Introduction to the Radiology of Fractures and Related Injuries

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Introduction to the Radiology of Fractures and Related Injuries

- Types: location and mechanisms of injury
- Classifications and grading
- Radiologic vs. Clinical features
- Variants
Types of Fractures

- Incomplete vs Complete

**Incomplete (Predominantly in Children)**
- Bowing (acute plastic bowing)
- Torus (bucking of cortex)
- Greenstick (fracture of cortex)

**Complete**
- Simple
- Comminuted

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Simple Fractures

- Alignment & displacement of fragments
Simple Fractures

- Directions of the fracture lines

**DIRECTION OF FRACTURE LINE**

- Transverse
- Oblique
- Spiral
- Longitudinal
Other terms: fracture line not seen

- Impaction, depression, and compression
Uncommon fractures

- Stress and pathologic etiologies

**SPECIAL TYPES OF FRACTURES**

**Stress**
- fatigue
  - (normal bone, abnormal stress - e.g. jogging)

**Pathologic**
- insufficiency
  - (abnormal bone - e.g. osteoporotic; normal stress - e.g. walking)
- secondary to pre-existing abnormality - e.g. bone tumor
Fractures involving the growth plate

- Salter-Harris Classification
Injuries of non-articulating joints

- Acromioclavicular & coracoclavicular separation
- Sprain or tears in the AC and (or) CC ligaments, resulting in AC separation with inferior displacement of the scapula and extremity

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Anterior dislocation of the humeral head

- Depression fractures
- Hill-Sacks & Bankart lesions
Proximal Humeral Fractures

- Classification by location and extent of displacement

![Four Segment Classification of Fractures in the Proximal Humerus](image)
Fracture-dislocation of the humeral head

- Classification by anatomic location and displacement

<table>
<thead>
<tr>
<th>Fracture-Dislocation</th>
<th>Two-Part (one segment displaced)</th>
<th>Three-Part (two segments displaced; one tuberosity remaining in continuity with the head)</th>
<th>Four-Part (three segments displaced)</th>
<th>Articular Surface</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anterior</strong></td>
<td><img src="fig5-22bp.tif" alt="Fracture of greater tuberosity" /></td>
<td><img src="fig5-22bp.tif" alt="Fracture of surgical neck and greater tuberosity" /></td>
<td><img src="fig5-22bp.tif" alt="Fracture of surgical neck and both greater and lesser tuberosity" /></td>
<td>&quot;head splitting&quot;</td>
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<tr>
<td><strong>Posterior</strong></td>
<td><img src="fig5-22bp.tif" alt="Fracture of lesser tuberosity" /></td>
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<td>&quot;impression&quot;</td>
</tr>
</tbody>
</table>
Distal Humeral Fractures

- Muller Classification of Extra-articular extension
Distal Humeral Fractures

- Muller Classification of intra-articular extension

Distal Humeral Fractures

Intra-articular: Transcondylar

- fracture of trochles
- fracture of carpitellum

Intra-articular: Bicondylar, Intercondylar

- Y-shaped bicondylar fracture
- Y-shaped intercondylar fracture with supracondylar comminution
- complex comminuted fracture
Dislocations

- Posterior elbow
Radial Head fracture

- Mason Classification
  
  I = undisplaced
  II = displaced
  III = comminuted
  IV = dislocated
Olecranon Fractures

- Horne-Tanzer Classification

IA = Oblique proximal 3rd
IB = Transverse proximal 3rd
IIA = Oblique middle 3rd
IIB = Transverse middle 3rd
III = Oblique distal 3rd
Fractures of the forearm

Monteggia fracture-dislocations

Bado classification of fractures of the proximal ulna:
- I = with anterior radial dislocation
- II = with posterior radial dislocation
- III = with lateral radial dislocation
- IV = with anterior radial dislocation and fracture
Fractures of the forearm

- Colles fracture

Fractures to the distal radius, usually with lateral or dorsal displacement of the distal fragment.
Fractures of the forearm

- Smith fractures (reverse Colle’s fractures)

Fractures of the distal radius with volar displacement and angulation of the distal fragment
Fractures of the wrist

- Scaphoid fractures

Second most common injury of the upper limb

normal scaphoid bone
Fractures of the hand

- Bennett fracture-dislocation

Intra-articular fracture of the proximal end of the first metacarpal, with dorsal and lateral dislocation of the distal segment.
Fractures of the Proximal Femur

- Intra- and Extracapsular fractures
Blood supply of the femoral head

- Interruption of this blood supply secondary to intracapsular fracture may lead to osteonecrosis.
Fractures of the Proximal Femur

- Impaction of the femoral neck into the femoral head
Posterior column fx of acetabulum

- Acetabular fracture (↔)
- Posterior dislocation of the femoral head
Anterior dislocation of the femoral head

patient C
Fractures of the distal femur

- Supracondylar, condylar, and intercondylar extension
Fractures of the distal femur

- intercondylar fracture
Summary

- simple vs. comminuted fractures
- stress and pathologic fractures
- intra- vs. extra-articular involvement
- dislocation vs. separation
- depression fractures and associated lesions
- effects of fractures on blood supply