Treatment of Humeral Shaft Fracture

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Anatomy
Anatomy
classification

- Low-energy Vs high energy
- Soft tissue injury
- Open fracture grading
- AO → A,B,C
Most humeral shaft fx can be managed nonoperatively

- Angulation 20 degrees
- Rotation 30 degrees
- Shortening 3 cm

Functional bracing
“gold standard” for nonoperative treatment
Indications for primary operation in humeral shaft fx

- Fracture indications
- Associated injuries
- Patient indications
**Indications for Primary Operative Treatment of Humeral Shaft Fractures**

**Fracture Indications**
- Failure to obtain and maintain adequate closed reduction
  - Shortening > 3 cm
  - Rotation > 30 degrees
  - Angulation > 20 degrees
- Segmental fracture
- Pathological fracture
- Intraarticular extension
  - Shoulder joint
  - Elbow joint

**Associated Injuries**
- Open wound
- Vascular injury
- Brachial plexus injury
- Ipsilateral forearm fracture
- Ipsilateral shoulder or elbow fracture
- Bilateral humeral fractures
- Lower extremity fracture requiring upper extremity weight bearing
- Burns
- High-velocity gunshot injury
- Chronic associated joint stiffness of elbow or shoulder

**Patient Indications**
- Multiple injuries, polytrauma
- Head injury (Glasgow Coma Scale score < 8)
- Chest trauma
- Poor patient tolerance, compliance
- Unfavorable body habitus
  - Morbid obesity
  - Large breasts

plate osteosynthesis

gold standard for fixation of humeral fractures

- high union rates (>95%)
- low complication rates (radial nerve palsy < 5%)
- rapid return to function
Surgical approaches

- Anterolateral approach
- Posterior approach
Humeral nails were introduced with the hope that the results would parallel the clinical success seen with femoral and tibial nailing.

Theoretical advantage of IMN:
- less invasive surgery
- undisturbed fracture hematoma
- load sharing device
Flexible nail

Problems

- nail migration
- Insufficient rotatory stability
Titanium Elastic Nail
Interlocking nails

- Biomechanical advantage (rotational stability)
- Risk of N/V injury during insertion of locking screws
The entry point for a standard antegrade nail is in the greater tuberosity, just lateral to the articular margin.

- Injury of rotator cuff
- Proximal impingement
- Shoulder pain
In retrograde nailing start point is in the midline, 2 cm above the olecranon fossa

- Iatrogenic fx at entry site
- Poor elbow function

Rommens created an entry site proximal to the olecranon fossa in the metaphysis of the distal humerus


Antegrade and retrograde nailing have similar treatment results, including healing rate and eventual functional recovery for middle humeral fractures.
Humerus does not tolerate distraction (risk factor for delayed and nonunion)

Nonunion after closed humeral nailing is frequently associated with distraction of the fracture
higher reoperation rate and greater shoulder morbidity with the use of nails

Humeral nails is preferred in:

1. widely separate segmental fractures
2. pathological fractures
3. fractures in patients with morbid obesity
4. fractures with poor soft tissue over the fracture site (such as burns)
Minimally invasive plate osteosynthesis
(biologic fixation)

- risk of injury to the radial nerve
Radial nerve palsy

- In 12% of patients
- Usually neuropraxia
- Spontaneous recovery in > 90%
- EMG if no recovery after 4 month
- Indications for early exploration: open fx, Nerve palsy during closed treatment

Summary

- Functional bracing → appropriate for ambulatory patients & isolated fractures
- Operative treatment (plate or IMN) → appropriate for selected patients and multiple injured patients
- Plating is the gold standard for fixation of humeral fx
Thank you for attention