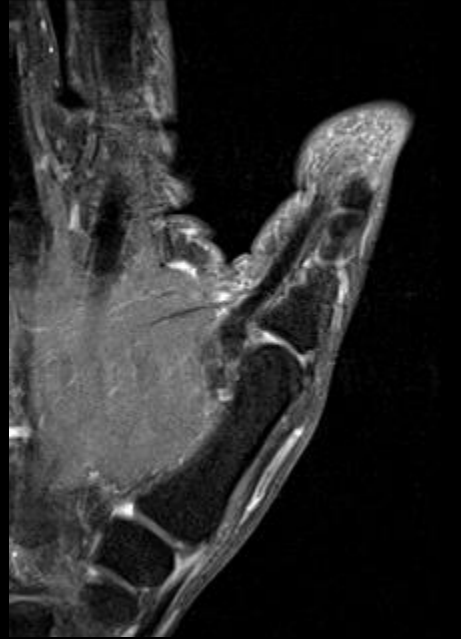
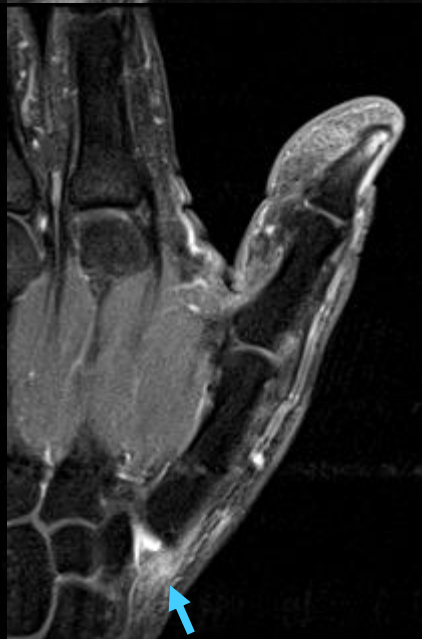
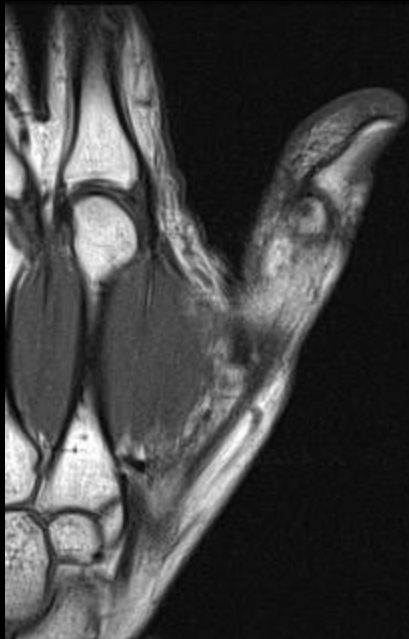
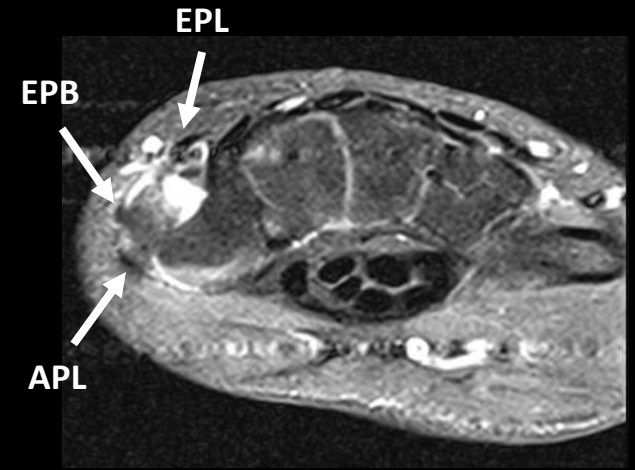
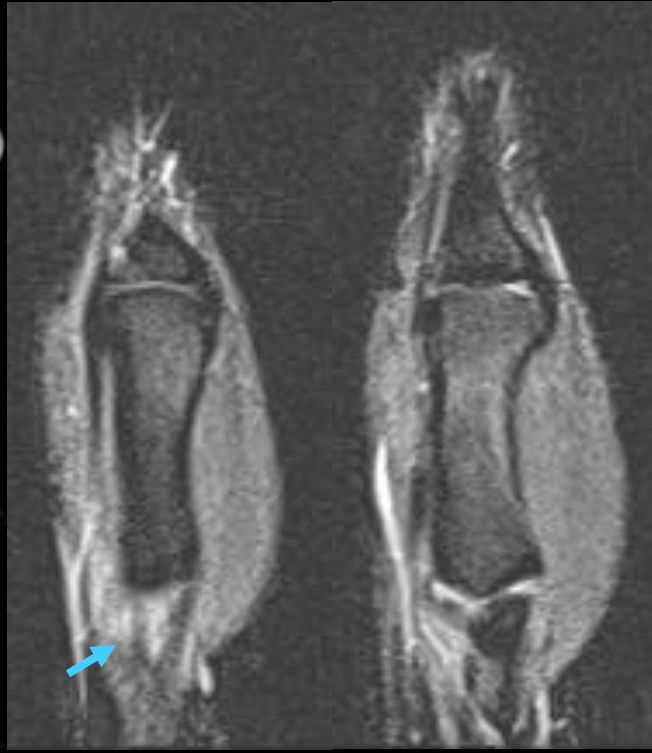
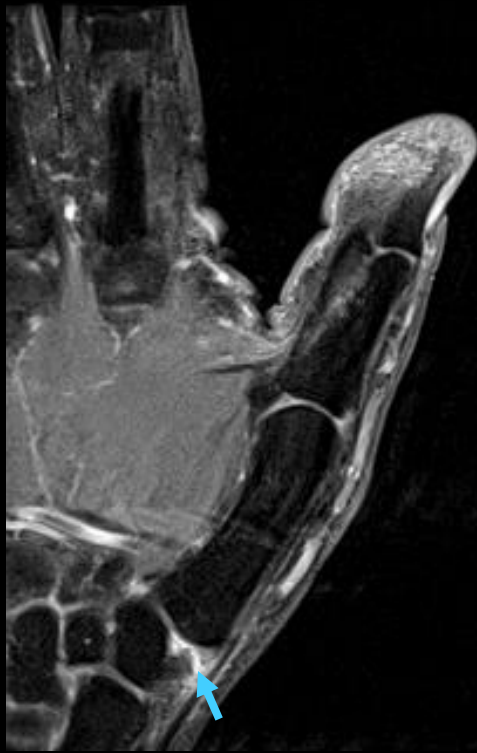




31yo M with chronic basilar thumb
and wrist pain that started after
cross-country bicycle ride 5 yrs ago.

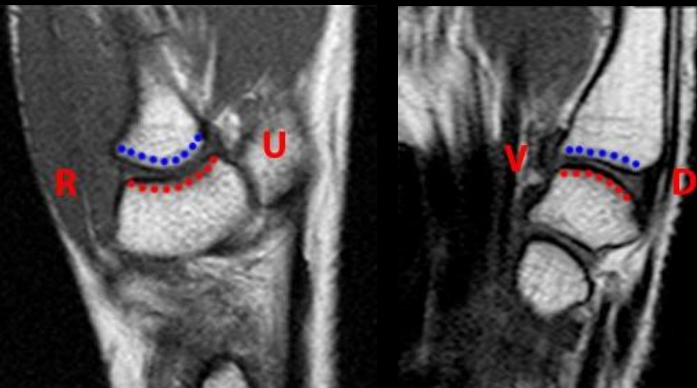
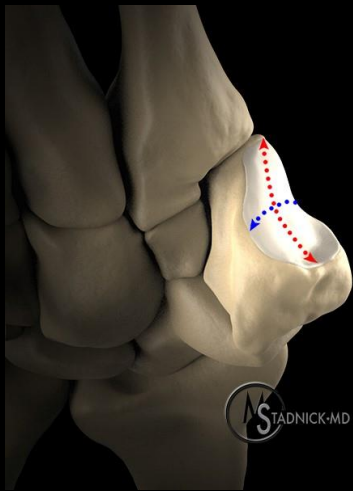






Full-thickness tear involving the dorsal deltoid ligament of the first carpometacarpal joint, involving the dorsal radial, dorsal central, and posterior oblique ligaments.

Thumb Trapeziometacarpal Joint



Coronal

Sagittal

- Shallow saddle joint with biconcave-convex shape
 - Concave distal trapezium surface in coronal plane (radioulnar)
 - Convex in sagittal plane (dorso-volar)
- Incongruent in resting position
- Stable and congruent in final phase of thumb opposition
- Wide range of motion
 - Flexion/extension (coronal)
 - Abduction/adduction (sagittal)
 - Circumduction
 - Opposition
- Stability derived from capsuloligamentous complex

Injury to Thumb Trapeziometacarpal Joint

- Thumb CMC is oriented along longitudinal compression axis of thumb, predisposing to OA and trauma.
- CMC1 is the second most common site of osteoarthritis in the hand (after DIP).
- Isolated CMC1 dislocation is rare (<1% hand injuries)
 - Usually involves near/complete tear of dorsal ligaments and partial tearing of AOL
- CMC1 dislocation usually accompanied by MC1 base fracture (Bennett fx, Rolando fx)



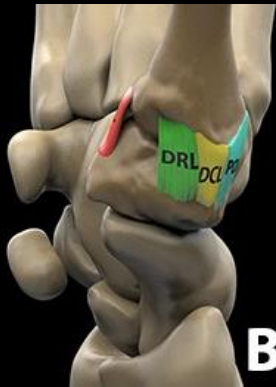
Ligaments of the Thumb Trapeziometacarpal Joint

- Dorsal Deltoid Ligament
 - Dorsoradial ligament (DRL)
 - Dorsal central ligament (DCL)
 - Posterior oblique ligament (POL)
- Anterior oblique ligament (AOL)
 - Superficial
 - Deep
- Intermetacarpal Ligament (IML)
- Ulnar collateral ligament (UCL)

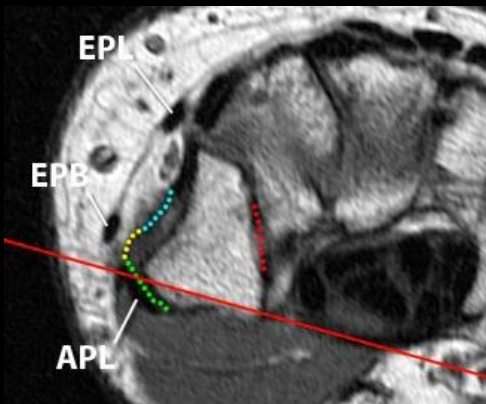
- Ligament laxity and joint hypermobility predispose to pain, joint incongruity, effusion, cartilage erosion, and subluxation

Dorsal Deltoid Ligament

- Capsular ligaments
- Best evaluated on sagittal plane



B



DRL

- Origin: dorsoradial tubercle of trapezium
- Insertion: broadly onto dorsal edge of MC1 base
- Located adjacent to dorsal side of abductor pollicis longus tendon

DCL and POL

- Origin: dorsal side of trapezium, adjacent and ulnar to DRL
- Insertion: dorsal and ulnar aspect of MC1, share insertion with IML
- DCL is deep to extensor pollicis brevis tendon
- POL is deep to extensor pollicis longus tendon

Dorsal Deltoid Ligament

- Thick, organized collagen bundles
- Primary restraint to dorsal dislocation of CMC1 joint
- Has sensory innervation for proprioception, most numerous about metacarpal insertion

Anterior Oblique Ligament

- Best evaluated on sagittal images



<http://radsource.us/thumb-carpometacarpal-joint/>



Cardoso AJR 2008

sAOL

- Capsular ligament
- Origin: volar tubercle of trapezium, 0.5mm proximal to articular surface
- Insertion: broad, 2mm distal to articular margin of volar styloid process of MC1
- Curtain-like, courses over volar tubercle of MC1
- Located immediately deep to thenar musculature

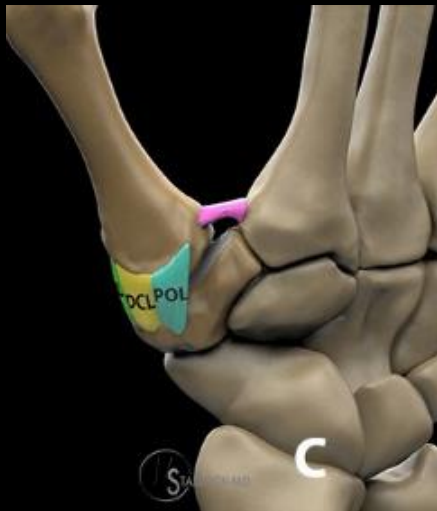
dAOL

- Intracapsular ligament
- A.k.a. beak ligament
- Origin: articular margin of trapezium at volar central apex
- Insertion: articular margin of MC1 base, just ulnar to volar styloid process
- Located deep to sAOL

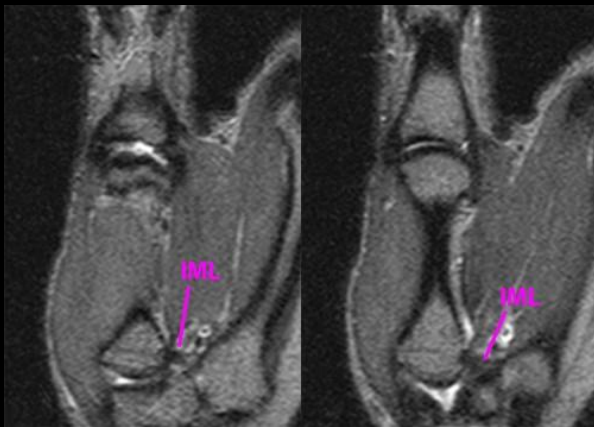
Anterior Oblique Ligament

- Thin, membranous, disorganized connective tissue with sparse collagen fibers and hypocellularity
- Prevents volar metacarpal subluxation, less important than dorsal deltoid ligament

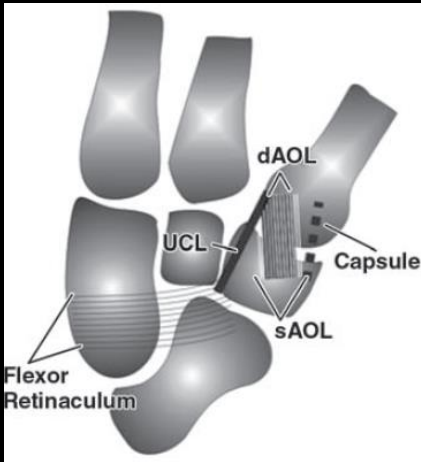
Intermetacarpal Ligament (IML)



- Extracapsular ligament
- Origin: dorsoradial aspect of MC2, radial to insertion of extensor carpi radialis longus tendon
- Insertion: volar-ulnar tubercle of MC1 base
- Best evaluated on sagittal images
- Resists radial translation of first metacarpal



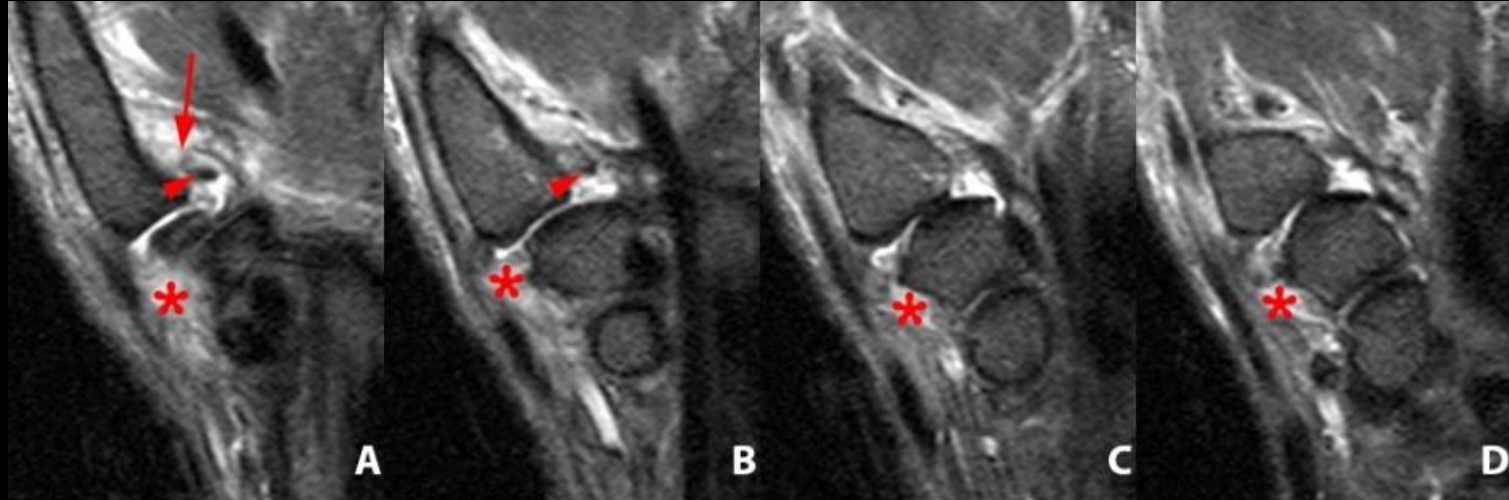
Ulnar collateral ligament (UCL)



Cardoso AJR 2008

- Extracapsular ligament
- Origin: distal and ulnar margin of trapezial ridge at flexor retinaculum insertion
- Insertion: volar-ulnar tubercle of MC1 base, superficial and ulnar to sAOL, slightly overlaps sAOL
- Best evaluated on coronal images
- Resists extension and abduction

- Acute tear of AOL usually occurs at metacarpal insertion (arrow)
- Acute tear of dorsal ligaments usually occurs at trapezial attachment (asterisk)



<http://radsources.us/thumb-carpometacarpal-joint/>

Associated findings

- Periosteal stripping of metacarpal attachment (AOL)
- Subcortical bone contusion or avulsion fracture
- Adjacent soft tissue hematoma
- Dorsoradial subluxation of thumb CMC due to abductor pollicis longus tendon

➤ AOL degeneration is a primary factor in development and progression of thumb CMC osteoarthritis.



<http://radsources.us/thumb-carpometacarpal-joint/>

- Distal retraction of fibrocartilagenous insertion of AOL at MC1 base
- Volar synovial recess enlarges
- Osteophytosis
- Ganglion cyst formation
- Periosteal stripping and eventual detachment of AOL attachment
- Dorsal subluxation of MC1
- Cartilage loss from volar to diffuse

References

1. Cardoso FN, Kim HJ, Albertotti F, Botte MJ, Resnick D, Chung CB. Imaging the ligaments of the trapeziometacarpal joint: MRI compared with MR arthrography in cadaveric specimens. *AJR Am J Roentgenol*. 2009 Jan;192(1):W13-9.
2. <http://radsourc.us/thumb-carpometacarpal-joint/>
3. Hirschmann A, Sutter R, Schweizer A, Pfirrmann CW. The carpometacarpal joint of the thumb: MR appearance in asymptomatic volunteers. *Skeletal Radiol*. 2013 Aug;42(8):1105-12.