PIE: Emergency Spine

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Spine: Key considerations

- Abnormal: Fracture or dislocation

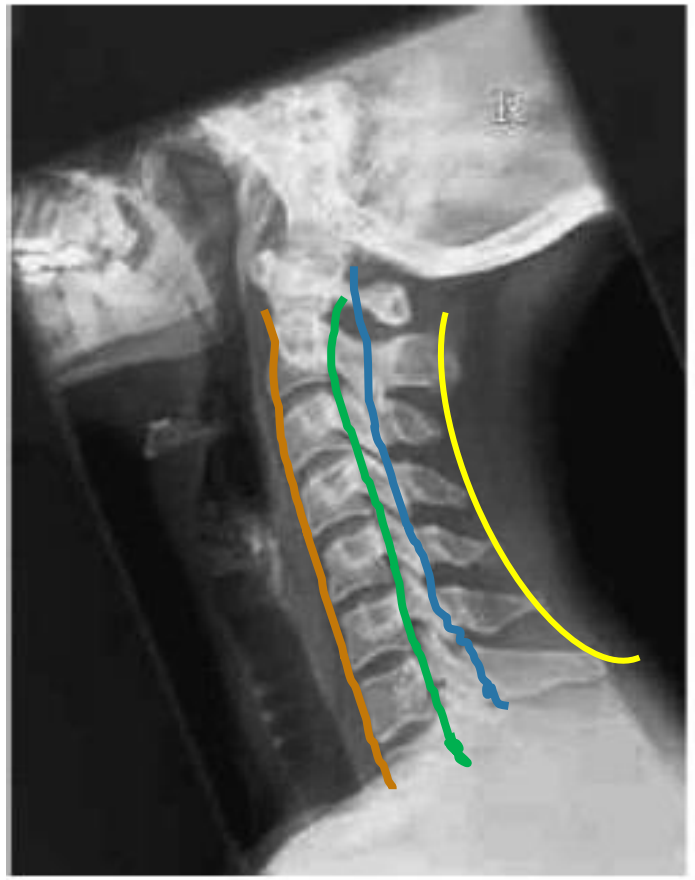
- Is injury stable or unstable

C-spine Alignment:Lateral

Assess four parallel lines.

- Anterior vertebral line:
  anterior margin of vertebral bodies
- Posterior vertebral line:
  posterior margin of vertebral bodies
- Spinolaminar line:
  posterior margin of spinal canal
- Posterior spinous line:
  tips of the spinous processes

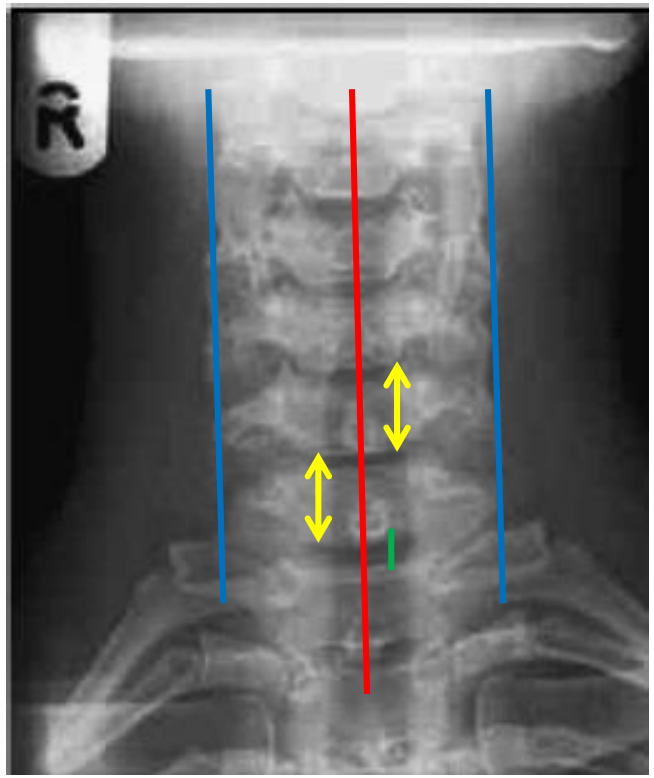
These lines should follow a slightly lordotic curve, smooth and without any steps



Clark's positioning

C spine: Alignment AP View

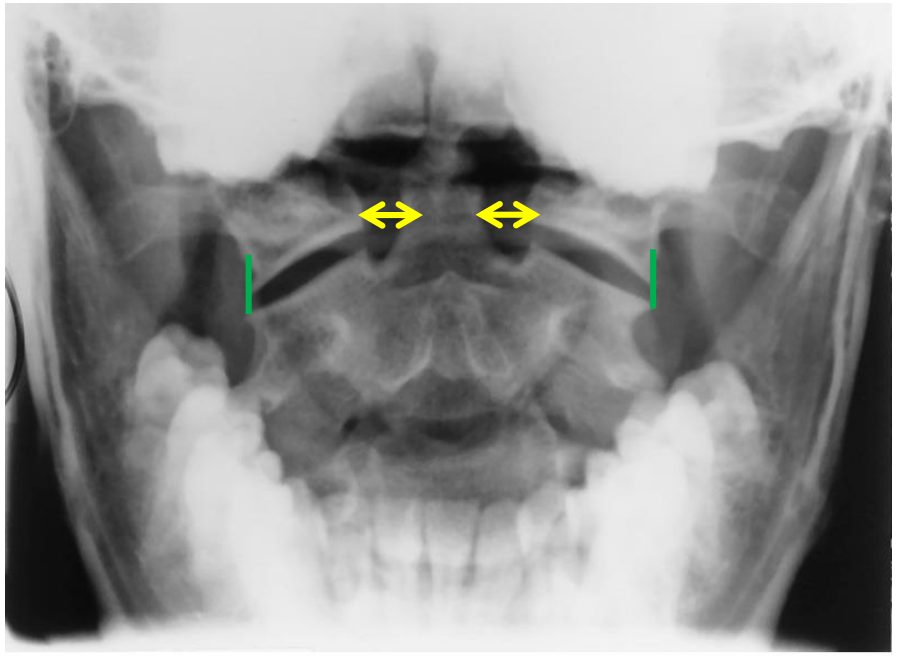
- Alignment should be evaluated using the edges of the vertebral bodies and articular pillars.
- The height of the cervical vertebral bodies should be approximately equal on the AP view.
- The height of each joint space should be roughly equal at all levels.
- Spinous process should be in the midline and in good alignment.



Clark's positioning

C spine alignment: AP Open mouth

- The distance from the dens to the lateral masses of C1 should be equal bilaterally.
- The tips of lateral mass of C1 should line up with the lateral margins of the superior articular facet of C2.



Bontrager

C spine: Bones

- Check cortical margins for steps, breaks or abnormal angulations.
- Inspect the vertebrae for changes to internal trabecular patter, lucencies or sclerotic appearances.
- Heights of each vertebral body should be the same at the anterior and posterior aspects.

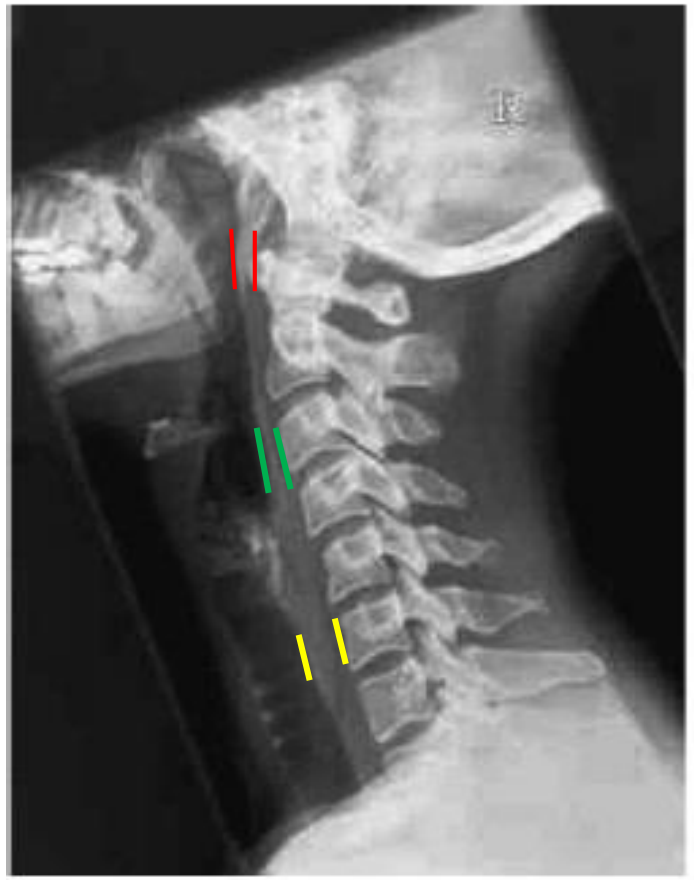
C spine: Cartilage and joints

- Check facet joints and interspinous gaps.
- **Disc spaces:**
  - Disc spaces should be roughly equal in height at anterior and posterior margins.
  - Disc spaces should be symmetric.
  - Disc space height should also be approximately equal at all levels.

Clark's positioning

C spine Soft tissue:
Allowable thickness: pre-vertebral spaces

- Pre-vertebral soft tissue swelling is important in trauma.
  - –Nasopharyngeal space at C1: - 10 mm
  - –Retropharyngeal space C2-C4: - 5-7 mm
  - –Retrotracheal space C5-C7
    - 14 mm children)
    - 22 mm (adults)



Jefferson's fracture

- Fracture of the ring of C1
- Involves both anterior & posterior arches
- Lateral displacement of lateral masses
  - If > 7mm, unstable fracture
  - Look for: Asymmetry in space between odontoid & C1
  - Lateral masses of C1 overhangs lateral masses of C2

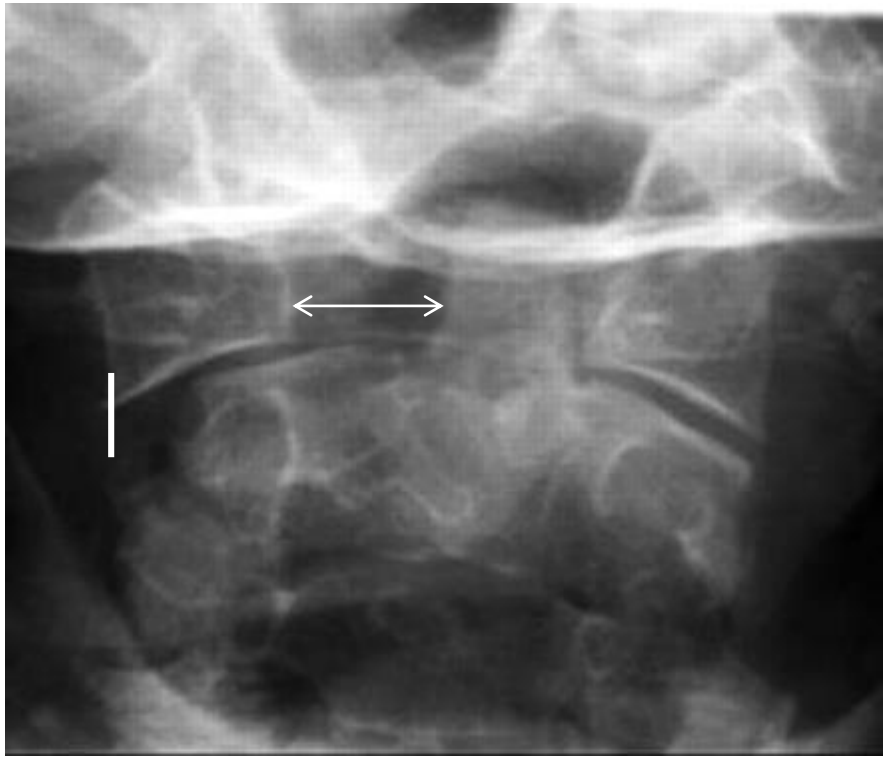
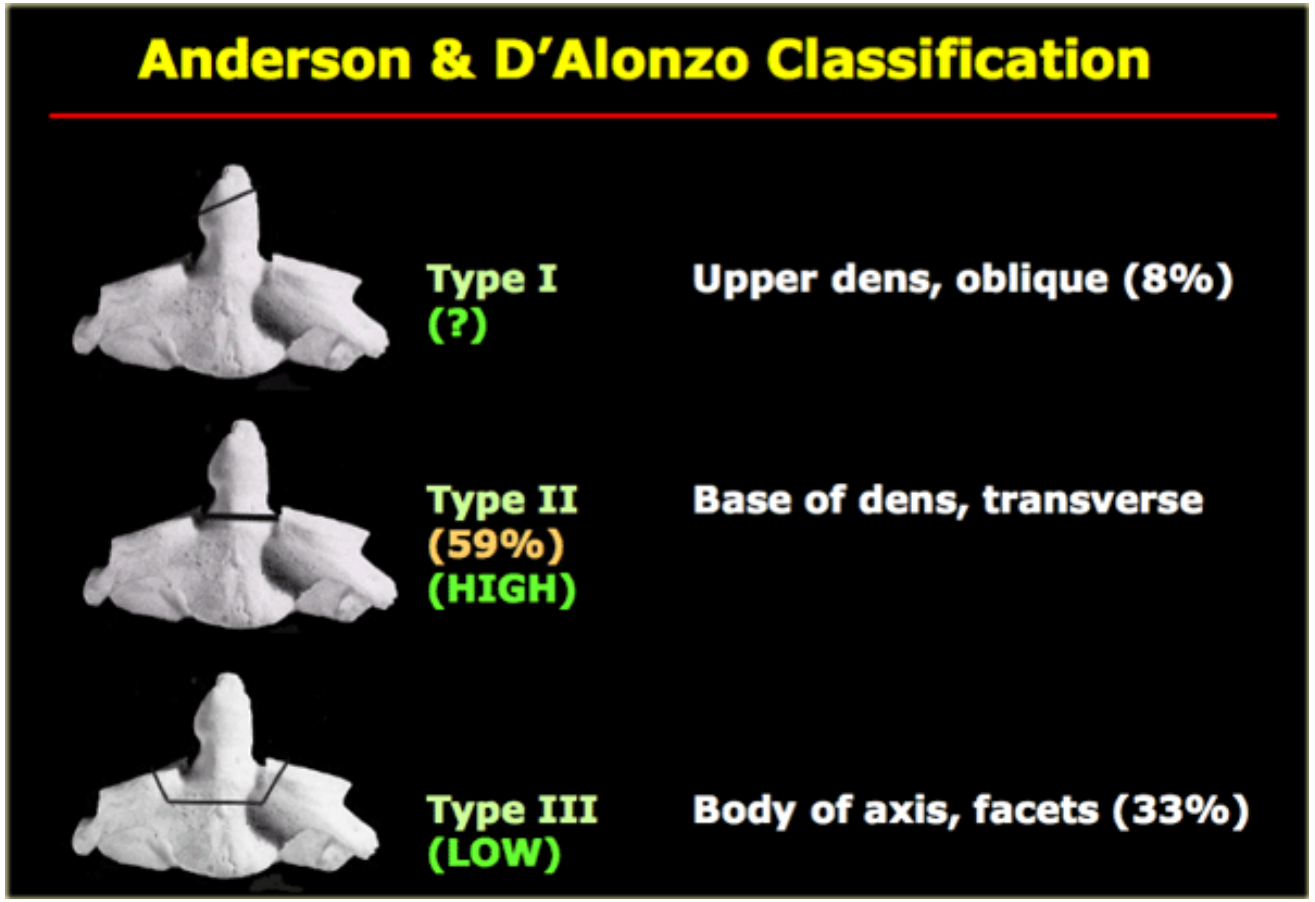


Image Monash University

Odontoid Peg fractures

- Mechanism of injury: hyperextension or hyperflexion
- Type 11: Most common.
- Occurs through base of odontoid
- Blood supply often compromised
- Risk of non-union



Hangman's fracture

- Bilateral fractures of pedicles of C2
- Anterior subluxation or dislocation of vertebral body of C2
- Prevertebral soft-tissue swelling
  - Look for: Fracture posterior C-spine of C2 pedicle
  - Displacement of posterior spinal line

Hyperflexion Teardrop Fracture

- Most severe flexion fracture.
- May appear simple.
- Triangular anterior fracture of inferior vertebral body associated with posterior displacement of vertebral body into spinal canal.
- High risk of neurological damage

Clay-Shoveller's fracture

- Avulsion fracture of spinous process; commonly of C6/C7
- Caused by severe muscle contraction
- Stable fracture

Thoracic Spine

- Fractures in middle or upper thoracic spine are rare in adults.
- More common in children (T4-5).
- May image for metastatic or metabolic disease.

T9 crush Fracture

- Crush fracture is shown with marked anterior wedging.
- Causes: osteoporosis, metastatic disease

Lumbar Spine

- Fracture Dislocation of L1

Spondylolysis

- Radiographic Features:
- The disc spaces between the lower thoracic and lumbar vertebral bodies are significantly reduced.
- The vertebral end plates are sclerotic.
- Spurs are visible at the margins of the vertebral bodies (arrow).

Spondylolisthesis

- Forward displacement of vertebrae
- Causes:
  - Trauma
  - Degenerative Joint Disease

Metastatic disease

- Metastic case history:
  - Adult female, past history: carcinoma of colon, with back pain
- Radiographic feature:
  - area of dense sclerosis in the body of L2 without enlargement of the vertebral body.

Metastatic disease

- Case history:
- 70 year old man with frequency, post-micturition dribbling and some back pain
- Radiographic features:
  - Increased bone density of vertebrae and pelvis.
  - The density is irregular and confluent.

Summary

- Consider the mechanism of injury when interpreting plain film radiographs of the spine
- Use ABCs systematic assessment when interpreting plain film radiographs of the spine
- Identify typical traumatic radiographic appearances and common pathologies of the spine


THANK YOU