Examination of the Hand and Wrist

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Introduction

- Superficial structures
  - Easy palpation
  - Must know anatomy
- Many structures, many diagnoses...
  Exam must correlate with imaging
- Contralateral hand/wrist as baseline
Anatomy Wrist

- 8 bones: SLTPHCTT
- Many Ligaments
- Flexor and Extensor tendons
- 3 nerves:
  - Ulnar
  - Median
  - Radial
- Ulnar, radial arteries
Individual Muscles of Forearm [Continued]
Extensors of Wrist and Digits

- Olecranon
- Medial epicondyle
- Lateral epicondyle
- Common extensor tendon
- Extensor digitorum and extensor digiti minimi (cut away)
- Interosseous membrane
- Radius
- Ulna
- Extensors of thumb
  - Abductor pollicis longus muscle
  - Extensor pollicis brevis muscle
  - Extensor pollicis longus muscle
- Extensors of digits (except thumb)
  - Extensor indicis muscle
- Extensor digitorum and extensor digiti minimi tendons (cut)

Note: anconeus muscle not shown because it is extensor of elbow.
Anatomy Wrist
Observation

- Position being held
- Ability to move, function
- Deformity
- Swelling
- Atrophy
- Color
- Scars
Wrist ROM

- Uninjured side as baseline
- Flexion 80 degrees
- Extension 70 degrees
- Ulnar deviation 30-35 degrees
- Radial deviation 20 degrees
- Pronation 75 degrees
- Supination 80 degrees
Strength Testing

- Manual strength testing
  - 5 point scale
  - Resisted flexion, extension, ulnar and radial deviation, supination and pronation

- Jamar dynamometer
  - 5 handle positions or one handle position with 3 measurements
  - Non-dominant hand as reference
  - Dominant hand generally 5-10% stronger
  - Women 60 lbs pressure, men 80-100 lbs pressure
Palpation

- Radial Wrist
- Dorsal Wrist
- Ulnar Wrist
- Palmar Wrist
Radial Wrist 1

- Distal palmar tuberosity of scaphoid
  - Ulnar/radial deviation
- Flexor carpi radialis
- First dorsal compartment
- Radial styloid
Radial Wrist 2

- Dequervain’s
  - Finkelstein’s

- Intersection syndrome
  - Junction of APL/EPB and ECRL/ECRB; 3-4 cm proximal to radial styloid

- 1st CMC joint
  - Traction, ulnar pressure to reduce subluxation
  - Osteoarthritis
  - Grind test

- Snuffbox
  - Ulnar deviation to palpate waist of scaphoid
  - Radial artery within
Dorsal Wrist

- Lunate
- Dorsal ganglion
- Extensor Digitorum (4th compartment)
- EDM (5th compartment)
- CMC joints
Ulnar wrist

- TFCC
  - Grind test

- ECU
  - Subluxation, painful snapping with supination of ulnarly deviated wrist

- Ulnar styloid

- Triquetreum
  - Radial deviation
Ulnar Wrist 2

- DRUJ
  - Piano key sign
- Pisiform
- Hook of hammate
- FCU
- Guyon’s canal
Palmar Wrist

- Palmaris Longus
- Carpal Tunnel injection
Special Tests

- Finklestein’s
- Tinel’s
- Phalen’s
Scapholunate Instability

Watson’s test
- Thumb on palmar distal tuberosity
- Ulnar to radial deviation
- Scaphoid should move palmarly under thumb
- Release with thumb, clunk suggests injury

Finger Extension test
- Wrist in flexion
- Resist finger extension over DIP joints
- Pain SL interval suggests injury
Lunotriquetral Instability

- **Compression test**
  - Thumb applies pressure radially to triquetrum between FCU and ECU

- **Ballottement test (Shuck)**
  - Support lunate with thumb dorsally and index palmarly
  - Alternating dorsal and palmar loading of triquetrum with thumb and index of other hand
Radiocarpal Instability

**Drawer**

- Support forearm with one hand
- Grasp metacarpals with other, gentle traction, then anterior/posterior force
- Alternative to grasp radius, then anterior/posterior force over triquetrum
Nerve/Vascular Impingement

- **Median Nerve**
  - Sensation digits 1-4
  - Thenar atrophy
  - Phalen’s
  - Tinel’s

- **Ulnar Nerve**
  - Sensation digits 4-5
  - Hypothenar atrophy

- **Ulnar artery thrombosis**
  - Allen test
Anatomy-Hand

- Palmar Creases
  - Distal Palmar Crease
  - Proximal Palmar Crease
  - Thenar Crease

- Dorsal surface
  - MCP and IP joints
  - Nails
Anatomy-Hand

Bones

- Metacarpals
  - 2\textsuperscript{nd} and 3\textsuperscript{rd} are immobile
  - 4\textsuperscript{th} and 5\textsuperscript{th} are mobile
- 14 phalanges
**Anatomy-Hand**

- **Muscles (intrinsic)**
  - Thenar and hypothenar
  - Pinching
  - Interossei

- Lumbricals
  - 4 muscles that arise from the tendon of flexor digitorum profundus muscle.
  - IP extension
  - MCP flexion
Anatomy-Hand

**Ulnar Nerve**
- Passes through Guyon’s canal with ulnar artery
- Motor
  - Innervates all intrinsics except thenar muscles and 2 radial lumbricals
  - Power Grip
- Sensory
  - Ulnar 1.5
- Testing
  - Finger abduction against resistance
  - Purest sensory test is palmar surface of tip of 5th finger
Anatomy-Hand

**Median Nerve**
- Passes through carpal tunnel on volar wrist
- **Motor**
  - Fine control of pincer grasp
  - Innervates thenar muscles and 2 radial lumbricals
- **Sensory**
  - Radial 3.5 fingers and their dorsal tips
- **Testing**
  - Opposition of thumb to each finger
  - Purest sensory test is palmar tip of index finger
  - Anterior Interosseous injury if can’t make “ok” sign

Median Nerve Sensory Innervation
Anatomy-Hand

- Radial Nerve
  - Motor
    - Innervates extrinsic wrist and finger extensors
    - Does not innervate any intrinsic muscles
  - Sensory
    - Dorsally for 3.5 fingers
  - Testing
    - Wrist and hand extension against resistance
    - Purest sensory test is web space between thumb and index fingers
Anatomy-Hand

- Extensor tendons
- Flexor tendons
  - FDP splits FDS to attach at distal phalanx
  - Test FDP by stabilizing PIP and flex DIP
  - Test FDS by anchoring other fingers in extension
Anatomy-Hand

Blood supply:

- **Neurovascular bundles**
  - Contain digital artery, vein, and nerve
  - Two bundles: one radial and the other ulnar

- **Radial and Ulnar arteries join in 2 arches**
  - Superficial Palmar Arch: superficial to flexor tendon
    - Located at base of first web space
  - Deep Palmar Arch (deep to flexor tendons)
    - Proximal to superficial arch by 1 cm
Hand ROM

- Abduction/Adduction – Abd 20 degrees
- Thumb opposition
- Thumb palmar abduction/adduction = 70/0
- Finger flexion/extension
  - MCP = 90/30-45
  - PIP = 100/0
  - DIP = 80-90/0-10
  - Thumb IP = 80-90/0-20
  - Thumb MCP = 55/0
Strength testing-hand

- Grip
- Pincer
- Abduction
- Adduction
Palpation

- Thenar and hypothenar muscles
- First Metacarpal
- Metacarpals 2-5
- Phalanges
  - Collateral stability
Hand Injuries/Conditions

- Osteoarthritis
  - Heberden’s nodes
  - Bouchard’s nodes
Central Slip Extensor Tendon Injury

- Tender at dorsal aspect of the PIP joint (middle phalanx)
- Inability to actively extend the PIP joint
- Splint in full extension for 6 weeks
- Refer: Avulsion fracture involving more than 30 percent of the joint or inability to achieve full passive extension
Boutonniere Deformity

- Can occur acutely, but more often after several weeks
- Extensor tendon/Central slip ruptures at PIP
- Lateral bands slip volar and flex PIP, DIP extends
Extensor tendon injury - Mallet finger

- Tear or stretch of extensor tendon prior to insertion on distal phalanx
- Exam: Soft tissue swelling, lack of full extension of DIPJ
Mallet finger

- X-ray may show lack of full extension with or without a fracture of proximal aspect of distal phalanx
- Strict immobilization in full extension 6-8 weeks
- Consider surgery for fx > 30% of articular surface
Flexor tendon injury - Jersey finger

- Inability to actively flex distal phalanx
- Ring finger most commonly affected
  - Protrudes further than other fingers on grasping
- Forced extension of actively flexed DIP joint

Examples
- Football player grabs a player's jersey on tackle
- Lifting latch on car door
Jersey Finger

- Avulsion of Flexor Digitorum Profundus (FDP) as DIP is forcibly extended
- Can be seen with a laceration of the volar aspect of the phalanx
- Tendon may retract to the PIP or as far as the palm
- Surgical referral
Collateral Ligament Injury

- Maximal tenderness at involved collateral ligament
- Test stability of joint while the finger is in 30 degrees of flexion and the MCP joint is flexed.
- Stable joint: buddy tape for two to four weeks. Do not leave fifth digit exposed if ring finger is taped.
Volar Plate Injury

- Maximal tenderness at the volar aspect of involved joint
- Test for full flexion and extension as well as collateral ligament stability.
- Splint at 30 degrees of flexion and progressively increase extension for two to four weeks. Buddy tape at the joint if injury is less severe.
- Refer: Unstable joints or large avulsion fragments
UCL Injury-Skier’s Thumb

- AKA “gamekeeper’s thumb”
- Caused by hyperextension of Ulnar collateral ligament
- Exam:
  - Tender at UCL = x-ray first
  - Abduction stress at MCP with MCP in flexion
  - Abnormal if > 15 degrees from opposite side, or 35 degrees absolute
Skier’s thumb

- Stenar lesion = surgery
- Stable injuries are splinted
- Can also get radial collateral ligament injuries
**Metacarpal neck fractures**

- Check angulation and rotation

- Angulation of 2\textsuperscript{nd}, 3\textsuperscript{rd}, 4\textsuperscript{th}, 5\textsuperscript{th} MC
  - Think: 10, 20, 30, 40
  - Accept: 10, 10, 30, 40
  - Powergrip of index and long compromised by angulation therefore reduce anything >10 degrees
Questions?
Thank You!