

# What not to do in VEPTR or 4 of my worst VEPTR mistakes

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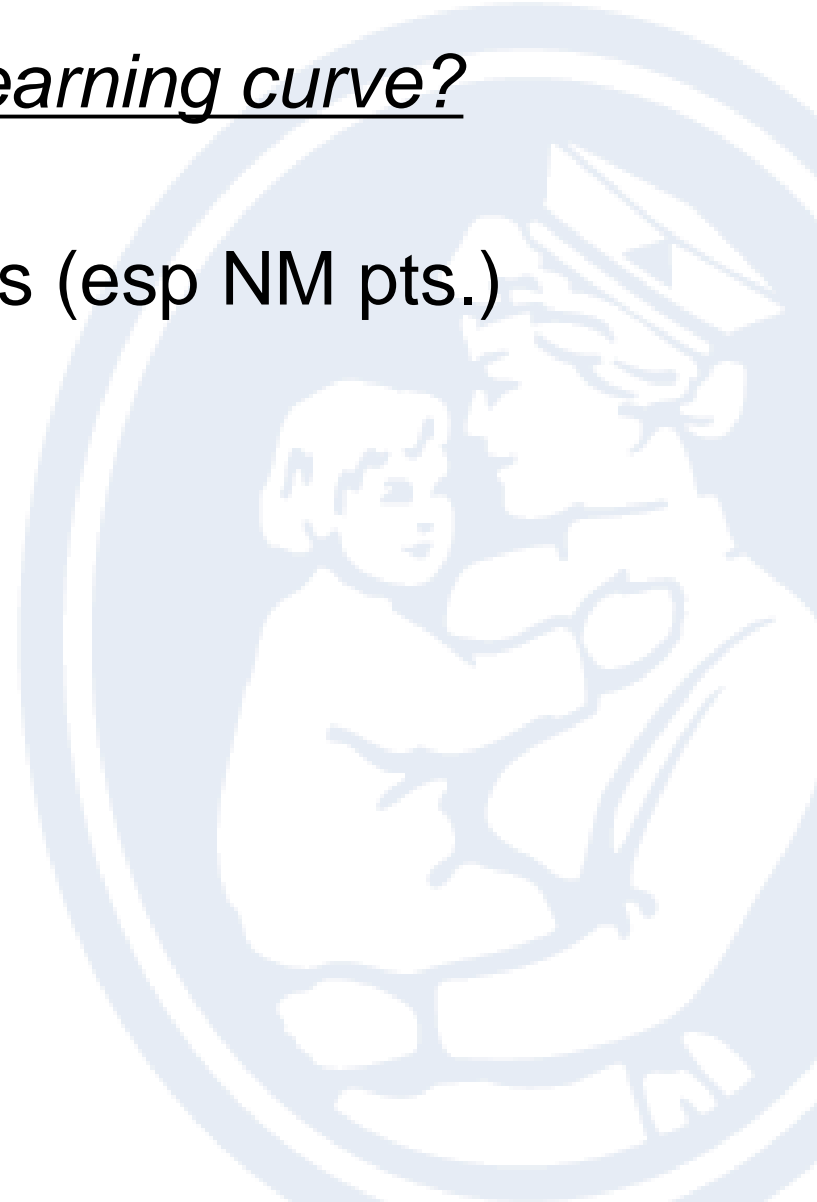
# Conflicts of Interest

- **Consultant:**
  - Medtronic
  - J&J, Depuy/Synthes
  - Biomet
- **Royalties:**
  - Synthes spine (VEPTR II)



# Three things to not do with VEPTR

- *Can you avoid my learning curve?*
  1. Upper thoracic kyphosis (esp NM pts.)
  2. Reversed iliac hooks
  3. Over-distraction

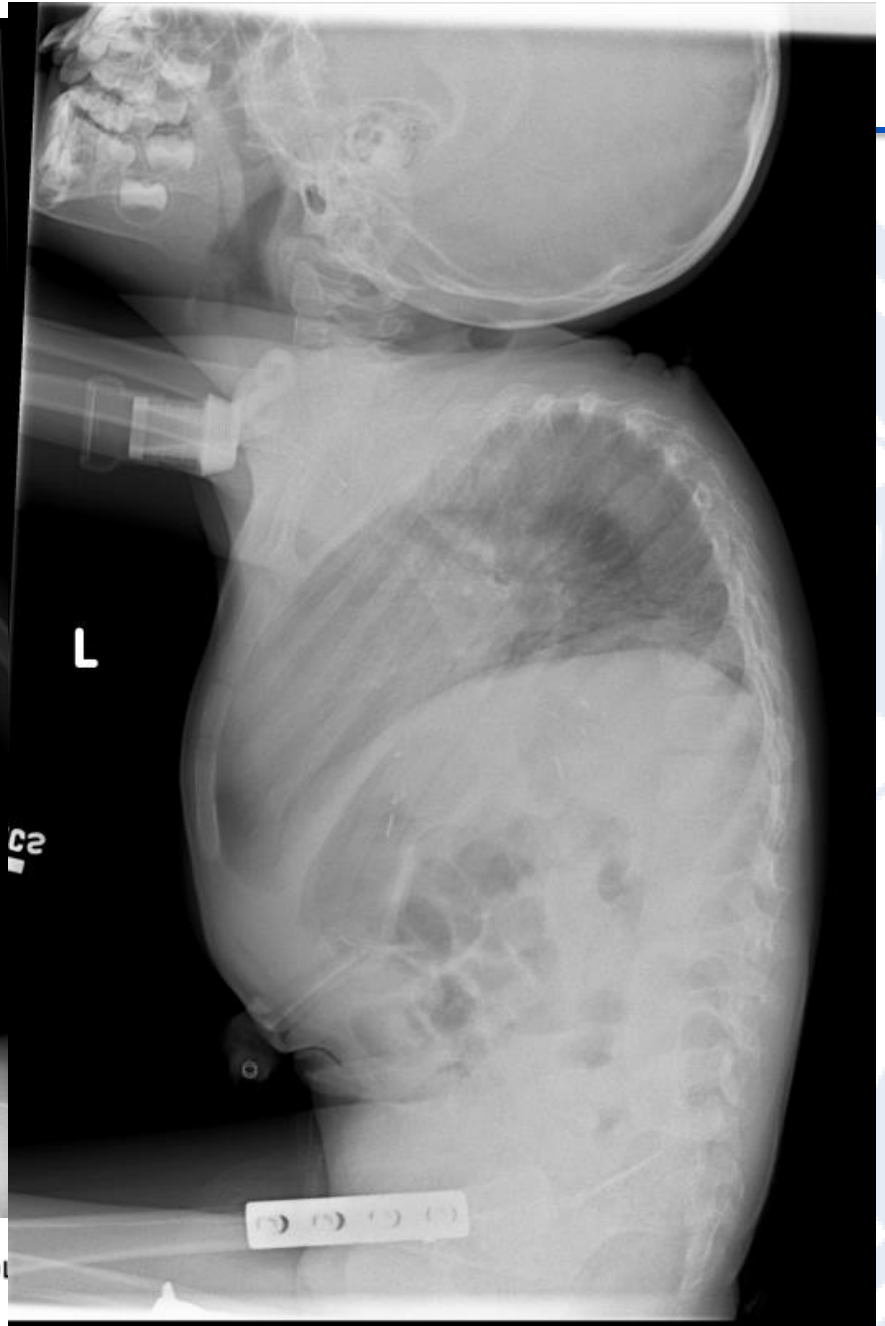
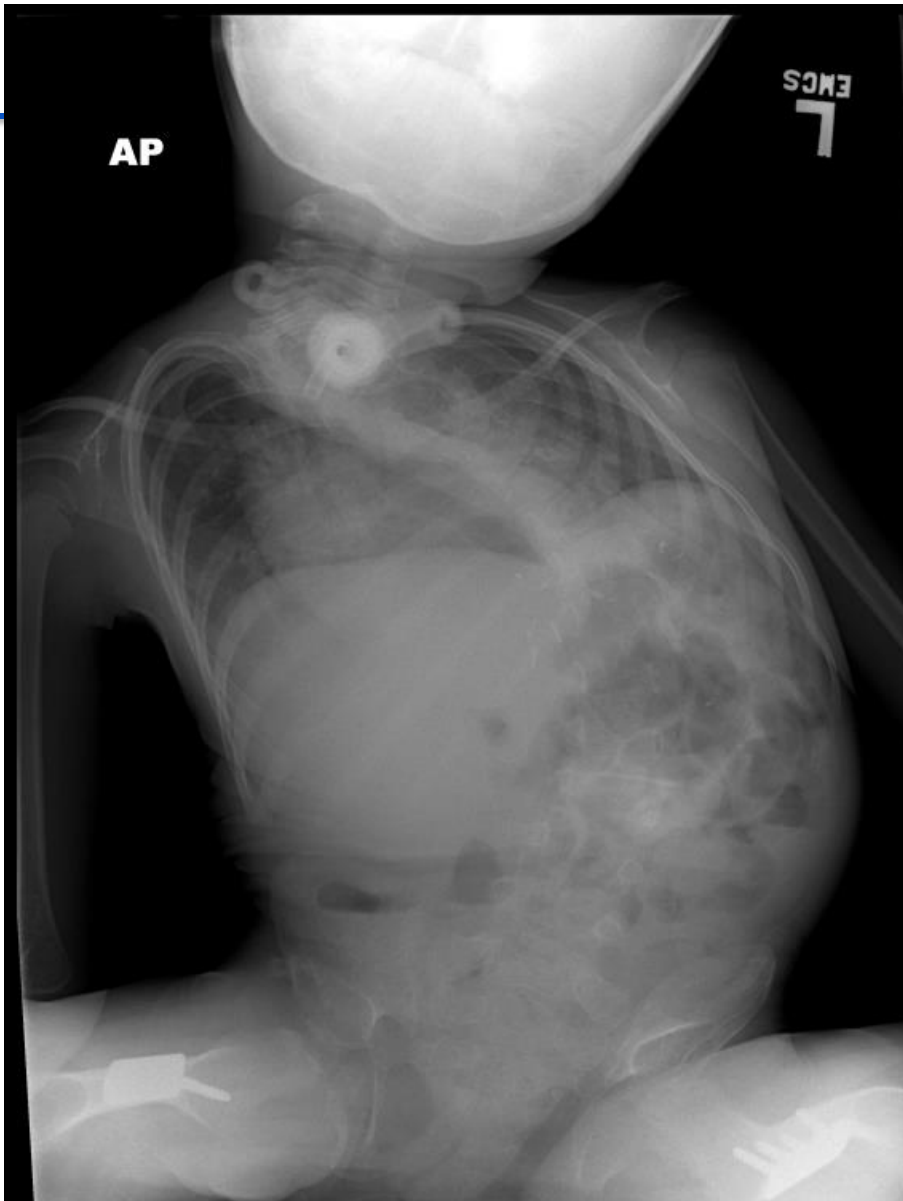


# Upper thoracic kyphosis



# Arthrogryposis, trach, vent at night





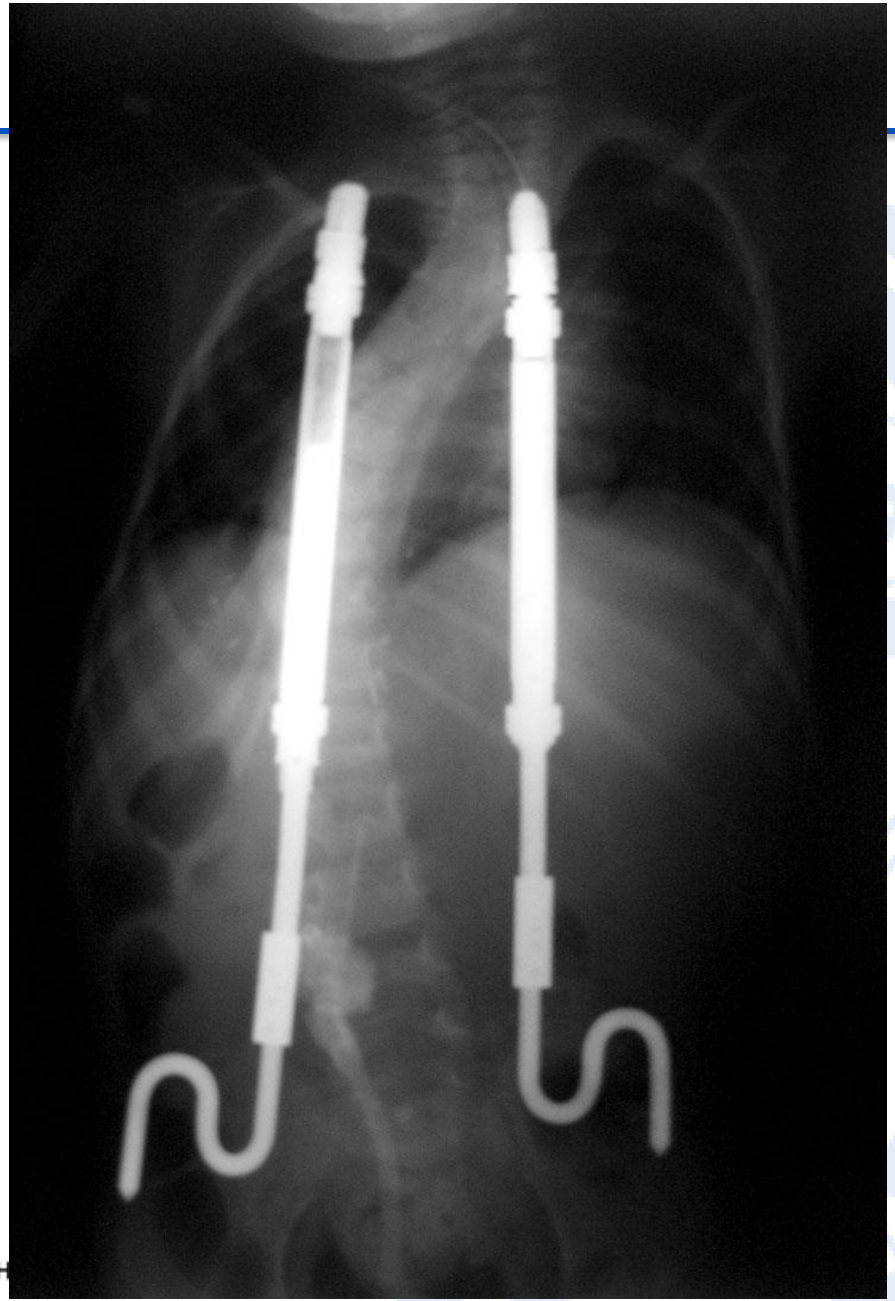
- **Halo gravity traction to help correct upper thoracic kyphosis**
- **Bilateral rib to pelvis VEPTR**





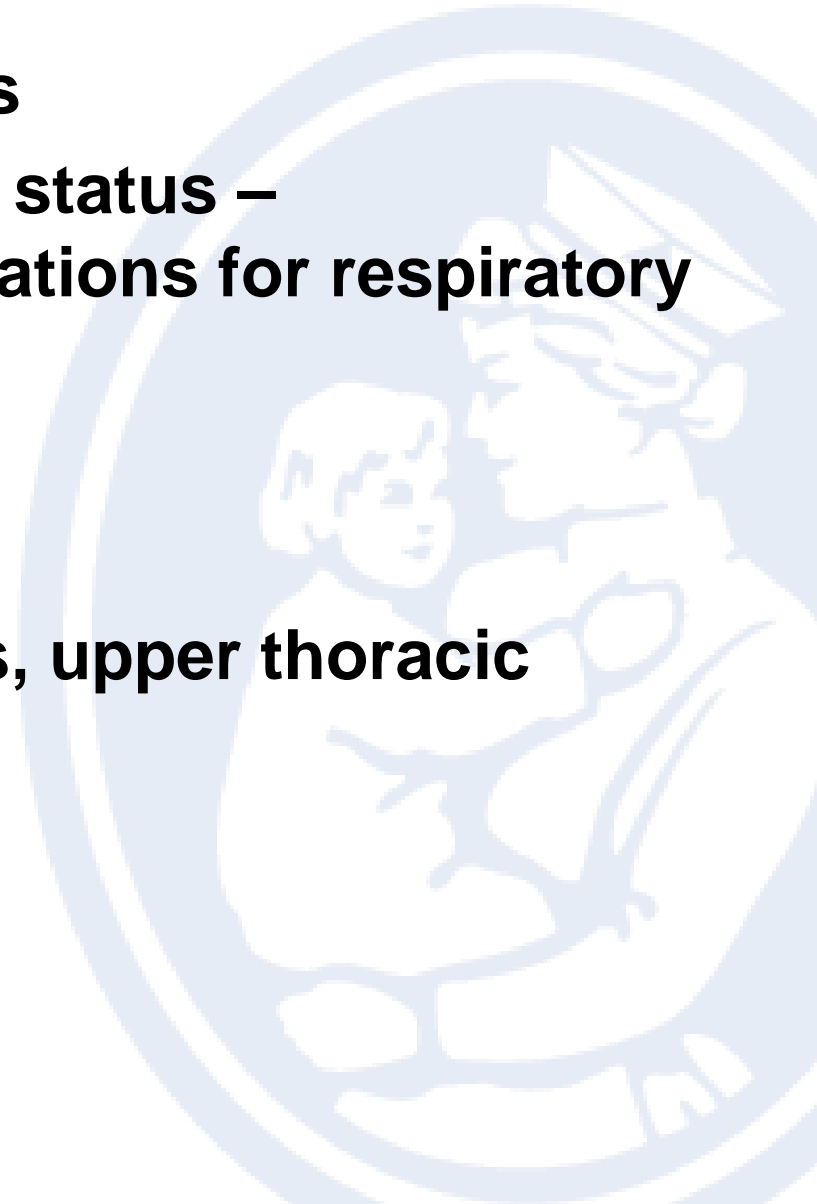


CAL SCH

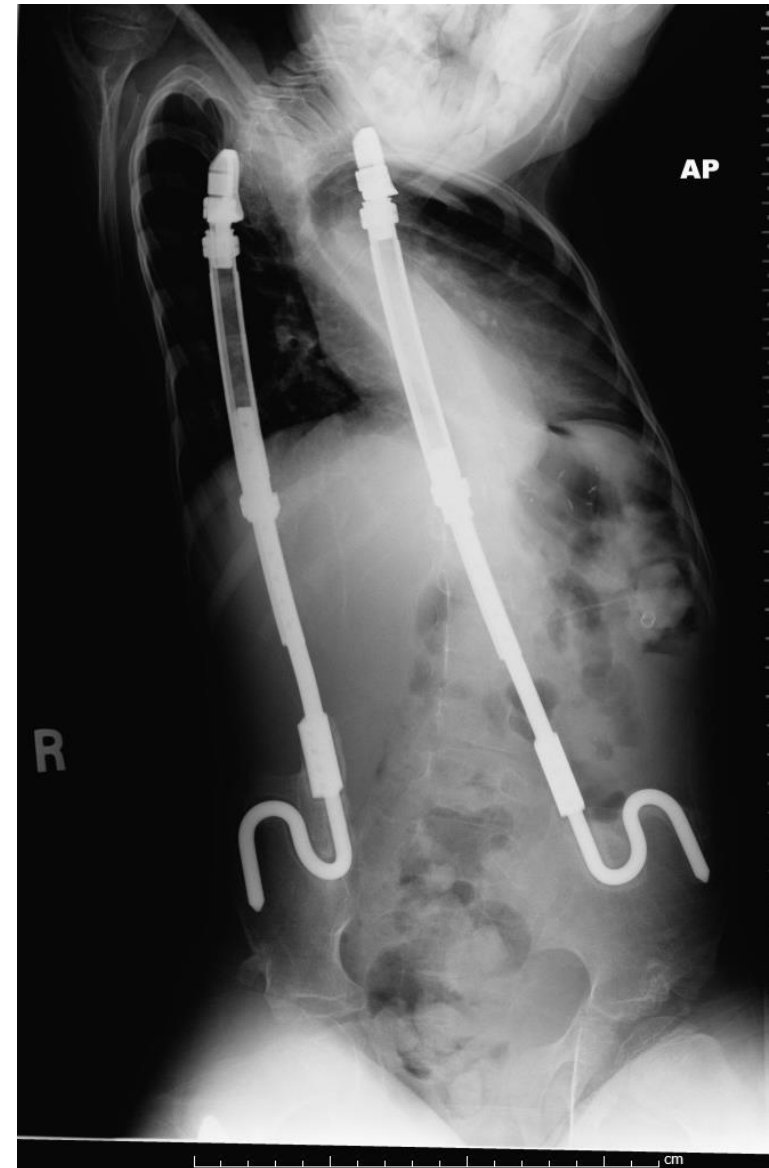




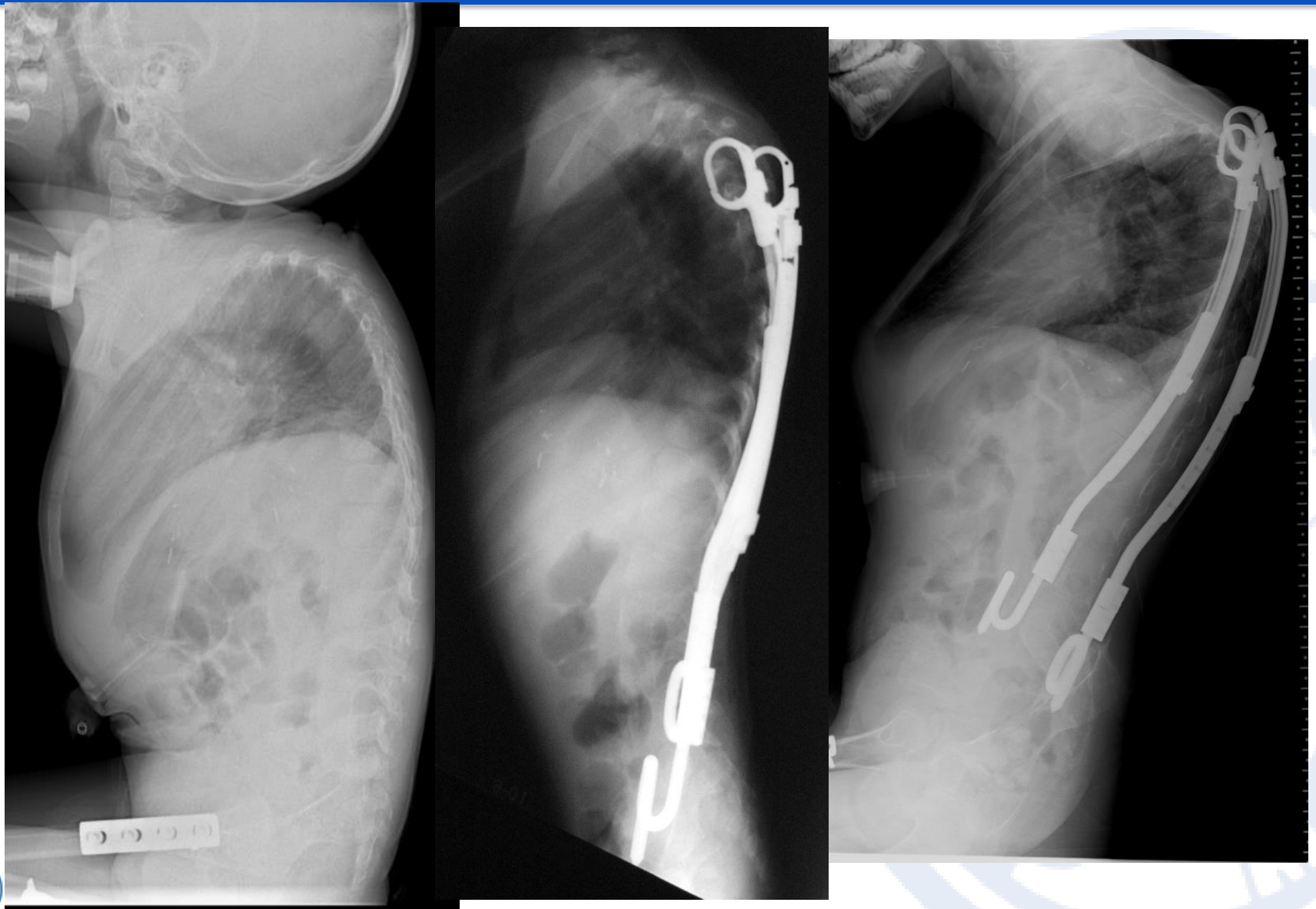
- **VEPTR lengthened x 5 years**
- **Vastly improved pulmonary status – decannulated, no hospitalizations for respiratory distress**
- **Gained weight, grew**
- **No cervical discomfort**
- **Worsening cervical lordosis, upper thoracic kyphosis**



# Age 8

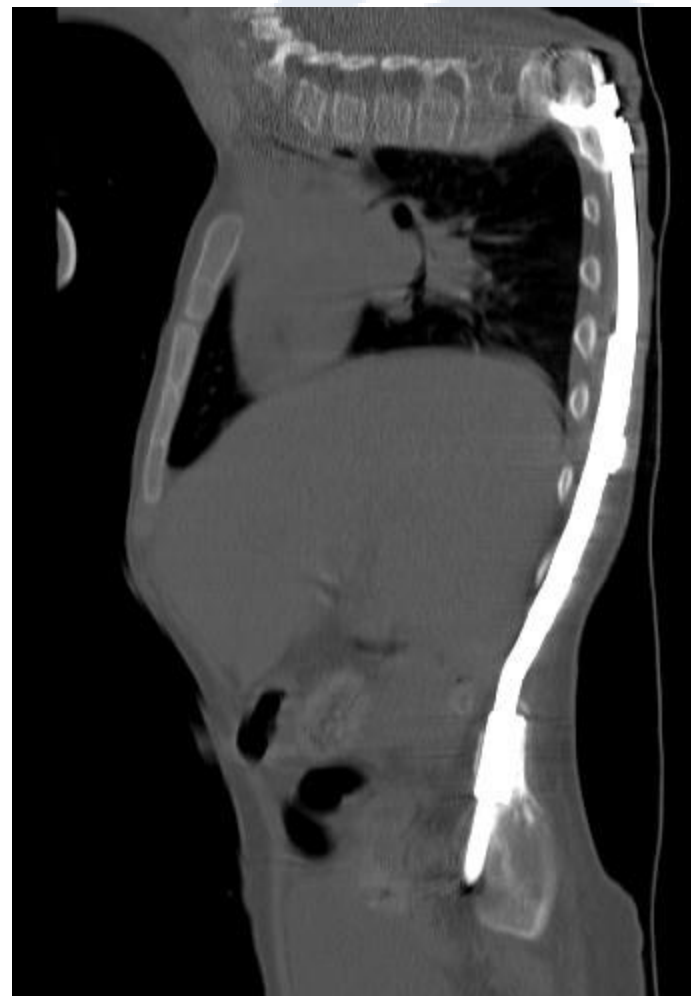


# LC – arthrogryposis – age 3 to 8



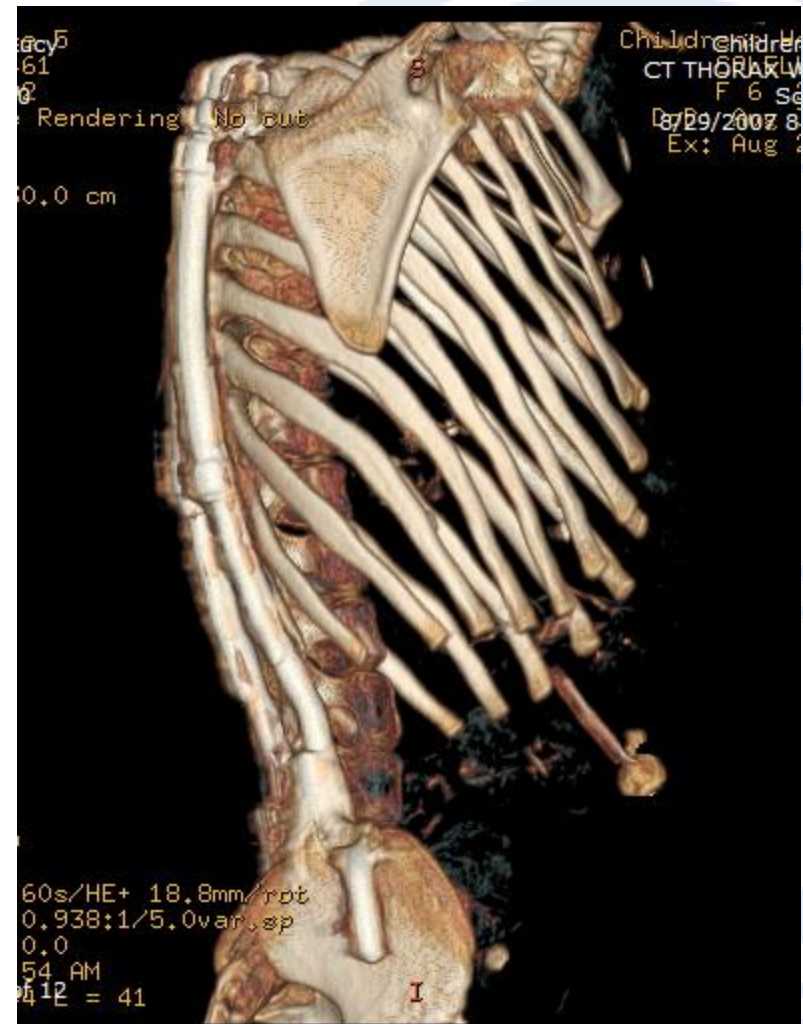
# LL Arthrogyryposis

- **Cervico thoracic junction collapsed further into kyphosis, rotating around VEPTR attachments**



- **Plan?**

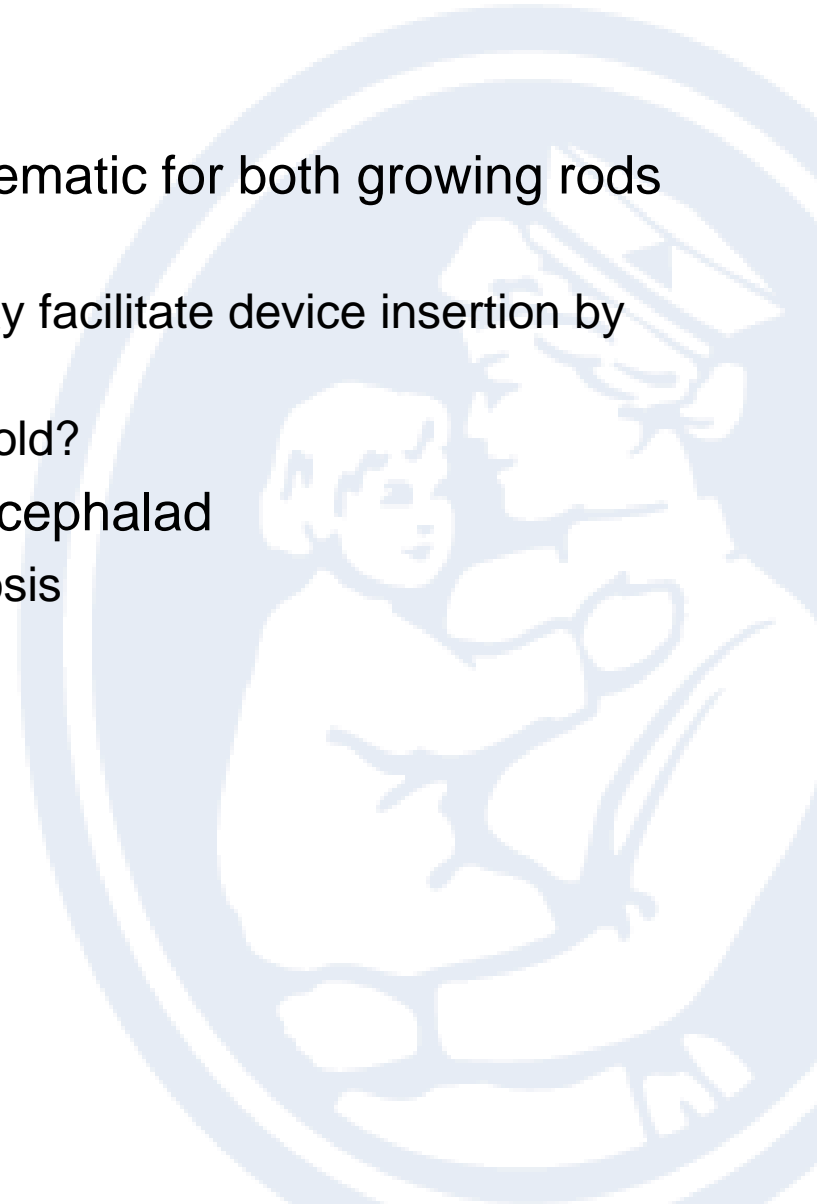
- Halo gravity traction
- Posterior VCR
- Add instrumented posterior fusion from approx C5 to T5
- Exchange of VEPTR
- Continue lengthening VEPTR



# Early Onset Deformity. – etiology as a factor:

- **Collapsing neuromuscular**

- Kyphosis (upper thoracic) problematic for both growing rods and VEPTR
  - Pre-op halo gravity traction may facilitate device insertion by diminishing kyphosis
  - Can get them in but will they hold?
- Growing rods can extend more cephalad
  - Better for upper thoracic kyphosis



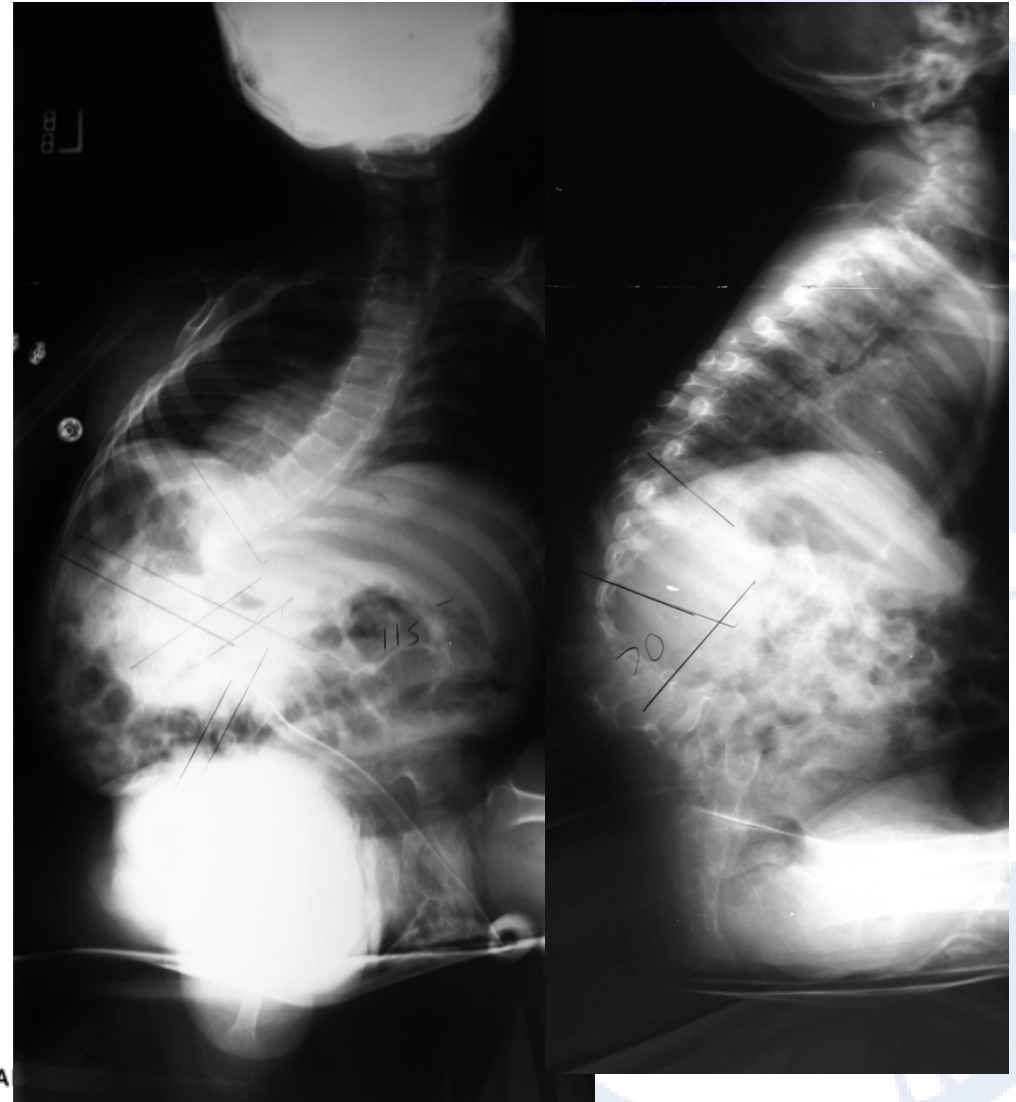


# Reversed iliac hooks



# 4 y.o. with Ehlers Danlos variant

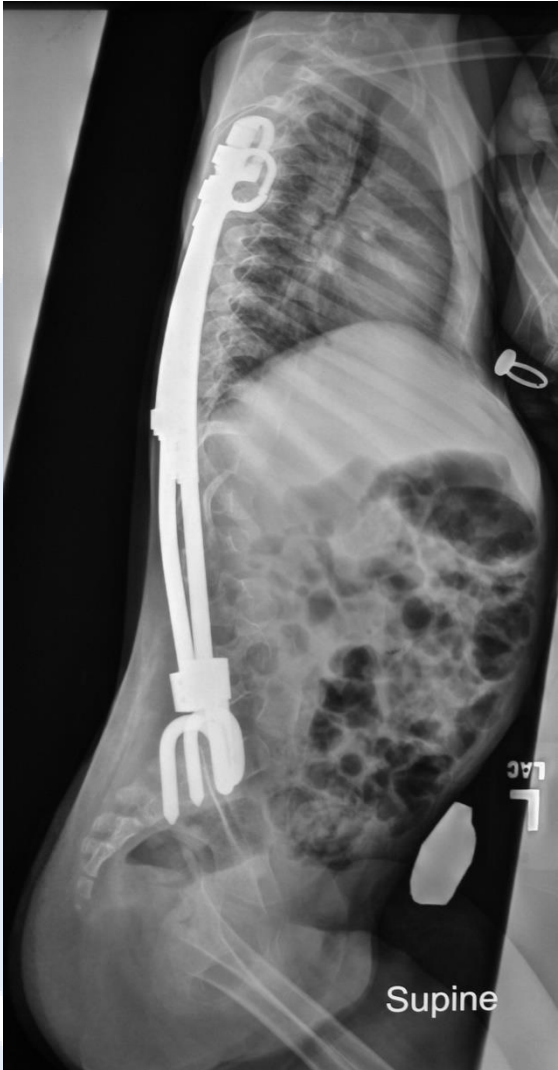
- **Worsening deformity**
- **Recurrent breakdown when attempting to sit or with a brace**
- **Severe osteopenia, recurrent fractures**
- **Increasing respiratory distress (secondary TIS)**



# Ehlers Danlos with reversed iliac hooks

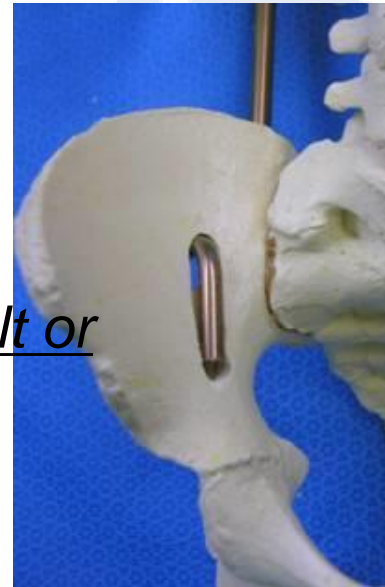
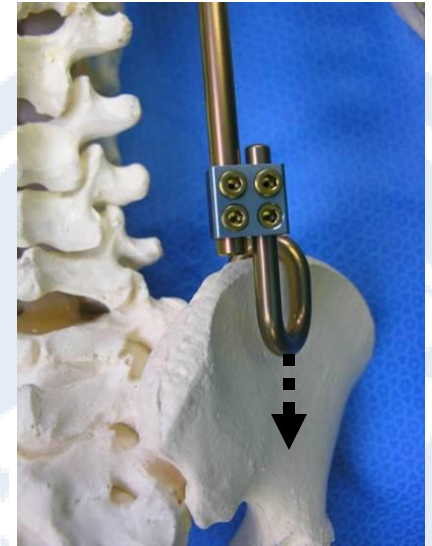


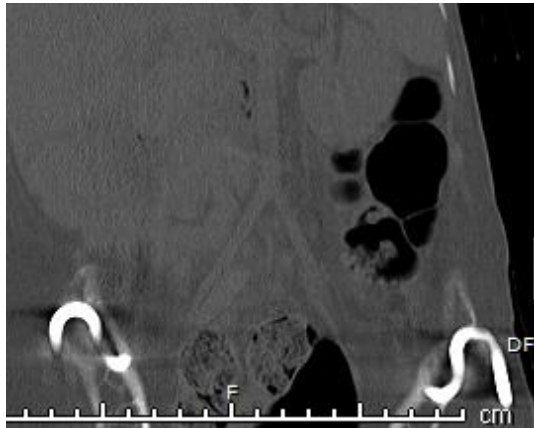
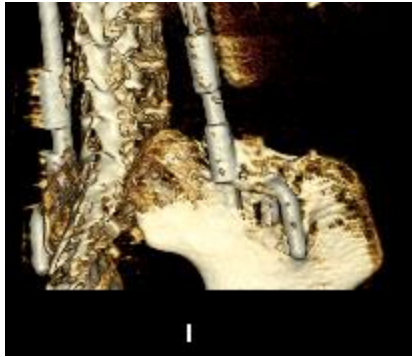
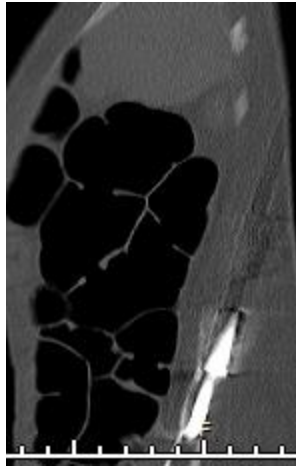
Hooks reversed –  
loop on inner table of  
pelvis to better resist  
dorsal displacement



# Complications of VEPTR: Anchor Point Problems:

- **Chronic, long-term:**
  - Iliac S-hook drift
  - Common over time, particularly in unilateral devices
    - Drift is generally distal, not posterior or lateral
  - Indications for revision:
    - Too close to hip joint
    - Loss of fixation
  - Revision straightforward but may require significant exposure
  - *If iliac hooks reversed, extraction much more difficult or even impossible*





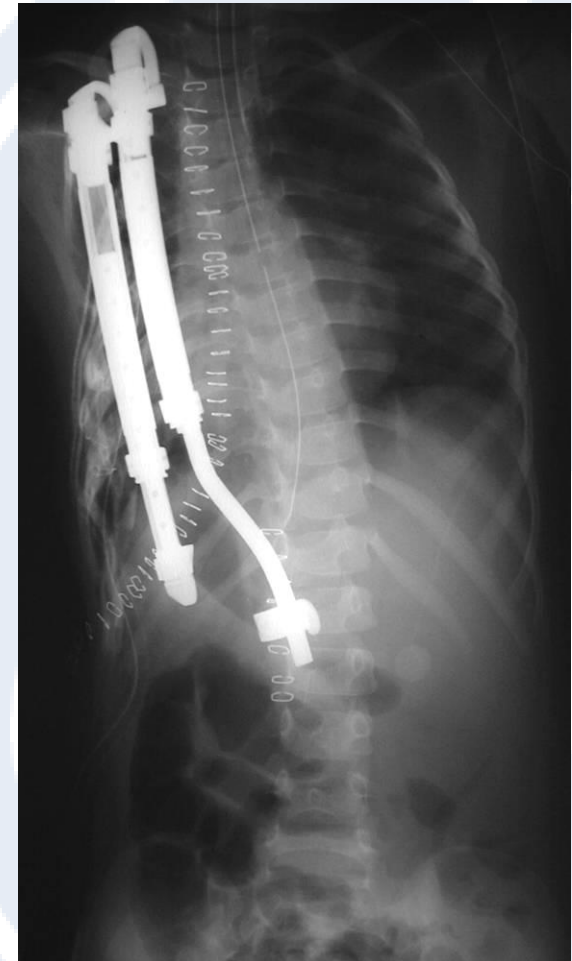
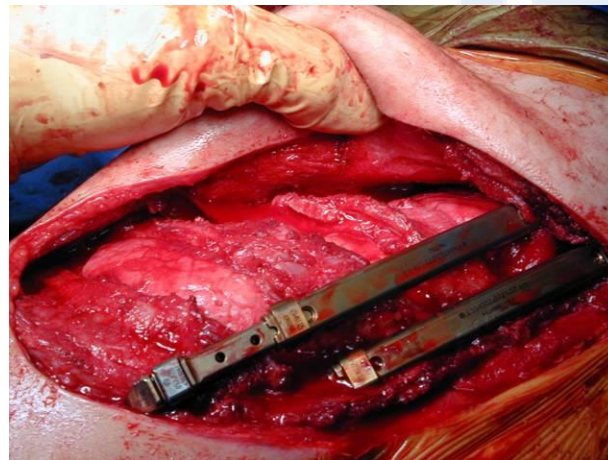
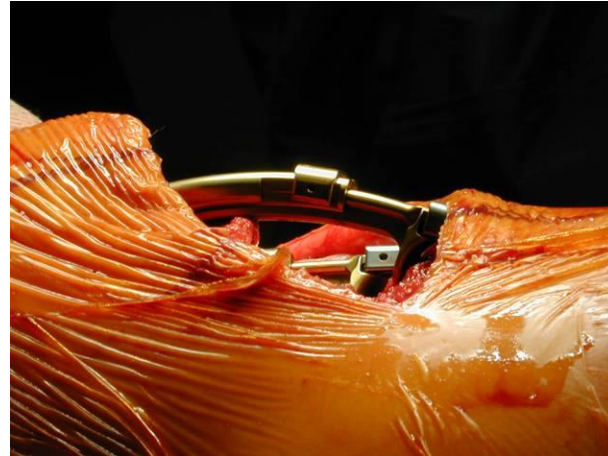
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# Insufficient soft tissue management



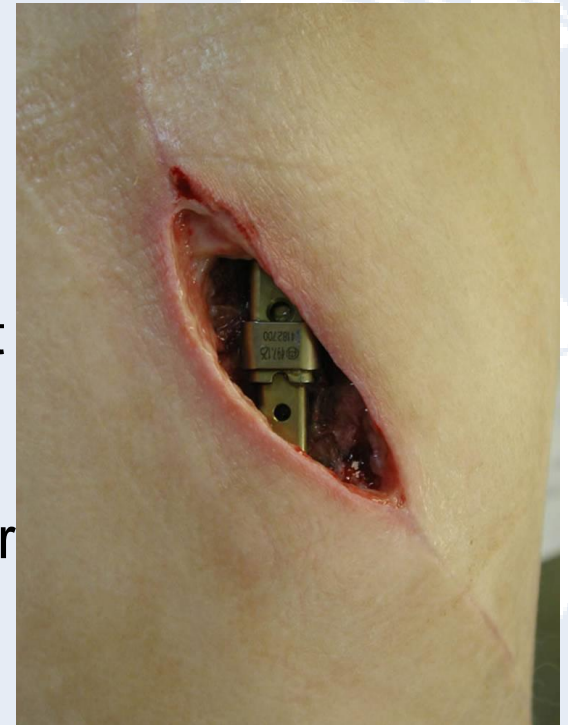


# Acute Brachial Plexus palsy – 5 yo with thoracogenic scoliosis – resolution with device shortening – 6 months



# Deep infection with primary procedure

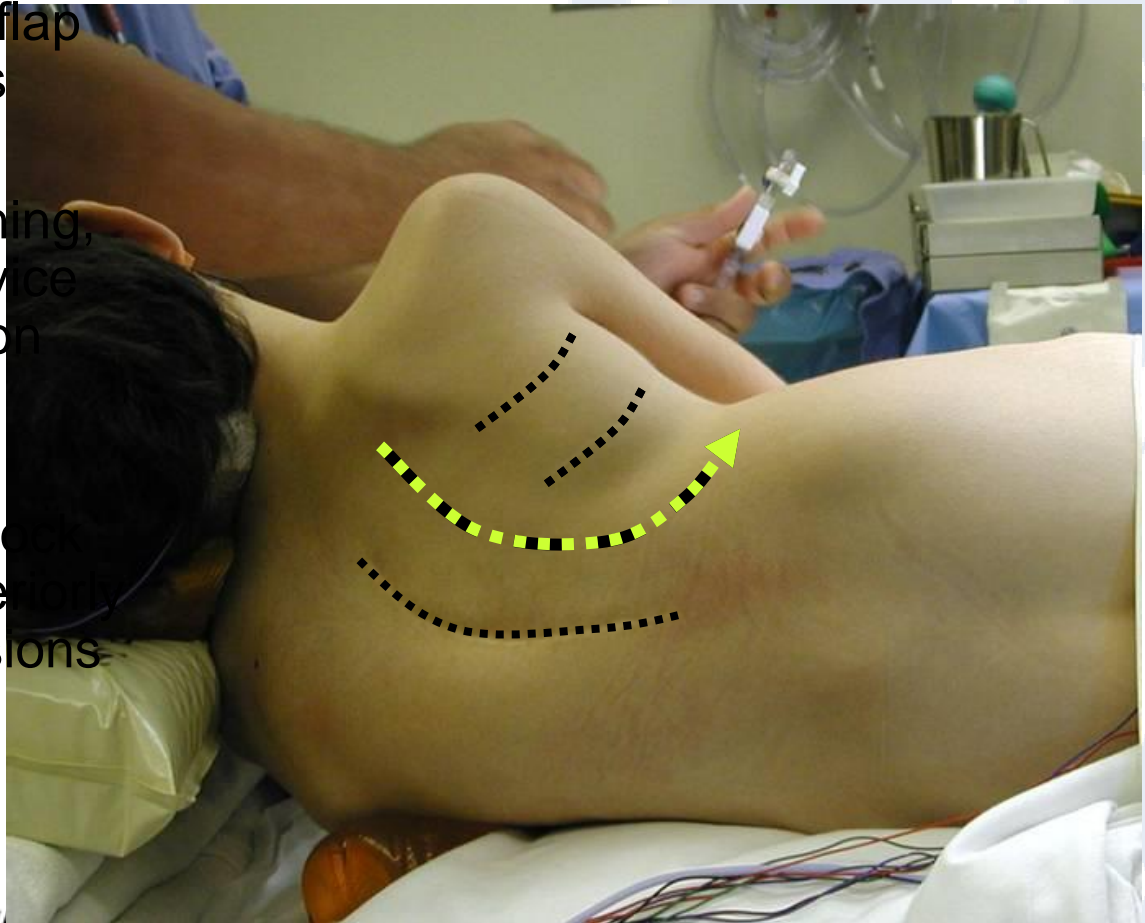
- **12 yo with TEF, multiple prior thoracotomies, prior chest wall infections, rib fusions.**
  - Expansion thoracostomy x 2, rib to rib and rib to spine device
    - No preparation of flaps, expanders
    - Poor soft tissue coverage, no muscle coverage from prior procedures.
  - POD 14 trauma to wound over prominent device while sitting against chair. On vacation
  - Both devices removed – fusion 6 mo later
- **Moral:**
  - Create healthy flaps
  - No full thickness wounds over devices



# VEPTR Surgical Procedure:

- **Incision planning**

- Consider prior incisions
- Consider ‘delay’ of flap or tissue expanders
- Nutrition!
- Access for lengthening, exchange Later device access for expansion
  - Periodic lengthening
  - Distraction lengthening moves superiorly with expansions
  - ?Tissue expanders





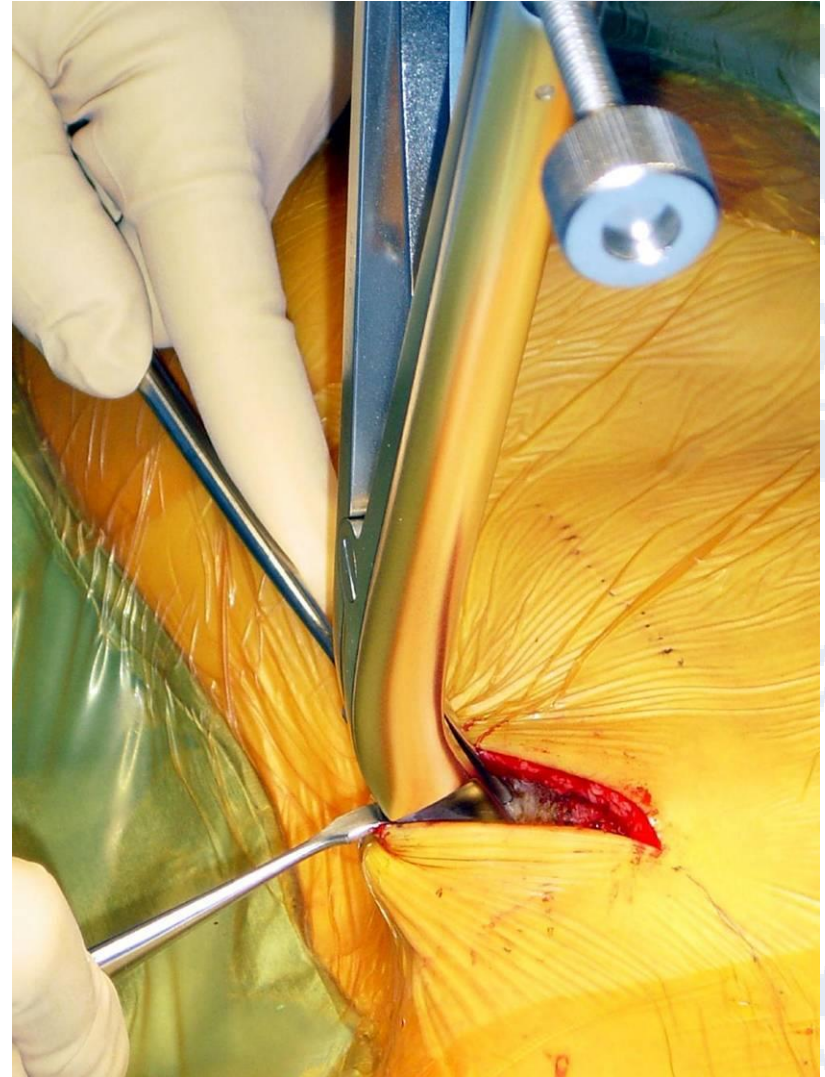
# VEPTR– create a healthy musculo-cutaneous flap:

- Preservation of maximum soft tissue envelope
- Goal: Healthy musculo-cutaneous flap
- Full thickness elevation:
  - Skin
  - All muscles, scapula
  - Trapezius more distal than skin

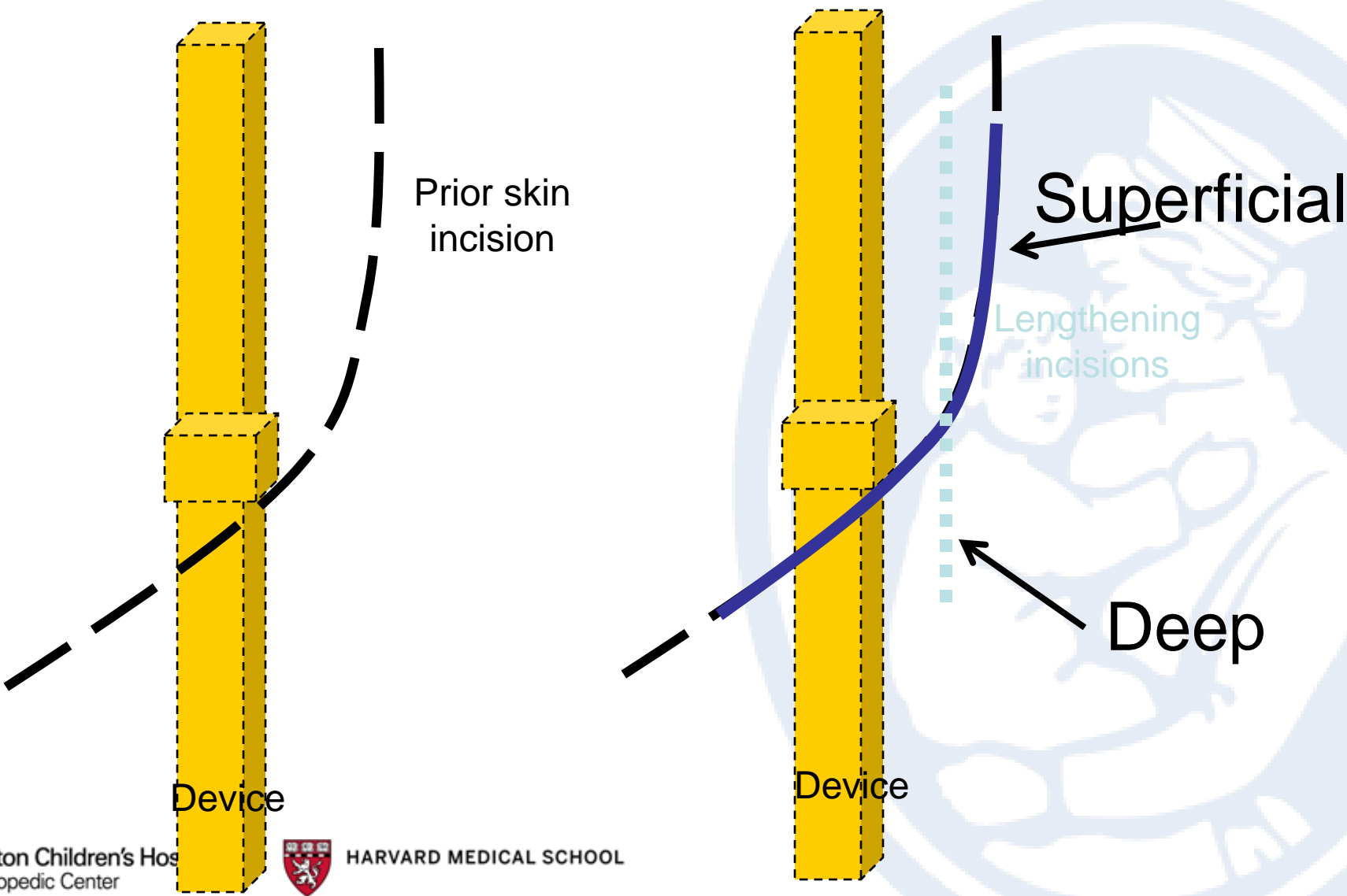


## Lengthenings:

- **A 2x / year chance for a complication!**
- **Avoid full thickness incision over device**
- **Pull muscle back together with closure**
  - Attending level closure



# Avoiding full thickness incisions at the time of *device lengthening*:





# Over-distraction



# Rib fractures – acute loss of correction

- **Patient #24**
  - VACTERL
  - Rib fractures during initial insertion, distraction ('just a little more')
  - Loss of correction, fixation
  - Revision at 6 months



# Pre-op

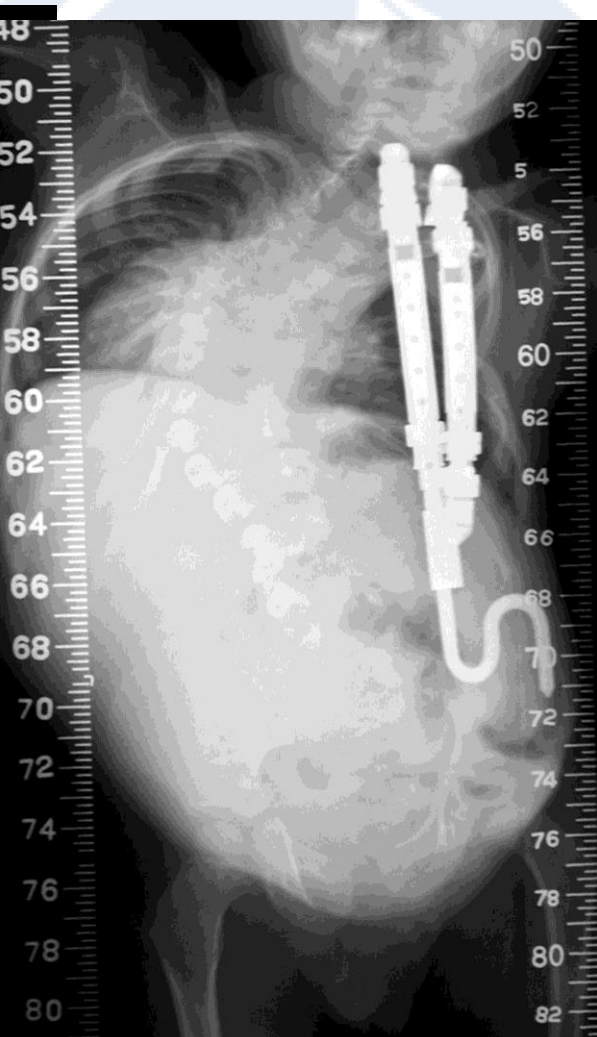
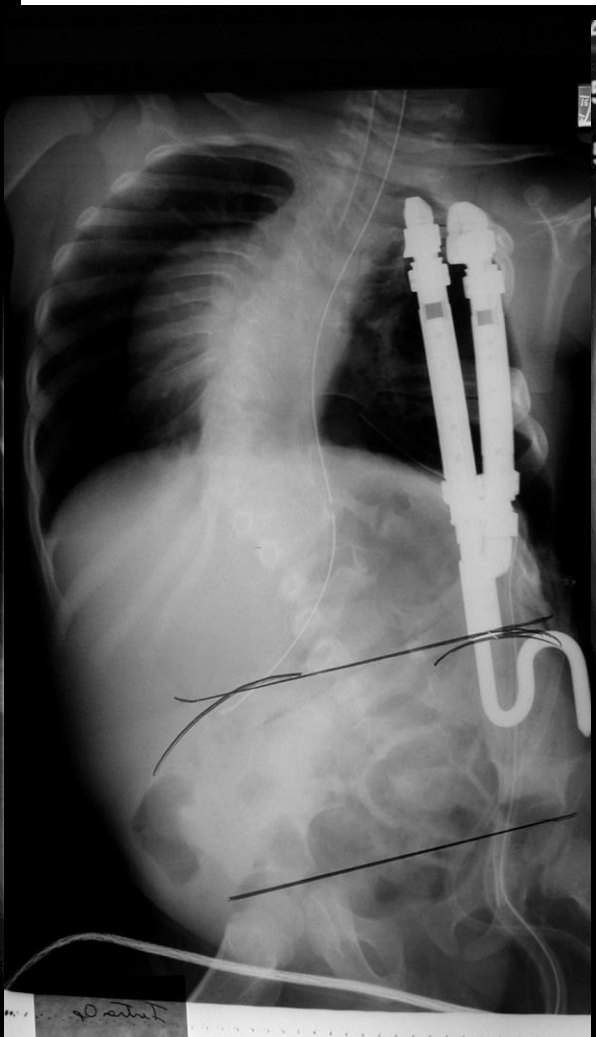


# Rib fractures – acute loss of correction

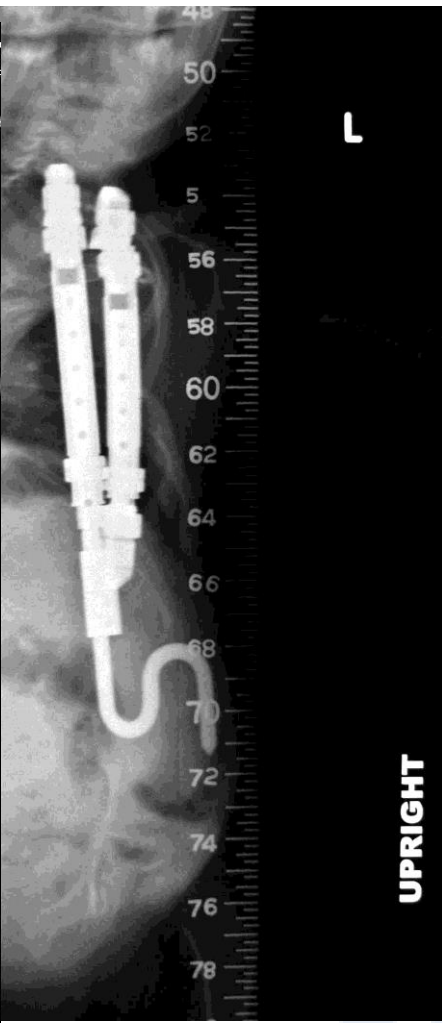
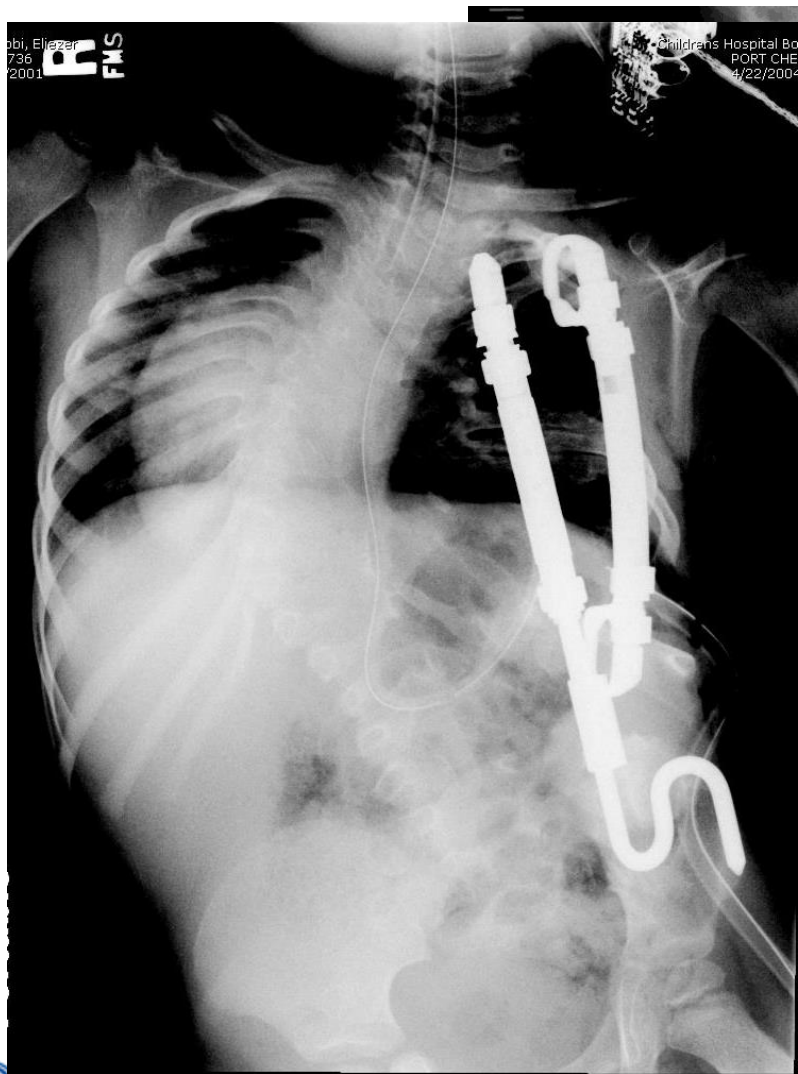
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Standing

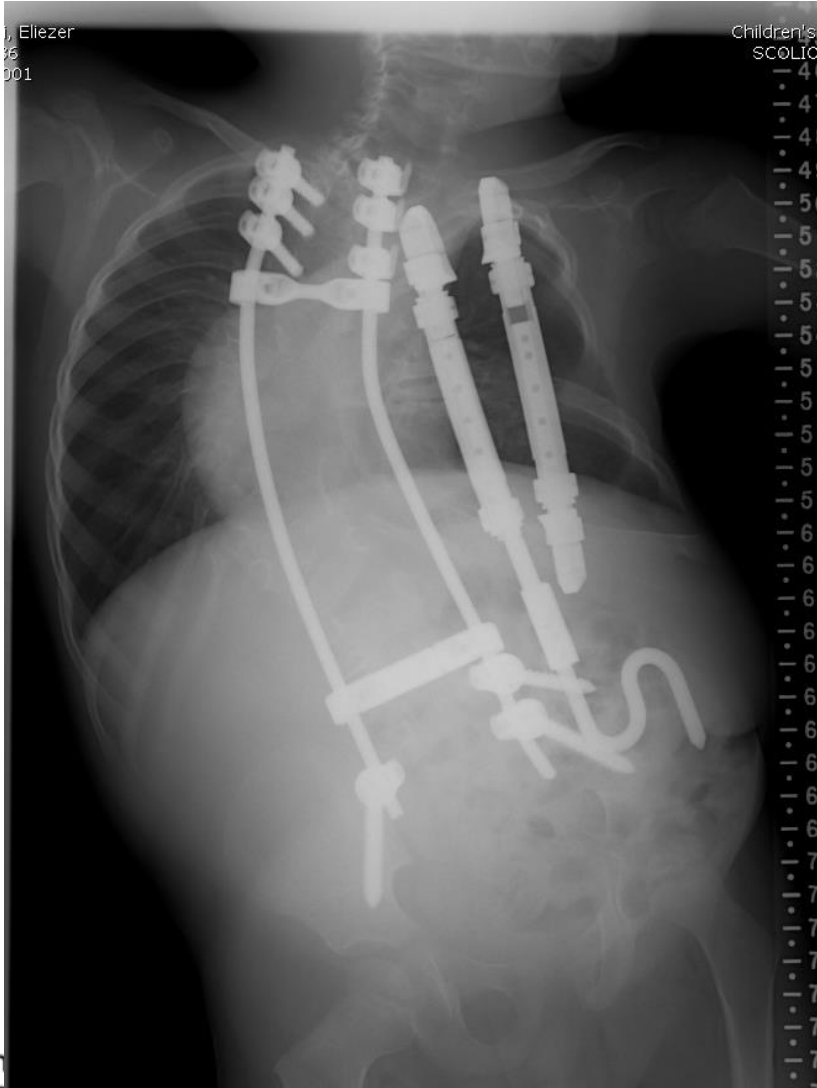


# Rib fractures – revision after 6 months of healing, drifted again to



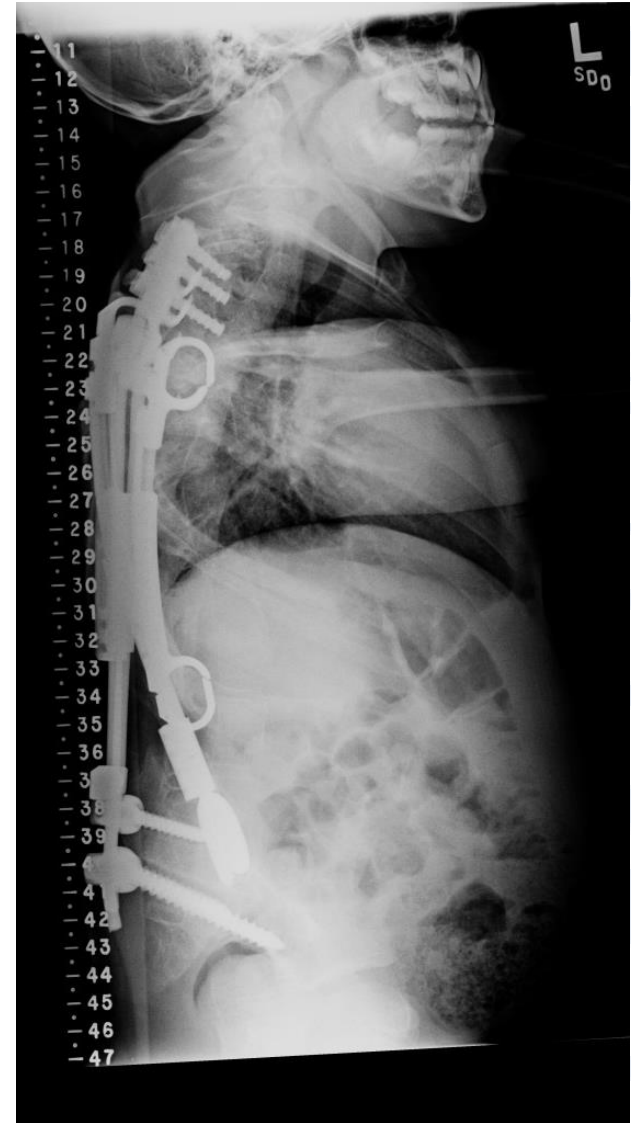
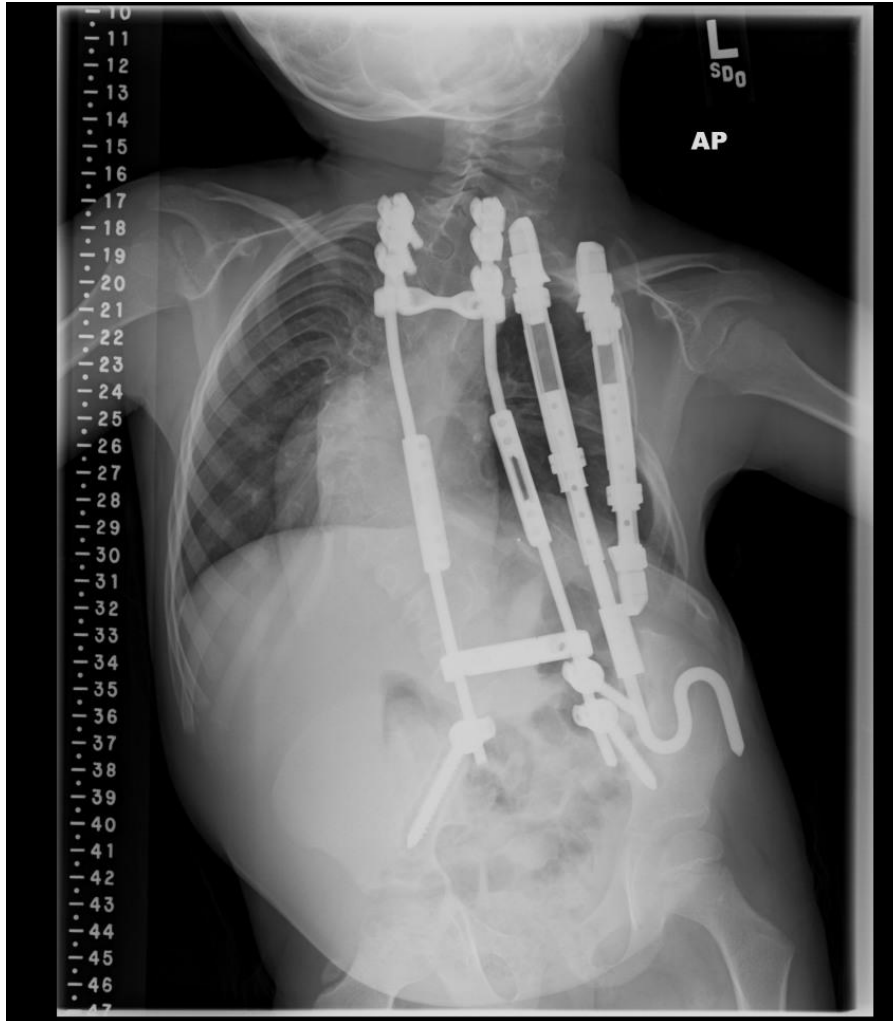


# Rib fractures – eventual control with growing rods.





# 3.5 years post op, after lengthenings:



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# Thanks!



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HARVARD MEDICAL SCHOOL

