LSUHSC
Occupational Therapy
Treatment of Humeral Fractures

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**Proximal Humeral fractures**

Types:
- Surgical neck
- Anatomic neck
  - fractures that transect the epiphysis.
- Greater tuberosity. Can have tear of the rotator cuff, potential for impingement
- Lessor tuberosity. Occurs with posterior shoulder dislocations
- Combination-
  - Neer’s 3 and 4 part
- Articular surface

Cause:
- Fall on the outstretched hand from a standing height
- In younger patients, high energy trauma
- Direct blow
- Older osteoporotic patients

Treatment:
- Most are non-displaced and nonoperative treatment is selected
- Operative treatment includes ORIF, percutaneous fixation, and proximal humeral head replacement.
Clinical Union

Clinical union determines the physicians decision to progress the patient through the rehabilitation program. Occurs when the fracture fragments move in unison. Usually within 6-8 weeks. Cancellous healing is seen radiographically. Once clinical union is seen, therapy can become more aggressive.
**Humeral shaft fractures**

*Occurs as the result of a direct blow from a fall or a MVA*

*Can have associated Radial nerve injury (16%). Usually spontaneously resolves in 90% of cases within 4 to 5 months.*

*Described in terms of (1) location (2) type of fracture line- transverse, oblique, spiral, comminuted, segmental and (3) opened or closed*

*Surgical indication when there is inability to maintain the fracture in adequate alignment with closed methods, patients with multi-trauma, floating elbow (Ipsilateral fracture of both forearm bones and humerus), fractures with severe nerve or muscle damage, prolonged bedrest, noncompliance or failure with closed treatment.*

*Closed fractures which are treated with closed methods have union rates of >90%. Closed treatment methods include coaptation splint, Sling and swathe, abduction pillow, and functional brace (Sarmiento)*
Distal Humeral Fractures

Cause:
* High-energy mechanism (MVA)
* Low-energy mechanism - fall while walking. Associated with osteoporosis or bone lesions

Surgical indications:
* Intra-articular fragment displacement, physeal displacement, supracondylar comminution and displacement, open fractures, floating elbow patterns, neurovascular injury, compartment syndrome and multi-trauma.
* Operative intervention is to restore articular congruity and elbow stability

Classification systems:
The AO-ASIF is most commonly used
  * Group A fractures are extraarticular i.e supracondylar, transcondylar, epicondylar
  * Group B fractures are partially articular i.e capitellum, trochlea
  * Group C fractures are entirely intraarticular i.e T and Y condylar, lateral and medial condyles
**Distal Humeral Fractures**

Nonoperative treatment depends on the fracture type. Casting used for nondisplaced fractures:

* Medial epicondyle fractures are immobilized with the elbow flexed at 90°, the forearm pronated and the wrist flexed to 30° to relax the common flexor-pronator muscle group

* Lateral epicondyle fractures are immobilized with the elbow flexed at 90°, the forearm in supination, and the wrist extended to relax the extensor muscles.

* Stable nondisplaced extra-articular distal humerus fractures can be treated with LA cast for 2 weeks then HEB with early elbow motion

**Operative**

A fracture that extends into the joint may require ORIF
Distal Humeral Fractures Therapy

*With elbow fractures and dislocations vigorous stretching, active or passive is never permitted.
*Can lead to increased periarticular hemorrhage and fibrosis causing loss of motion.
*Can lead to myositis ossificans and formation of heterotopic bone
*Treatment with Hinged Elbow Brace (HEB) allows for early ROM while preventing medial and lateral instability
*Dynamic and static progressive splinting may be helpful. Collaborate with MD on fracture stability, healing and inflammatory process
Distal Humeral Fractures Treated with Hinged Elbow Brace

*Hinged elbow brace is fabricated. MD will determine parameters for AROM of the elbow and ROM advancement or if elbow is to be locked at 90°
*If HEB is locked at 90° initially, the hinge is adjusted 15° weekly in both extension and flexion. Splint is adjusted as edema decreases
*AROM exercises of the shoulder, wrist and hand. Elbow as permitted
*Pt educated in no lifting, pushing, pulling with the arm.
*ADL modifications
*Edema control
*Sensory assessment, grip and pinch if indicated for nerve palsy
*Hinged Elbow Brace is discontinued (based on fracture healing) by MD
*Supination and Pronation exercises can begin once HEB is discontinued

**Refer to timeline under fracture brace with collar and cuff for weeks 4-12
Strengthening at 8 weeks or when fracture demonstrates healing radiographically
Fracture Bracing: Typically with Proximal and Midshaft Humeral Fractures

*Patient compliance is essential
*Typically contraindicated with severe associated soft tissue injuries
*Contraindicated in patients who are bedridden and unable to assume gravity-dependent position of the UE needed during healing.
*Gravity results in adequate alignment
*Permits ROM of joints adjacent to the fracture
*Works on the principle of soft tissue compression
*Allows micromovement at the fracture site which promotes fracture healing
*Clinical union takes an average of 8-12 weeks
*Successful functional bracing of humeral shaft fractures include patients who are ambulatory and able to perform the exercises.
*Closed treatment is difficult in the bedridden patient, obese, multi-trauma, or unable to comply with or tolerate bracing

**Weight-bearing and lifting with the affected extremity is contraindicated unless the fracture is stabilized with an intramedullary rod. Typically plated fractures of the humeral shaft can begin immediate weight-bearing using a platform walker or crutch.
Humeral fracture brace with collar-cuff
Fracture Brace with Collar and Cuff

Patients with humeral fractures are placed in a coaptation plaster splint by MD.

Days 3-7 post injury
*A referral is made to Occupational Therapy for a functional fracture brace with collar and cuff. Elbow is flexed to 90°. If Radial nerve injury include the wrist. Place wrist in extension.
*Perform Semmes Weinstein, grip and pinch with Radial Nerve palsy.
*Patient begins Codman’s pendulum exercises for the shoulder.
  6-8 times daily for 5 minutes
*Patient begins wrist and hand AROM exercises.
*Soft sponge for hand squeezing to decrease distal edema.
*OT instructs patient in one-hand dressing techniques and other ADL modifications.
*Patient education in no use of the extremity in ADL’s.
*Patient must be instructed in sleeping reclined.
*Retrograde massage/edema reduction techniques.
Codmans
Weeks 1-4
* Patient continues with exercises as above
* Patient is followed for adjustments to brace as edema decreases
* MD will determine based on x-ray when collar –cuff can be discontinued.
  OT will fabricate a volar wrist splint with associated Radial Nerve palsy
* Monitor for signs of impingement.
* Patient must be cautioned against any lifting, pushing, or pulling with the arm
* Patient must be instructed not to lean or rest on the elbow of the arm
* With Radial Nerve palsy Semmes Weinstein and MMS at 3 weeks for baseline
* Brace can be removed at wks 3-4 for hygiene care. Once some clinical healing occurs

Weeks 4-6
* Patient is followed for brace adjustments
* When collar-cuff is discontinued then AAROM to the shoulder can begin with pulleys in forward flexion  Elbow ROM can begin
* Patient can use arm to feed self, button, etc. once collar-cuff is discontinued
* Patient continues to wear the humeral portion of the fracture brace
* Patient continues AAROM with pulleys, elbow, wrist and hand AROM
* Continue to remind patient of no lifting, pulling or pushing using the arm
* No resistive
Weeks 6-8
* Light functional strengthening and self care activities
* Continue with pulley exercises. Add other shoulder planes of motion
* Continue to follow with a radial nerve injury for Semmes, MMS and splinting
* Light weight-bearing is typically allowed
* Gentle isotonic exercises to the elbow
* Fracture brace may be discontinued at 8 weeks, dependent on fracture healing (decided by the physician).

Weeks 8-10
* Humeral fracture brace is typically discontinued
* Strengthening exercises can progress
* Stretching if full PROM is not present and the fracture is stable.
* Continue to follow with radial nerve injury for Semmes, MMS and splinting

Weeks 10-12
* Full resistive and light lifting are permitted if fracture is healed
* Theraband strengthening exercises
* Patient can generally return to pre-injury level of independence in ADL and work
Management post ORIF for Proximal /Midshaft Humeral Fracture

Fixation by:
  Intramedullary nails
  External fixation
  Plating

*With IM nails patients are allowed to weight-bear and use the arm for light ADL’s as pain permits. Provided fixation is stable Codmans pendulum, AROM and AAROM exercises 1 week post op

*External Fixation
  Instruct patient in pin site care
  Wk 1 Codmans at shoulder, elbow AROM/AAROM
  Wk 2 AROM/AAROM of shoulder in supine
  Wk 4-6 light weight bearing isometric of shoulder

*Plating with or without bone graft
  Exercises are same as with external fixation
Post operative therapy

Day 0-week 1
* Codmans shoulder, AROM/AAROM at elbow, wrist and hand AROM
* Distal edema control
* ADL’s. Modifications and one-handed techniques

Week 1
* Continue ROM
* Edema control
* Sensory screening, grip and pinch testing

Week 2
* Add shoulder AAROM in supine

Week 3-4
* Add shoulder AROM (if fracture is stable and patient is pain free)
References

3. Dr A. Hollister, MD. Associate Professor Orthopaedic Surgery LSUHSC Shreveport, La.
4. SpringerImages
5. Carla M. Saulsbery LOTR, CHT. Rehab Services -LSUHSC Shreveport , La.