

Fractures and Dislocations of the Hand

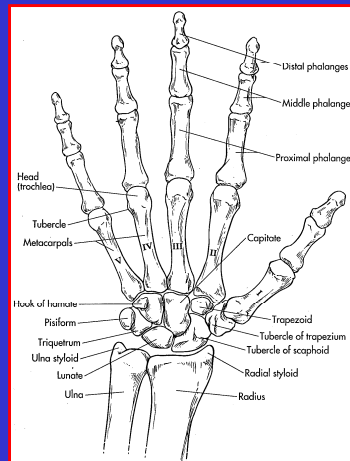


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2010

Questions Only

Anatomy

- Thumb bi-phalangeal
- Digits tri-phalangeal
- Rotation more important than angulation
- MP and PIP collateral ligaments lax in flexion



Initial Assessment

Physical Exam

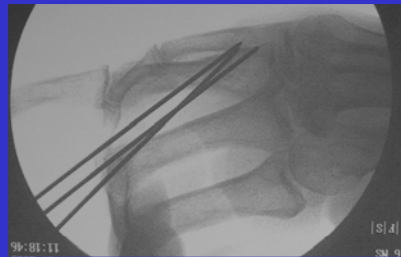
- Malalignment
- Swelling
- Circulatory status
- Neurologic exam
- Tenderness
- Assess adjacent joints



Initial Assessment

X-rays

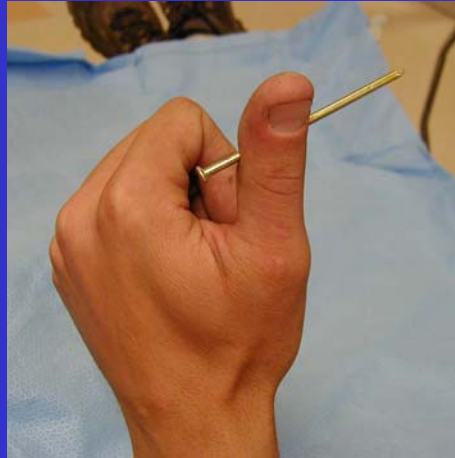
- Good quality films
- DO NOT accept inferior quality
- Standard position
- Multiple views



Fracture Factors

“Personality”

- Open or closed
- Comminution
 - Stable
 - Unstable
- Location
 - Shaft
 - Articular
 - Periarticular
- Avoid epynomns



Phalangeal Fractures

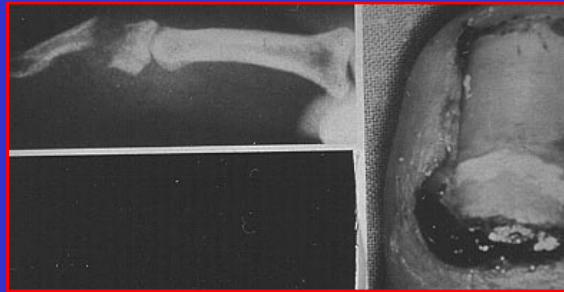
- Distal phalanx
- Bony mallet
- Shaft fracture
- Condyle fracture
- PIPJ injuries-
 - Ligament injuries
 - Fracture/dislocation
- Fractures of the metacarpal base-
 - Bennet's
 - Rolando
 - CMC fx dislocation



Phalangeal Fracture

Distal

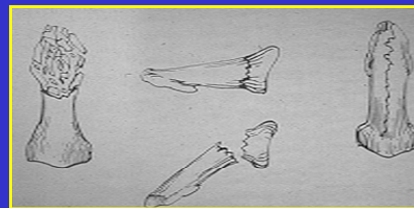
- Crush mechanism
- Associated nailbed disruption



Phalangeal Fracture

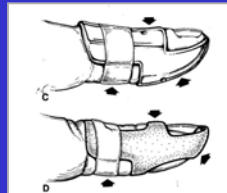
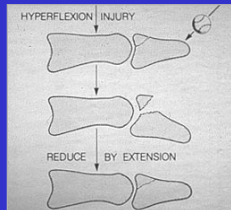
Distal

- Begin neglect for tuft fracture
- Closed treatment-four weeks
- Pin fixation for shaft or base
- Nonunion rare and usually asymptomatic



Bony Mallet

- Operative treatment only indicated if there is volar subluxation of joint or possibly with fragment >50% joint CTQ
- Should be treated as a tendon injury
- DIPJ immobilization 6 -8 weeks
- Residual ext lag and “lump”



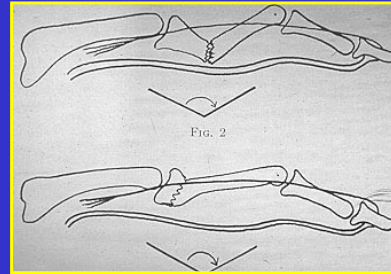
Phalangeal Shaft

- Proximal-(P1)
- Middle-(P2)
- Displacement depends on which bone is fractured and the location of the fracture

Proximal Phalangeal Shaft

Deforming Force CTQ

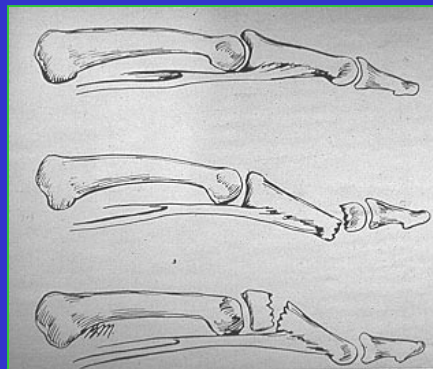
- Apex Volar angulation
- Interossei proximally
- Central slip distally
- PIP extensor lag
equal to bony angulation



Middle Phalangeal Shaft

Deforming Force CTQ

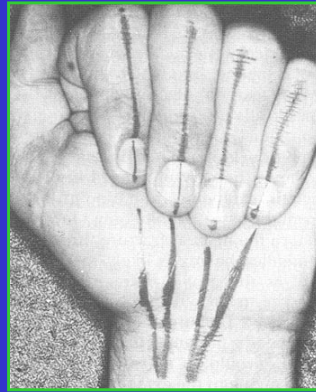
- Angulation dependent on site of fx



Phalangeal Shaft

Malrotation

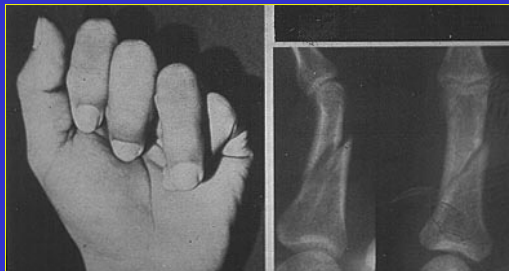
- Converge on scaphoid tubercle **CTQ**
- No one fixed point
- Semiflexion-plane of nails



Phalangeal Shaft

Malrotation

- Twisting mechanism
- Oblique fracture
- Even seemingly nondisplaced fractures can be malrotated !!!!!



Phalangeal Shaft

Treatment

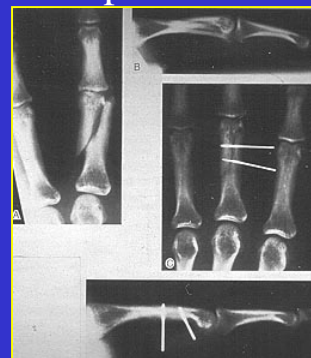
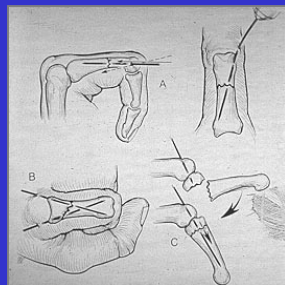
- Buddy taping and early active motion may be fine for stable fx
- Immobilize wrist and digits in protective position:
MP's at 90d,
PIP's in extension
- Places collateral ligaments at maximum stretch



Phalangeal Shaft

Treatment

- Closed manipulation and pinning
- Avoid pins about PIP joint to prevent stiffness



Phalangeal Shaft

Treatment

- ORIF
- The critical advantage-early motion
- Pay a price with soft tissues
- K-wire
- 90-90 wiring
- Screw or plate fixation (Try to place on lateral side to avoid extensor adhesions)

Condyle Fracture

Avulsion

- Usually point of collateral insertion
- Buddy taping-

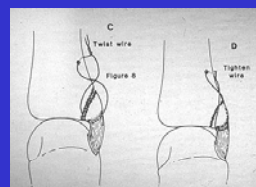
Small fragments

Nondisplaced

- Mini screw fixation
- Tension band-

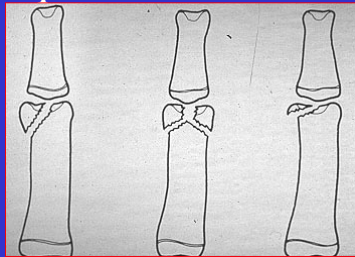
Larger fragments

Displacement

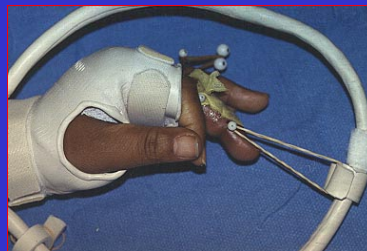
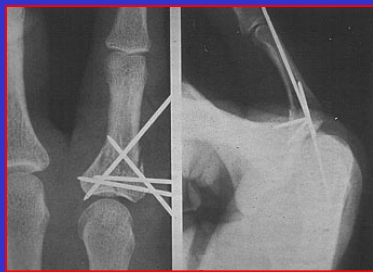


Condyle Fracture

- Intrarticular
- Digital angulation
- Guarded prognosis
- Requires ORIF



Intra-articular Fractures

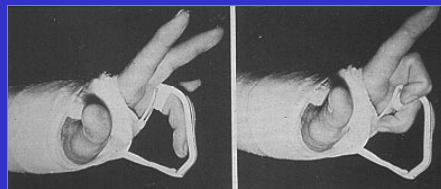
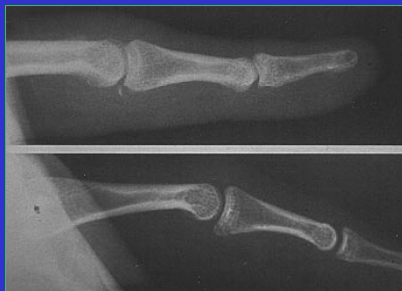


Collateral ligament injuries to the PIP joint

- VP and one collateral ligament must be torn to create instability
- Most dislocations dorsal
- Volar dislocation requires ORIF **CTQ**
- Isolated collateral ligament injury treated with ROM and buddy taping
- Watch out for delayed boutonniere deformity

Volar Plate Avulsion Fracture

- Small fragment
- Collateral ligaments intact
- Stiffness most common complications



Fracture-Dislocations

- Unstable
- Collateral ligaments with volar fragment
- Usually dorsal dislocation

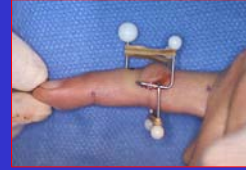
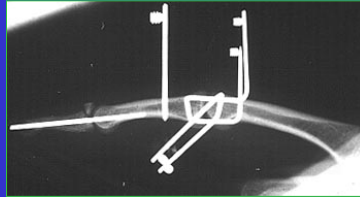


PIPJ Fracture Dislocation

- Acute-
 - Agee force couple**
 - ORIF**
- Chronic-
 - Volar plate arthroplasty**
 - PIPJ arthroplasty**
 - Hemiamate arthroplasty**

Agee Force Couple

- Early Active ROM
- Requires > 50% dorsal P2 base intact
- Excellent ROM

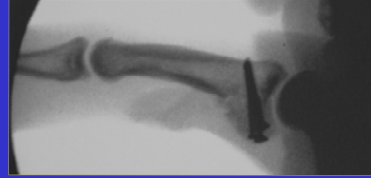
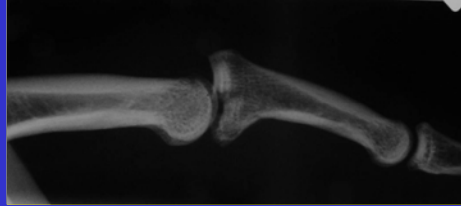


Volar Plate Arthroplasty

- Requires > 50% of dorsal base of middle phalanx
- Requires complete excision of the collateral ligaments **CTQ**
- Average 85 deg ROM



Hemihamate Arthroplasty



Metacarpal Fracture Head

- Avulsion fx of collateral ligament
- Frequently comminuted
- Difficult fixation
- Distraction
- Early motion
- Acute arthroplasty



Metacarpal Fracture

Neck and Shaft

- Usually dorsal angulation
- Intrinsic and extrinsic pull
- 10,20,30,40 rule **CTQ**
- More mobility in ulnar digits
- Compensates for angulation

Metacarpal Fracture

Closed Reduction

- Wrist block anesthesia
- Jahss reduction
- Intrinsic Plus position
- Circumferential cast
- Usually unsuccessful !!!!!!!

Metacarpal Fixation

Indications

- Unstable fx
- Angulation
- Malrotation-long oblique
- Multiple fx
- Open injury
- Shortening > 1cm

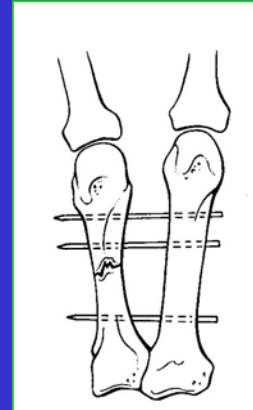
Metacarpal Fixation

- K-pins
- Screws
- Plates
- Intramedullary
- Interosseous wiring
- External fixation

Metacarpal Fixation

K-wires

- K-pin fixation
- Avoid extensor system
- Including sagittal bands
- Allows AROM
- 3-4 weeks



Metacarpal Fixation

Screws

- Long oblique
- Fx length twice bone width
- 2 or 3 lag screws
- 2.0 or 2.4 mm

Metacarpal Fixation Plates

- Transverse fx
- Multiple fx
- Open injuries
- Hard on extensor system
- Frequent need for removal

Digital MP Ligament Injuries

- Mostly radial collateral ligament of small finger
- Test instability with MP in flexion **CTQ**
- Ensure there is no avulsion fx: Brewerton xray
- Rx buddy tape and splinting
- Repair if not healed > 4mo

Thumb MP Ligament Injuries

- Ulnar collateral ligament
Stener Lesion
- Radial collateral ligament

Thumb MP Ligament Injuries

- Repair if there is volar subluxation
- > 30 degrees instability in flexion **CTQ**
- Fx fragment displaced > 2 mm

Thumb Metacarpal

- Extraarticular
- Intraarticular-
 - Bennett's fx
 - Rolando



Thumb Metacarpal Treatment

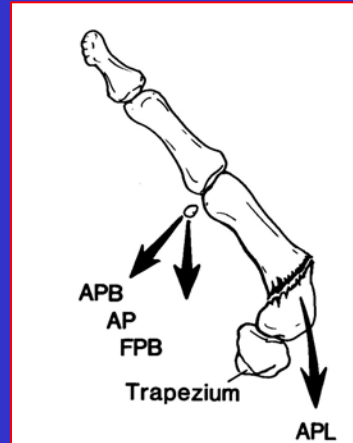
- Extraarticular-
 - Closed Rx for most
 - wires
 - ORIF
- Bennett's-
 - K wires
 - ORIF
- Rolando-
 - ORIF
 - Distraction / early AROM



K

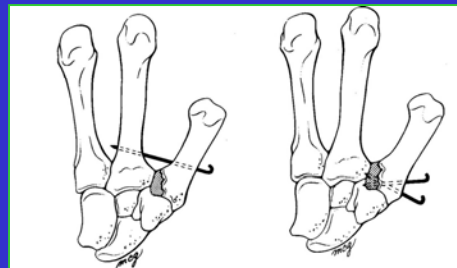
Bennetts Fracture

- Displacement from pull of APL CTQ



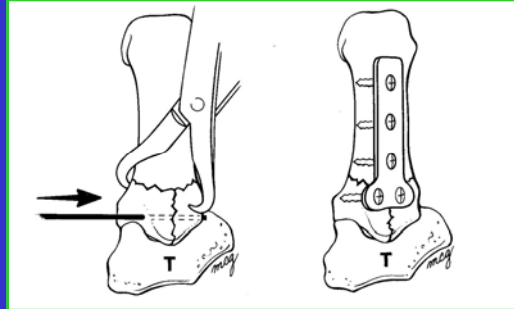
Bennetts Fracture Treatment

- Percutaneous pinning
Pin fixation across the fracture is NOT required
- ORIF



Rolando Fracture Treatment

- Percutaneous pinning
- ORIF
- Distraction
- Ext Fix



Thumb CMC Dislocation

- Tear of volar oblique “beak” ligament and dorsal capsule **CTQ**
- Closed reduction usually unsuccessful
- Percutaneous pinning vs open ligament stabilization with tendon graft “Eaton Procedure”

CMC Fracture Dislocation

- 5 > 4 CMC joint
- Dorsal dislocation
- Associated with hamate avulsion fractures
- Easily missed on standard xrays
- 30 degree Supination xray confirms the diagnosis “supination oblique” CTQ

CMC Fracture Dislocation Treatment

- Closed treatment alone can lead to recurrent subluxation
- Closed reduction and pin fixation

2008 OITE

Figures 39a and 39b show the radiographs of a 27-year-old man who fell on his middle finger. Which of the following factors is the most important determinant of final outcome?

- 1- Anatomic reduction of the middle phalanx articular surface
- 2- Reattachment of the volar plate to the base of the middle phalanx
- 3- Keeping the middle phalanx reduced on the condyles of the proximal phalanx
- 4- Continuous passive motion in the postoperative period
- 5- Stable internal fixation



2007 OITE

A 19-year-old man reports stiffness and pain after sustaining a jamming injury to his little finger 6 weeks ago. AP and lateral radiographs are shown in Figures 81a and 81b. Management at this time should consist of

- 1- immediate range-of-motion exercises.
- 2- extension splinting of the proximal interphalangeal (PIP) joint.
- 3- closed reduction and percutaneous pinning of the PIP joint.
- 4- open reduction and central slip repair.
- 5- open reduction and lateral band reefing.



A 21 y/o sustains a dorsal complex MP dislocation of the index finger. During open reduction, the structure most at risk of injury is

- A. FDS
- B. FDP
- C. Volar Plate
- D. Radial Digital Nerve
- E. Ulnar Digital Nerve

A 19 y/o male has hand pain after striking a wall with his clenched fist. He has dorsal pain and tenderness over the ulnar aspect of his hand. AP and Lateral X-rays are negative. Which of the following imaging studies should be ordered next

- A. CT
- B. 30 degree pronated view
- C. 45 degree supinated view
- D. Carpal Tunnel View
- E. Clinched fist view