Standing tall: Spinal alignment in adult spinal deformities

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Life is a kyphosing event
Spectrum of pathology

- Osteoporosis
- Discs and facet joints
- Failure of the spinal column
Outline

Standing tall by re-aligning the spine

- Consequences of advanced degenerative changes
- How do we measure the effects
- Case examples
- When to refer
Disc degeneration
Changes in the ‘motion segment’

- resistance of the annulus to torque is reduced
- increased mechanical demand on posterior elements
The coronal plane deformity
The sagittal plane deformity
Idiopática
Thoracic kyphosis:  
38° ± 18

Lumbar lordosis:  
48° ± 18
Pelvic measures

- Sacral slope (SS)
- Pelvic tilt (PT)
- Pelvic incidence (PI)
Pelvic incidence

- Key parameter
- Perpendicular to:
  - the middle of the sacral end plate
  - mid-point of femoral heads
- $55^\circ \pm 10.6^\circ$ (Vialle JBJS 2005)
Significance of pelvic tilt

- Centre of gravity over LL
- Maintains sacral plate posterior to the hip
- Increases with age
Cone of economy

J. Dubousset
Type 1: Non-harmonious spine

Thoraco lumbar disc

Junctional listhesis
Type 2: Harmonious but Flat Back

Early disc degeneration
Type 3: The most harmonious ("probably a good back")
Type 4: Harmonious but hyper-curved.

- When young: very strong
  - High PI
  - Good lordosis

- With aging
  - Will lose lordosis
  - Pelvic tilt increases to compensate for anterior imbalance

Lumbar stenosis + spondylolisthesis
Fixed or flexible sagittal deformity
59 / F

AP Cobb 26°

CSL 7 cm

Pelvic:
  PI 55°
  SS 20°
  PT 35°

LL 44°

TL 66°

TK 56°

SVA 11 cm
Aims of intervention

- Restore the lordosis
- Restore the plumb line
- Restore the ‘curves’
Adult Deformity: Surgical goals

- Normalize & balance contours
- Fuse the least number of segments
- Neural decompression
- Obtain solid biological fusion
Adaptation of lordosis

- Excise facet joints
- ‘Open’ degenerate disc spaces
- Osteotomies
- Measure the PI, and build in the lordosis

\[ LL = PI \pm 9^0 \]
Surgical reconstruction: Adult Deformity

- Major operation
- Anaesthetic input early
discuss mortality and morbidity
- 2 spinal surgeons
- Spinal cord monitoring
- ITU, Physiotherapy
Problems

- Realistic expectations
- Medical co-morbidities
- Osteoporosis
- Junctional problems
When to refer

- Unable to stand upright
- New ‘forward gaze’ issues
- Static or dynamic ‘stoop’
- Loss of ‘height’
When to refer

• Axial back pain

• Radiation: thigh pain; claudication; groin pain

• Myotomal radiation

• Refer early......not all need surgery
Active

Back pain

‘Leans over’ after a long walk

Difficulty in ‘straightening up’ when standing up from sitting
Clinical pathway

Invasiveness

Time

Physiotherapy
Medications
Alternative therapies

Injections:
• Facet blocks
• Root blocks

Decompression

Fusion; Reconstructions

Referral
Never too early!

- Not everyone needs an operation
- Understanding expectations
- Tailor management
- Review over time