Commonly missed fractures in the ED
Objectives

Provide a basic review of patterns of misdiagnosis of plain film radiographs often seen through the Emergency Department.

Illustrate a framework of strategies to establish a more sound interpretation algorithm.

Review cases of commonly misdiagnosed plain film radiographic pathology.
Malpractice Claims

• Overlooking orthopedic injuries is a leading cause of medical malpractice claims out of the ED.


Massachusetts Joint Underwriters Association: Missed fractures comprised 20% (during 1980-1987) and 10% (1988-1990) of malpractice claims.

Fractures are 2\textsuperscript{nd} in claim amount and number of cases established against ED physicians.
Patterns of Plain Film Misdiagnosis

• 1) Normal Anatomy and Variants

• 2) Pattern Failure

• 3) Associated Pathology

• 4) Suboptimal Positioning and Number of Projections

• 5) Photographic vs Clinical Assessment of Imaging
Normal Anatomy and Variants
Variants
Pattern Recognition
Associated Pathology
Associated Pathology
Suboptimal Positioning and Number of Projections
Suboptimal Positioning and Number of Projections
Suboptimal Positioning and Number of Projections
Suboptimal Positioning and Number of Projections

• Stubbed toe on coffee table
Suboptimal Positioning and Number of Projections
Suboptimal Positioning and Number of Projections
Suboptimal Positioning and Number of Projections
Suboptimal Positioning and Number of Projections
Photographic vs Clinical Assessment of Imaging
Photographic vs Clinical Assessment of Imaging
Photographic vs Clinical Assessment of Imaging
“The eye sees what the mind knows”
Pediatric elbow

• Ask yourself four basic questions
  – Is there a joint effusion?
  – Is the alignment maintained?
  – Are ossification centers normal?
  – Are there subtle fractures?
Pediatric elbow Effusion?
Pediatric elbow Alignment?
Pediatric elbow Alignment?
Pediatric elbow Ossification centers?

- C-apitellum (1yr)
- R-adius (3yrs)
- I-nternal (5yrs)
- T-rochlea (7yrs)
- O-lecranon (9yrs)
- E-xternal (11yrs)
Trochlear ossification mimicking loose bodies
Subtle Fractures
Lateral condyle fracture

- 2\textsuperscript{nd} most common distal humerus fracture in children.
- 4-10 years
- Tend to be unstable and prone to nonunion.
- Treatment strategies based on amount of displacement. MRI likely needed to establish the degree of cartilaginous involvement.
- Overprojection of the capitellum can lead to false positive read.
Overprojection of the capitellum
Medial Epicondyle avulsion

- Apophysis located outside the joint—may not see joint effusion with injury.

- Caveat—poor positioning on lateral view can give avulsed appearance posteriorly. Avulsions tend to occur anterior and distal.

- 50% incidence of associated elbow dislocations. With every dislocation the 1st question should be “where is the medial epicondyle?”.
5 year old with elbow pain
25 year old with medial wrist pain
Triquetral Fracture
Triquetral Fracture

- 2\textsuperscript{nd} most common carpal bone fracture

- Frequently seen on lateral projection as a dorsal chip fracture.

- Occasionally an off lateral position (such as a reverse oblique) may be of assistance if there is high clinical suspicion, yet initial radiographs are negative.
Ankle and foot

• Occult fractures?

  – Retroprospective study-344 pt’s with ankle and foot fractures.
Calcaneus

- Bohler’s Angle-normally 20-40 degrees.
- Angle of Gissane normally 130 degrees.
- Anterior calcaneal process
- Role of CT
- Associated injuries
Fall from 15 foot tree
Non specific heel pain
Subsequent MRI
Pain after fall
Role of CT

- Initial assessment with conventional radiographs including an axial view of the heel (Harris view).

- CT is becoming the standard in assessing calcaneal fractures.
  - Intraarticular fractures represent approx 75% of calcaneal fractures.
Associated injuries

• 10% associated with thoracolumbar fracture.
25 year old soccer player
Fracture of the Lateral process of the talus

- Radiographs often underestimate the extent of this fracture and CT is recommended for any fracture larger than a tiny chip.
- May be visible in only one view.
Right hip pain
Right hip pain
Acetabular fractures

- **Landmarks**
  - Teardrop
  - Ilioischial line (post column)
  - Iliopectineal line (ant column)
  - Posterior rim
  - Anterior rim

- **Femoral neck fractures**
  - Most common missed of hip fractures.
  - Consider CT or MRI
Summary

• Understanding and overcoming some of the basic patterns of failure in diagnostic interpretation of plain film radiographs.

• Have a systematic approach and recognize some commonly overlooked areas regarding orthopedic injuries.
References

- Paul CC, Janes PC. Snowboarder’s Talus Fracture; Skiing trauma and safety: intl symposium 1996.
Thank you!

Are you all you want to be at the viewbox?

Any Questions?