Upper limb fractures

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Principles of fracture management

- Restoration of anatomy
- Stable fracture fixation
- Preservation of blood supply
- Early mobilisation of limb and patient
Restoration of anatomy

- Length
- Alignment
- Rotation
Stable fracture fixation

- Allows for fracture healing

- Prevention of loss of anatomy
  - Length
  - Alignment
  - Rotation
Preservation of blood supply

- Soft tissue protection
  - Periosteum
  - Muscle
  - Arteries
  - Veins
Early mobilisation

- **Limb**
  - Joint stiffness
  - Muscle atrophy
  - Contracture formation

- **Patient**
  - Pneumonia
  - DVT/Pulmonary embolus
  - Pressure sores
  - Hospital acquired infections
Management

- Operative
- Conservative
- Weight bearing status
- Wound management
- Antiobiotics
- Anticoagulation
- Smoking
- Immunomodulators
Clavicular fractures

Clavicular fractures

- Medial 1/3 (5%)
  - Usually non-operative, operative if post. displacement
- Middle 1/3 (80%)
  - Non-operative if <100% displacement
  - Operative if >100% displaced
- Lateral 1/3 (10%)
  - Neer classification
Clavicular fractures

- Non operative management
  - Sling vs Figure of 8
  - NWB 6 weeks
  - Range of movement exercises 2-4 weeks

- Risks
  - Non union
    - Lateral 1/3 (up to 50%)
    - Fracture displacement/shortening >2cm
  - Decreased shoulder strength
Clavicular fractures

- **Operative management**
  - Sling 7-10 days, then active range of motion
  - NWB 6 weeks, once union confirmed and pain free range of motion- strengthening
  - Full activity in 3 months

- **Benefits**
  - Faster union
  - Improved functional outcomes
  - Improved cosmesis
  - Improved shoulder function strength

- **Risks**
  - Implant removal
Clavicular fractures
Clavicular fractures
Clavicular fractures
Clavicular fractures
Scapular fractures

- Usually high energy mechanism
- Location
  - Acromion
  - Corocoid process
  - Neck of scapula
  - Body of scapula
Scapular fractures

- Spine: 11%
- Coracoid: 5%
- Acromion: 12%
- Body: 35%
- Glenoid: 10%
- Glenoid neck: 27%
Scapular fractures

- Non operative management
  - 2 weeks sling, early motion
- ORIF
  - Glenohumeral instability
    - >25% glenoid
    - >5mm step-off
    - Medialisation of glenoid
  - Open fracture
  - Scapula neck (>40 degrees, 1cm)
  - Coracoid >1cm displacement
Humerus fractures

- Location
  - Proximal
  - Shaft
  - Distal

http://upload.wikimedia.org/wikipedia/commons/a/ad/Gray207.png
Humerus fractures- proximal

- Non operative management
  - Minimally displaced surgical neck (1,2,3)
  - Greater tuberosity <5mm displacement
  - Consideration for age, bone quality
  - Early range of motion in 14 days

- Operative management
  - CRPP
  - ORIF
  - IM rod
  - Hemi arthroplasty
  - Total shoulder arthroplasty
Humerus fractures- shaft

- Non operative management
- Splint then functional bracing
  - <20 degrees anterior angulation
  - <30 degrees varus/valgus angulation
  - <3cm shortening
- ORIF or IM nail
  - Brachial plexus injury
  - Open fracture
  - Pathological fracture
  - Spiral/oblique
Humerus fractures - distal

- Supracondylar
- Single/double column fracture

- Non operative
  - Non displaced single column

- Operative
  - CRPP
  - ORIF
  - Total elbow arthroplasty

- Risks
  - Heterotopic ossification
  - Joint stiffness
  - Degenerative joint disease
  - Cubital valgus/varus
Olecranon fractures

- Non operative
  - Non displaced fractures
  - Immobilisation in 45-90 degrees of flexion, for 3 weeks, then mobilise

- Operative
  - TBW
  - IM fixation
  - Plate and screw fixation
  - Fragment excision and triceps advancement
Monteggia fractures

http://www.orthobullets.com/trauma/1024/monteggia-fractures
Monteggia fractures

- Non operative- closed reduction
  - More common in children
  - Casting with forearm supination

- Operative- ORIF ulnar +/- open radial head reduction
  - Comminuted ulna
  - Unable to reduce radius
Galeazzi fractures

http://www.orthobullets.com/trauma/1029/galeazzi-fractures
Galeazzi fractures

- Operative all cases
  - ORIF radius, stabilisation of DRUJ

- DRUJ
  - If stable- cast in supination 6 weeks
  - Percutaneous pin fixation
  - Open reduction- ECU
  - ORIF ulnar styloid
Forearm fractures

- Non operative
  - Distal 2/3 ulna (nightstick)
    - <50% displacement, <10 degrees angulation
  - ORIF
    - Proximal 1/3 ulnar
    - All radial shaft fractures
    - Both bone fractures
Distal radius fractures

Distal radius fractures

http://www.orthobullets.com/trauma/1027/distal-radius-fractures#4713
Distal radius fractures

http://rad.desk.nl/images/thmb_477a59f6ebe6fTEK-Barton2x.jpg
Distal radius fractures

http://www.orthobullets.com/trauma/1027/distal-radius-fractures#4713
Distal radius fractures

- Non operative
  - Extraarticular
  - <5mm shortening
  - Dorsal angulation <5degrees**

- Surgical fixation
  - Displaced/intraarticular- >2mm step
  - Comminution
  - Loss of volar tilt and radial length after casting
  - >5mm shortening, >5 degrees dorsal angulation**
Summary

- Management plan for upper limb fractures based on AO principles:
  - Restoration of anatomy
  - Stable fracture fixation
  - Preservation of blood supply
  - Early mobilisation of limb and patient
Acknowledgements

AO Foundation

- https://aotrauma.aofoundation.org

- Orthobullets
  - http://www.orthobullets.com/

- Wheeless’ Textbook of Orthopaedics
  - http://www.wheelesslessonline.com/