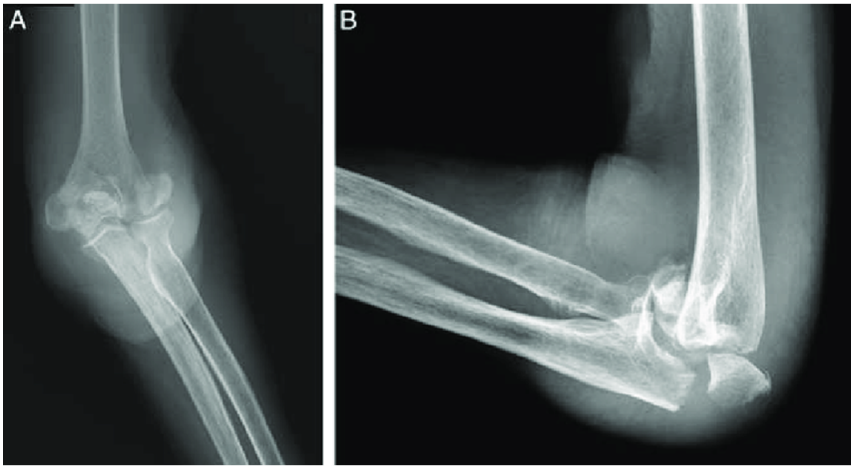
Distal Humerus Fractures w/ Dr. Grandizio Notes

Mechanism of Injury
- Low energy fall or high energy trauma
- Capitellum- shearing force

Symptoms
- Elderly- eval for fall precipitants (undiagnosed arrhythmias, cerebrovascular disease, polypharmacy, alcohol dependence)

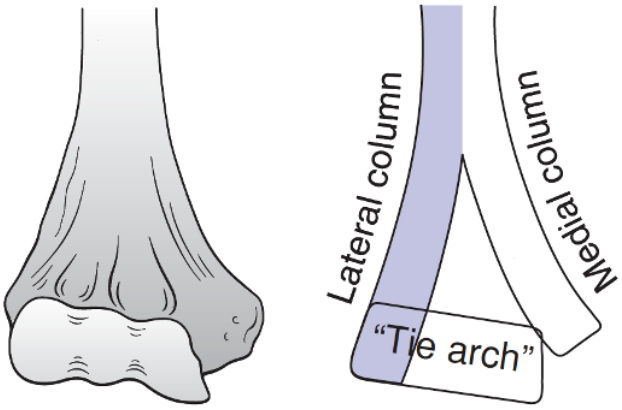
Physical Examination
- ATLS
- Eval extremity- blisters,skin tenting, open wounds
- NV exam- eval neuropathy, pulses

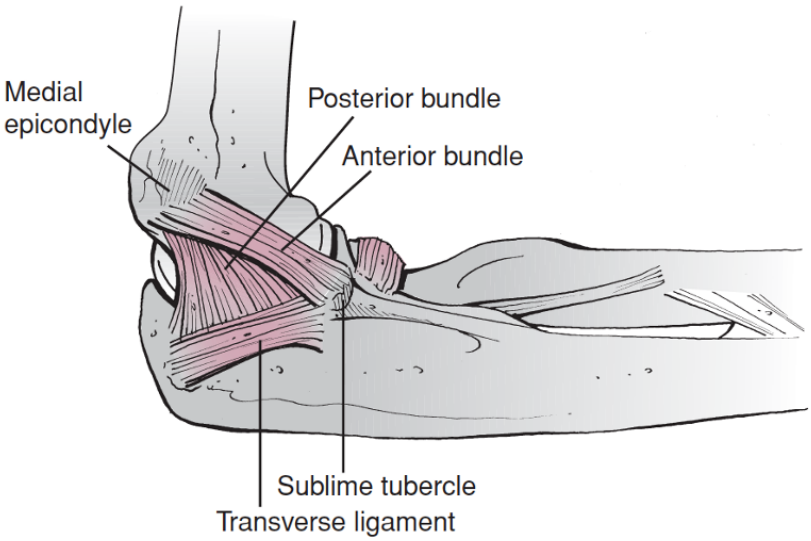
Imaging Evaluation
- AP/Lateral/ oblique
- CT w/ 3D recon-
    - improves identification + visualization of fx patterns
    - Identify fx fragments
    - 

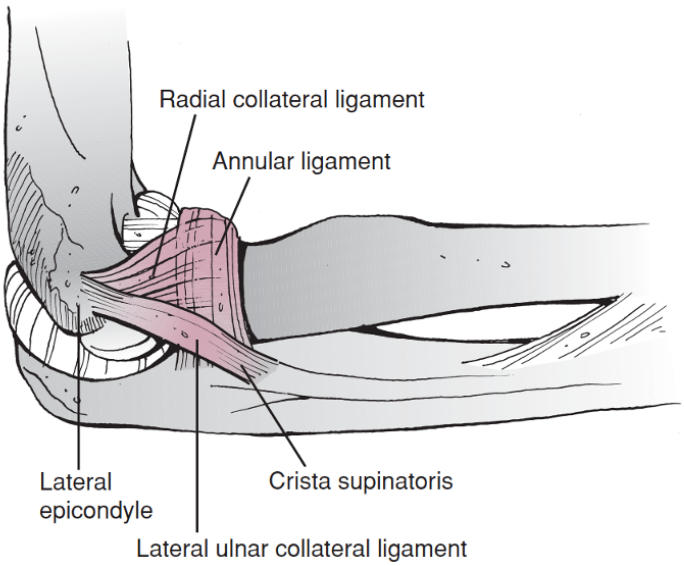
-  

Classification
- AO

Pathoanatomy
- Trocho-ginglymoid joint
- Trochoid- rotary motion through radiocapitellar + proximal radioulnar joints
- Ginglymoid (hinge like)- motion through ulnohumeral joint
- Trochlea- greek for pulley- articulates w/ greater sigmoid notch of ulna
- Olecranon fossa posterior + coronoid anterior- avoid screw placement here to prevent impingement + dec ROM
- Soft tissues
    - LCL complex
        - RCL, LUCL, annular ligament
    - MCL
        - anterior/posterior bundle + transverse ligament
    - Nerves
        - Ulnar
        - Radial nerve-
            - enters spiral groove 20cm proximal to medial epicondyle
            - exits 14cm proximal to lateral epicondyle
            - Two branches- nerve to medial head of triceps + anconeus AND lateral brachial cutaneous nerve
        - Median nerve
            - w/ brachial a, between biceps + brachialis in anteromedial aspect of arm
        - Blood supply to adult elbow
            - Medial, lateral, posterior vascular arcades


Lateral column
Medial column
"Tie arch"


Medial epicondyle
Posterior bundle
Anterior bundle
Sublime tubercle
Transverse ligament


Radial collateral ligament
Annular ligament
Lateral epicondyle
Crista supinatoris
Lateral ulnar collateral ligament

Non-op tx

- Rare in young pts
- Old patients w/ unrepairable distal humerus fx where arthroplasty may be best option
- Older patients unfit for surgery
- Treatment technique
    - Cuff + collar. Active elbow flexion at 2 weeks
    - Cast?
    - Traction?

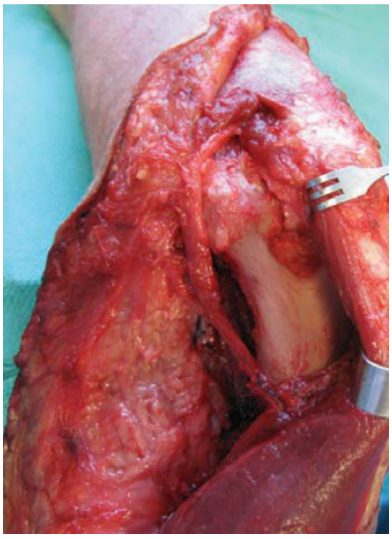
Operative tx

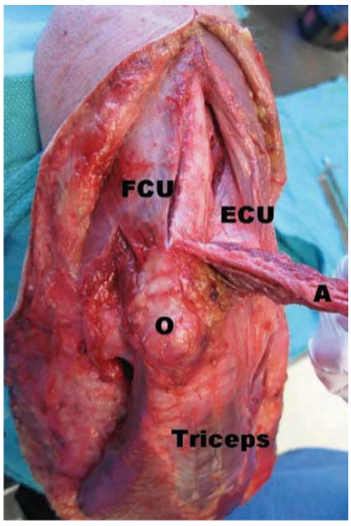
- ORIF for most displaced intra-articular distal humerus fx + extra-articular (transcolumn) fx
    - Early motion is vital. -must have a stable construct
- Timing?
    - Surgery within 48-72hrs- may lead to dec HO and stiffness
    - Fixation should happen within 2-3 weeks
- Open fx?
    - Ex fix?

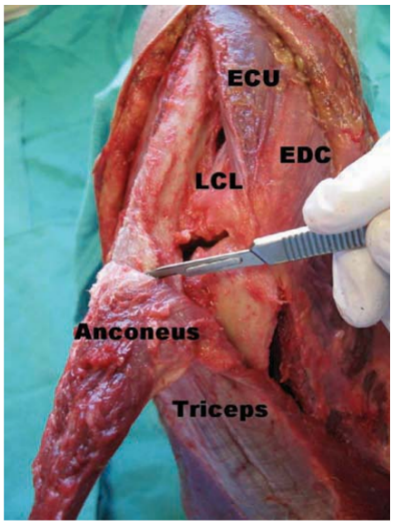
Operative Positioning

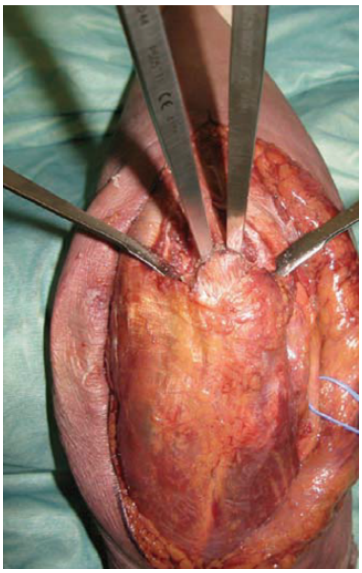
- Supine/ lateral/ prone

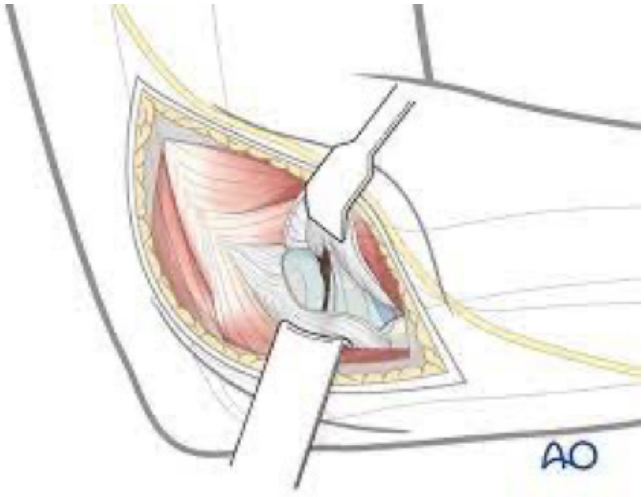
Operative Approaches

- Decision depends on fx pattern, extent of articular involvement, soft tissue injury, surgeon preference
- For B1/B2 fx- (lateral kocher + medial hotchkiss approach)
- Posterior
    - Paratricipital
        - Limited articular visualization
        - 3rd window in boyds interval- between anconeus + lateral column
        - 
    - Triceps splitting
    - Triceps reflecting

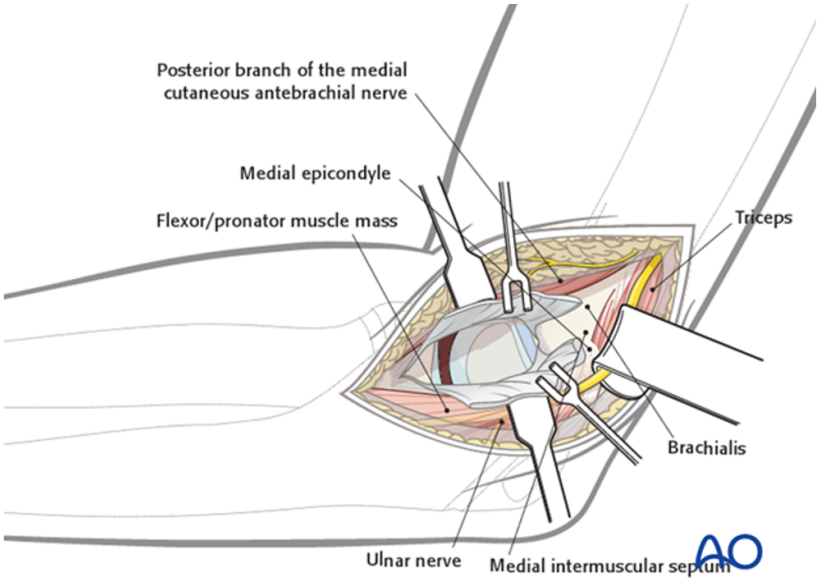
- Anconeus peel
    - 



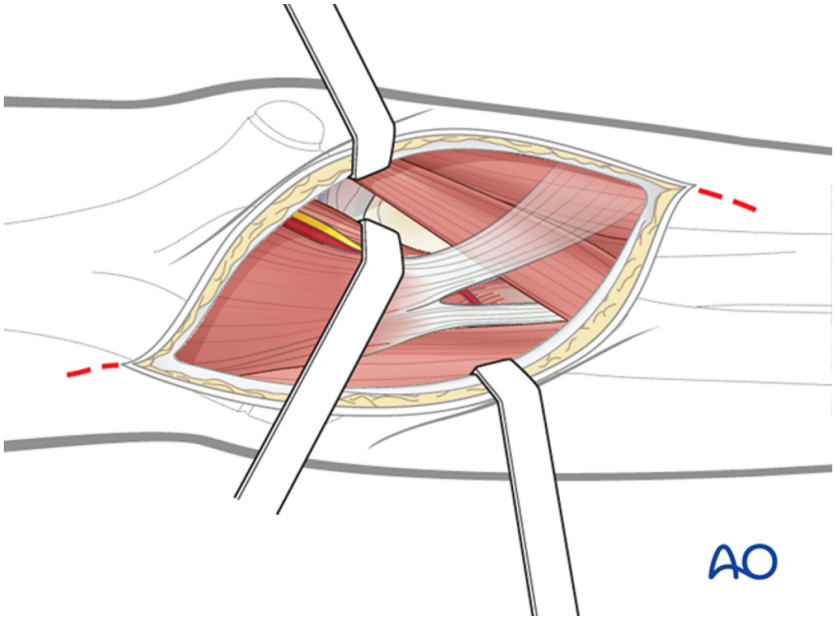
- Olecranon osteotomy
    - Intra-articular comminution (avoid if TEA)
    - Best articular visualization
    - Chevron osteotomy- most stable
    - Can lead to nonunion
    - 
    - Ulnar n typically identified + dissected from struthers > FCU motor branch
- Lateral
    - Kocher



-
    - EDC split
    - Kaplan
- Medial
    - Hotchkiss over the top



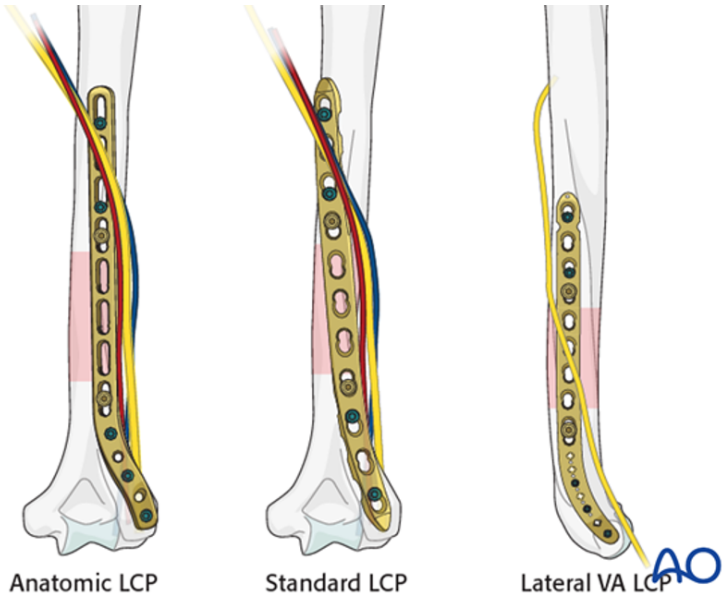
-
- Anterior
    - Henry



-

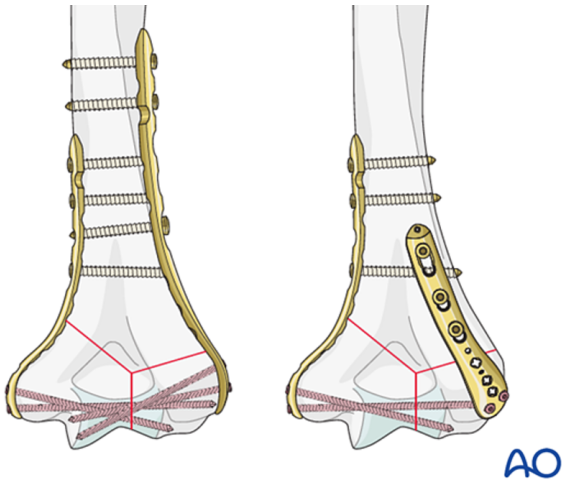
Fixation Techniques

- Plate type
  - Lateral 3.5 DCP plate/ equivalent
  - Medial- 3.5 recon plate, 3.5 DCP plate, or newer fx specific precontoured plate



-

- Plate position
  - Parallel plating v Orthogonal
  - Parallel- interdigitation of locking screws through distal fragment- makes an arch- adds biomechanical stability
  - Screws inserted through plate, longest screws possible (esp important in low trans column fx)



- Plate length
    - at least 3 screws both medial and laterally proximal to metaphyseal component of fx. plates should end at different levels to avoid a stress riser

- Fixation sequence:
    - K wires (.03, .045) > plate ?
    - Anterior aspect of distal humerus critical to have functional joint
    - also need medial trochlea and either lateral half of trochlea or capitellum

Case presentations

Sources:

Rockwood and Green's fractures in adults

Harborview Illustrated Tips & Tricks in Fracture Surgery

O'Driscoll, S. W. (2005). Optimizing stability in distal humeral fracture fixation. *Journal of shoulder and elbow surgery*, *14*(1), S186-S194.