Common Fracture of Upper Extremity

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Objectives
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- Clavicle
- Fractures about shoulder
- Shaft of Humerus
- Distal end of Humerus
- Radius and Ulna
- Distal end of Radius
Fracture of Clavicle

- The most common fracture
- rarely required open reduction
  - figure of eight cast for mid-shaft fracture
  - sling for distal 1/3 fracture
- Mechanism of injury
  - Direct: 94% of 122 pt. (Stanley, Trowbridge, and Norris)
  - Indirect: fall on outstretching hand
- Non-union
  - 0.1% treat by closed reduction (3/2235 pt., Neer)
  - 3.7-4% treat by open reduction (Neer, Rowe)
- Malunion
Fracture of Clavicle

- Indication for ORIF
  1. Non-union
  2. Neurovascular involvement
  3. Fracture of distal end clavicle with torn coracoclavicular ligaments in adults
  4. Soft tissue interposition
  5. Floating shoulder
Fractures about Shoulder

- Fractures of Scapula
- Fractures and Fracture-dislocations of Shoulder
- Fractures of Proximal Humerus
Fractures of Scapula

- Treatment by sling and early active motion
- Rarely need open reduction
- Indication of open reduction
  1. Significantly displaced fractures of the acromion with retraction of the fragment and encroachment on the subacromial space
  2. Fractures of the coracoid with acromioclavicular separation
  3. Glenoid rim fractures
Fractures and Fracture-dislocations of Shoulder
Fractures of Proximal Humerus

- Young patient: high-energy trauma
- Older patients: osteoporosis

1. avulsion fractures of the tuberosities
2. impacted fractures of the surgical or anatomical neck
3. displaced fractures
4. fracture-dislocations
5. articular surface impression fractures
1. avulsion fractures of the tuberosities

- most commonly occur as a result of seizures or secondary to glenohumeral dislocations
- Non-operative treatment
- displaced more than 1 cm, open reduction and internal fixation are required
2. impacted fractures of the surgical or anatomical neck

- Conservative treatment
3. displaced fractures

4. fracture-dislocations

- over 1 cm of displacement or more than 45 degrees of angulation

- non-displaced fractures are essentially one-part fractures and can be treated with sling support and gradual exercises

- Displaced two-part fractures involving the tuberosities are treated as described under avulsion fractures
3. displaced fractures

4. fracture-dislocations

- Indications for operative treatment of two-part fractures include
  1. Open fractures
  2. The inability to obtain or maintain an acceptable closed reduction
  3. Injury to the axillary artery
  4. Selected multiple trauma patients
3. displaced fractures

4. fracture-dislocations

- Three-part fractures are best treated by open reduction and internal fixation
- One of the tuberosities remains with the articular head fragment, thereby retaining its vascularity. With accurate reduction and fixation and intensive rehabilitation, good results can be obtained
- Four-part fractures the articular head segment has lost its blood supply, and prosthetic replacement will give the best result
5. articular surface impression fractures

- Often are the result of shoulder dislocations in which the head is impaled on the edge of the glenoid.

- Treatment after reduction of the dislocation depends on the size of the head defect and whether it significantly affects shoulder stability.

- When the impression defect involves more than 40% of the articular surface, a primary humeral head prosthesis.
Fracture of Shaft of Humerus

Most humeral shaft fractures can be treated non-operatively.

- Hanging arm cast
- Coaptation splint (Sugar tong)
- Arm cylinders with a collar and cuff sling
- Functional bracing
- Skin traction or skeletal traction
- Abduction splints
- Spica casts
Fracture of Shaft of Humerus: Indication for ORIF

(1) satisfactory position and alignment cannot be achieved by conservative

(2) associated injuries in the extremity require early mobilization

(3) segmental fracture

(4) pathological fracture

(5) fractures are associated with major vascular injuries

(6) a spiral fracture of the distal humerus is of the type described by Holstein and Lewis, in which radial nerve palsy develops after manipulation or application of a cast or splint

(7) when treatment of associated injuries makes bed rest necessary
Fracture of Distal End of Humerus

(1) supracondylar fractures
(2) transcondylar fractures
(3) intercondylar fractures
(4) fractures of the condyles (lateral and medial)
(5) fractures of the articular surfaces (capitellum and trochlea)
(6) fractures of the epicondyles
Supracondylar Fractures of Humerus
Transcondylar fractures of Humerus
Intercondylar Fractures of Humerus
Fractures of the humeral condyles (lateral and medial)
Fractures of the articular surfaces
(capitellum and trochlea)
Fractures of the epicondyles
Fracture of Distal End of Humerus

Disability - limitation of motion, pain, weakness, and possibly instability

Limitation of motion is the most common cause of disability

(1) a mechanical block because of malunion

(2) obliteration of the olecranon fossa by displacement of the humeral condyles, exuberant callus, or fibrous tissue

(3) periarticular fibrosis resulting from the trauma, poor surgical technique

(4) infection

(5) repeated stretching and tearing of adhesions by forceful manipulation

(6) prolonged immobilization.
Olecranon Fracture

- ORIF
Sideswipe Fractures

- Elbow protruding from a car window is struck by a car passing in the opposite direction or strikes a fixed object.
- Gustilo type 3
  - Fracture of the shaft of the ulna
  - Comminuted fracture of the radial head
  - Fracture of the shaft of the radius
  - Comminuted fracture of the condyles of the humerus
Fracture-dislocations of Elbow

- Closed reduction as soon as possible
- If the elbow is stable, a long arm posterior splint is applied with the elbow in 90 degrees of flexion
- Early active exercises at 2 to 3 weeks
- Dislocation of the elbow can damage the median, ulnar, or anterior interosseous nerves
- When nerve deficit is present before and after reduction, it is best to wait and observe for signs of resolution.
- If resolution has not occurred at 3 months, exploration
- Stiffness and posttraumatic arthritis are common complications
Vascular injuries

- Fortunately is rare
- Early recognition is critical
- Immediate repair of the brachial artery or reconstruction with a saphenous vein graft for this vascular injury
Fracture of Coronoid Process

Regan and Morrey divided fractures of the coronoid process into three types

- type I fracture is a simple avulsion of the tip.
- type II fracture involves less than 50% of the coronoid process.
- type III fracture involves more than 50%.
Fracture of Radial Head

- important stabilizer of the elbow joint
- preservation of the radial head, if possible, especially if there is an associated fracture of the coronoid process
- If the radial head cannot be preserved, the medial collateral ligament and flexor-pronator mass should be repaired.
- The elbow should be immobilized in 90 degrees or more of flexion for 3 to 4 weeks and followed closely for redislocation.
- Broberg and Morrey recommend early, complete excision of the radial head for type III fractures and immobilization for no longer than 4 weeks.
Heterotopic Ossification

- common after fracture-dislocations and can be seen on roentgenograms as early as 3 to 4 weeks after injury.
- Its severity appears to be associated with the magnitude of the injury and the length of immobilization.
- Early motion also appear to reduce heterotopic ossification.
- Resection of heterotopic bone to improve motion should be delayed until 12 months after injury.
Fracture Ulnar and Radius

- Closed reduction and long arm cast (accept only reduction less than 10-degree angulation)
- Open reduction and internal fixation (ORIF)
Isolated Fracture of Radius or Ulna

- Closed reduction and long arm cast with
  - supination for fracture proximal radius
  - neutral for fracture middle radius
  - pronation for fracture distal radius

- ORIF

- Isolated ulnar fracture (Night stick fracture)

- The most common complication is delay union, may be non-union in some case
Monteggia’s Fracture

- Fracture of proximal ulna and dislocation of proximal radio-ulnar joint (Radial head)
- ORIF
Galeazzi’s Fracture

- Fracture distal 1/3 of shaft of radius and dislocation of distal radio-ulnar joint (ulnar head)
- ORIF
Fracture of Distal Radius (Colles’ Fracture)

- Distal radius fracture (metaphysis)
- 1 inch from wrist joint
- Extra-articular fracture can conservative treatment
Intra-articular fracture of distal radius

- Open reduction and internal fixation (ORIF) with anatomic reduction
- No articular stepping, no bone gap