Musculoskeletal Trauma of the Wrist

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The Wrist

- Most common site of injury in entire skeleton
- Distal radius and ulna fractures are 10 times more common than carpal bone fractures
- Mechanism of injury is most often “Fall On OutStretched Hand”
  FOOSH
The Wrist

• Complex anatomy makes identification of abnormalities difficult
• Dislocations are easy to overlook
• Complications are significant so these fractures are among the “MUST NOT MISS” radiologic diagnoses
Anatomy
Anatomy

Anatomy

Modified from Radiographic Anatomy of the Skeleton Michael L. Richardson, M.D.
http://www.scar.rad.washington.edu/RadAnatomy.html
Anatomy
Zone of Vulnerability
Standard Imaging Studies for Suspected wrist trauma or complications

• Wrist series
  – PA, lateral, and oblique plain films
• Special views
  – usually of scaphoid
• CT scan
  – useful for occult fractures, fragments, nonunion, osteonecrosis
Other Imaging Studies
(Less Useful in Evaluation of Acute Injury)

- MRI
  - Early/occult osteonecrosis
  - cartilaginous and ligamentous injuries
  - marrow processes

- Arthrography
  - disruption of ligamentous compartments

- Flouroscopy
  - Carpal instability with reproducible symptoms

- Bone scintigraphy
  - Occult fractures
  - Osteomyelitis
Common Wrist Fractures
Case 1: 23 Year Old with FOOSH

Fracture
Scaphoid (navicular) Fracture

- Most commonly fractured carpal
- Difficult to detect
- Frequently occult, becoming evident only over time (5-10 days)
- If there is “snuff box” tenderness, special scaphoid view(s) should be requested
Scaphoid View

- Ulnar flexion
  - Better visualisation of radial surface of scaphoid, where fractures often occur
  - “Fourth view” often added to standard wrist series

- Variety of other special scaphoid views

Multiple Scaphoid Views
Osteonecrosis of the Scaphoid

• 5-15% of scaphoid fractures
• Increased radiodensity over proximal pole
• Take weeks to appear
• Likelihood depends on location of fracture line
• Other complications: nonunion, instability, DJD
• Complications increase with delayed diagnosis and treatment

Electronic Journal of Hand Surgery
http://www.eatonhand.com/img/IMG00016.htm
Wrist CT
CT Reconstruction
Scaphoid Fracture s/p ORIF
**pearl** Scaphoid Fracture

- Common
- Difficult to detect
- Especially prone to complications
- May become radiographically evident only over time
- **Therefore…**

If scaphoid views are requested, the patient **MUST** be followed-up radiographically, even if initial studies are negative
Case 2: 60 Year Old with FOOSH
Colles’ Fracture

- Transverse fracture of distal radius
- Distal fragment angulated dorsally
- Often comminuted
- Often impacted
- 60% have associated ulnar styloid fracture
Case 3: 6 Year Old with FOOSH
Greenstick Fracture

- Children
- Greater bone elasticity
- Break in 1 cortex
- Usually angulated
- Usually not subtle
Case 4: 6 Year Old with FOOSH

Radiology Cases in Pediatric Emergency Medicine, (1) 18.
http://www2.hawaii.edu/medicine/pediatrics/pemxray/v1c18.html
Torus Fracture

- Children
- Buckling of 1 cortex
- Variant of greenstick
- Little or no angulation
- Often subtle and easily missed
Case 5: 16 Year Old with FOOSH
Salter-Harris Fracture

- Involves growth plate
- Risk of premature fusion and deformity
- S-H classification predicts risk
- May be impossible to detect radiographically

- Therefore…
  tenderness at growth plate should be treated as S-H fracture, even in absence of radiographic evidence

Radiology Cases in Pediatric Emergency Medicine, (1) 18.
http://www2.hawaii.edu/medicine/pediatrics/pemxray/v1c18.html
Salter-Harris Classification

American Family Physician Vol. (46), number 4
Common Wrist Fractures

Kids:

• Greenstick Fracture
• Torus Fracture
• Salter-Harris Fracture

Adults:

• Scaphoid Fracture
• Colles Fracture
Wrist Dislocations
Dislocations of Wrist

• Less common than fractures, but still comprise about 10% of carpal injuries

• Anatomy may be confusing at first, but a few simple tips will make it easy
On the Frontal View…

• Look for Three Arcs
  – Clear, smooth, and continuous
  – Spaces should be 2mm or less
• Disruption in any one of these arcs signifies dislocation
On the Lateral View…

- Look to see that the radius + lunate and lunate + capitate articulate
- Like an apple in a cup in a saucer
- If the cup is empty, there is a dislocation

Lunate Dislocation

- Most common dislocation
- Best seen on lateral view
- On frontal view, Arcs 2 and 3 disrupted and “pie sign” is present
- Treatment is traction and closed reduction vs ORIF and ligamentous repair

Perilunate Dislocation

- Best seen on lateral view
- On frontal view, again, Arcs 2 and 3 are disrupted
- Often associated with scaphoid fracture

Navicular Subluxation (Scaphoid Dislocation AKA Scapholunate Dissociation)

- Second most frequent carpal dislocation
- Subluxation, not a full dislocation
- “David Letterman” sign (aka “Terry Thomas” sign)
- “Ring” sign
- Arcs 1 2 & 3 disrupted
- Often associated with radius fracture

Common Wrist Dislocations

- Lunate dislocation: pie sign
- Perilunate dislocation
- Navicular subluxation:
  - David Letterman/Terry Thomas Sign
  - Ring Sign
Summary

- Common fractures may be predicted from the age of patient:
  - Child → Greenstick
  - Teen → Salter-Harris
  - Adult → Scaphoid
  - Older → Colles’

- Particular vigilance required for scaphoid fractures

- CT is modality of choice for detecting occult fractures

- Dislocations may be detected with knowledge of normal carpal relations
References


Brown J., Deluca S. Growth Plate Injuries: Salter Harris Classification American Family Physician Volume(46), number 4, Figure 2.
Acknowledgements

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The end.