Learning objectives

1) Appropriately employ radiography, CT and MRI when screening for spinal injuries.
2) Analyze spine images using a pattern approach.
3) Classify spine injuries into pathomechanical families.

I have no financial disclosures.

Screening for cervical spine injuries


Screening for cervical spine injury

- Thin-section CT, not radiography, is primary screening study for suspected cervical spine trauma
- 3-view radiography only when CT not readily available; not substitute for CT
- “Concerns about cost and radiation require careful selection of patients who truly are at risk and need imaging.”
- Applies to adults and older children

Screening in younger children <16

- “…not sufficient evidence to establish reliability of NEXUS criteria in younger children, or to recommend whether radiography or CT should be initial imaging study.”
- Considerations regarding radiation exposure should be paramount
- Initial evaluation …radiography (3-views) regardless of mental status.

Screening for cervical soft tissue injury

- soft-tissue injuries are quite common after significant trauma,
- and many of these lesions do not lead to mechanical instability
- MRI should be primary modality
- MRI when neurologic status cannot be fully evaluated within 48 hours of injury, including those with normal CT examination
Screening for thoracic or lumbar injury

- MDCT is the procedure of choice, adults and children 16 – 18
- Radiography in children < 16 (AP, lateral)
  - unless the patient has already had a CT examination of the chest, abdomen, and pelvis

2007 ACR Appropriateness Criteria

KEY IMAGES
approach a 400 image cervical spine MDCT

2 mm bone and soft algorithm
transverse, sagittal, coronal
Analyse using pattern approach

1. Assess for adequate coverage
2. Assess for artifacts
3. Count the vertebrae
4. Cranio-cervical region in 3 planes
5. Lower cervical spine on sagittal images with reference to transverse and coronal

Assess for adequate coverage

- Top: occipital bone
- Bottom:
  - T1 if torso scan to follow
  - T4 if only C-spine imaged

Assess for artifacts

- Complete pedico-laminar rings
- Disrupted facet joints
- Rotational malalignment
- Patient motion

Assess for artifacts and major injuries
Count the vertebrae

Cranio-cervical region
- analysis in 3 plane
- Occipital condyles
- Lateral masses C1 & C2
- Dens
Lower cervical spine
Sagittal reformatted images

- Mid sagittal alignment
  - Anterior translation
  - Kyphosis
  - Interspinous or interlaminar widening
  - Disc space widening
- Vertebral bodies for compression fracture
- Facet joints for fracture or subluxation
- Spinous process for missed fracture

Pedicle-laminar ring
Pedicle
Articular mass
Lamina
Transverse process
Spinous process

Inferior facet of C5
Superior facet of C6
Coronal reformatted images

- Dens and C1-C2 articulations
- Transverse processes for fracture
- Spinous processes for rotational malalignment
Classify spine injuries into pathomechanical families

- Scores injury based on: injury morphology, disco-ligamentous complex, and neurologic status
- Simplifies injury morphology
  - compression injuries,
  - distraction injuries,
  - rotational/translational injuries.

The subaxial cervical spine injury classification system: a novel approach to recognize the importance of morphology, neurology, and integrity of the disco-ligamentous complex.

Conclusion

- Screen with MDCT and selective use of MRI; radiography of limited value.
- Radiation dose concerns warrant judicious use of any screening test.
- Analyze spine images using a systematic pattern.
- Classify spine injuries into pathomechanical families.
- Learn how the spine surgeons in your area classify injuries; try the Vaccaro system.