normal anatomy & alignment of the spine

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AADO
Trauma Series I - Spinal Injury Workshop
OLC, PWH
Feb 2014
outline

- alignment
- regions
- planes
- functional spinal unit
- bony & soft tissue
- C, T & L
alignment
curves in the spine

- primary
- at birth
- large “C”
developing lordosis

- secondary
  - crawl → cervical lordosis
  - stand → lumbar lordosis
describing alignment &/or deformity

- global
- regional
- segmental
- coronal
- sagittal
- rotational
- combined
radiological assessment

For example, where the pelvic incidence of an individual is ideally 12.

The FBI technique post op shows that correction obtained is 36.

Pelvic parameters pre-op: conclusion the balance is restored but not perfect. Applying

Patient no. 13. Left: Preoperative (EOS) X-ray showing

Pelvic incidence

Sacral slope

Pelvic tilt

Preoperative planning. C7 translation angle: C7TA. Midpoint of C7 inferior plateau (a) is translated on the plumb line ascending from the mid part of the S1 plateau (b). Point c is on the anterior cortex of the selected vertebra for osteotomy, which is mainly L4 vertebra. Femur obliquity angle: FOA. Femur flexion is measured as the angle between the femoral axis and the plumb line (d). Pelvis compensation angle: PTA. Pelvic tilt is measured as usual: line between center femoral head to mid part of S1 plateau and vertical line. If PT between 15 and 25: add 5°. If PT superior 25° add 10°.
pelvic incidence (PI)

= sacral slope (SS) + pelvic tilt (PT)
what about the most impt part?

frontal (anterior-to-posterior) view

lateral (left-to-right) view
latest development

- EOS system (Biospace, Paris, France)
  - high sensitivity xenon particle detector
  - collimated detector mechanically coupled to x-ray tube
  - scan from head to toes
  - radiation 10-20% of x-rays
functional spinal unit (FSU)
consists of

- same motion segment
- 3-joint complex
- intervertebral disc (IVD)
- 2 facet joints
cont’d

- annulus fibrosus
  - laminated fibrocartilage
  - obliquely oriented fibers, alt. defections
  - tight & rigid w/ normal nucleus pulposus
  - anchor: adj. endplates
  - trabecular fibers - centrally & peripherally
  - periosteum w/ overlying PLL & ALL - peripherally
cont’d

- nucleus pulposus
  - gelatinous, viscous PG
  - felted mesh of loose fibrous strands
  - hygroscopic
- hydrostatic pressure - pressure gradient & osmolarity
where can we put implants?
thoracolumbar spine

pedicle hook

laminar hook

TP hook

thoracolumbar spine
pedicle screws
references:

- Netter’s & Lasts Anatomy.
thank you

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