Junctional Kyphosis: Management

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Disclosures

- DePuy Spine: Research Support, Royalties
- Globus: other

Outline

- Causes
  - Proximal
  - Distal
- Prevention
- Management
  - Nonsurgical
  - Surgical

Causes mechanical/biological

- Stress transition
- Ligmentous laxity
- Contractures/stiffness
  - Hip, neck contractures
  - Functional Needs
- Osteoporosis
- More literature in AIS
  - Less on immature spine

Settings

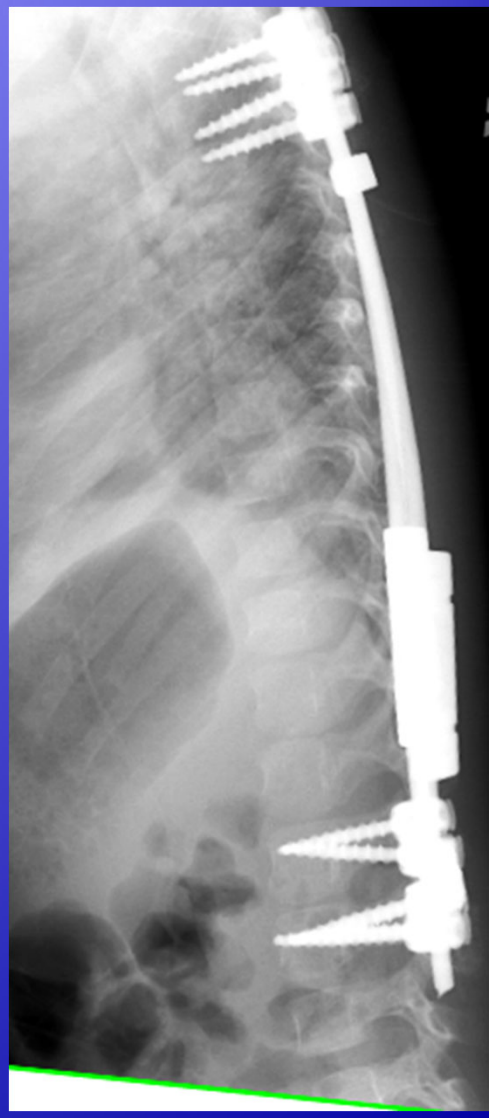
- May occur after
  - definitive fusion
  - Growing treatment
  - VEPTR?
    - Less common
    - Mostly distal

Causes

- Surgical technique
  - Exposure
  - Anchor type
  - Pedicle screws
    - Proven to cause more PJK in AIS
    - Helgeson, Newton Spine 2010
- Growth
  - Powerful internal force
  - Continued stress over time

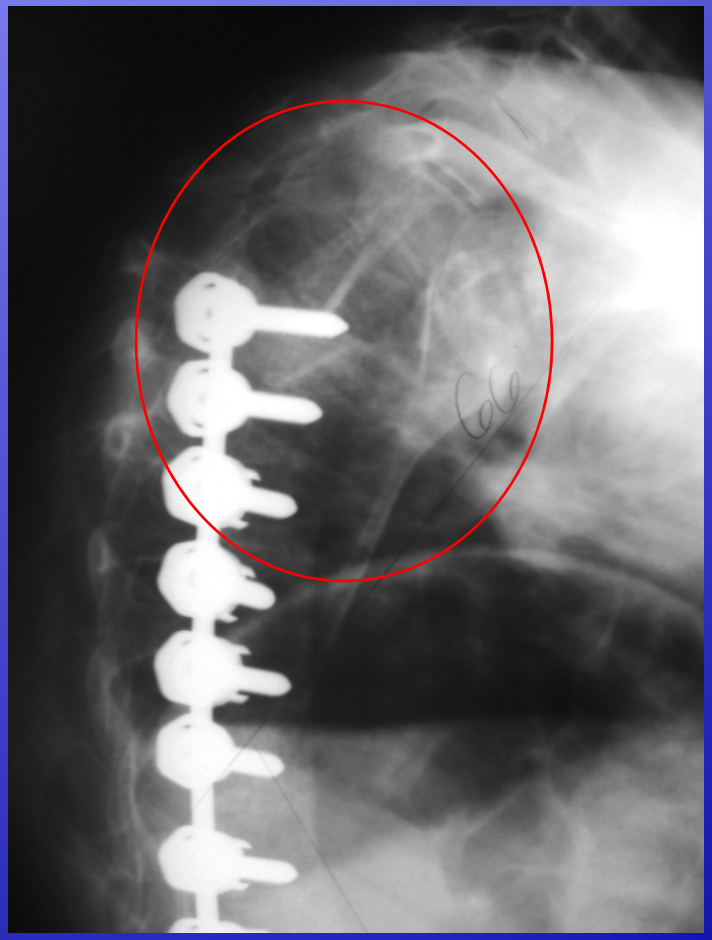
Pedicle screws and PJK

- Stiffen/constrain uppermost level
- May over-straighten spanned segment
- Necessitate more dissection
- Weaken bone at top
  - Transverse stress riser



Junctional kyphosis

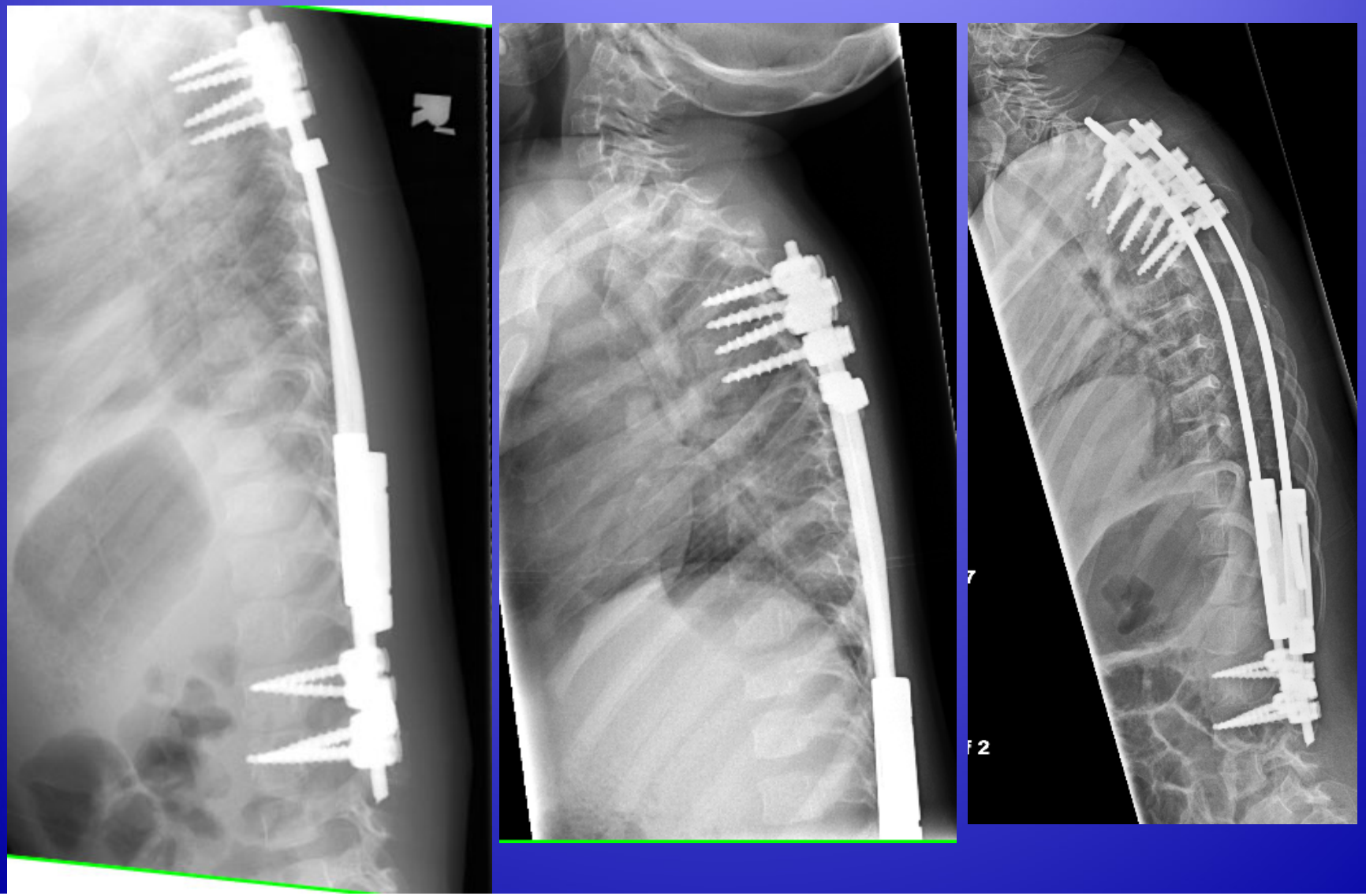
- May occur after anterior fusion!



PJK evolution

- 2.5 m.o.
- Normal MRI
- “Failed” cast

PJK evolution



When Does it become Critical?

- When risk of sudden failure exists
  - May cause neuro deficit
  - In immediate postop period
  - Posterior element fracture
    - Significant pain may be a sign
  - Vertebral translation
- When Skin integrity is threatened
- Airway problems

Prevention

- Correct kyphosis with traction
- Minimize stripping of muscles/ligaments
  - M.I.S. techniques?
    - Percutaneous screws
- Proximal TP hooks
  - “Soft landing”
- Does postop brace help?
  - Maybe if difficulty with head control, standing
  - Not routinely, however

Prevention

- Anticipated PJK/DJK is a factor in choosing levels
  - Do not span too long initially
    - Especially proximally
    - Rarely above T2/3
- Plan to correct at final fusion
  - When mature

Prevention

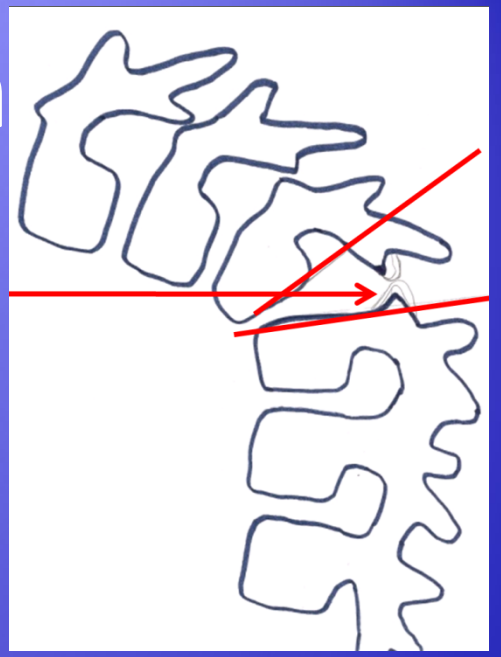
- Avoid excessive correction of preop kyphosis
  - The spine is accommodated to it!
    - Kim, Lenke proved this in AIS (Spine, 2007)

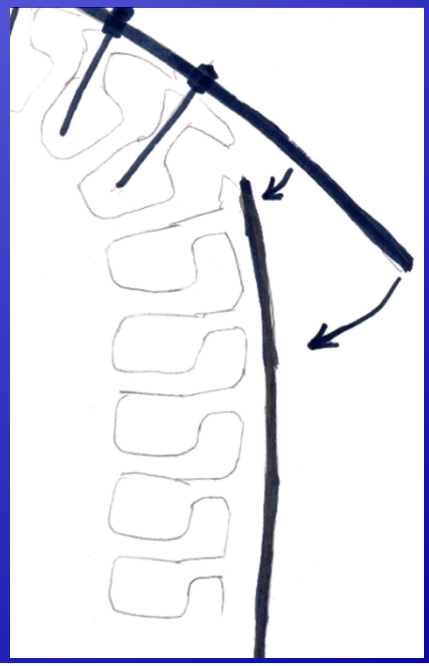
Prevention

- Educate family/therapists to watch
  - Avoid excessive head-lag
  - Post-operative bracing if concerns?

Surgical Correction

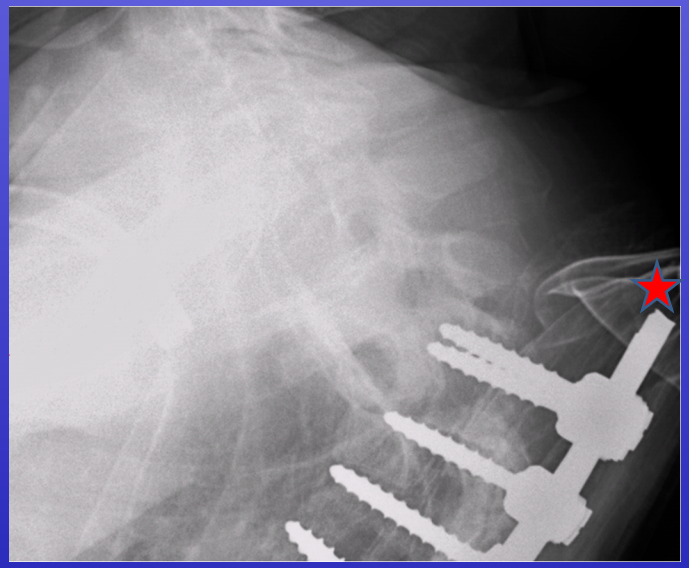
- Resect overgrown apical bone
- Colinear rods
  - Anchors in line & adjacent
  - Caution with connectors

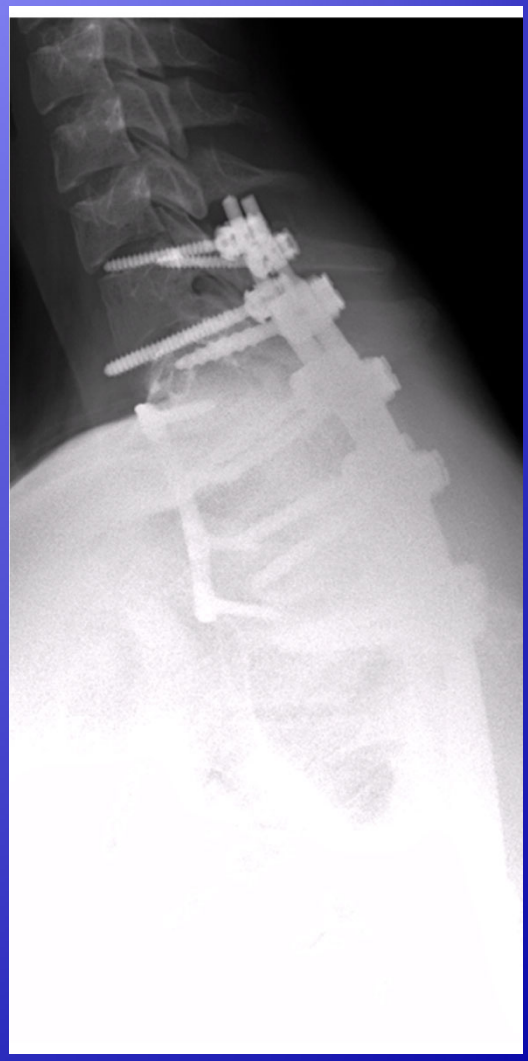




Posterior Correction

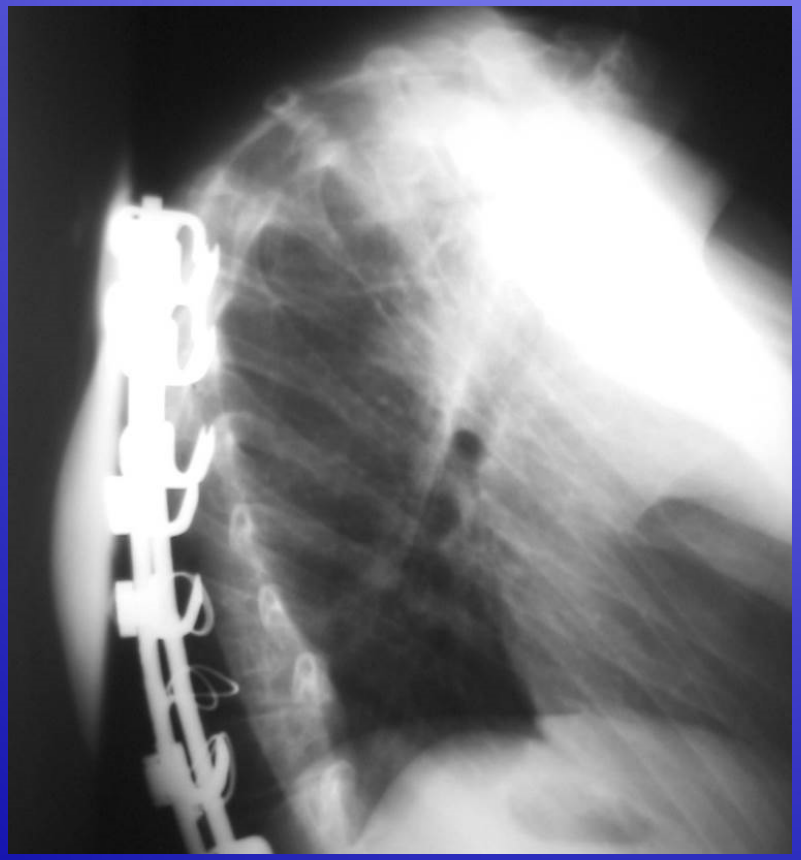
- Suggest ≥ 2 levels additional
- Bury screws as deeply as possible
- Bend rod ends aggressively
- Other tips?

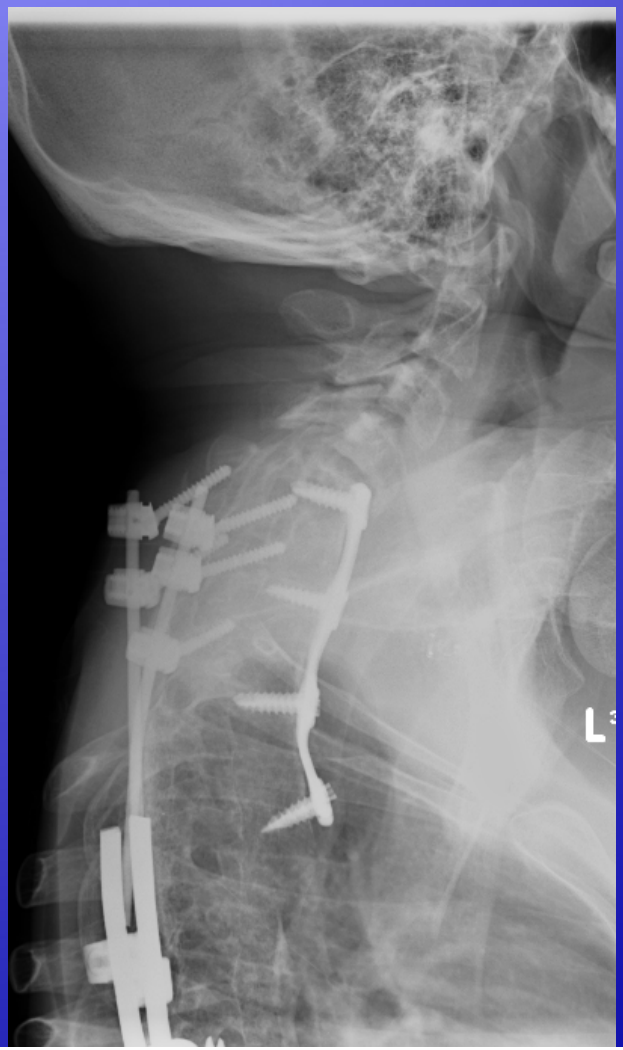




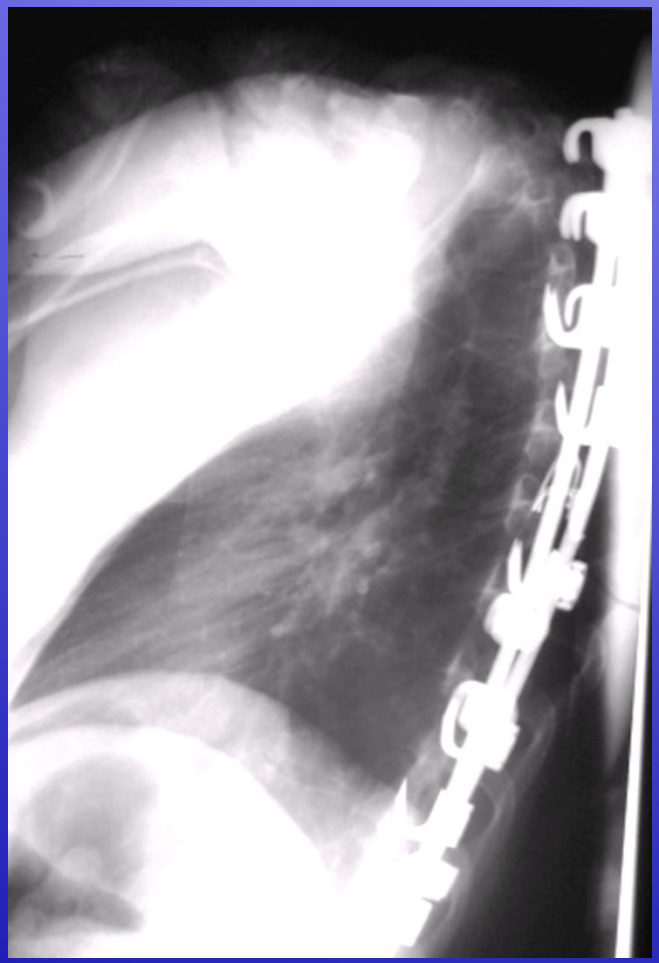
Anterior correction

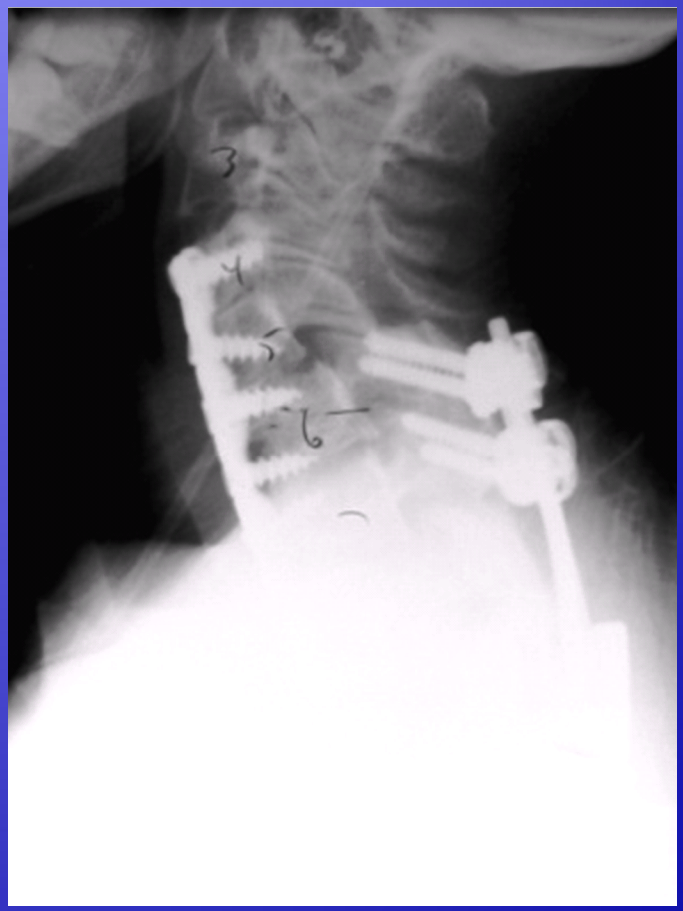
- For PJK at cervicothoracic junction
  - If osteopenic or deficient





Anterior fixation:
may be cranial to avoid posterior stripping





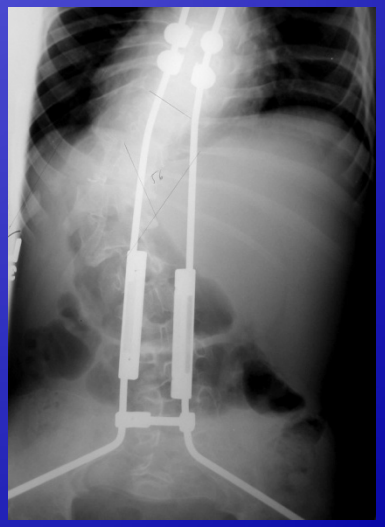
Distal Junctional Kyphosis

- Connective Tissue/muscle disorders
- Instrumentation to Thoracolumbar junction

Vs.

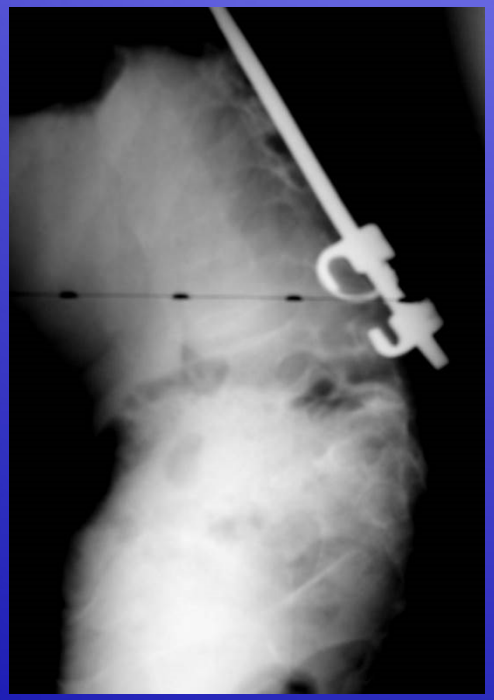
DJK

- Sometimes fixation to pelvis allows more comfort and mobility
  - In connective tissue /neuro disorders
  - Should be stable in sagittal plane
    - Hooks less effective
  - My preferred construct:
    - S1 + S2 screws
    - Iliac rods



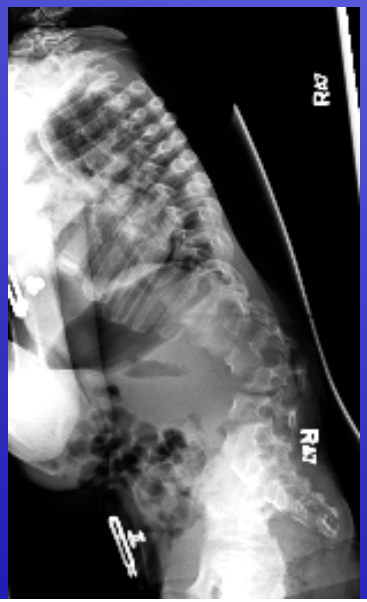
DJK

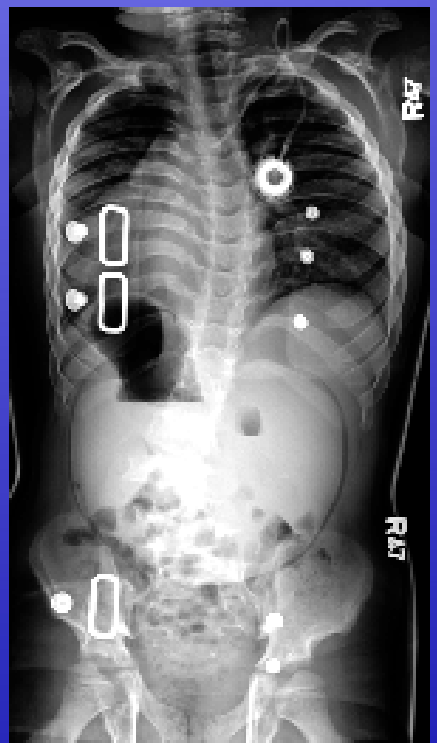
- Kyphosis may be less obvious
  - Relative to normal lordosis
  - May be just a loss of nl terminal lordosis



Distal Junctional Kyphosis
Hurler Syndrome 9 y.o.

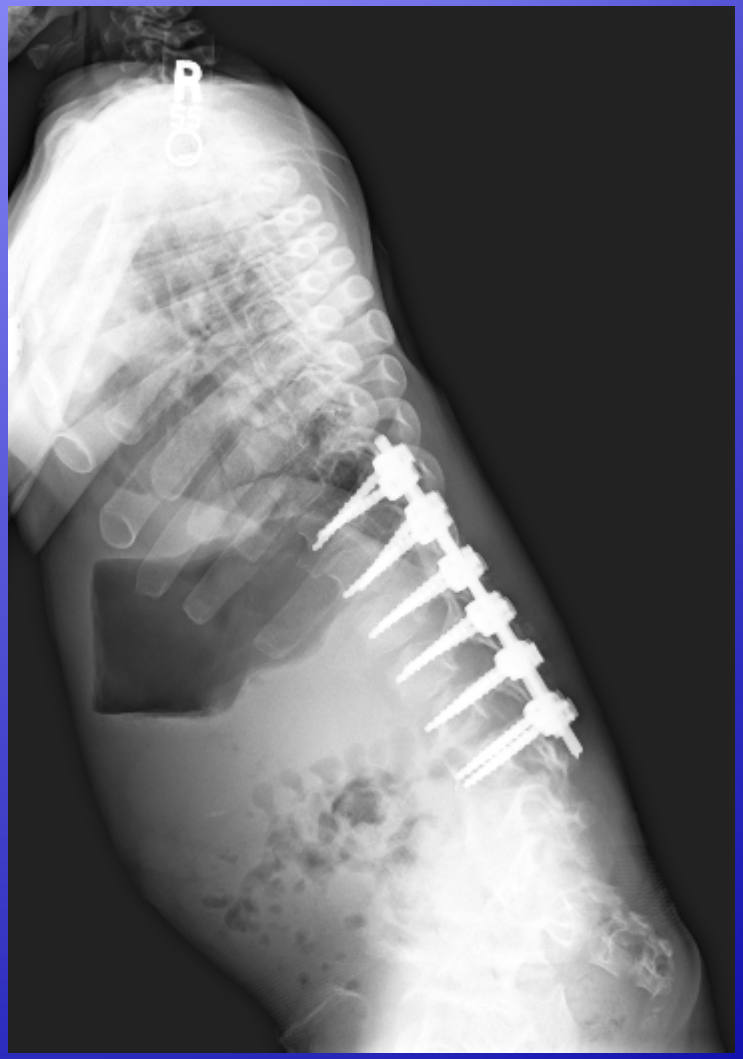
- Braced 4 yr
- Neuro normal
- No hip flexion contractures





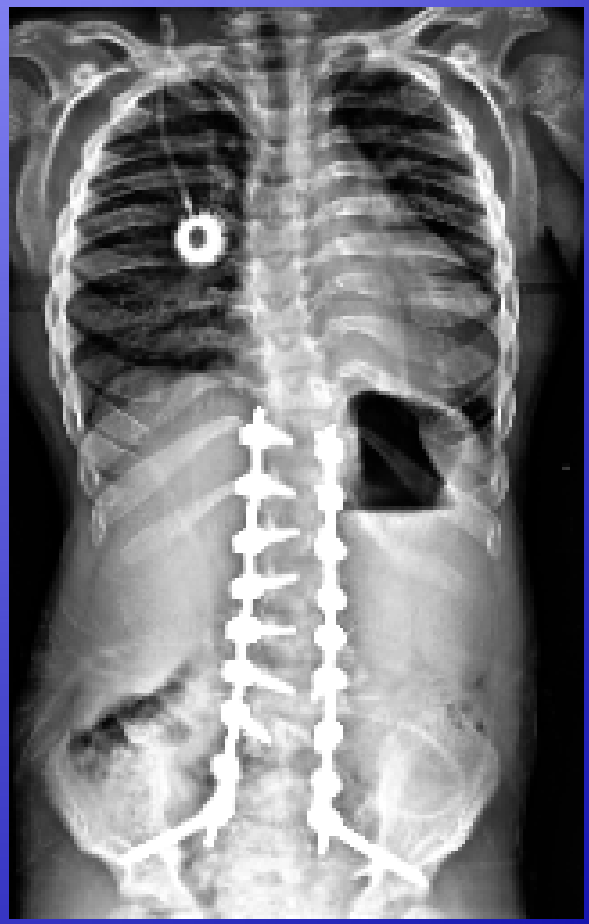
PSF T10-L4

- 1 yr post-op
- Can’t stand straight



Hurler 9 yo

- Final lat

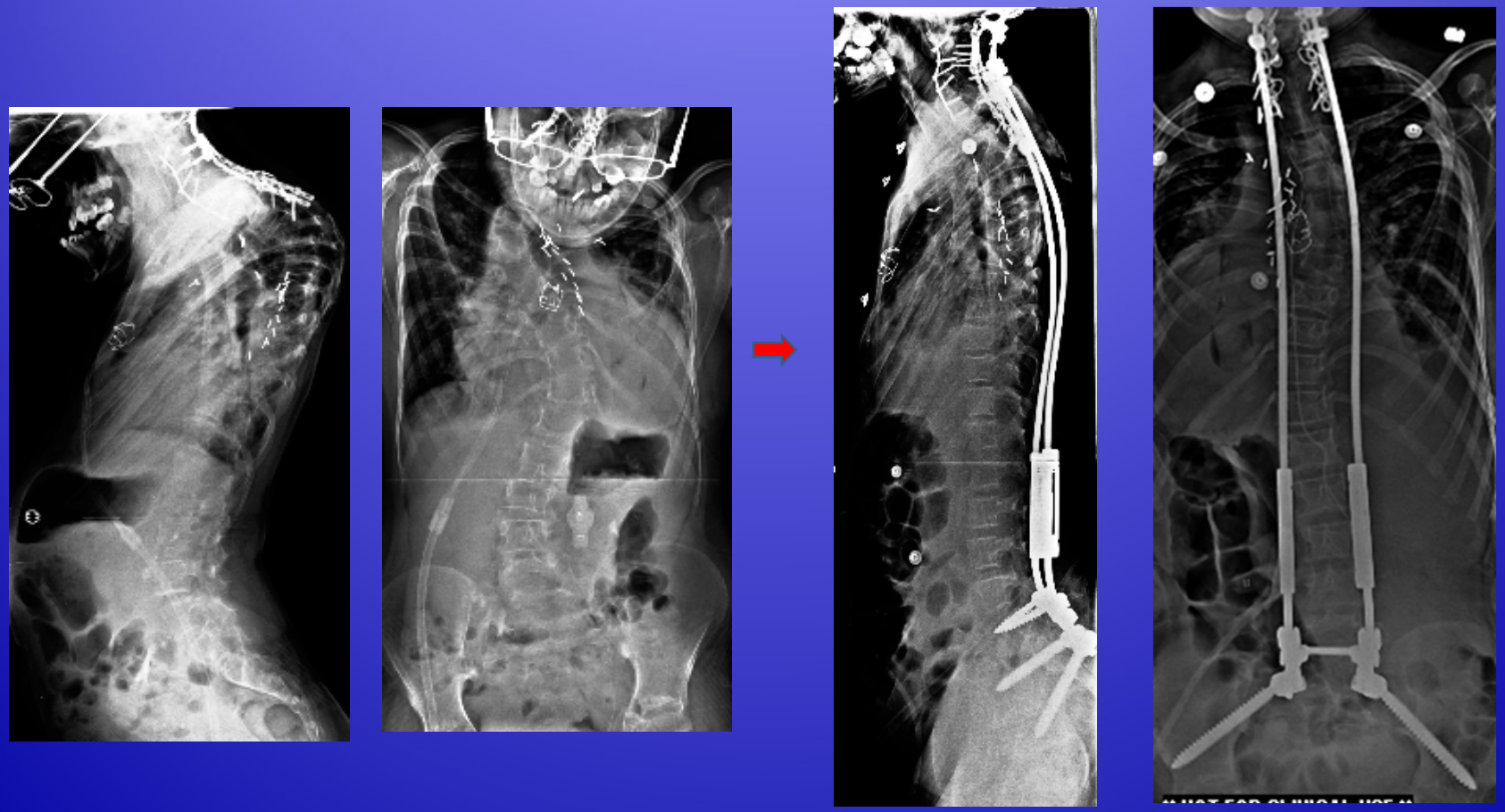


DJK

- 10 yr old with Loeys-Dietz Syndrome
- Respiratory failure
- PCO2 60-80

Cervicothoracic kyphosis

- Loeys-Dietz syndrome



Summary

- Junctional Kyphosis is common with growing implants
- Prevent by anticipation, sagittal “restraint”
- Sometimes well tolerated
- Correct if functionally disabling or unstable

Thanks

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