Cervical Spine Injuries: Assessment and Classification

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Assessment

- Clinical
- Radiological
  - static
  - dynamic
- Tomograms
- CT
- MRI
Classification

- Cervicocranium (C1,C2)
- Lower Cervical Spine
Cervicocranium

Dislocation  Fracture

Occiput  +
  +

Atlas  +
  +

Axis  +
Occipital Condyle Fracture

- Rare
- Axial compression, lateral bending, shear
- Associated fractures/dislocations
- Cranial nerves at risk
Atlanto-Occipital Dislocation

- Rare, because survival is unusual
- 1% of all C-spine injuries
- Present in up to 8% of fatal RTA
- Twice as common in Children
- Stabilised by Alar and Tectorial ligaments
- Power’s ratio
- Brainstem and cranial nerves at risk
C1 fractures

- ‘Jefferson’ 1920
- Segal 1987 A Current classification
- Up to 13% of all C-Spine fractures
- Peg view - Spence AAOffset $\geq$ 7mm (JBJSA 1970)
- Lateral C-Spine, CT
- Decompressing injury
- Up to 50% have another spine fracture
C1-C2 Dislocations

- **Atlantodental**
  - Rare and likely to have cord injury or death
  - Diagnosis difficult - Reduces in extension
  - Atlanto-Dens Interval $\geq 3\text{mm}, ADI \geq 5\text{mm}
    (Fielding JBJS 1974)
  - Flexion lateral views if neurologically intact and diagnosis in doubt
C1-C2 Dislocations

- **Rotatory Fixation**, Fielding 1977
- Adults-Traumatic
- Children-viral infection/self limiting
- Integrity of Transverse Ligament 45°/65°
- C1 pivots around the Dens or the Facet joint
- C1 may sublux or truly dislocate
- Wink sign on peg view. 15° Rotated CT
  - Doesn’t reduce in rotation
C2 Fracture-Odontoid

- 7-14% of C-Spine Fractures
- D’Alonzo and Anderson 1974
- Type I, II, III
- 25% presented with Neurology
- Type II have a High Rate of NonUnion
  - 36% treated conservatively
- 4 of 49 had a second C-Spine fracture
- Late Cord Injury from minor trauma has been widely reported following NonUnion
C2 Fracture-Hangman’s

- Bilateral Pedicle Fracture
- The commonest fatal C-Spine Injury
  - (30% of such injuries Alker OCNA 1978)
- True Hangman’s is Extension-Distraction
- RTA Hangman’s is Extension-Compression
- Decompressing injury
- 31% have another C-Spine injury
- Disc and Facet integrity are key to stability
- Classification Levine JBJS 67A 1985
C2 Fracture-Lateral Mass

- Rare
- Axial and Lateral Bending Forces
- Articular Fracture
Lower Cervical Spine

- Facet Dislocations
  - (Flexion-Rotation)

- Others by Mechanism
  - (Allen Clin Orthop 1984)
    - Compression (Axial Loading)
    - Extension
    - Flexion
    - Penetrating
Lower Cervical Spine

- Danis 1984  3 Column model
  - Middle Elements are
    - Posterior wall of Vertebral Body
    - Posterior Longitudinal Ligament
    - Posterior Annulus Fibrosus
    - **VITAL FOR STABILITY**

- White and Panjabi  Experimental model (Clin Orth 1975)
Lower Cervical Spine

- Facet Dislocations
- A soft tissue injury mainly
- Unilateral or Bilateral (± Facet fracture)
- Order of Component Failure
- Disc inevitably involved to some extent if White and Panjabi criteria are met
- Unilateral 24% nerve root, 32% incomplete cord, 24% complete cord injury
- Bilateral up to 65% complete cord injury
Lower Cervical Spine

- Flexion
- Causes compression fracture of body
- Assess stability using described approach
- Posterior elements usually intact
- Posterior ligament injury may occur.
  Clinical and radiological assessment.
  ‘Perched Facets’ Potential for late instability. Follow up X-Rays
Lower Cervical Spine

- Axial Load
- Burst Vertebral Body + ‘Teardrop’
- Interpedicular distance
- Posterior elements usually intact
- Cord injury common
Lower Cervical Spine

- Extension
- Soft tissue injury
- OA predisposes to Cord injury
- Bruised forehead, Quadriplegia, No fracture
- Anterior longitudinal ligament tear
- Cord compression by extruded disc and posterior osteophyte
Lower Cervical Spine

- Penetrating
- Self explanatory
- Pharyngeal contamination possible