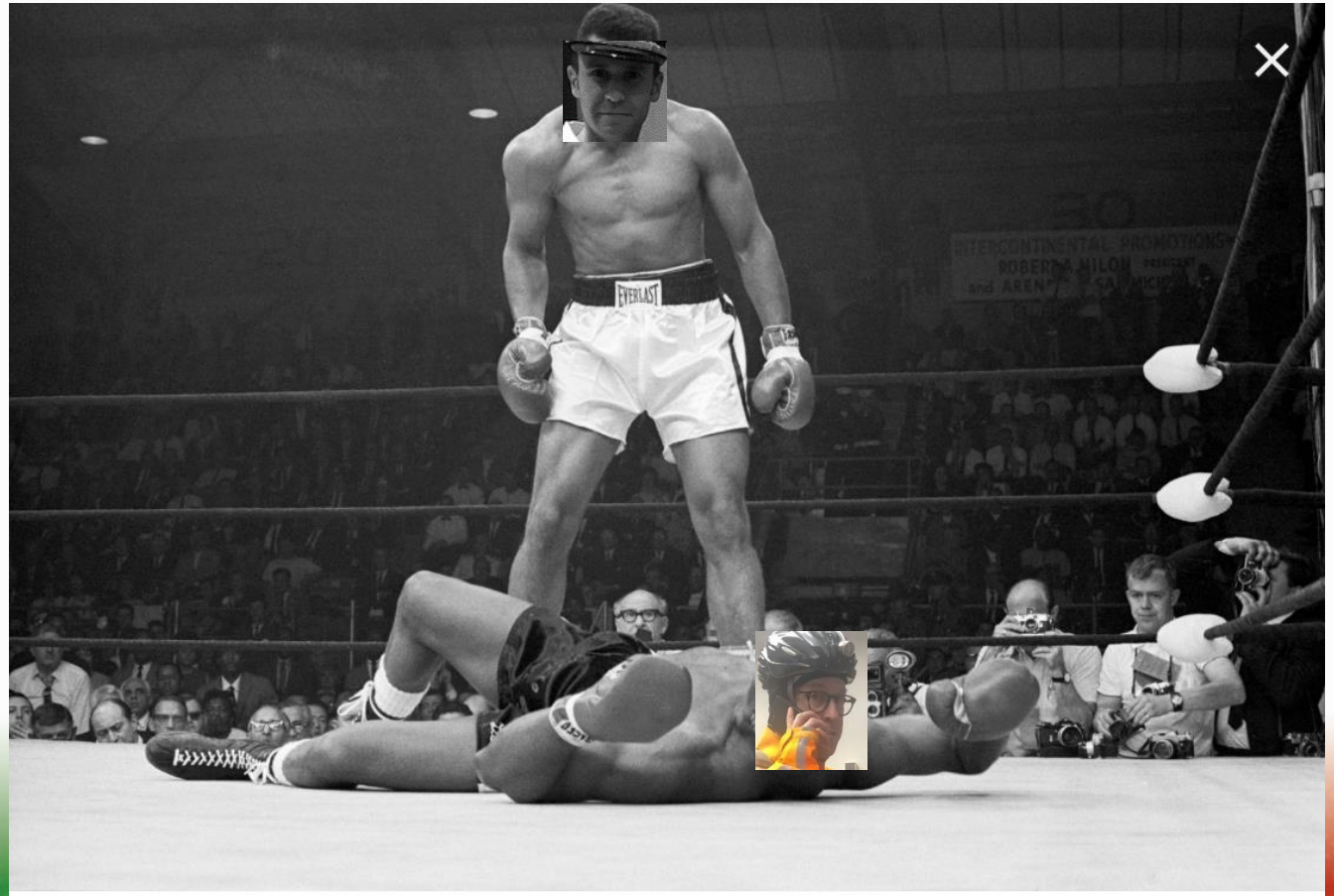




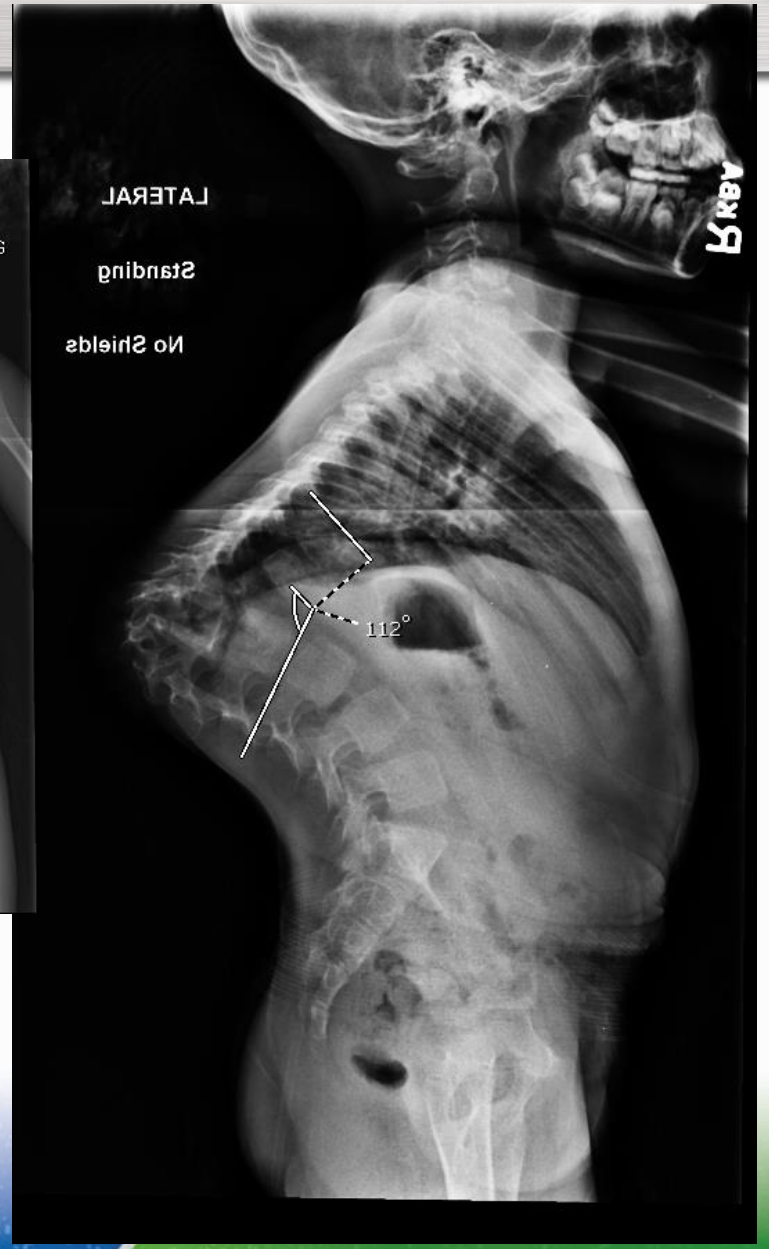



# Side by Side Example Coming Up

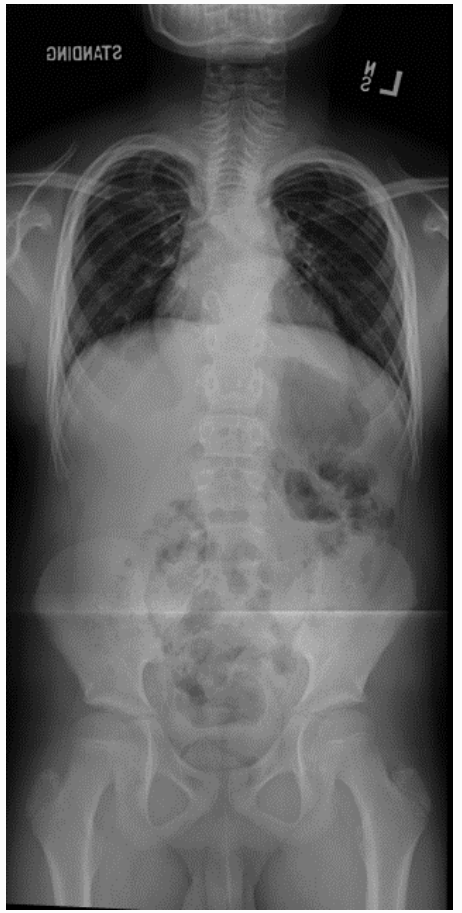
- Obligatory and fantastic

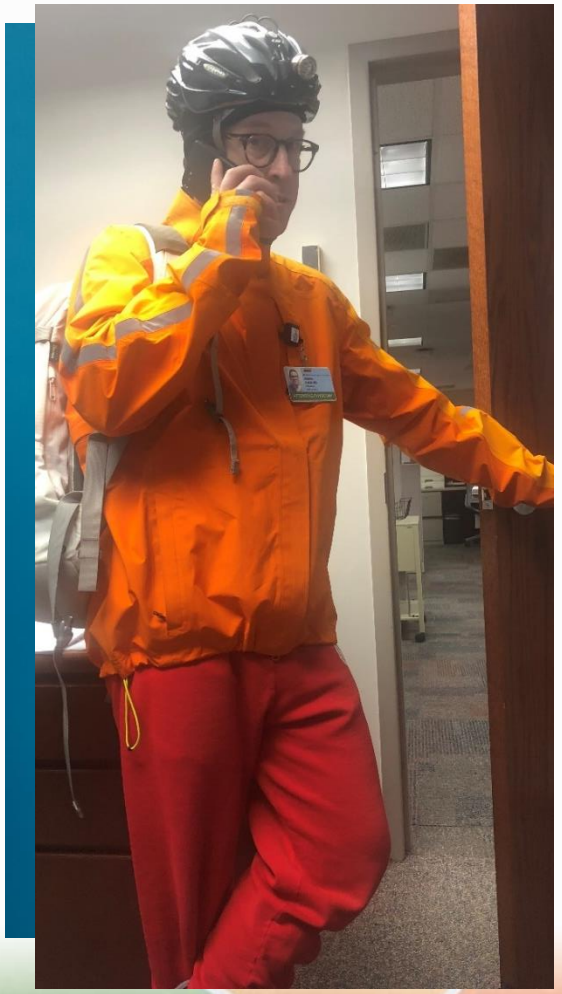


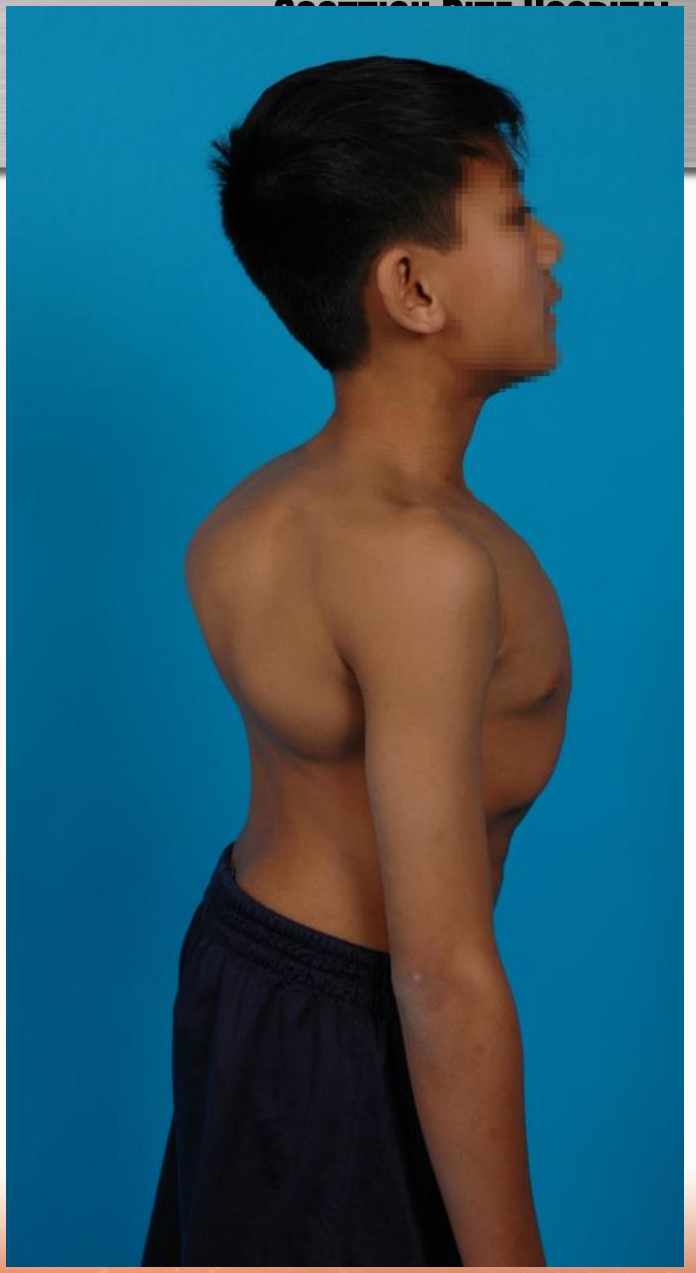
10 year old female from Africa

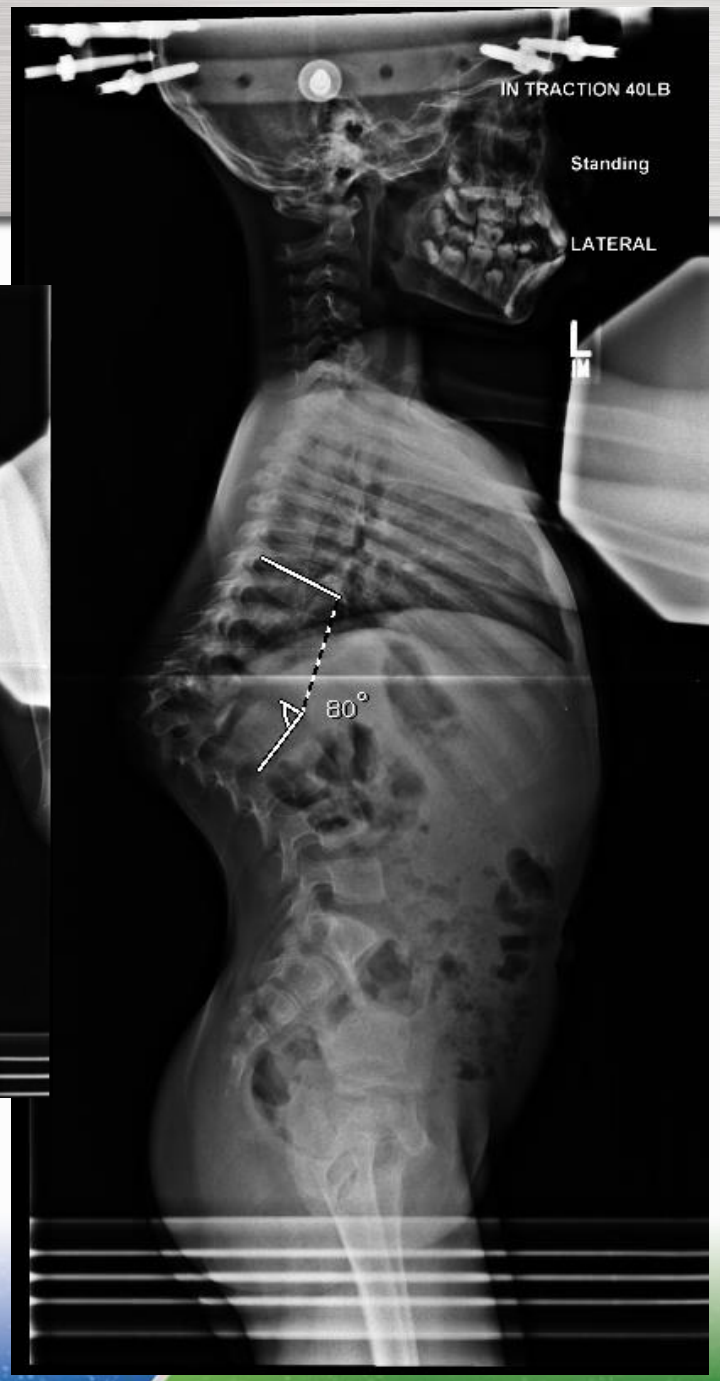

12 year old male from Honduras

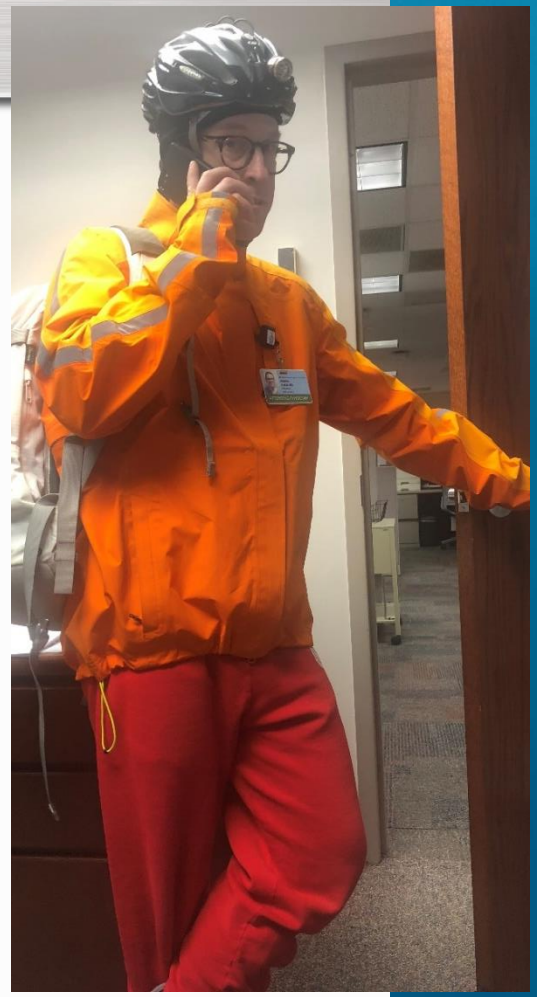


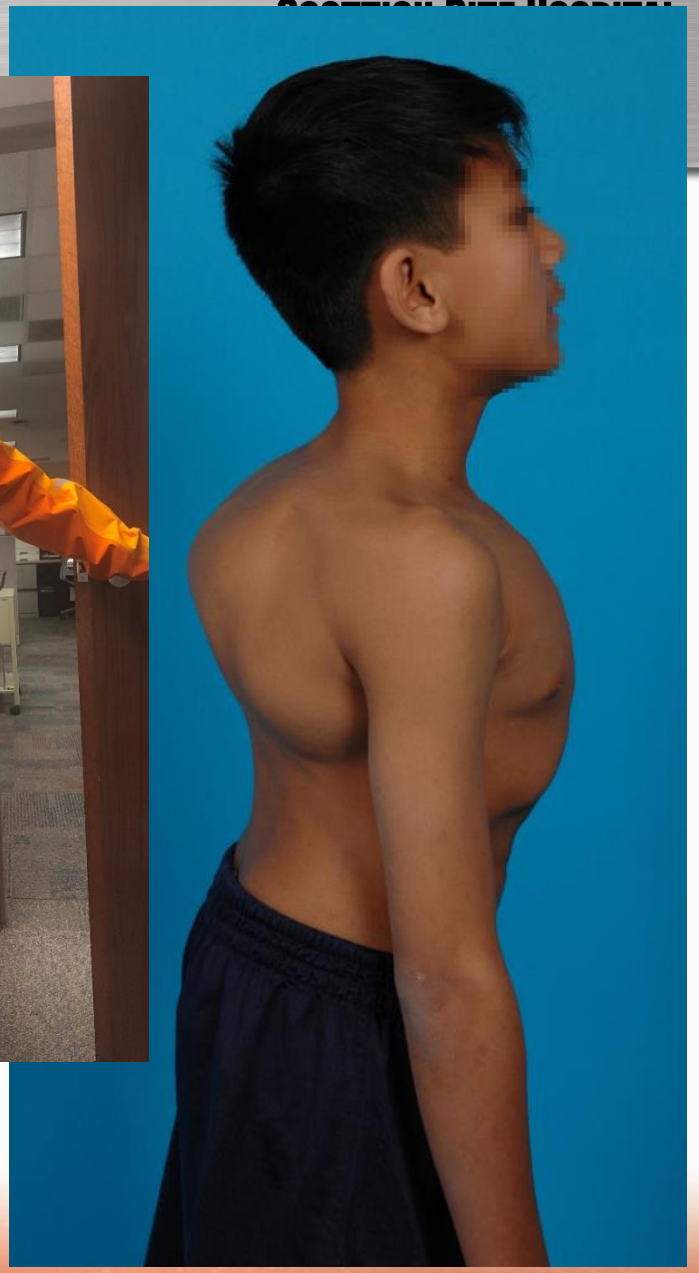




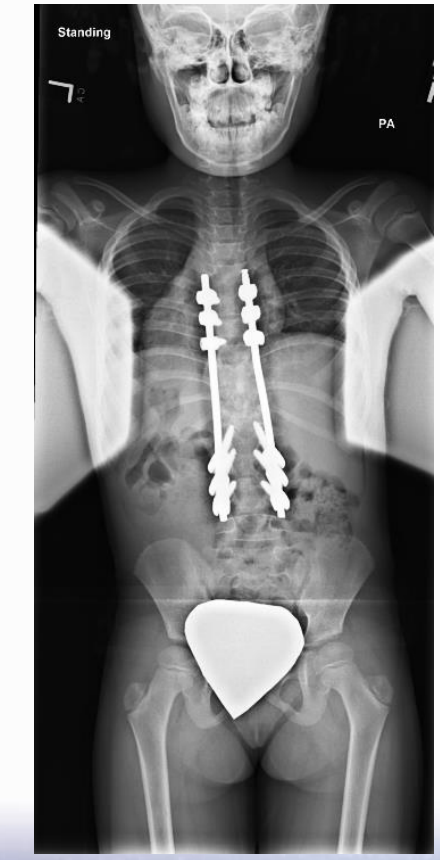

Standing
PA
R
IM
TRACTION 40LB

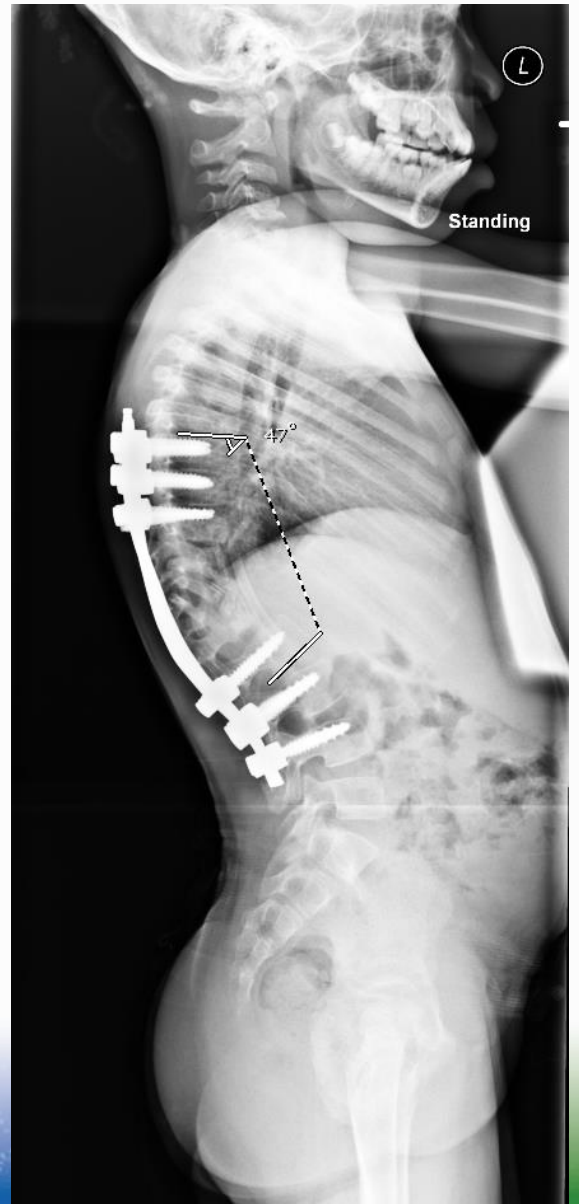

IN TRACTION 40LB
Standing
LATERAL
L
IM
80°



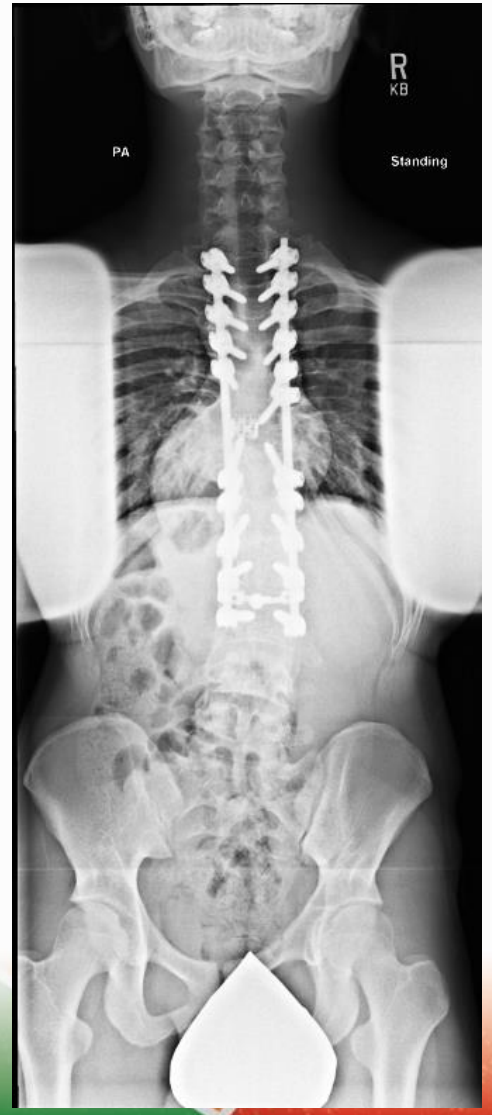


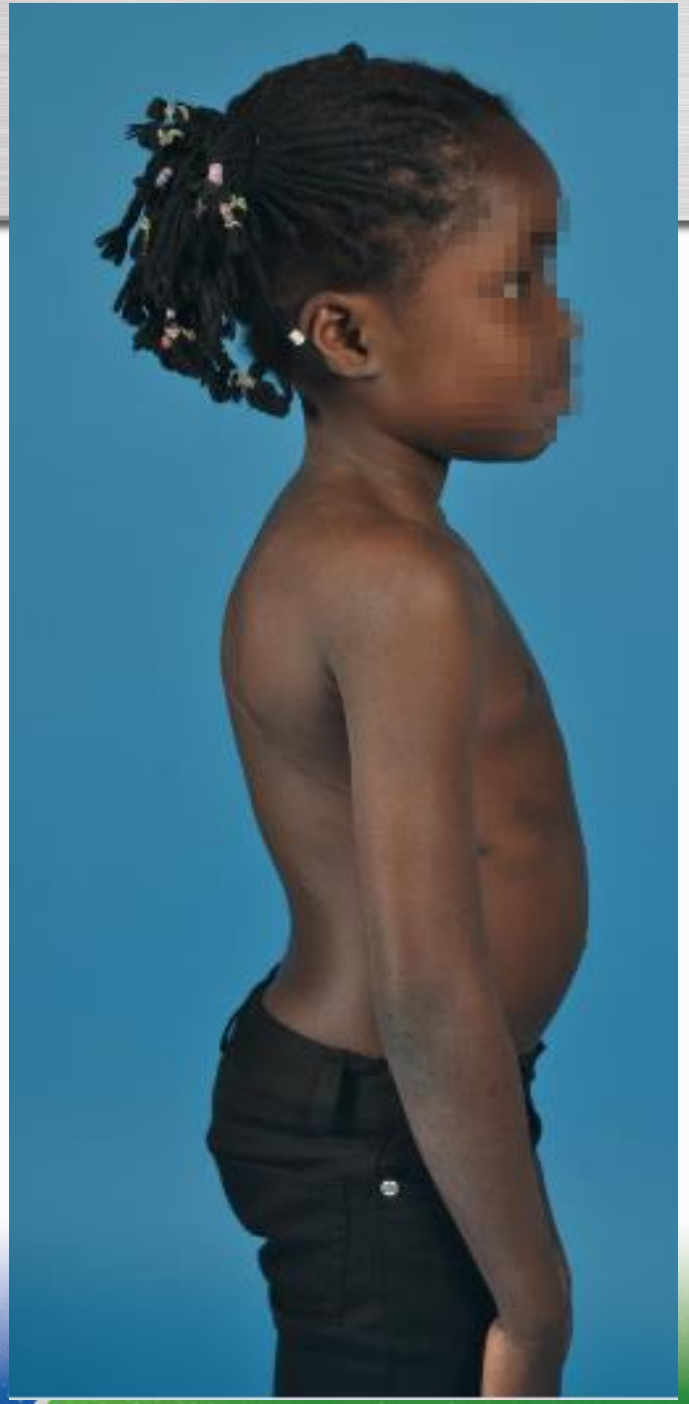
# Pontes with anterior strut

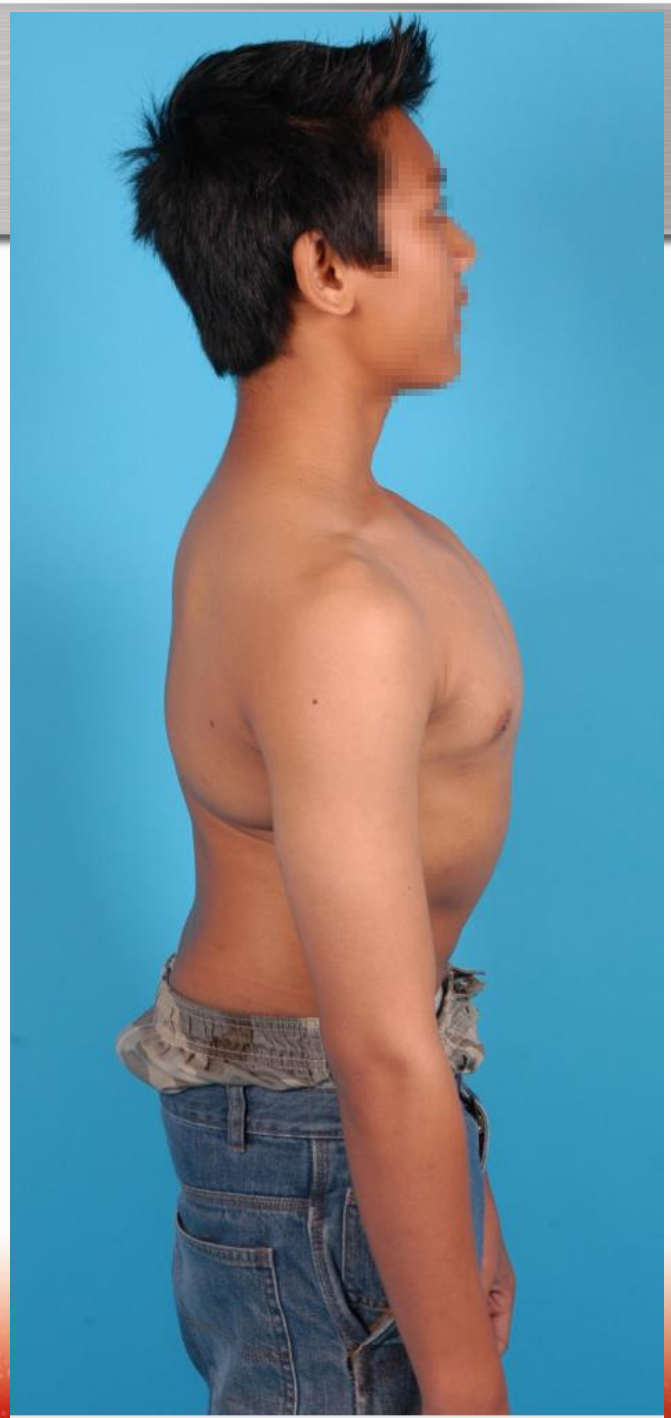



# VCR



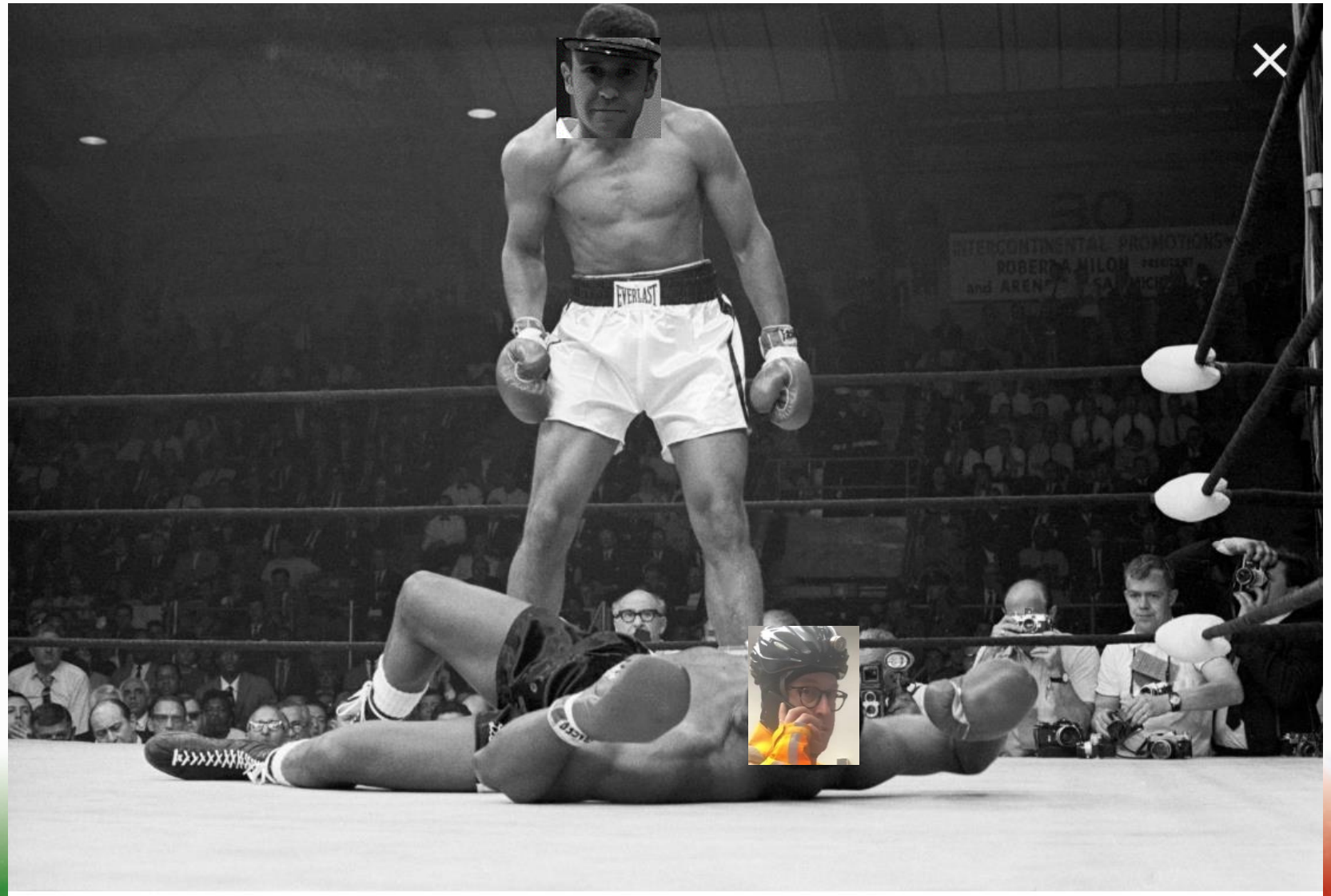





# Rumble in the Jungle

## Thrilla in Manilla

## Big Fun in Lis-Bon

# Thank You!