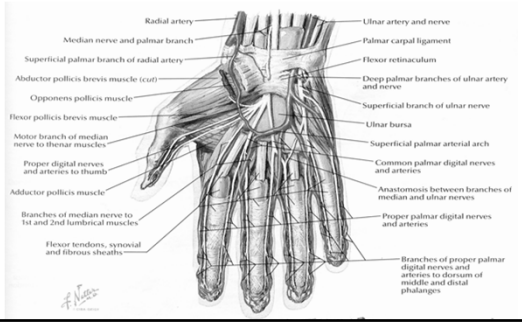
Tendon/Joint Conditions of the Hand

David A. Toivonen, M.D.

Hand and Upper Extremity Center of Northeast Wisconsin

Anatomy: Nerve, Tendon, and Vascular Supply



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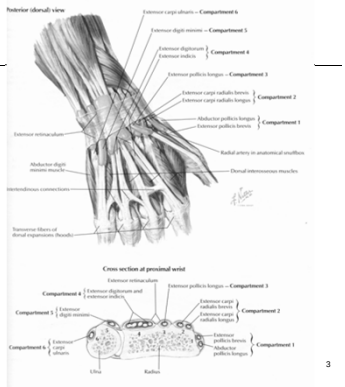
Anatomy



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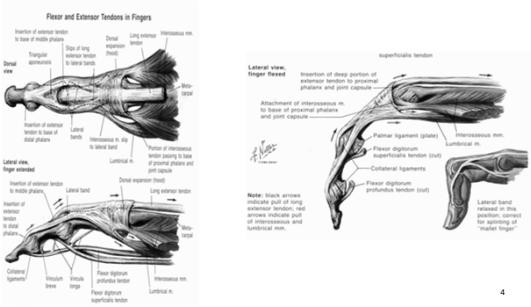
Anatomy: Flexor and Extensor Tendons



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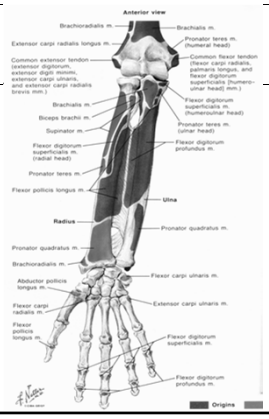
Anatomy: Joints



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Aging Effects

- Impacts musculoskeletal system
  - Joint cartilage thinning common
    - Arthritis, injuries, diseases
    - Proteoglycan changes—more susceptible to damage
  - Ligaments/tendons become more stiff/less flexible
    - Chemical changes
    - Tear easier/heal slower
    - Increased stiffness

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Aging Effects

- Bone density declines after age 30
  - More fragile/fractures
- Muscle loss after age 30
  - Amount of tissue and number of fibers decreased
  - Slower response/weaker

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Aging Effects

- 60% of 65-74 years olds—MD observed musculoskeletal disorders
- More susceptible to ligament tears, joint injuries, and fractures
- Treatment
  - Maintain active lifestyle, exercise/stretching, dietary considerations

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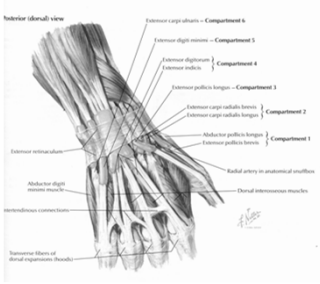
Tenosynovitis/tendonitis

- "Painful tendon conditions"
- Tendonitis overused/abused term



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Tenosynovitis/Tendonitis: Causes

- Proliferative/inflammatory-RA, crystalline (gout, pseudogout), septic
- Tendon entrapment/stenosing tenosynovitis-narrowing/stenosis
  - Usually non-inflammatory
  - Tendon constant motion causes hypertrophy/fibrosis of retinacular sheath
    - Decreased gliding
    - Increased edema
    - Catching
    - May be caused by direct trauma

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Tendon Entrapment: Causative Factors

- Women more common than men
- Age
- Anatomic factors
- Degenerative factors
- Activities

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Trigger Digits

- Thumb/fingers
- Painful catching/popping with flexion-extension
- Locking/stiffness

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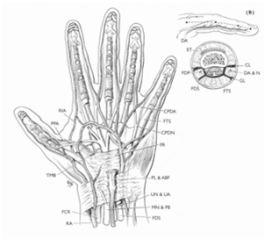
Trigger Digits

- Tendon entrapment due to mechanical impingement of digital flexor tendons at retinacular pulley at metacarpal level
  - Pulley hypertrophy-friction (fibrocartilaginous metaplasia due to repetitive compressive loads)



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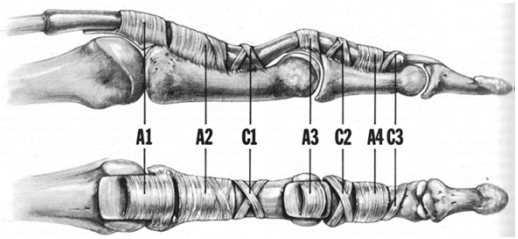

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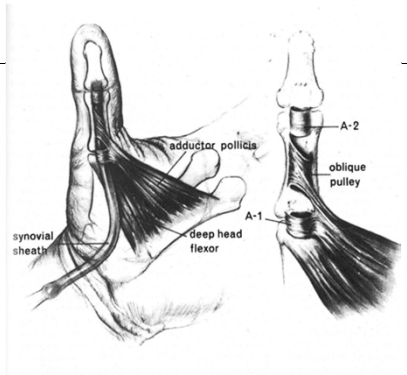

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Trigger Digits: Presentation

- Most common in healthy, middle-age woman
- Female 2-6 times greater than men
- May present with several digits involved
- Most commonly affected digit is thumb; then the ring, middle, and small; and, least common, the index

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Trigger Digits: Lifetime Incidence (Non diabetic)

- Over the age of 30: 2.2%
- IDDM: 10%

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Trigger Digits: Symptoms

- Localized palmar tenderness
- Snapping and catching perceived at PIP joint
- Differential diagnosis
  - Extensor subluxation
  - MP joint pathology
- Can occur in children

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Trigger Digits: Classification

- Grade I—Pre-triggering
- Grade II—Active
- Grade III—Passive
- Grade IV—Contracture (PIP joint)

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Trigger Digits: Causation/Work Factors

- Age clearly a factor as peak incidence of trigger digits—average 55-60 years
- Likely no effect from keyboarding
- Several studies suggest relationship to exertion/pressure over pulley while performing forceful grip or repetition
  - Welding, using of heavy sheers, constant hand-held tool work/vibration
- Direct trauma/contusion

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Trigger Digits: Treatment

- Steroid injections
- High success rate
  - Especially in nondiabetic, single digit, discreet nodule, short duration of symptoms
  - 50-70% success
  - Less successful in diabetics

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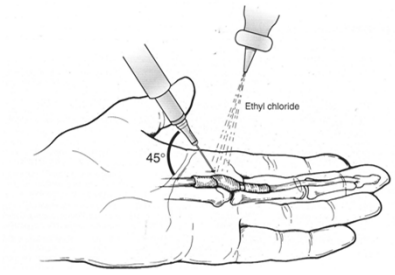

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Trigger Digits: Splinting

- Several studies
- Splint MP joint in flexion/splint DIP joint in extension
  - Demonstrated benefit with early presentation

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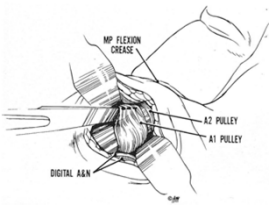
Trigger Digits: Surgical Treatment

- A1 pulley release
  - Open, percutaneous
    - Local anesthetic for single digits
    - Early range of motion
    - Full activities generally 2-3 weeks



Open Trigger Release

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Trigger Release: Complications

- Infection
- Stiffness
- Nerve injury
- Persistent triggering
- Tendon bowstringing

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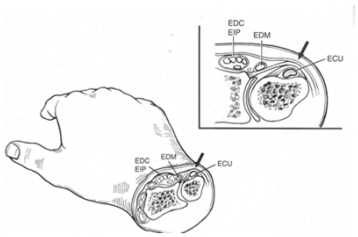
Dorsal Wrist Extensor Tendonitis

- Six separate dorsal extensor compartments



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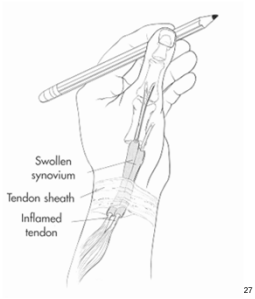
De Quervain's Tendonitis

- Tendon entrapment of the first dorsal extensor compartment (EPB/APL) (1895)
  - 1893 (Washer Woman's Sprain)
  - Friction and rigid retinacular sheath
  - Aberrant tendon/anatomic variation



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De Quervain's Tendonitis: Causation

- Activities requiring frequent abduction of thumb and ulnar deviation of wrist most common
- Direct contusion

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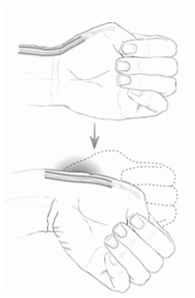
De Quervain's Tendonitis

- Localized radial wrist pain and swelling
- Pain with wrist flexion-extension and especially ulnar deviation
- Pseudo-triggering of thumb possible
- Swelling and crepitus possible
- Finkelstein's test



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De Quervain's Tendonitis: Differential Diagnosis

- Intersection syndrome
- First carpometacarpal joint/STT joint osteoarthritis
- Superficial radial nerve neuritis
- Ganglion cyst
- FCR tendonitis

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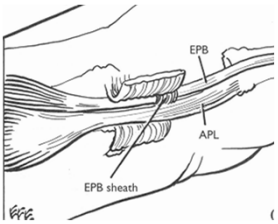
De Quervain's Tendonitis: Treatment

- Splint immobilization (variable response)
- Corticosteroid injection
  - 50-80% success
    - Steroid complications to thin overlying subcutaneous layer
  - Lower success rate with diabetics



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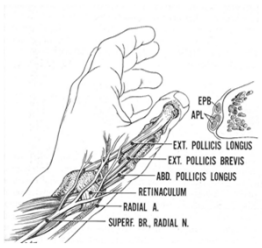
De Quervain's Tendonitis: Pertinent Anatomy

- Anatomic variations—very common
  - Multiple slips
  - Up to 35% with subdivided first extensor sheath
  - Failure to recognize may lead to surgical failure



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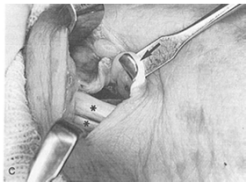
De Quervain's Tendonitis: Surgical Treatment



- Failure of conservative care
- Release of all compartments and decompression of all tendon slips
- Excision of septa within sheath if needed
- Repair of sheath upon completion to prevent tendon subluxation
- Avoidance of superficial radial nerve

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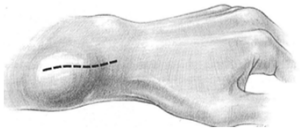
Intersection Syndrome

- Abductor pollicis longus/extensor pollicis brevis crossing radial wrist extensors
- 4 cm proximal to wrist joint
- Tendon entrapment of 2nd dorsal extensor compartment



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Intersection Syndrome

- Activities requiring frequent or repetitive wrist motion
  - For example: rowing, weight lifting

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Intersection Syndrome: Treatment

- Activity modification
- Wrist splint, 15° extension
- Steroid injection, 2nd dorsal extensor compartment
- Majority of patients improved with conservative care

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Intersection Syndrome: Surgical Treatment

- Longitudinal release of the 2nd extensor compartment extending to proximal swollen region
- Early active motion
- Results good with return to full activities, generally at 4-6 weeks

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Extensor Pollicis Longus Entrapment

- 3rd extensor compartment
- Requires early diagnosis to prevent tendon rupture
- Symptoms
  - Pain/tenderness
  - Swelling
  - Crepitus at Lister's tubercle
  - Pain with active/passive/resisted EPL function

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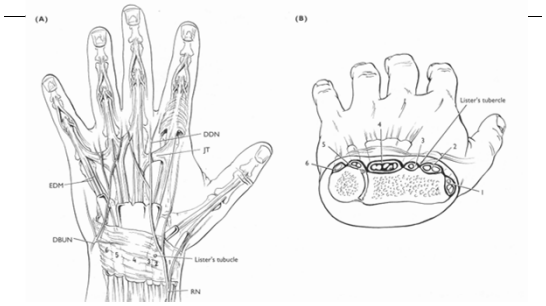

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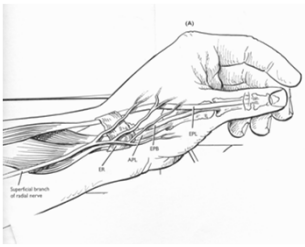
Extensor Pollicis Longus Entrapment: Causes

- Blunt trauma
- Colles' fracture
  - More common in minimally/nondisplaced fractures
- Repetitious thumb activities



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Extensor Pollicis Longus Entrapment/Rupture

- Local ischemia
  - Increased pressure within fibroosseous canal
  - Watershed zone with decreased vascularity
  - Degenerative/inflammatory etiologies for rupture

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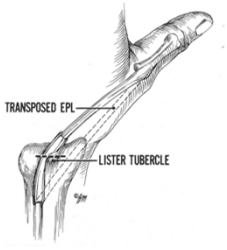
Extensor Pollicis Longus Tendonitis: Treatment

- Prompt operative treatment recommended to prevent attritional rupture
- Translocation of tendon with closure of sheath
- Early range of motion with return to full activities at approximately 4 weeks



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4th and 5th Extensor Compartment Entrapments

- Rare
- More common in rheumatoid patients
- Extensor indicis proprius tenosynovitis
  - Distal extensor indicis proprius muscle belly within retinacular sheath
  - Pain with resisted MP joint extension with wrist flexed

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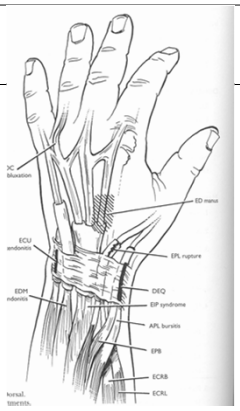

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5th Extensor Compartment Entrapment

- EDQ tendon
- Resisted small finger extension testing

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4th and 5th Extensor Compartment Entrapments: Treatment

- Rest
- Anti-inflammatories
- Steroid injections
- Surgical decompression
  - Accessory tendons
    - EDBM

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Extensor Carpi Ulnaris Entrapment

- Ulnar-sided wrist pain
- Twisting injury common cause
- Findings
  - Pain/possible night pain
  - Dysesthesias of dorsal ulnar sensory branch
  - Possible associated TFCC tears
  - Swelling at 6th extensor compartment with crepitus
  - Possible instability
  - Pain worsened with wrist motion, especially extension-ulnar deviation
- MRI helpful

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Extensor Carpi Ulnaris Tendonitis: Treatment

- Conservative
  - Rest
  - Splint
  - Anti-inflammatories
  - Possible casting
  - Steroid injections
- Surgical
  - Decompression
  - Retinacular reconstruction for stabilization

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Extensor Carpi Ulnaris Tendon: Surgical Recovery

- Decompression
  - 4-6 weeks
- Stabilization
  - 10-12 weeks

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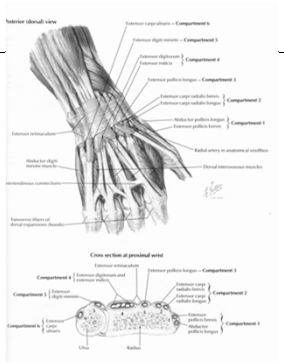
Stabilization



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Flexor Carpi Radialis Tendonitis

- Entrapment of the FCR tendon across the ridge of the trapezium within a tight fibrous canal
- Differential diagnosis
  - Ganglion cyst
  - 1st CMC joint osteoarthritis
  - STT joint osteoarthritis
  - Scaphoid fracture/nonunion
  - De Quervain's tendonitis

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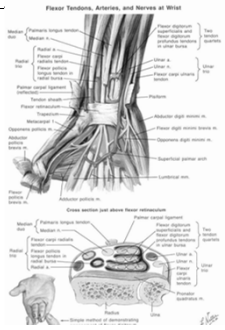
Flexor Carpi Radialis Tendonitis

- Pain at palmar wrist crease radially over scaphoid tubercle
- Increased pain with resisted wrist flexion
- Localized swelling
- Most common in women, age 50-60



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Flexor Carpi Radialis Tendonitis

- Caused by repetitive flexion-extension of the wrist
- Possible cause, blunt trauma
- Associated with scaphotrapezium trapezoid degenerative joint disease which may lead to attritional rupture

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Flexor Carpi Radialis Tendonitis: Treatment

- Conservative
  - Rest
  - Splint
  - Anti-inflammatories
  - Steroid injection
- Surgical
  - Decompression with removal of bony impingement/spurs
  - Return to full activities at 6-8 weeks

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Osteoarthritis

- Degenerative conditions of articular cartilage
- NOT inflammatory arthropathies such as rheumatoid arthritis
- Arthritis without clear etiology
- Most common joint affected, DIP joint
- Second most common, 1st CMC joint

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Thumb Basilar Joint Osteoarthritis/1st CMC Joint Osteoarthritis

- Evolution of human hand/prehensile thumb
- Saddle joint
  - Prehension, opposition, circumduction
- Very common

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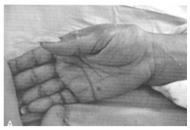
Thumb Basilar Joint Osteoarthritis: Symptoms

- Insidious progression
- Pain at base of thenar eminence, particularly with pinch and grip
- Limits forceful lateral pinch, i.e. turning a key, opening a jar, picking up a book
- Possible feelings of instability
- Thumb collapse/adduction



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Thumb Basilar Joint Osteoarthritis

- Women:Men ratio 10-15:1
- Increasing incidence in aging population
- Work-related mechanical loading may be factor
  - Prolonged exposure to forceful pinching
- Local trauma/injury possible cause/precipitant
- History prior Bennett's fracture

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Thumb Basilar Joint Osteoarthritis: Physical Examination

- Localized tenderness
- Positive grind test
- Swelling
- Crepitus
- Deformity
- Instability

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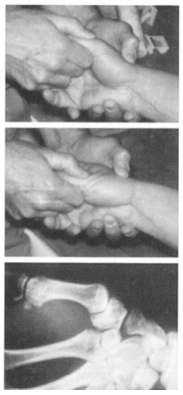
Thumb Basilar Joint Osteoarthritis



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Thumb Basilar Joint Osteoarthritis: Differential Diagnosis

- De Quervain's tendonitis
- FCR tendonitis
- STT degenerative joint disease
- Scaphoid fracture/nonunion
- Commonly occurs with carpal tunnel syndrome

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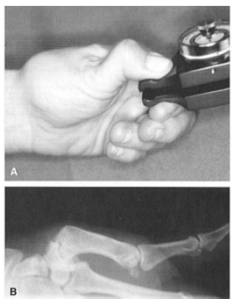
Thumb Basilar Joint Osteoarthritis

- Assess thumb MP joint for hyperextension/instability
  - Associated with thumb adduction
- Assess STT joint for involvement



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Thumb Basilar Joint Osteoarthritis

- Worker's Compensation concerns
  - Etiology
    - Pre-existing condition
    - Temporary aggravation
    - Trauma/injury as initial presentation
    - Prolonged forceful pinch exposure
  - Progressive symptoms

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Thumb Basilar Joint Osteoarthritis

- Conservative treatment
  - NSAIDS
  - Steroid injections (early)
  - Thumb spica splint/sleeve
  - Glucosamine and Chondroitin

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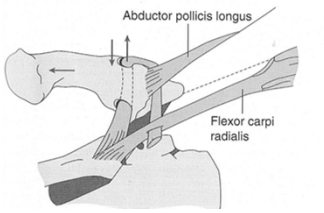
Thumb Basilar Joint Osteoarthritis: Surgical Treatment Early (Stage I-II)

- Stabilization procedure-Eaton-Littler procedure



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Thumb Basilar Joint Osteoarthritis: Surgical Treatment Early (Stage I-II)

- Metacarpal extension osteotomy
  - Unload palmar contact/shift contact areas to more intact dorsal articular surface

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Thumb Basilar Joint Osteoarthritis: Surgical Treatment Early (Stage I-II)

- 1st CMC joint arthroscopy debridement
  - +/- positive capsular shrinkage

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Thumb Basilar Joint Osteoarthritis: Surgical Treatment Advanced Disease

- Procedure that replaces/removes degenerated articular surface
  - Trapezium excision
    - Open/arthroscopy
  - Carpometacarpal joint fusion
  - Arthroplasty/interposition/LRTI/implant

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Thumb Basilar Joint Osteoarthritis: MP Joint Hyperextension

- Greater than 20-30° hyperextension causes collapse and increased stress on CMC joint ligament reconstruction
- Must address surgical correction with volar capsulodesis or joint arthrodesis
  - EPB release/transfer

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Thumb Basilar Joint Osteoarthritis: Trapezial Excision

- Good results--generally
- Possible instability concerns
- Open/arthroscopic
- Hematoma and distraction
- Trapezial excision with tendon interposition
  - Artelon

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Thumb Basilar Joint Osteoarthritis: CMC Joint Arthrodesis

- Good long-term results
- Shortcomings
  - Limited motion
  - Degenerative joint changes at adjacent joints
  - Hardware complications
  - Nonunion risk
  - Reserved for young, heavy manual laborers

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Thumb Basilar Joint Osteoarthritis: Implant Arthroplasty

- Multiple attempts over many years
  - Risks of loosening, subluxation/dislocation
  - Not reliable at this stage

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Thumb Basilar Joint Osteoarthritis: Ligament Resection Tendon Interposition (LRTI)/Resection Arthroplasty

- Reliable
  - Improved grip strength, 50-90%
  - Improved pinch strength, 30-60%
- Literature unequivocally supports LRTI arthroplasty

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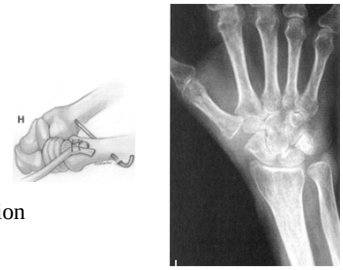
Thumb Basilar Joint Osteoarthritis: LRTI

- Trapezial resection with FCR tendon harvest
- One half of FCR tendon-ligament reconstruction
- One half of FCR tendon—interposition



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Thumb Basilar Joint Osteoarthritis: LRTI

- Four weeks immobilization
- Return to full activities at 3-4 months
- Two months of therapy

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Thumb Collateral Ligament Injury

- Ulnar/radial
- Etiology
  - Generally traumatic
  - Possible inflammatory causes

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Thumb MP Joint Ulnar Collateral Ligament Injury

- Gamekeeper's thumb
- Skier's thumb
  - Forced radial deviation
  - Distal tear off proximal phalanx—most common
  - Fracture possible

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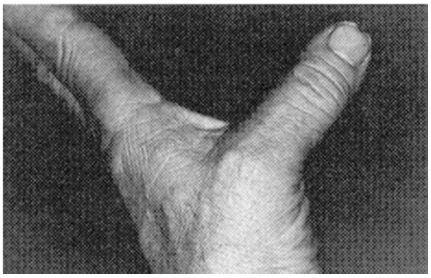
Ulnar Collateral Ligament Tear



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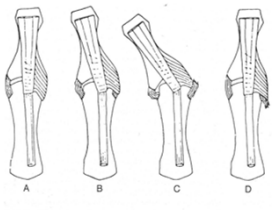
Thumb MP Joint Ulnar Collateral Ligament Injury: Acute Tear

- Clinical examination
  - 30° joint angulation with stress
  - No end point to stress
  - X-rays to rule out fracture
  - Palpate for Stener lesion
- Distal tear most common



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Thumb MP Joint Ulnar Collateral Ligament Injury: Acute Tear

- Treatment
  - Grade I/Grade II
    - Immobilization (splint/cast)
  - Grade III/Stener lesion
    - Surgical management/repair
    - Role of MRI
    - Most authors believe nonoperative treatment of Grade III lesions have unpredictable outcomes

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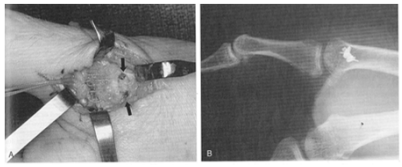
Thumb MP Joint Ulnar Collateral Ligament Injury: Acute Tear

- Arthroscopic-assisted/ open repair
  - Postoperative immobilization
  - Occupational therapy
  - Unrestricted activities 10-12 weeks
  - Possible stiffness, but stable



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Chronic Ulnar Collateral Ligament Injuries MP Joint

- Nonrepairable lesions greater than 2-4 weeks after injury
- Joint condition/x-ray
- Options
  - Conservative care
  - Ulnar collateral ligament reconstruction with graft
  - MP joint fusion
- 3-4 months before unrestricted activities

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Thumb MP Joint Radial Collateral Ligament Injury

- Mechanism
  - Forced adduction
  - Torsion on flexed MP joint
- Tears equally common proximal, distal, and mid substance
- Rotatory deformity possible

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Thumb MP Joint Radial Collateral Ligament Injury

- Evaluation
  - Ecchymosis
  - Swelling
  - Instability
    - 30-35° laxity/absence of firm end point
  - Possible dorsoradial prominence of metacarpal head
  - X-rays necessary to rule out fracture

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Thumb MP Joint Radial Collateral Ligament Injury: Treatment

- Grade I/II
  - Cast/splint immobilization
- Grade III
  - Immobilization
    - No rotation
    - Stener lesion not present on radial aspect
  - Surgical repair/reconstruction

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