Occult Fractures

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Objectives:

- To discuss plain film and physical findings that suggest an occult fracture
- To recognize clinical scenarios that are high risk for an occult fracture
- To discuss the evidence-based approach to evaluating patients for an occult fracture

High Risk!

  - 122 ED malpractice claims, 4 insurers
  - Most common “Missed Dx”
    - #1-Fracture, #2-Infxn, #3-MI
  - Most common Errors:
    - Failure to order right test (58%)
      - Radiologic study (61%): #1-Xray
    - Misinterpretation of test (37%)
      - Radiologic study (66%): #1-Xray

“Occult” Fracture?

- Not readily visible on plain radiographs, using standard techniques
- Clinically important
  - Change in management
  - Significant risk of complications if missed
- Missed Fracture = most common source of malpractice lawsuits in EM
The Plan:

- 3 clinical scenarios to illustrate common, occult fractures:
  - Hip
  - Elbow
  - Wrist

Case 1:

- 75 yo F fell onto her L side
- Pain in L hip with weight bearing
What should I do next?

1. Bone scan
2. CT scan
3. MRI
4. Sign out and go to lunch

Occult hip fracture

- Common, and clinically important
- Bone Scan (?) vs CT vs MRI
  - MRI is most supported by evidence
  - All three are superior to plain films
  - Local resources impact choice

MRI

- Frihagen, Acta Orthop, 2005:
  - 100 pts, hip trauma, negative plain films
  - All had MRI
  - 46 Hip Fx
  - 30 had surgery
Can CT exclude hip fx?
- Rapid advances in technology
- As good as MRI?

MRI vs CT:
- Lubovsky, Injury, 2005:
  - 6 pts with suspected fx, negative Xrays
  - All had MR and CT (slice?)
  - 5 of 6 had fx. CT “misdx’d” three.
    - Greater tuberosity fx in 3 who had inter-trochanteric fx by MRI

- Case series (not yet published)
  - 4 cases, negative CT, positive MRI

82 year old female:

CT:
MRI:

Occult hip fracture:

- MRI is still the “gold standard”

- What if I only have access to CT?

THE ELBOW

Case 2:

- 31 yo M crashed his bicycle
- c/o R elbow pain
- No deformity, slightly swollen
- Decreased ROM
What occult fracture is hiding in this adult elbow?

1. Radial head
2. Supracondylar
3. Olecranon
4. Calcaneus

Approach to the Elbow:

- 90 degree lateral

  1) Fat pads
     - Bulging anterior
     - Any posterior
2) Radio-capitellar line

Monteggia fx:

Kids:

3) Anterior Humeral Line

Anterior Humeral Line
THE WRIST

WRIST WATCH
Stephen Colbert's autographed cast
Check it out.

Case 3:
- 31 yo M struck by martial arts instructor
- c/o wrist pain
- Snuffbox tenderness

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What is your next move?

1. Thumb spica, follow up
2. CT scan
3. MRI
4. Sign out and go to lunch

Scaphoid fracture

- Most common carpal fracture
  - 10-20% occult
- Distal blood supply
- Delayed complications:
  - Non-union
  - Avascular necrosis

Best way to find occult fx?

- Bone scan:
  - Traditional—but obsolete
- MRI:
  - Better than bone scan in multiple studies
- CT:
  - As good as MRI?

MRI vs CT:

- Memarsadeghi, *Radiology*, 2006:
  - 29 pts, neg X-ray, had CT (4) and MRI
  - Gold std: plain films at 6 wks
  - 11 scaphoid fx
  - MR found 100%, CT found 8/11 (73%)
More CT studies:

- Ty et al., *Hand*, 2008
  - 28 pts, only used CT (no MRI)
    - 4 scaphoid fx, 10 others (radius, carpals)
  - No missed fx, but 8/14 neg CT lost to f/u
  - 47 pts, CT (64): 7 scaphoid fx, 10 others
  - MRI (prn) found one more fx (capitate)

Occult scaphoid fx:

- CT vs MRI not resolved
- Splint and follow-up vs Imaging today?

Summary:

- Clinical situations that suggest an occult fracture
- Evidence-based approach to evaluating patients for an occult fracture

Thank you!