Junctional Kyphosis: Management

Paul D Sponseller MD
Baltimore MD
ICEOS Toronto
November 19, 2010
Disclosures

• DePuy Spine: Research Support, Royalties
• Globus: other
Outline

• Causes
  – Proximal
  – Distal
• Prevention
• Management
  – Nonsurgical
  – Surgical
Causes mechanical/biological

• Stress transition
• Ligamentous 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
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

• Thanks