Hand and Wrist Injuries
HAND AND WRIST

HAND

WRIST
HAND FUNCTIONS

- 45% GRASP
- 45% PINCH
  - Side pinch (key pinch)
  - Tip pinch
  - Chuck pinch
- 5% HOOK
  - Carry bag
- 5% PAPERWEIGHT

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9 Finger Flexors

- Median nerve
- Transverse carpal ligament
- 5 deep flexors pass through superficialis tendons and insert on distal phalanx of each finger and thumb
- 4 superficial flexors insert on middle phalanx of digits 2-5

- Annular ligaments = pulleys (A1-A5)
  - PREVENT BOWSTRINGING
HAND ANATOMY

- **VOLAR PLATE**
  - Thickened portion of joint capsule
  - Static stabilizer (hyperextension)

- **COLLATERAL LIGAMENTS**
  - Medial and lateral stability
  - Maximally tight at
    - 70 degrees MCP flexion
    - 30 degrees PIP flexion
    - 15 degrees DIP flexion
HAND ANATOMY

digits

- FLEXOR
  - FDP
  - FDS
  - Volar plate
- Extensor
  - Central bands
  - Lateral bands
NERVES OF THE HAND

- **RADIAL**
  - WRIST AND FINGER EXTENSION

- **MEDIAN**
  - THENAR COMPARTMENT,
    OPPOSITION, PINCER GRIP

- **ULNAR**
  - INTRINSIC MUSCLES
  - POWER GRIP
MALLET FINGER

ANATOMY
- Dorsal avulsion
- Extensor digitorum tendon tear

MECHANISM:
- Forced flexion of extended digit

TREATMENT:
- No fracture: DIP extended for 6-8 weeks
- FRACTURE: if <30% joint surface, splint x 4 weeks
- If >30% refer for ORIF
- Less than full passive extension refer

COMPLICATIONS:
- Pressure necrosis from splint
- Permanent extensor lag
MALLET FINGER

When the tendon has been pulled off, it is impossible to fully straighten the tip of the finger.
JERSEY FINGER
JERSEY FINGER

ANATOMY:
- Tendon retracts
- Avulsion fragment may limit retraction
- Blood supply compromised

MECHANISM:
- Forced extension of flexed finger

TREATMENT:
- Refer immediately

COMPLICATIONS:
- Permanent loss of flexion
EXAM FINDINGS:
- Unable to flex isolated DIP
- Localized tenderness along flexor tendon
- FDP: hold PIP straight and flex DIP
- FDS: hold MCP straight and flex PIP or hold all fingers in extension except affected and flex
VOLAR PLATE RUPTURE

EXAM FINDINGS:
- Tender volar PIP
- Bruising, swelling

MECHANISM:
- Hyperextension injury
- Ruptures distally from attachment at middle phalanx
VOLAR PLATE RUPTURE

TREATMENT:
- Early mobilization
- Extension block splint
- Buddy tape
- Refer if >30% joint involved

COMPLICATIONS:
- Swan neck deformity: extensor tendons pull PIP into hyperextension, DIP flexion
CENTRAL SLIP AVULSION

ANATOMY

- Extensor digitorum communis tendon disruption
- Lateral bands migrate in volar direction

MECHANISM:

- Volar-directed force on middle phalanx against semi-flexed finger attempting to extend
CENTRAL SLIP AVULSION

EXAM:
- Pain, swelling over dorsal PIP
- PIP in 15–30 degrees flexion
- May have limited extension (better at 0 degrees than 30 degrees)

TREATMENT:
- Refer if >30% joint surface involved with avulsion fx
- PIP splint in full extension 4–5 weeks
- Protect 6–8 weeks for sports
- *allow DIP to flex* relocates lateral bands

COMPLICATIONS:
- Boutonniere deformity

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COLLATERAL LIGAMENT TEARS

**ANATOMY:**
- Partial or complete tear of ulnar or radial ligaments

**MECHANISM:**
- Varus or valgus stress to PIP, DIP or MCP

**EXAM:** (flex MCP, PIP 30 degrees flex)
- Laxity with varus or valgus stress
- Possible instability with active flex/extend
COLLATERAL LIGAMENT TEARS

TREATMENT:
- Buddy tape for 3 weeks
- If unstable with active ROM or obvious deformity → refer

COMPLICATIONS:
- Unstable joint
GAMEKEEPER’S THUMB

**MECHANISM**
- Hyperabduction of thumb
- >30 degrees or > 20 degrees difference

**EXAM:**
- Weak, painful pinch
- Pain over ulnar thumb
- XRAYS BEFORE STRESS
GAMEKEEPER’S THUMB

**SIGNS**
- Pain over ulnar thumb
- Stress testing positive
  - Testing in FULL FLEXION of MCP
GAMEKEEPER’S THUMB

**TREATMENT**
- No instability, no fracture = thumb spica x 6 weeks
- No instability, small avulsion = thumb spica
- Large avulsion or instability = thumb spica and REFER

**COMPLICATIONS**
- STENER lesion
- Instability
THUMB CMC FRACTURE DISLOCATION
(BENNETT’S FRACTURE)

Anatomy:
- Anterior oblique carpometacarpal ligament holds palmar fragment in normal anatomic position
- Abductor pollicis longus (APL) pulls metacarpal shaft fragment radial & dorsal

Treatment
- Reduction (TAPE)
  - Traction, abduction, extension, pronation
- Often unstable, requires surgery
ROLANDO’S FRACTURE

ANATOMY

- 3 part fracture at metacarpal base
- Comminuted with “Y” or “T” fragment

TREATMENT

- May be non-surgical if highly comminuted
- Surgery if fragments are large and amenable
DIP JOINT DISLOCATION

MECHANISM
- Hyperextension, hyperextension, varus/valgus forces

ANATOMY
- Usually dorsal
- Rare
- Strong collateral ligaments usually prevent

TREATMENT
- Reduction: digital block first
- Splint in 20-30 degrees flexion for 10-14 days
PIP JOINT DORSAL DISLOCATION
(COACH’S FINGER)

**MECHANISM**

BEWARE OF THE VOLAR DISLOCATION

PROXIMAL PHALANX CONDYLE BUTTONHOLES THROUGH THE TORN EXTENSOR MECHANISM

OFTEN CAN’T BE CLOSED REDUCED

- Reduction: avoid longitudinal traction
- Post-reduction: dorsal extension block splint with PIP blocked at 20-30 degrees flexion
Wrist #1

- 24-year-old male FOOSH while skiing over the weekend
- Seen at the mountain clinic and told “wrist sprain”
Scaphoid Fracture
Pathoanatomy

- Blood supplied from distal pole
- In children, 87% involve distal pole
- In adults, 80% involve waist
Scaphoid Fracture Imaging

- Initial plain films often normal
- Bone scan 100% sensitive and 92% specific at 4 days
- MRI, CT scan

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SCAPHOID FRACTURE

TREATMENT

- Initial radiographs positive
  - distal third heal in approx 6-8 weeks
  - middle third frx heal in 8-12 weeks
  - proximal third heal in 12-23 weeks

- Initial radiographs negative
  - Immobilize thumb spica cast x 7-14 days
  - Take out of cast, re-evaluate for tenderness
  - If +tenderness but neg radiographs....
Scaphoid Fracture

Treatment

- Suspected fracture with normal plain films
  - Short arm thumb spica (splint or cast)
  - F/U in 2 weeks
  - Consider bone scan
Scaphoid Fracture

Treatment

- Non-displaced fracture
  - Long arm thumb spica cast 6 weeks
  - Then, short arm thumb spica cast for 4-14 weeks
Scaphoid Fracture

Refer to Ortho

– Angulated or displaced (1mm)
– Non-union or AVN
– Scapholunate dissociation
– Proximal fractures
– Late presentation
– Early return to play
34-year-old female hairdresser with thumb pain for 2-3 months
Gradual onset
Now thumb hurts with any movement
DEQUERVAIN’S TENOSYNOVITIS

TREATMENT: consider injection every time
May need second injection to improve
DEQUERVAIN’S TENOSYNOVITIS

Figure 1
Swelling about the tendons to the base of the thumb results in painful motion.

Figure 2
Finkelstein maneuver used to diagnose deQuervain's tendinitis.

Figure 3
Surgery opens the sheath over the inflamed tendons.
Wrist #3

- 35 y/o seamstress c/o R dorsal wrist pain for 4 months
Kienbock Disease

- Lunatomalacia
- Avascular necrosis/vascular insufficiency
  - repetitive microfractures of lunate
- Young adults 15-40 yo
- Risk factors: negative ulnar variance
Kienbock Disease

**EXAM:**
- Wrist pain that radiates up the forearm
  - stiffness, tenderness, swelling over lunate
  - passive dorsiflexion of middle finger produces characteristic pain
Kienbock Disease

Stage I – IV

- Stage I: MRI only
- Stage II: Sclerosis
- Stage III: Some collapse
- Stage IV: Total collapse
Kienbock Disease

**TREATMENT:**

- Primarily surgical
  - **EARLY:** Radial shortening, ulnar lengthening
  - **LATE:** proximal row carpectomy, arthrodesis
Wrist #4

25-year-old tennis player twists wrist as he falls backwards reaching for a lob.
SCAPHOLUNUNATE DISSOCIATION
SCAPHOLUNUNATE DISSOCIATION

EXAM
- Watson’s test (scaphoid shift test)
- Scaphoid shuck test
- Pain/swelling over dorsal wrist, prox row

DIAGNOSIS
- Plain films: >3mm difference on clenched fist
- Scaphoid ring sign
TREATMENT

- If discovered within 4 weeks, surgery
- After 4 weeks, conservative treatment reasonable
  - Bracing
  - NSAIDS
  - Consider eval by hand surgery to confirm no surgery needed
Soccer player has pain in pinky side of wrist after a fall
Triangular Fibrocartilage Complex (TFCC) Tear

- Fall on dorsiflexed and ulnar deviated wrist
- Axial load with forearm in hyperpronation
TFCC Tear Pathoanatomy

- Tear in structures of TFCC
- Positive ulnar variance predisposes to injury
TFCC Anatomy

- Scaphoid fossa
- Ulnolunate ligament
- Ulnotriquetral ligament
- Lunate fossa
- Ulnar capsule
- Prestyloid recess
- Meniscus homologue
- Ulnar styloid
- Articular disc
- RADIUS
- ULNA
- Ligamentum subcruentum
- Dorsal DRUL superficial portion
- Dorsal DRUL deep portion
TFCC Tear History

- Ulnar-sided wrist pain aggravated by pronation/supination
TFCC Tear Physical

- Press test
- TFCC grind test
- Check for DRUJ injury
TFCC Tear Imaging

- Plain films may show positive ulnar variance
- Assess for fracture or ulnar subluxation
- MRI or Arthrography
TFCC Tear Treatment

- Long arm cast with forearm neut for 4-6 wks
- Refer for associated injuries including ulnar instability
GOLFER’S FRACTURE

- Hook of hamate fracture
  - Swing of golf club, bat
  - 2% of all carpal fractures
  - 1/3 of all hamate fractures = golf related

- Distal lateral border of Guyon’s Canal

- High rate of non-union
  - May consider early operative treatment
GOLFER’S FRACTURE

CARPAL TUNNEL VIEW
**GUYON’S CANAL SYNDROME**

**ANATOMY**
- Ulnar nerve rides between pisiform and hamate
- Feeds interosseous muscles, lumbricals (intrinsics)

**TREATMENT**
- Pad area
- NSAIDS
- r/o hamate fracture
MEDIAN NERVE:
ANTERIOR INTEROSSEOUS SYNDROME

EXAM FINDINGS
– Proximal forearm pain, worse with exercise
– Weak pinch – can’t form “O”

ANATOMY
– Compression of anterior interosseous median nerve branch from deep fascia of pronator teres or flexor digitorum superficialis tendon
– Innervates:
  - flexor pollicis longus
  - flexor digitorum profundus
  - pronator quadratus