PHYSICAL MEDICINE & REHABILITATION

UNIVERSITY OF MICHIGAN
HEALTH SYSTEM

Wrist and Hand Examination

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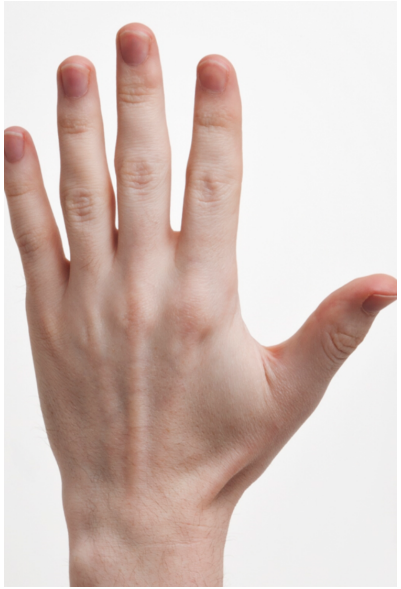
Objectives

- Understand the osseous, ligamentous, tendinous, and neural anatomy of the wrist and hand
- Outline palpable superficial landmarks in the wrist and hand
- Outline evaluation of and differentiation between nerves to the wrist and hand
- Describe special testing of wrist and hand

Wrist Anatomy

- Radius
- Ulna
- Carpal bones



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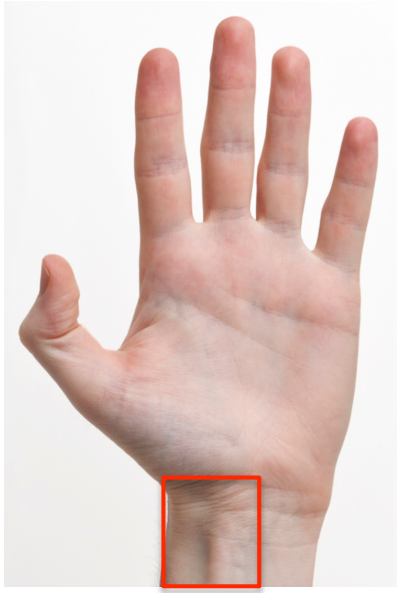

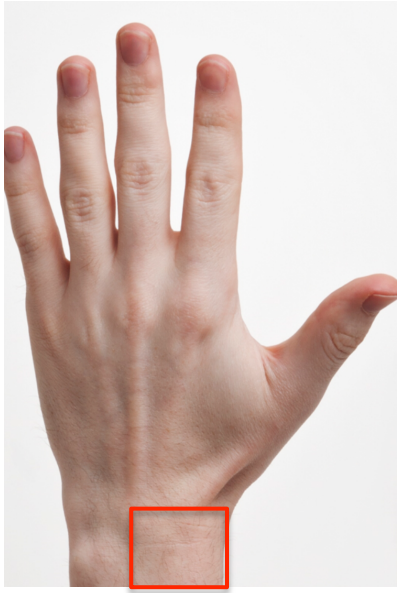

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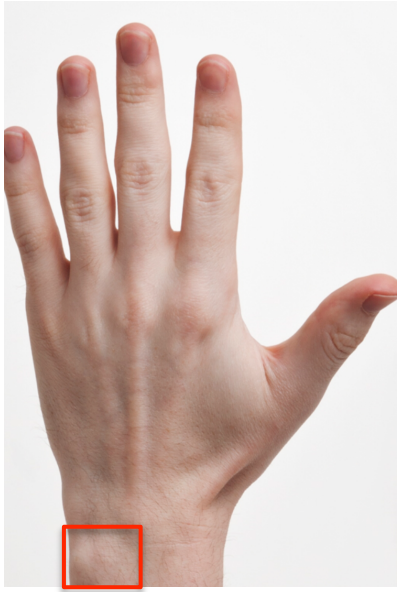

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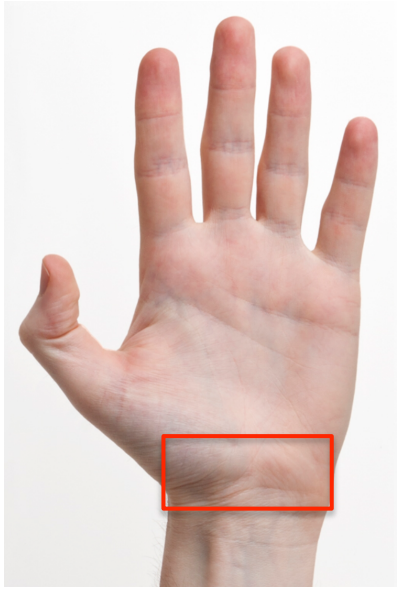
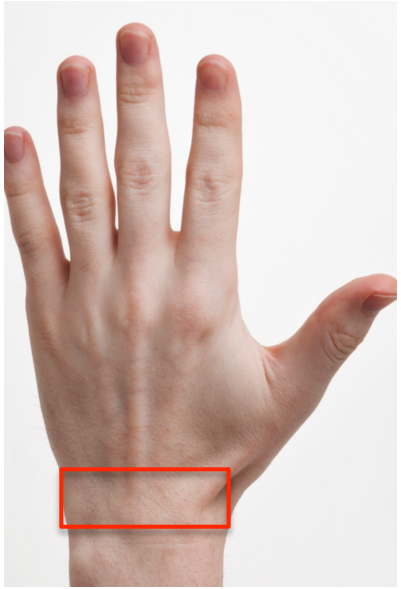




Inspection

- Ecchymosis
- Erythema
- Deformity
- Laceration

Inspection

- Common Finger Deformities
  - Swan Neck Deformity
  - Boutonniere Deformity
  - Hypertrophic nodules
    - Heberden's, Bouchard's

Inspection

- Swan Neck Deformity
  - PIP hyperextension, DIP flexion
  - Pathology is at PIP joint
    - Insufficiency of volar/palmar plate and supporting structures
    - Distally, the FDP tendon tightens from PIP extension causing secondary DIP flexion
  - Alternatively, extensor tendon rupture produces similar deformity

Inspection

- Boutonniere Deformity
  - PIP flexion, DIP hyperextension
  - Pathology is at PIP joint
    - Commonly occurs from insufficiency of dorsal and lateral supporting structures at PIP joint
    - Lateral bands migrate volar/palmar, creating increased flexion moment
    - Results in PIP “button hole” effect dorsally

Inspection

- Nodules
  - Osteoarthritic
    - Hypertrophic changes of OA
      - PIP - Bouchard's nodule
      - DIP - Heberden's nodule
  - Rheumatoid Arthritis
    - MCP joints affected most
    - Distal radioulnar joint can also be affected
    - Synovitis process = swelling, erythema, pain

Palpation

- Systematic palpation is essential for accurate diagnosis
- Localize points of maximal tenderness
- Always compare to opposite side

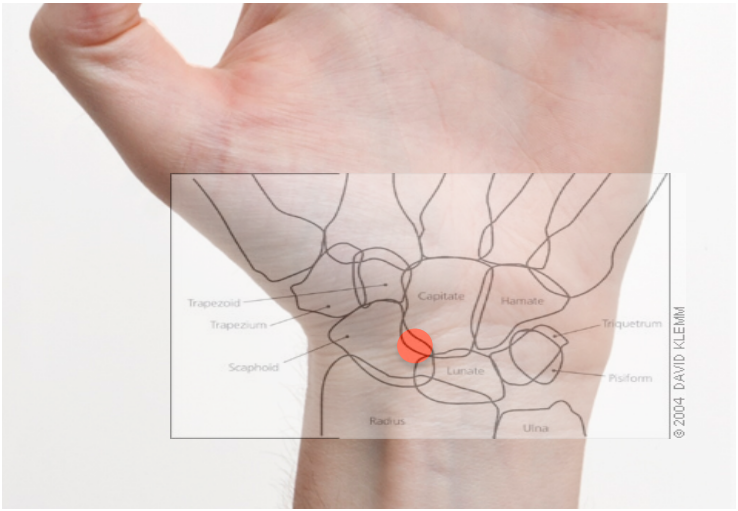
Scaphoid

- Prominence at the thenar eminence and distal end of the palpable tendon of the flexor carpi radialis

- The scaphoid tubercle represents the palmar projection of the scaphoid

Scaphoid

- Has a proximal pole, a waist, and a distal pole
- Proximal Pole
  - Palpable just distal to Lister's tubercle

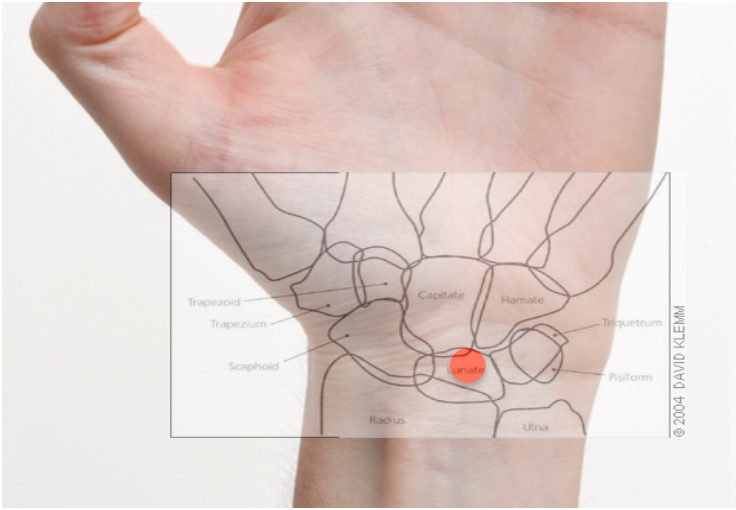


Scaphoid

- Has a proximal pole, a waist, and a distal pole
- Waist
  - Located within anatomic snuffbox

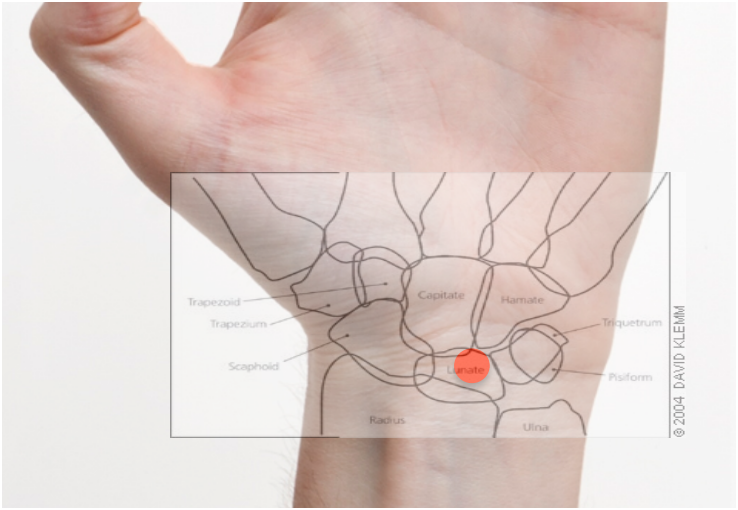
Scaphoid

- Has a proximal pole, a waist, and a distal pole
- Distal Pole
  - Palpable just distal to palmar wrist crease
  - Becomes more prominent with wrist radial deviation



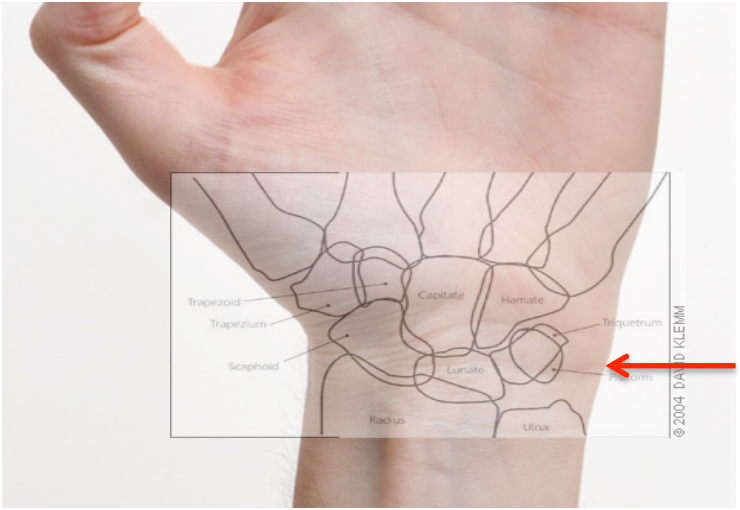
Lunate

- In line with 3rd metacarpal
- Palpable within a depression just ulnar to scaphoid proximal pole and ulnar to extensor carpi radialis tendons
  - Wrist dorsiflexion → Increases depression
  - Wrist extension → Fullness emerges



Triquetrum

- Ulnar lobe palpable within the ulnar snuffbox just distal to the ulnar head/styloid process
- Dorsal lobe palpable on dorsal wrist just distal to ulnar head



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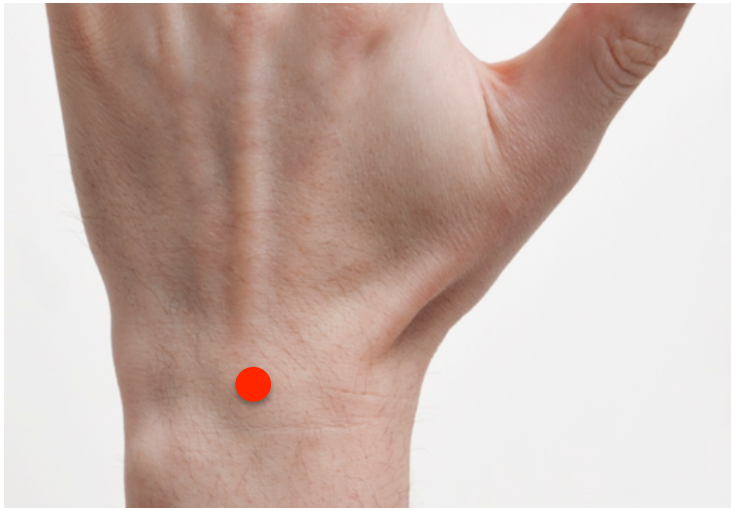

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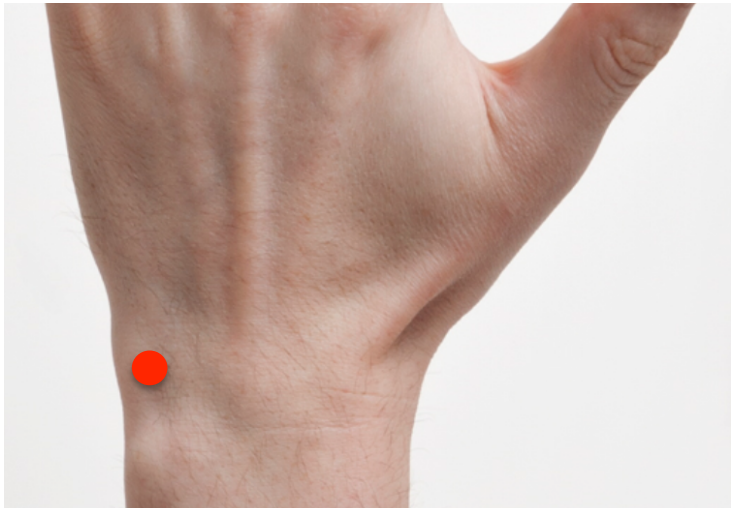
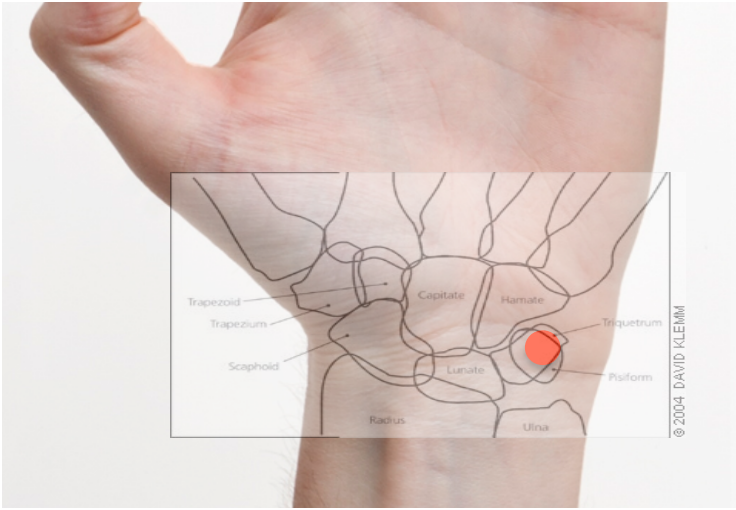


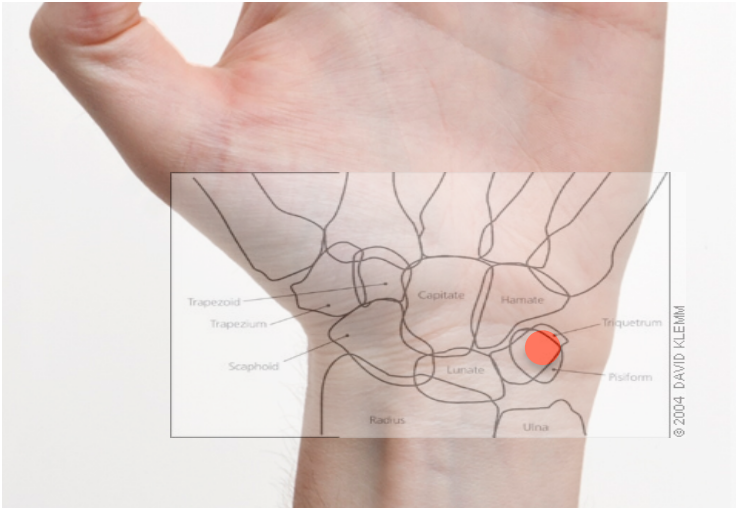
Pisiform

- Palpable on the palmar aspect of the wrist, just distal to the FCU tendon, which attaches to the pisiform



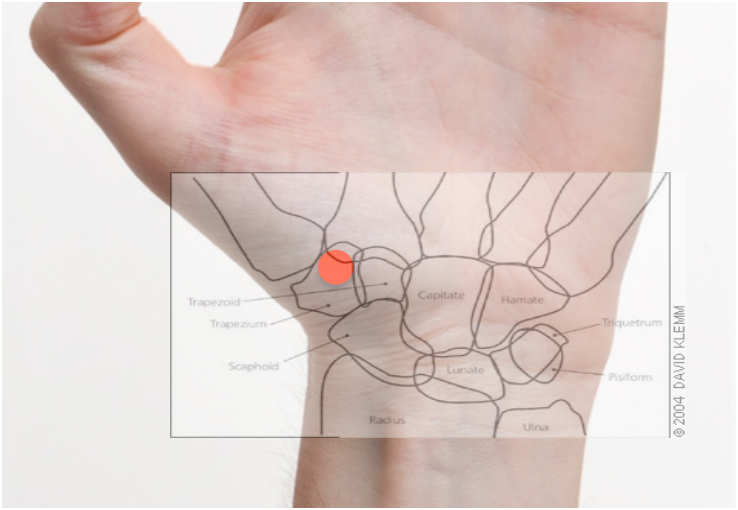
Pisiform

- Pisotriquetral articulation can be passively moved
  - Passive wrist flexion relaxes FCU tendon
  - Permits examiner to move the pisiform relative to triquetrum



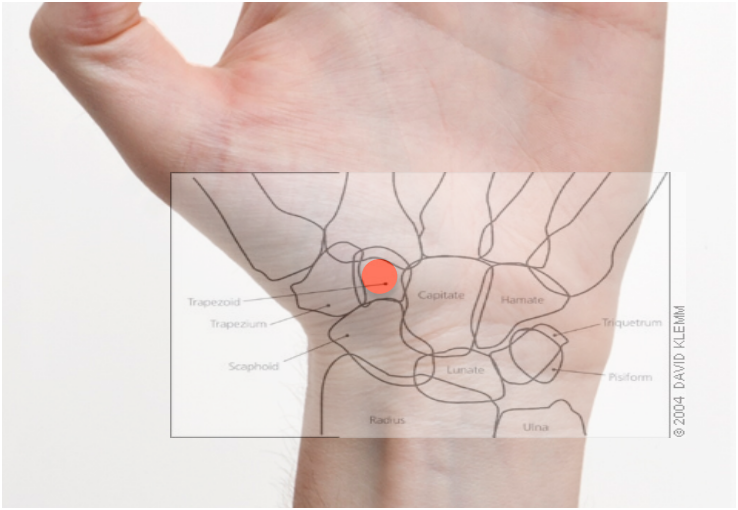
Trapezium

- Palmar surface palpable just distal to scaphoid tubercle
- Dorsal surface palpable in distal aspect of anatomic snuffbox



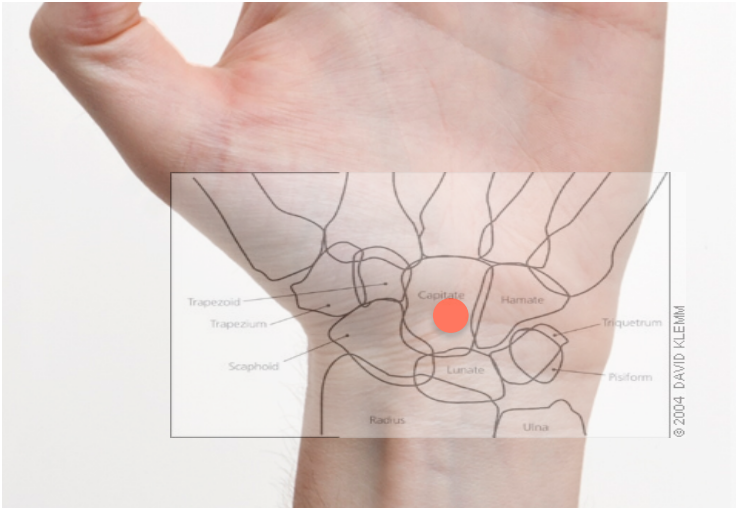
Trapezoid

- Dorsal surface palpable just proximal to the base of the second metacarpal, deep to the ECRL tendon



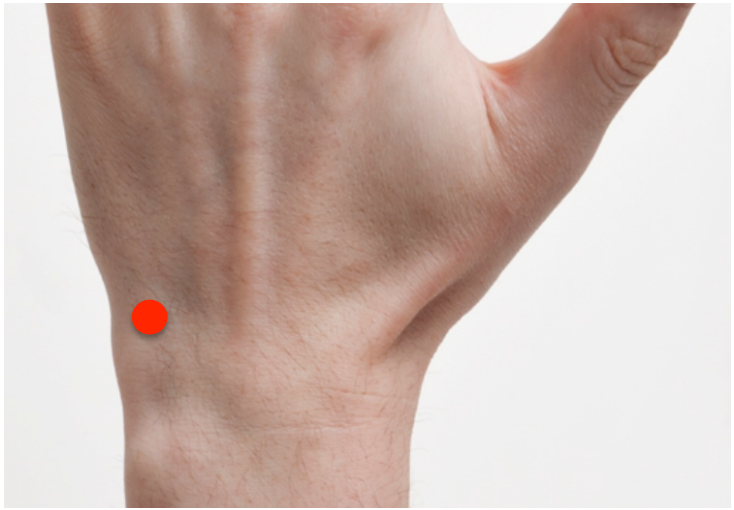
Capitate

- Dorsal surface palpable just distal to the lunate and proximal to the base of the 3rd metacarpal, deep to the ECRB and EDC tendons



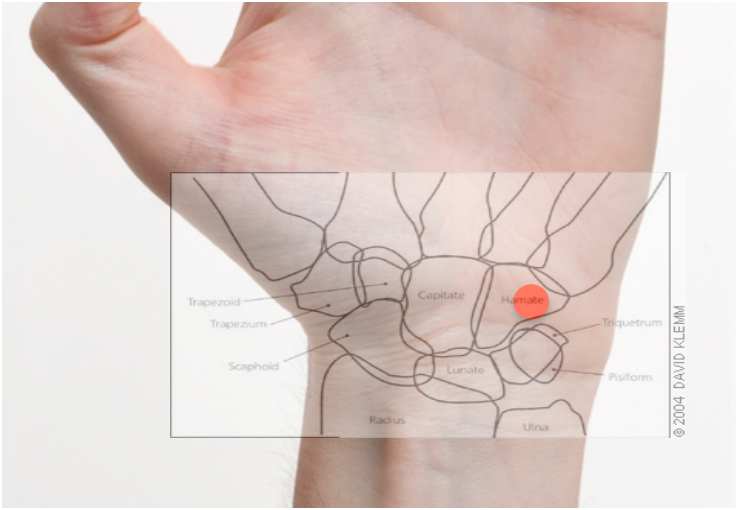
Hamate

- Dorsal surface palpable just ulnar to triquetrum and proximal to the 4th and 5th metacarpal bases



Hamate

- Hook of hamate is palpable on the palmar surface about one finger width distal and ulnar to pisiform



Radius

- Radial styloid
- Lister's tubercle
- Articulates with distal ulna

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Distal Radial Ulnar Joint

- Palpable between distal radius and distal ulna
- Articulates in motions of pronation/supination
- Instability can occur at this articulation

Dorsal Wrist

- Anatomic snuffbox
  - Dorsal-radial side of wrist

Dorsal Wrist

- Anatomic snuffbox
  - Bounded by:
    - Radially - 1st dorsal wrist compartment tendons
      - Abd pollicus longus, Ext pollicis brevis

Dorsal Wrist

- Anatomic snuffbox
  - Bounded by:
    - Ulnarly - 3rd dorsal wrist compartment tendon
      - Ext pollicis longus

Dorsal Wrist

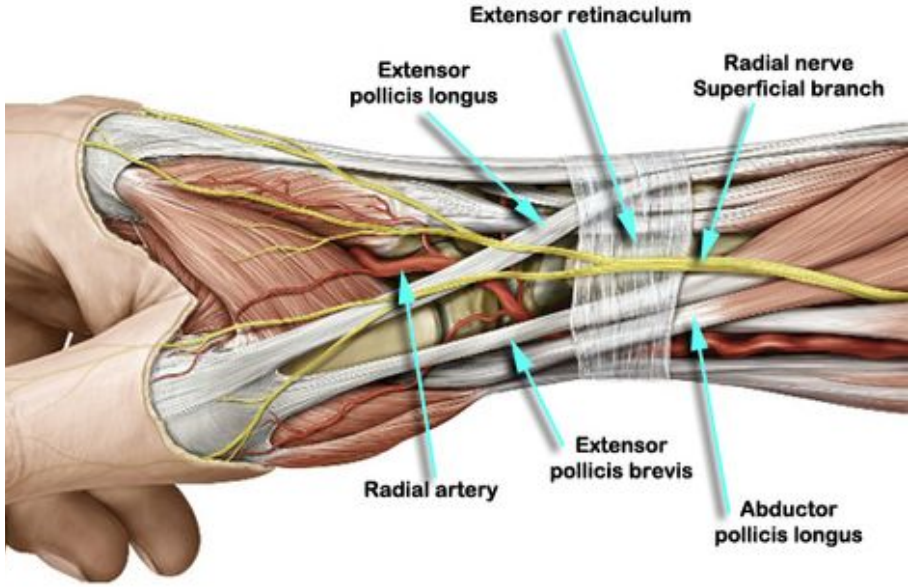
- Anatomic snuffbox
  - Bounded by:
    - Proximal – Radial styloid

Dorsal Wrist

- Anatomic snuffbox
  - Bounded by:
    - Distal – 1st metacarpal head

Dorsal Wrist

- Anatomic snuffbox
  - Palpable deep in dorsal snuffbox
    - Scaphoid
    - Radial artery
    - Superficial radial nerve



Dorsal Wrist

- Lister's Tubercle
  - Bony prominence on dorsal surface of distal radius just proximal to radiocarpal articulation

Dorsal Wrist

- Lister's Tubercle
  - Extensor pollicis longus curves around this tubercle from distal forearm to ulnar thumb

Dorsal Wrist Compartments

- 1st – Abductor Pollicis Longus, Extensor Pollicis Brevis
- 2nd – Extensor Carpi Radialis Longus and Brevis
- 3rd – Extensor Pollicis Longus
- 4th – Extensor Indicis Proprius, Extensor Digitorum
- 5th – Extensor Digiti Minimi
- 6th – Extensor Carpi Ulnaris

Dorsal Wrist Compartments

- 1st – Abductor Pollicis Longus, Extensor Pollicis Brevis

- DeQuervain's Tenosynovitis

Palmar Wrist Tendons

- Brachioradialis
- Flexor carpi radialis
- Flexor pollicis longus
- Flexor digitorum profundus and superficialis
- Palmaris longus
- Flexor carpi ulnaris

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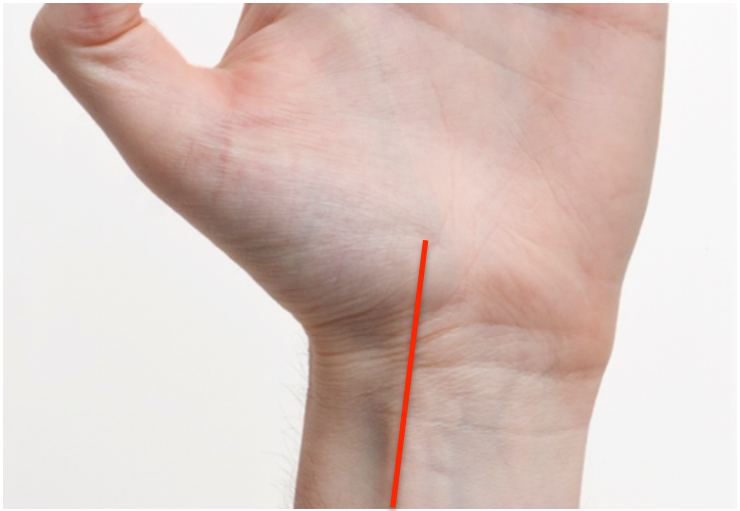

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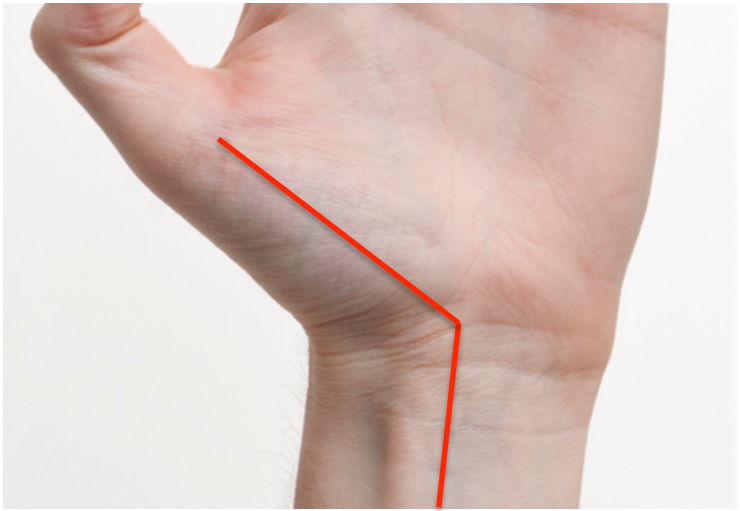

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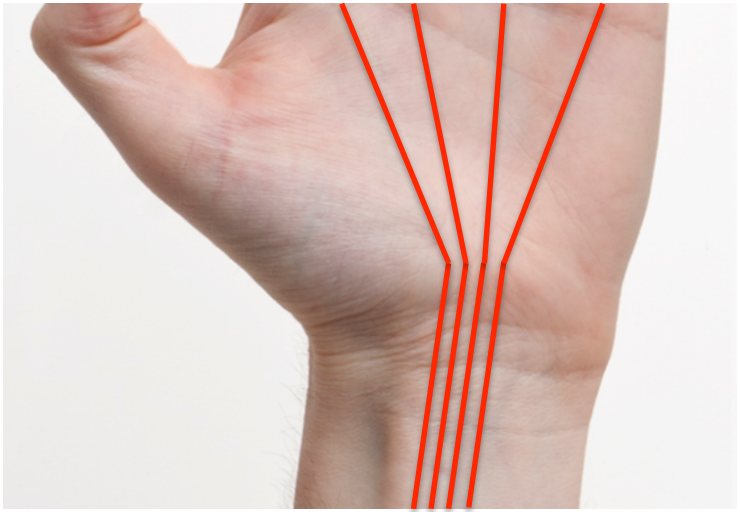

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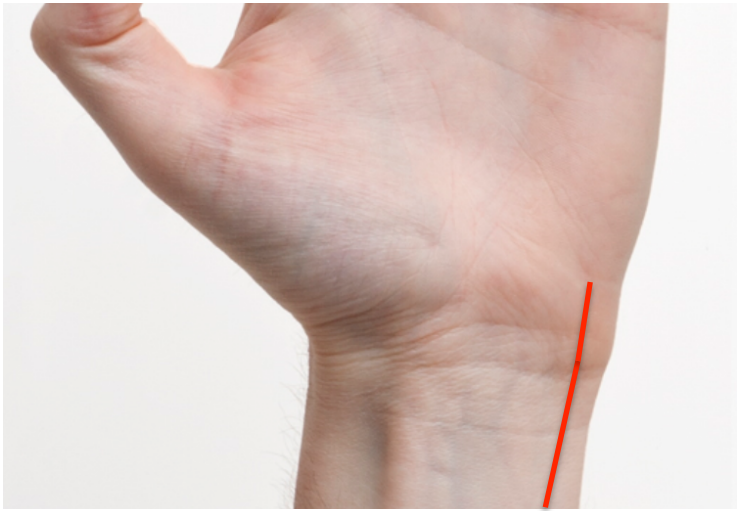
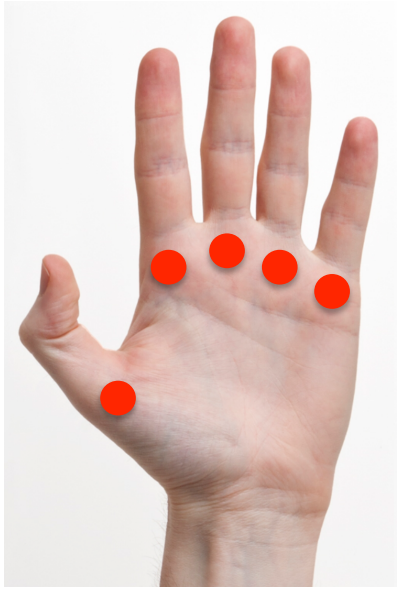
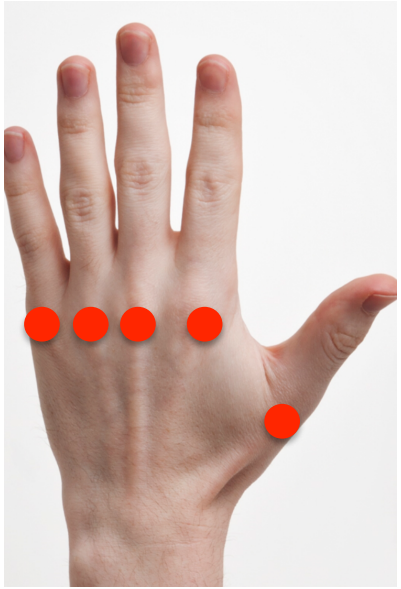


Hand

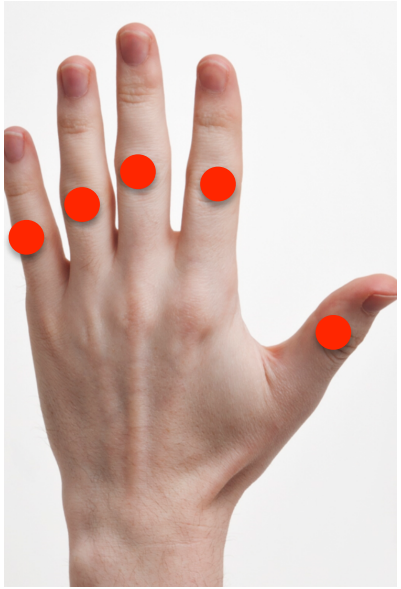
- Metacarpal-Phalangeal Joints (MCPs)





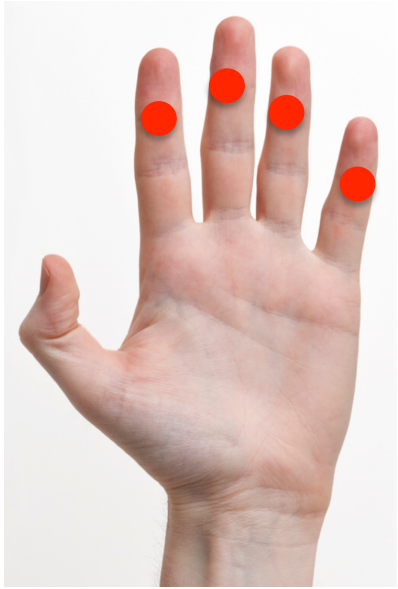
Hand

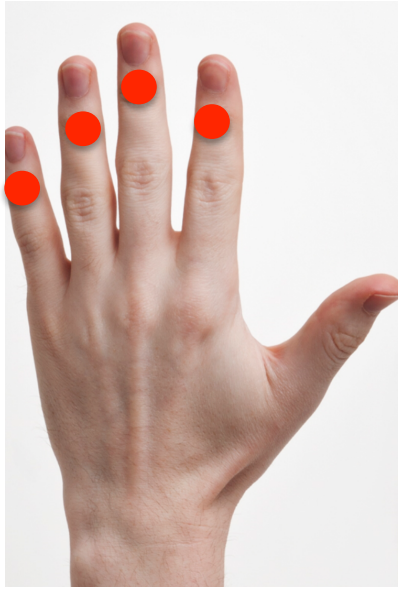
- Proximal Inter-Phalangeal Joints (PIPs)



Hand

- Distal Inter-Phalangeal Joints (DIPs)





Range of Motion

- Wrist
  - Flexion to 90
  - Extension to 60
  - Ulnar deviation to 45

Range of Motion

- Fingers
  - All fingers should achieve full flexion and extension

- Lag – lack of ACTIVE range of motion
- Block – lack of PASSIVE range of motion

Neurologic Examination

- Median Nerve
- Ulnar Nerve
- Radial Nerve

Neurologic Examination

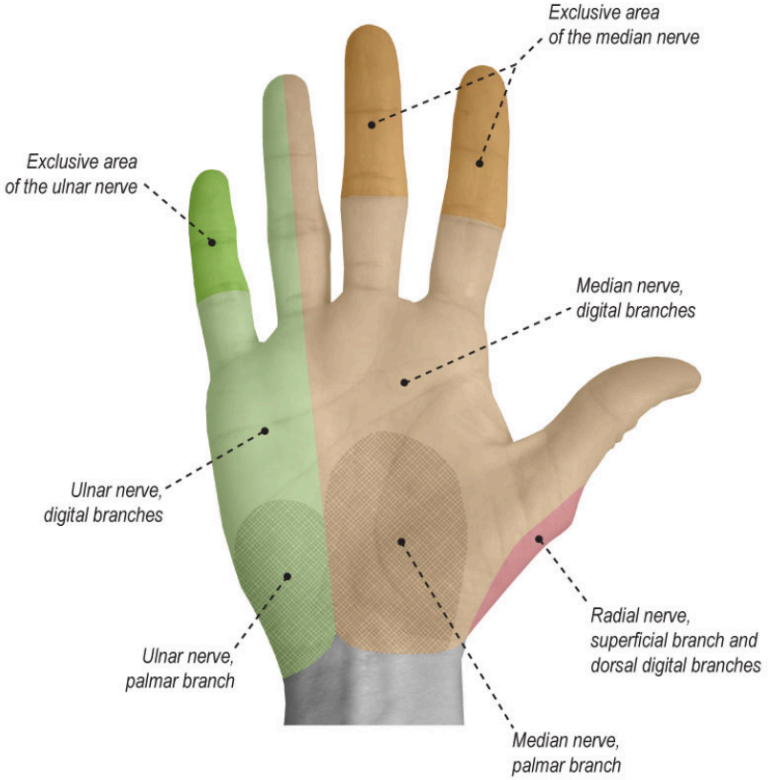
- Median Nerve
  - Location
    - Enters wrist deep to the transverse carpal ligament within the carpal tunnel

Neurologic Examination

- Median Nerve
  - Innervates
    - Flexor digitorum profundus and superficialis
    - Flexor pollicis longus
    - Pronator quadratus
    - Pronator teres
    - Flexor carpi radialis
    - Abductor pollicis brevis

Neurologic Examination

- Median Nerve
  - Cutaneous sensation
    - Thenar eminence
    - Palmar aspect of radial 3 ½ fingers
    - Distal dorsal aspect of radial 3 ½



Neurologic Examination

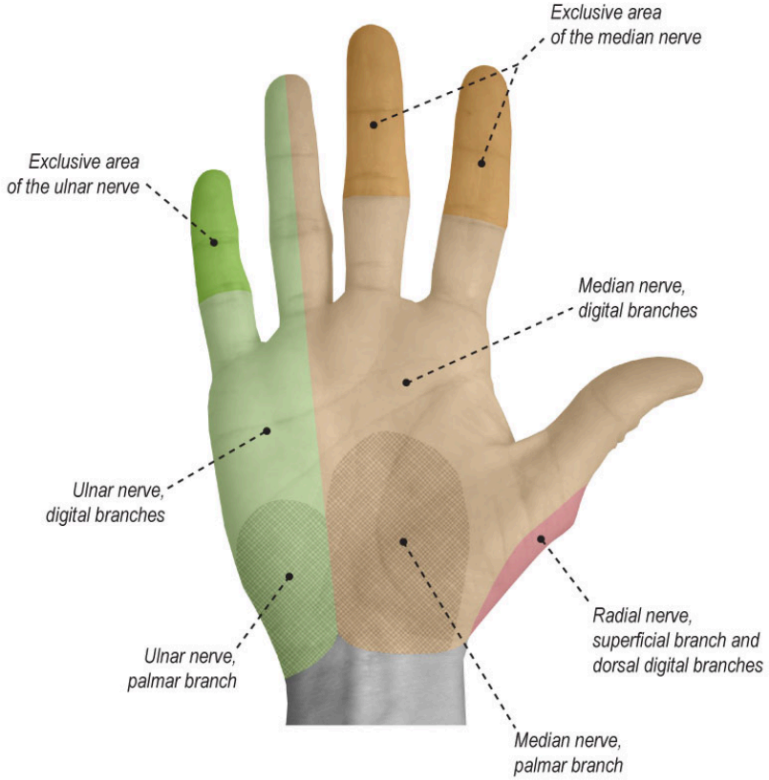
- Ulnar Nerve
  - Location
    - Traverses through Guyon's canal at wrist
      - Just radial to pisiform
    - Lies between pisiform and hook of hamate

Neurologic Examination

- Ulnar Nerve
  - Innervates
    - FDP and FDS to ring and little fingers
    - First dorsal interosseus
    - Abductor digiti minimi

Neurologic Examination

- Ulnar Nerve
  - Cutaneous innervation
    - Ulnar 1 ½ digit palmar and dorsal surfaces
    - Hypotenar eminence



Neurologic Examination

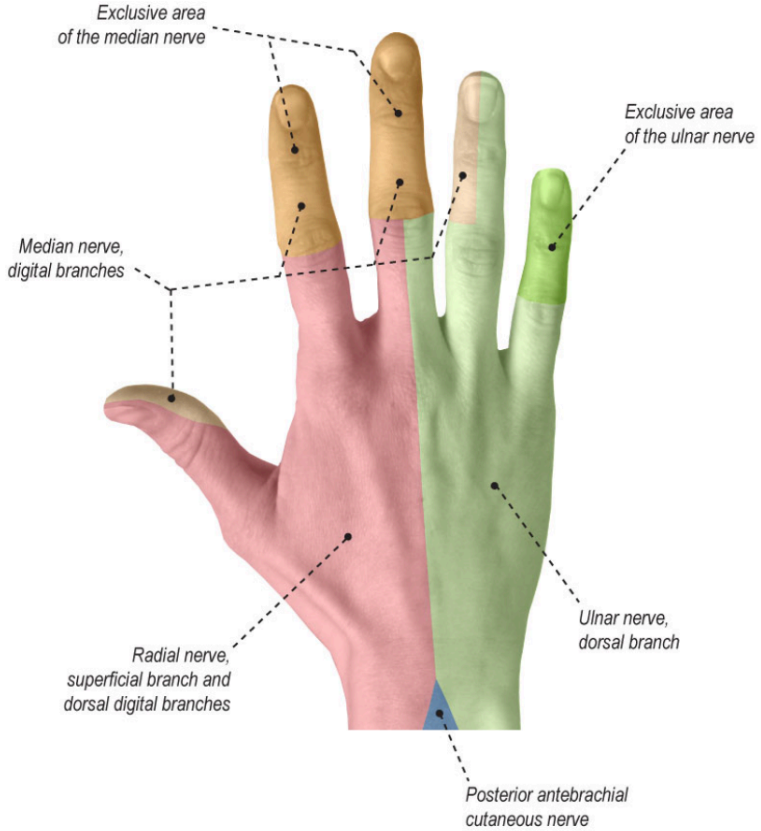
- Radial Nerve
  - Location
    - Through spiral groove at mid-humerus
    - Between two heads of supinator (ulnar, humeral)
    - Dorsal forearm divisions
      - Deep motor branch
        - Becomes posterior interosseous nerve
      - Superficial sensory branch
        - Crosses wrist at dorsolateral radius

Neurologic Examination

- Radial Nerve
  - Innervates
    - Extensors of wrist, thumb, and digits
    - Supinator

Neurologic Examination

- Radial Nerve
  - Cutaneous innervation
    - Dorsal wrist and hand
    - Dorsal radial 3 ½ fingers to DIP joints



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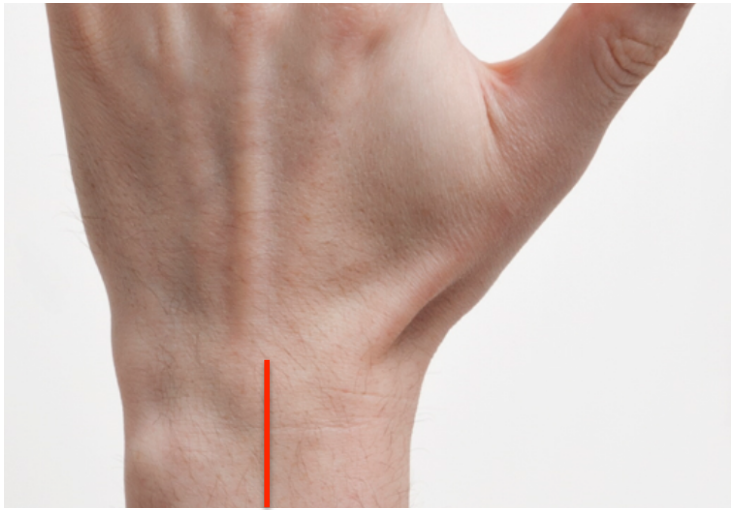

Neurologic Examination

- Radial Nerve
  - Dorsal forearm divisions
    - Superficial sensory branch
      - Crosses wrist at dorsolateral radius

Provocative Testing

- Attempt to reproduce force/mechanism of injury with manual testing
- Perform only after ruling out fracture

Watson Test

- Assesses for scapholunate instability
- aka Scaphoid Shift Test

- Procedure
  - Place thumb over scaphoid tubercle and index finger over dorsal aspect of scapholunate joint
  - Apply dorsally directed force with thumb against distal pole of scaphoid while passively moving wrist from ulnar to radial deviation

Watson Test

- Positive Test
  - Sudden, dyskinetic shift of scaphoid with dorsal wrist pain
    - “Catch-up Clunk”
  - Pathoanatomy
    - Instability at the scapholunate joint interferes with normal flexion-extension motion of the scaphoid during wrist radial-ulnar deviation

Lunotriquetral Shuck/Shear

- Assesses for lunotriquetral instability

- Procedure
  - Grasp lunate between the thumb and index finger of one hand
  - Grasp triquetrum/pisiform between the thumb and index finger of second hand
  - Shift the two grasping hands in opposite directions

Lunotriquetral Shuck/Shear

- Positive Test
  - Reproduction of pain
  - Lunotriquetral excursion greater than 2 mm

- Pathoanatomy
  - Instability/ligamentous insufficiency at lunotriquetral articulation

Distal Radioulnar Joint Instability

- Assesses for dorsal-volar instability

- Procedure
  - Grasp distal radius and ulna between thumb and index of opposite hands 3-4 cm proximal to wrist
  - Translate radius relative to ulna in neutral, supination, and pronation

Distal Radioulnar Joint Instability

- Positive test
  - Crepitus
  - Translation > 5mm

Carpal Tunnel Syndrome

- Provocative Tests
  - Carpal Tunnel Compression Test
  - Phalen Test
  - Reverse Phalen Test
  - Tinel Sign

Carpal Tunnel Syndrome

- Carpal Tunnel Compression Test
  - Procedure
    - Apply firm pressure directly to carpal tunnel
      - Between scaphoid and pisiform
      - Distal to wrist crease
    - Have patient lightly make fist

Carpal Tunnel Syndrome

- Carpal Tunnel Compression Test
  - Positive Test
    - Paresthesias in distribution of median nerve

Carpal Tunnel Syndrome

- Phalen Test
  - Procedure
    - Elbows flexion, forearm neutral
    - Wrist in maximal passive flexion
  - Positive Test
    - Paresthesias in distribution of median nerve

Carpal Tunnel Syndrome

- Reverse Phalen Test
  - Procedure
    - Elbows flexion, forearm neutral
    - Wrist in maximal passive extension
  - Positive Test
    - Paresthesias in distribution of median nerve

Carpal Tunnel Syndrome

- Tinel Sign
  - Procedure
    - Percussion over median nerve within the carpal tunnel
      - Between scaphoid and pisiform
      - Distal to wrist crease
  - Positive Test
    - Paresthesias in distribution of median nerve

Finkelstein Test

- Assesses for tenosynovitis involving the tendons of the first dorsal wrist compartment (APL and EPB)
- Procedure
    - Wrist in neutral position
    - Examiner places thumb on dorsal thumb proximal phalanx and fingers on palmar aspect to grasp thumb
    - Wrist is ulnarly deviated
    - Thumb is gradually pulled into maximal flexion

Finkelstein Test

- Positive Test
  - Pain over first dorsal wrist compartment or dorsal thumb

- Pearl
  - Can also cause pain secondary to 1st CMC joint OA

Carpometacarpal Compression Test

- Assesses for 1st CMC joint pathology, most commonly arthritis
- Aim is to produce axial compression of the thumb first CMC joint with a “mortar and pestle” action
  - Elicit pain from CMC/basal thumb osteoarthritis

Carpometacarpal Compression Test

- Procedure
  - Grasp patient's 1st metacarpal with one hand and the distal radius with the other
  - Apply a longitudinal compression along the 1st metacarpal into the carpal bone, axially compressing the CMC joint
  - Apply rotatory motion to metacarpal
- Positive Test
  - Pain at 1st CMC joint

Froment's Sign

- Assesses intrinsic hand muscle strength
  - Positive test indicates weakness of ulnar-innervated adductor pollicis muscle

- Procedure
  - Position thumb against second finger in a "pinch grip" position
  - Patient is instructed to actively adduct thumb into 2nd finger to pinch fingers together

Froment's Sign

- Positive Test
  - Prominent flexion at thumb IP joint because of insufficient adduction strength
    - Median innervated FPL intact and flexes FPL of the thumb to compensate and maintain pinch pressure

Gamekeeper's Thumb

- Assesses for thumb MCP joint Ulnar Collateral Ligament insufficiency/laxity

- Procedure
  - Immobilize thumb metacarpal in with one hand and the proximal phalanx with the other
  - Apply an ulnarly directed force to the radial side of the joint to gap the thumb MCP joint on ulnar side

Gamekeeper's Thumb

- Positive Test
  - Pain at thumb MCP joint
  - Asymmetric gapping of radial side of joint

Questions