

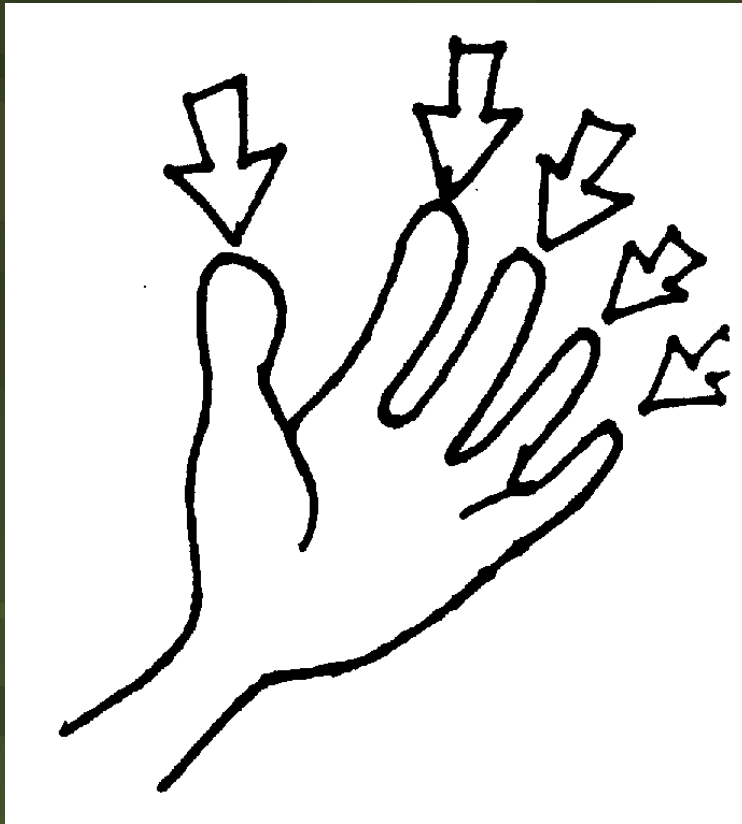
Hand and Wrist Injuries



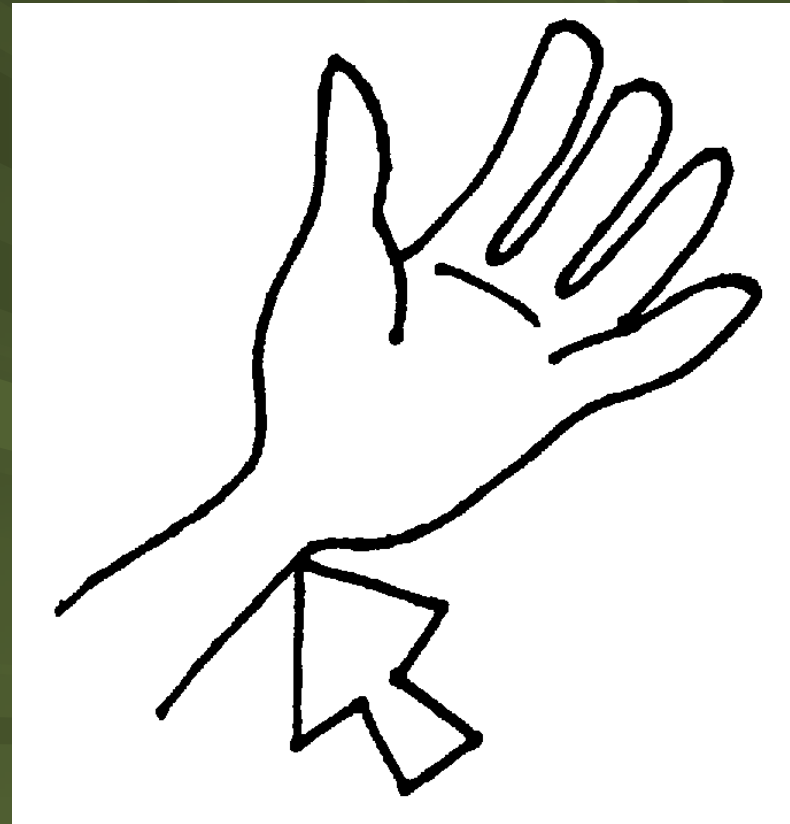
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HAND AND WRIST

■ HAND



■ WRIST



HAND FUNCTIONS

■ 45% GRASP

■ 45% PINCH

– Side pinch

– Tip pinch

– Chuck pinch

■ 5% GRASP

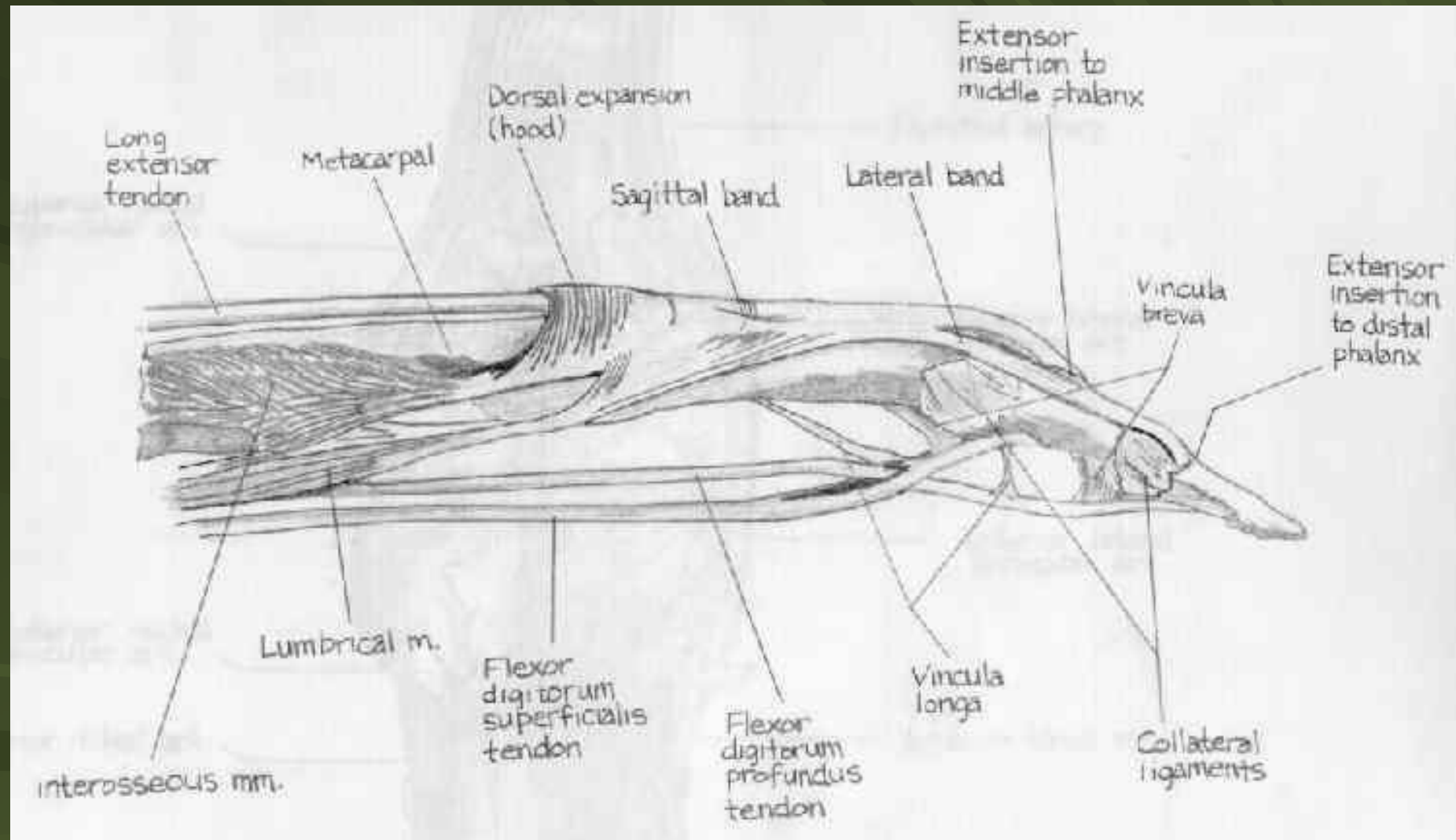


■ 5% GRASP



HAND & FINGER ANATOMY

- 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

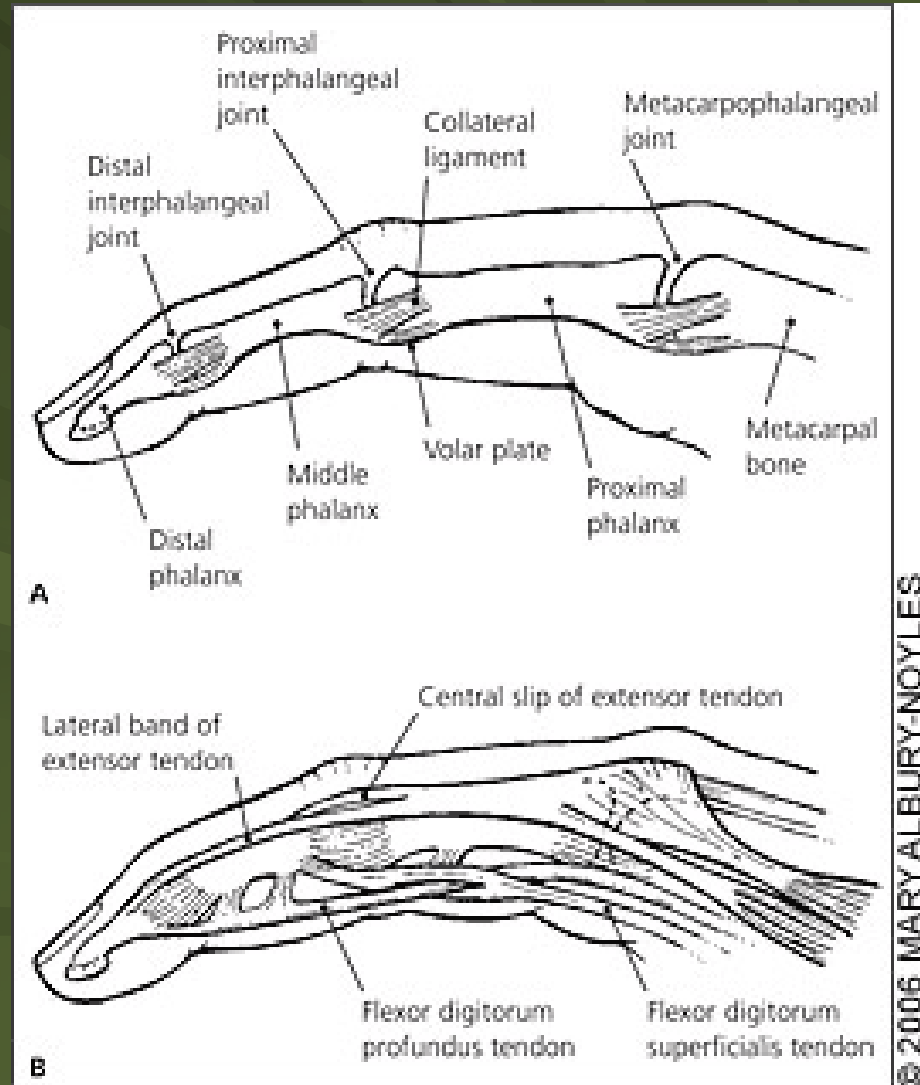
digits

■ 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

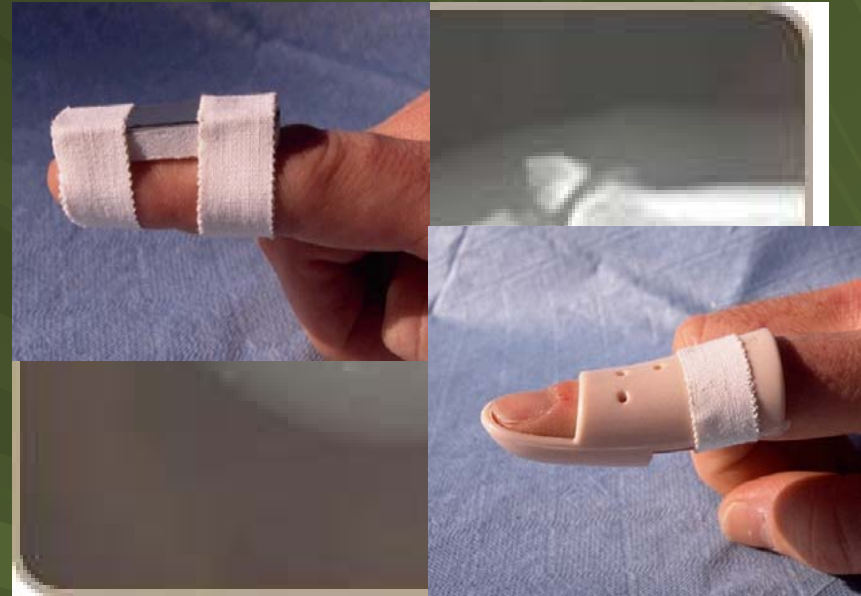
- Dorsal avulsion
- Extensor digitorum tendon tear

■ 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.

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JERSEY FINGER



JERSEY FINGER

■ ANATOMY:

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

■ MECHANISM:

- Forced extension of flexed finger

■ TREATMENT:

- Refer immediately



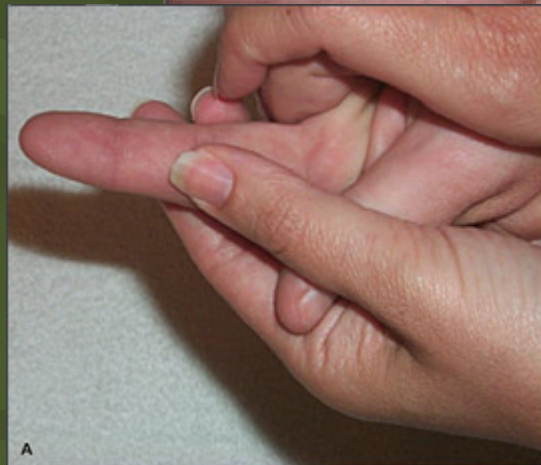
■ COMPLICATIONS:

- Permanent loss of flexion

JERSEY FINGER

■ 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



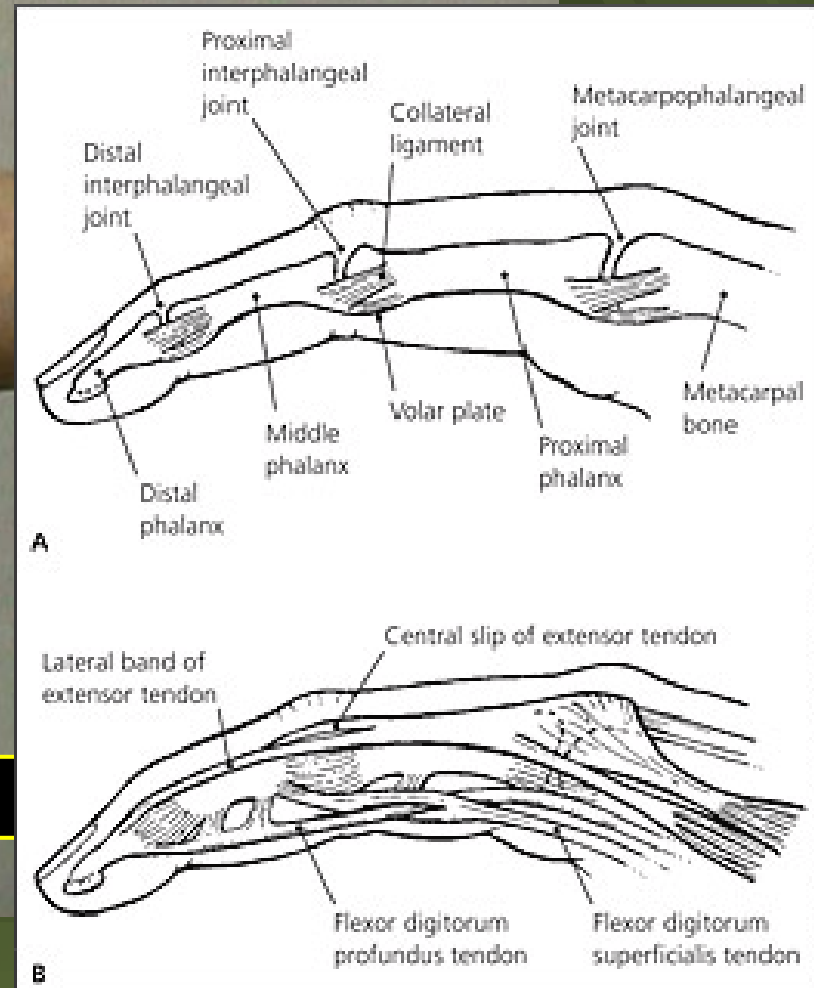
VOLAR PLATE RUPTURE

■ TRE

- E
- E
- B
- R
- in

■ COM

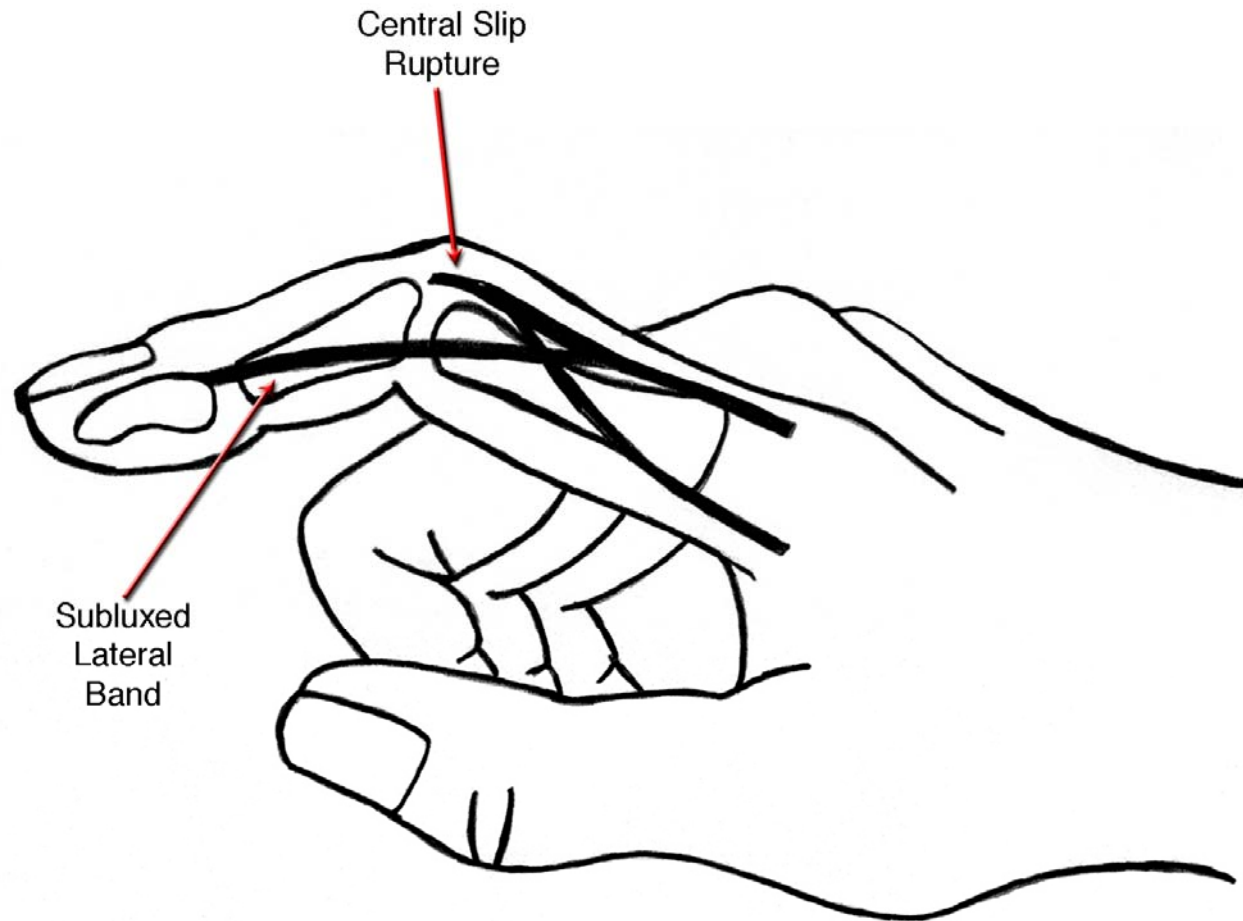
- S
- ex
- P
- hyperextension, D
- flexion



CENTRAL SLIP AVULSION

■ A

■ M



CENTRAL SLIP AVULSION

■ EXAM:

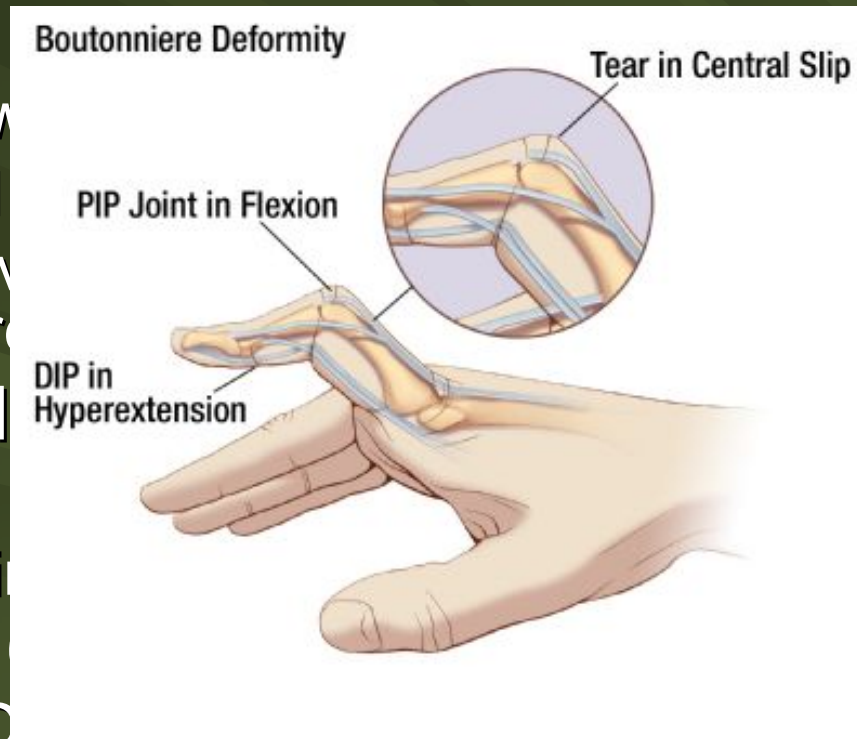
- Pain, swelling
- PIP in 10-15 degrees
- May have 30 degrees

■ TREATMENT:

- Refer if severe
- PIP splint
- Protect
- *allow DIP to flex - releases lateral bands

■ COMPLICATIONS:

- Boutonniere deformity



0 degrees than

th avulsion fx

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

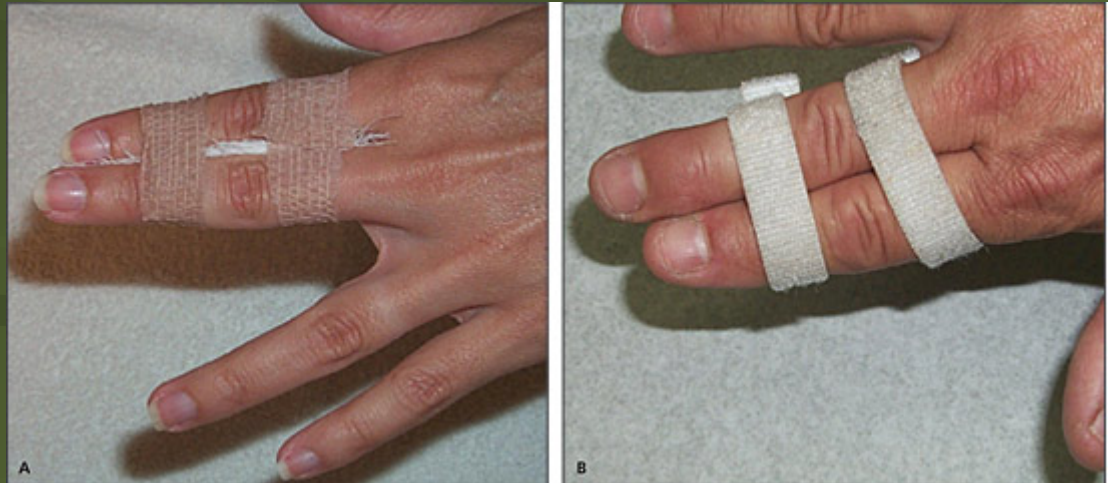
COLLATERAL LIGAMENT TEARS

■ TREATMENT:

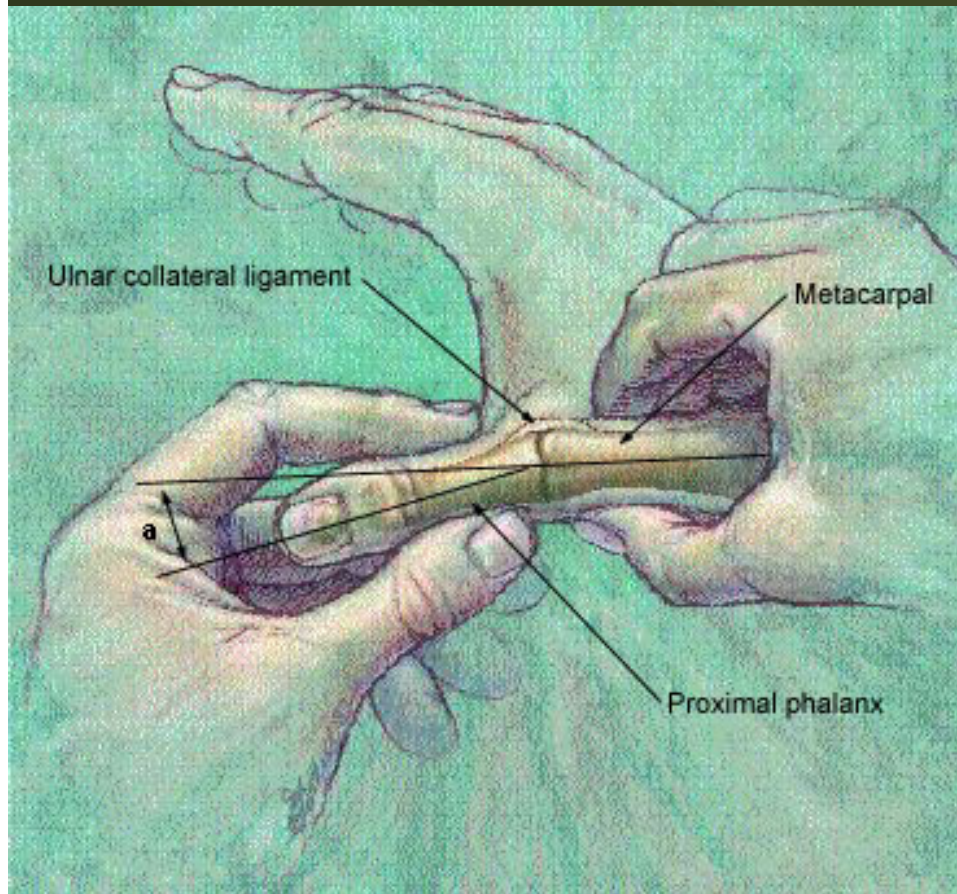
- Buddy tape for 3 weeks
- If unstable with active ROM or obvious deformity → refer

■ 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

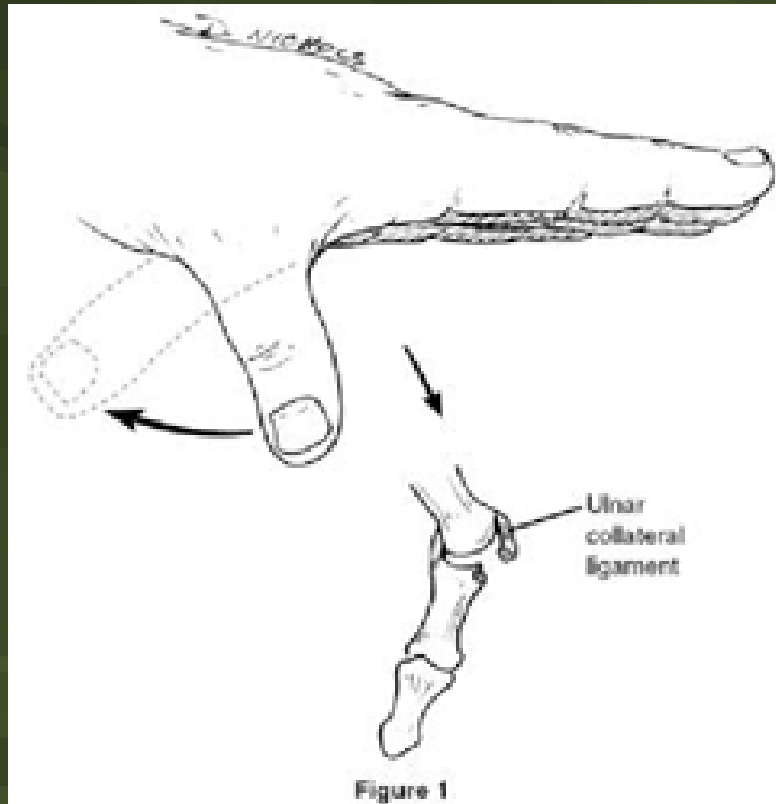
GAMEKEEPER'S THUMB

■ SIGNS

- Pain over ulnar thumb
- Stress testing positive
 - Testing in FULL FLEXION of MCP



GAMEKEEPER'S THUMB

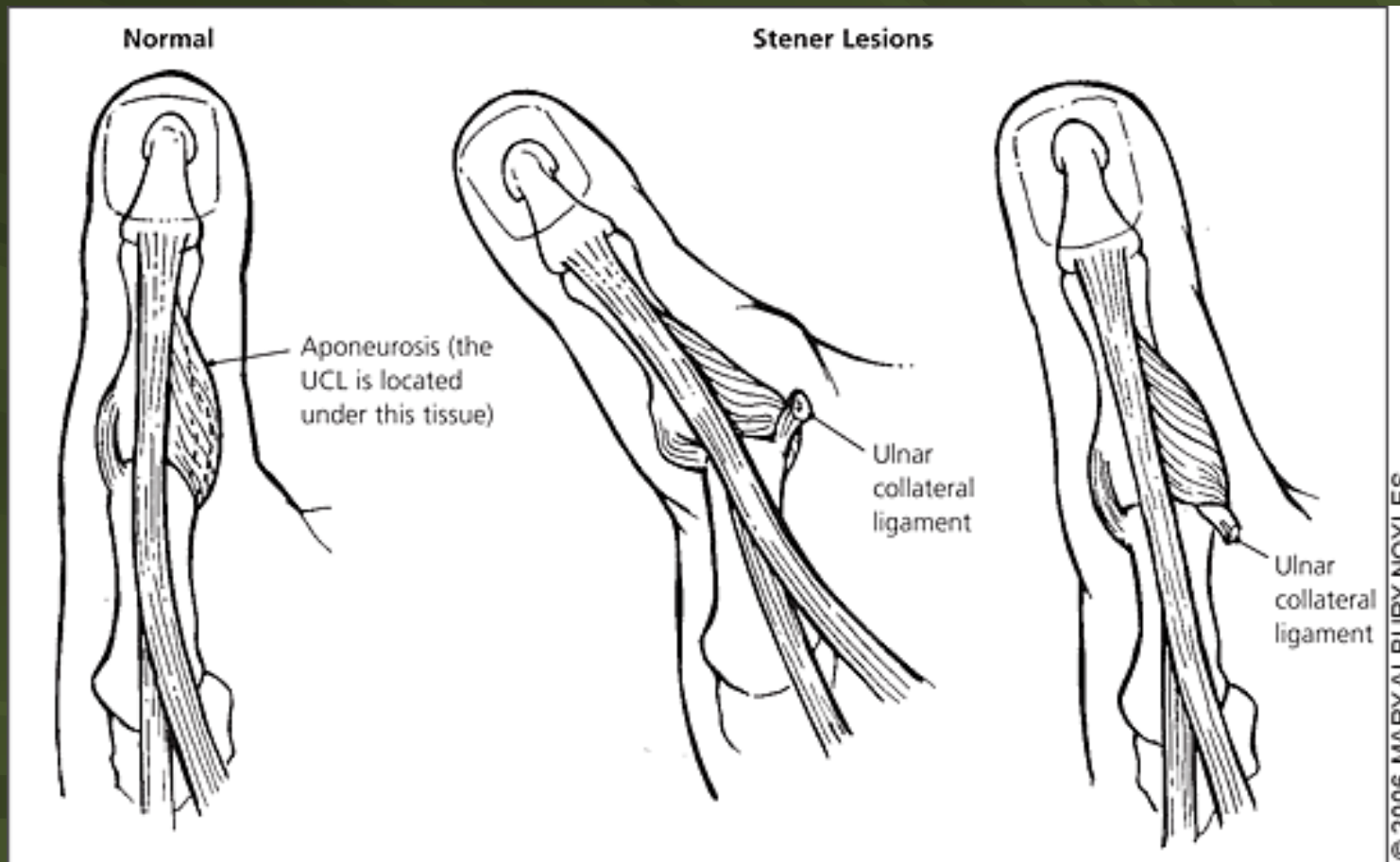


■ TREATMENT

- 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



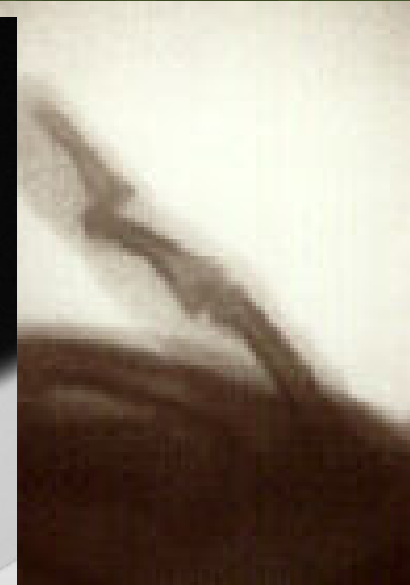
DIP JOINT DISLOCATION

■ MECHANISM

- Hyperextension

■ ANATOMY

- Usually
- Rare
- Strong



by prevent

■ TREATMENT

- Reduction: digital block first
- Splint in 20-30 degrees flexion for 10-14 days

PIP JOINT DORSAL DISLOCATION

(COACH'S FINGER)

■ MECHANISM

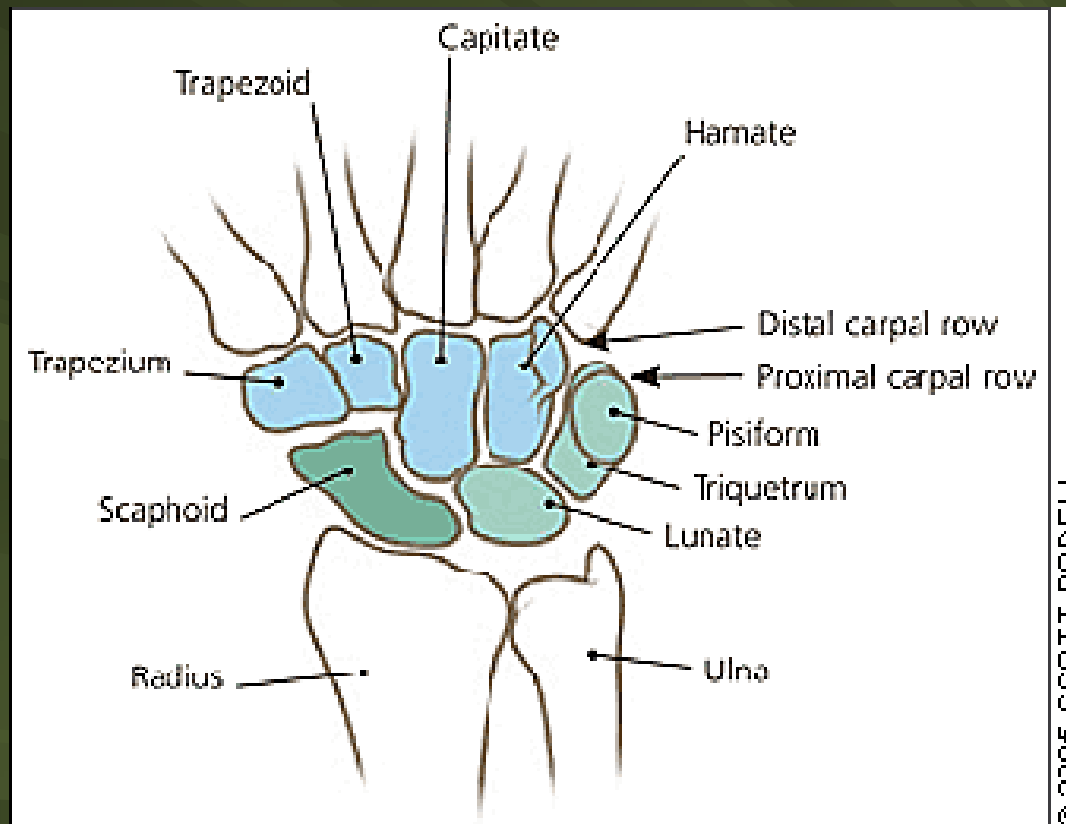
BEWARE OF THE VOLAR DISLOCATION

■ 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



Wrist #1

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

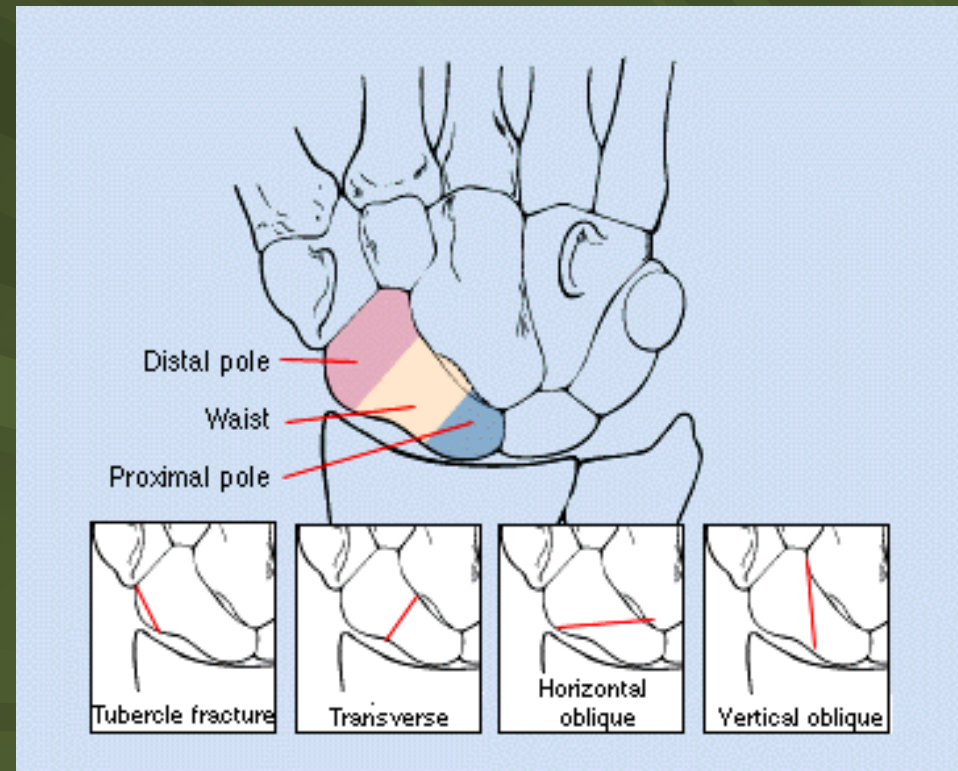






Scaphoid Fracture Pathoanatomy

- 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



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

Wrist #2

- 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

Figure 2: Mary Albury-Noyes

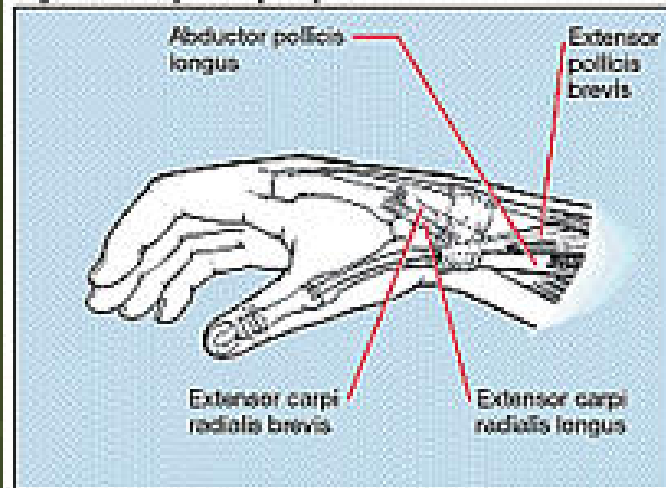


Figure 2. De Quervain's tenosynovitis involves relative narrowing of the tendons that make up the first dorsal compartment: the extensor pollicis brevis and abductor pollicis longus. Intersection syndrome involves inflammation at the junction of the first and second dorsal compartments. The second compartment consists of the extensor carpi radialis longus and extensor carpi radialis brevis tendons.



DEQUERVAIN'S TENOSYNOVITIS

Figure 1

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

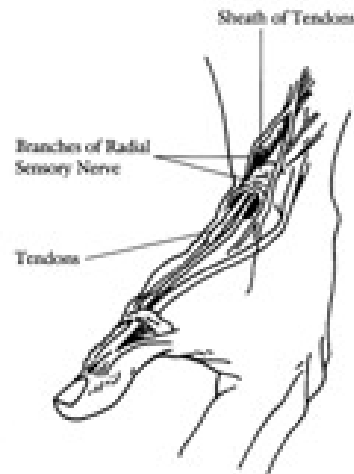


Figure 2

Finkelstein maneuver used to diagnose deQuervain's tendinitis.

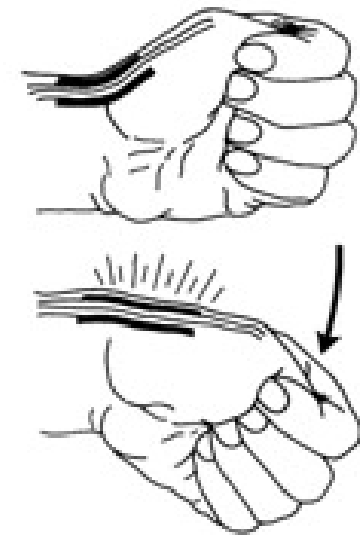
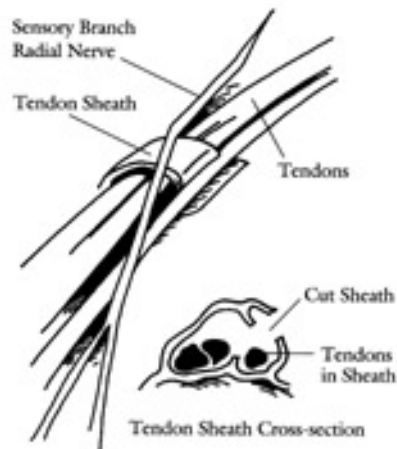


Figure 3

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



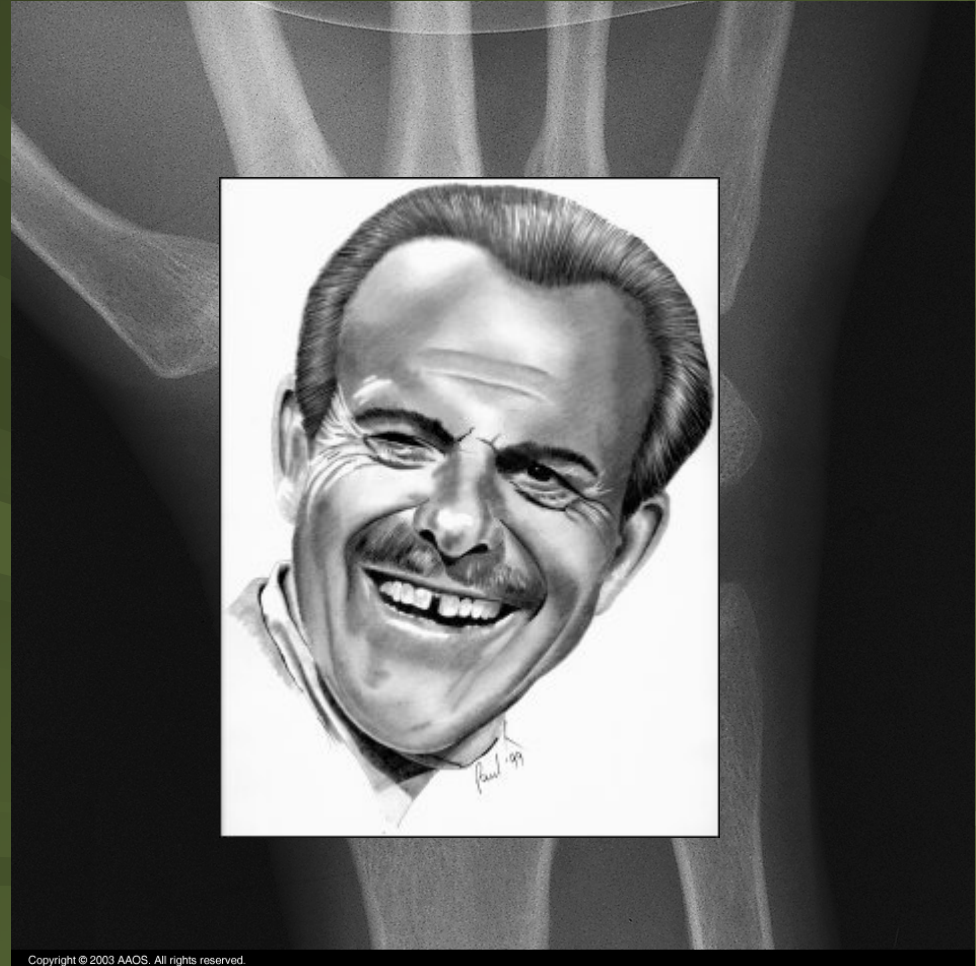
Wrist #4

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





SCAPHOLUNATE DISSOCIATION



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SCAPHOLUNATE 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

Wrist #5



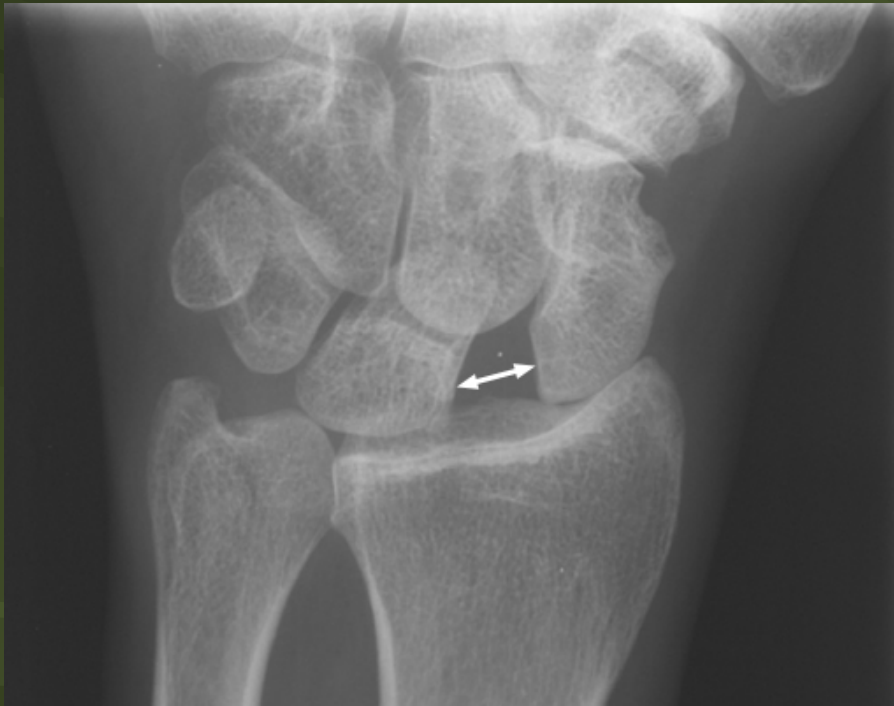
- Soccer player has pain in pinky side of wrist after a fall

Triangular Fibrocartilage Complex (TFCC) Tear

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

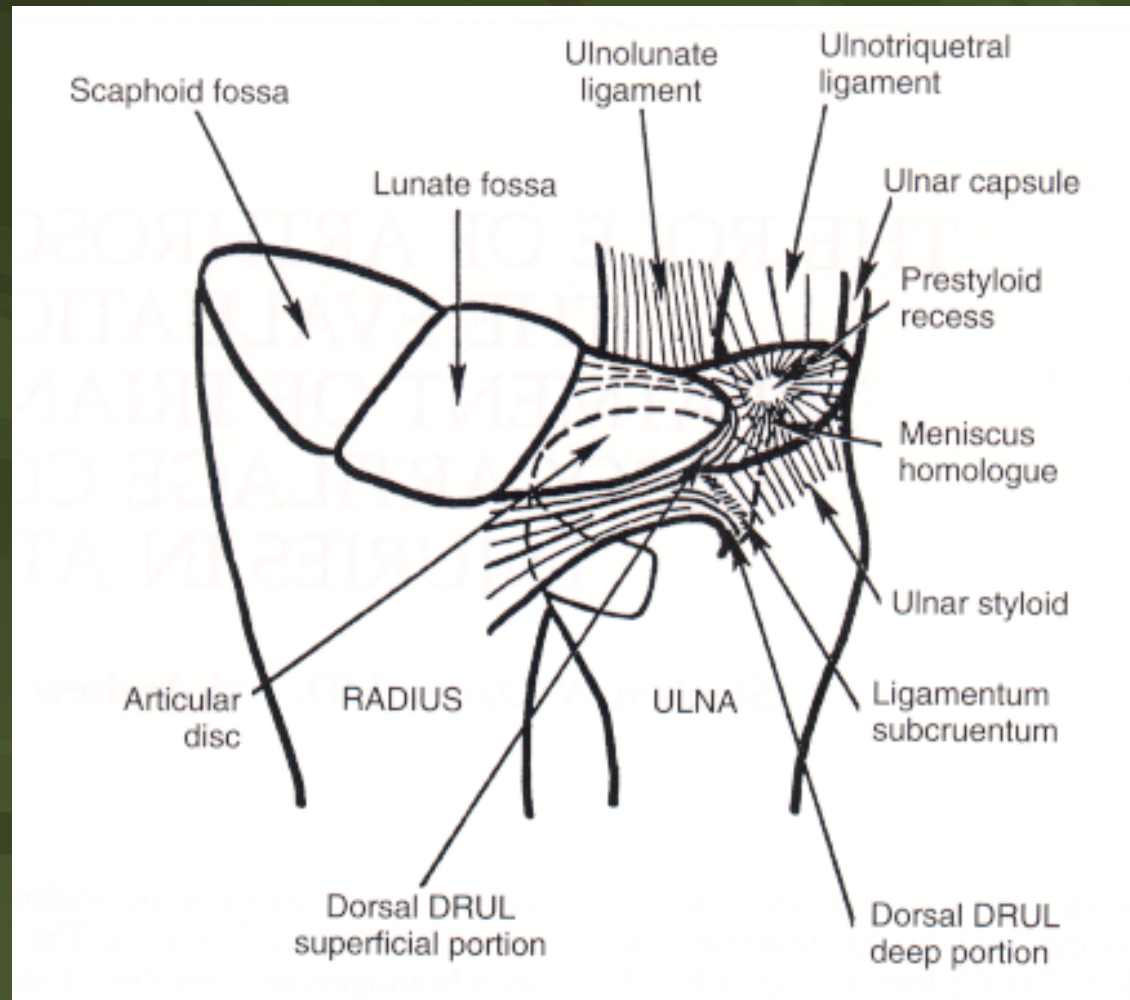


TFCC Tear Pathoanatomy



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

TFCC Anatomy



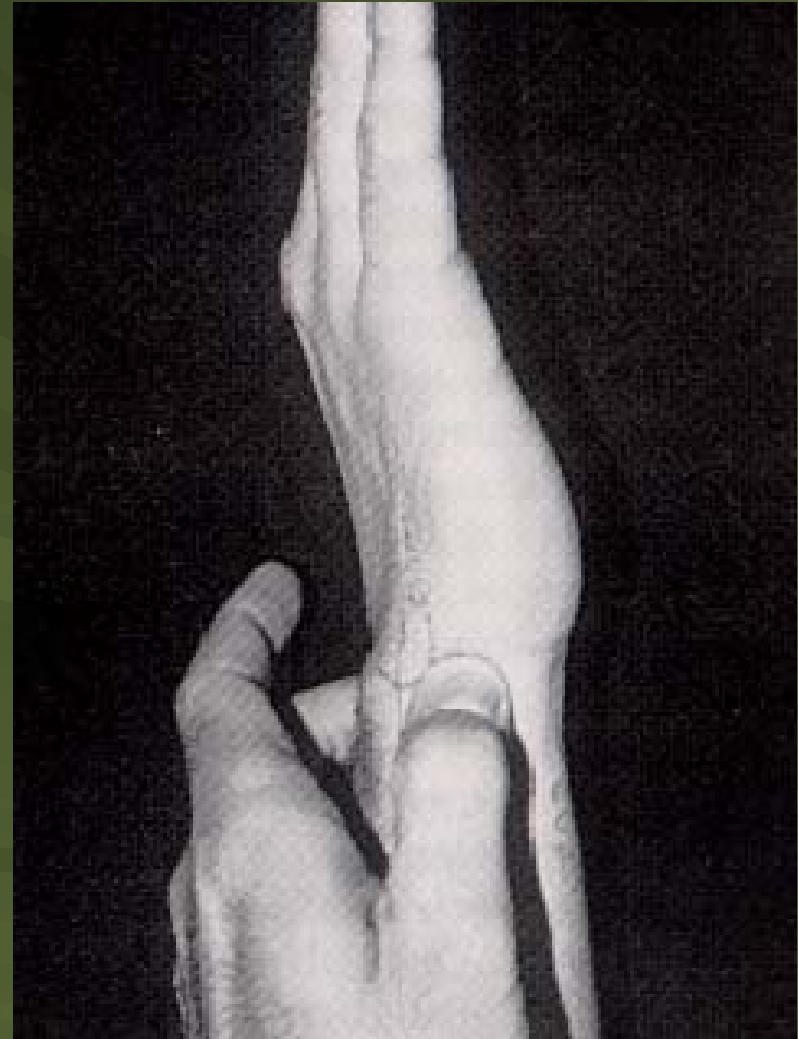
TFCC Tear History

- Ulnar-sided wrist pain aggravated by pronation/supination

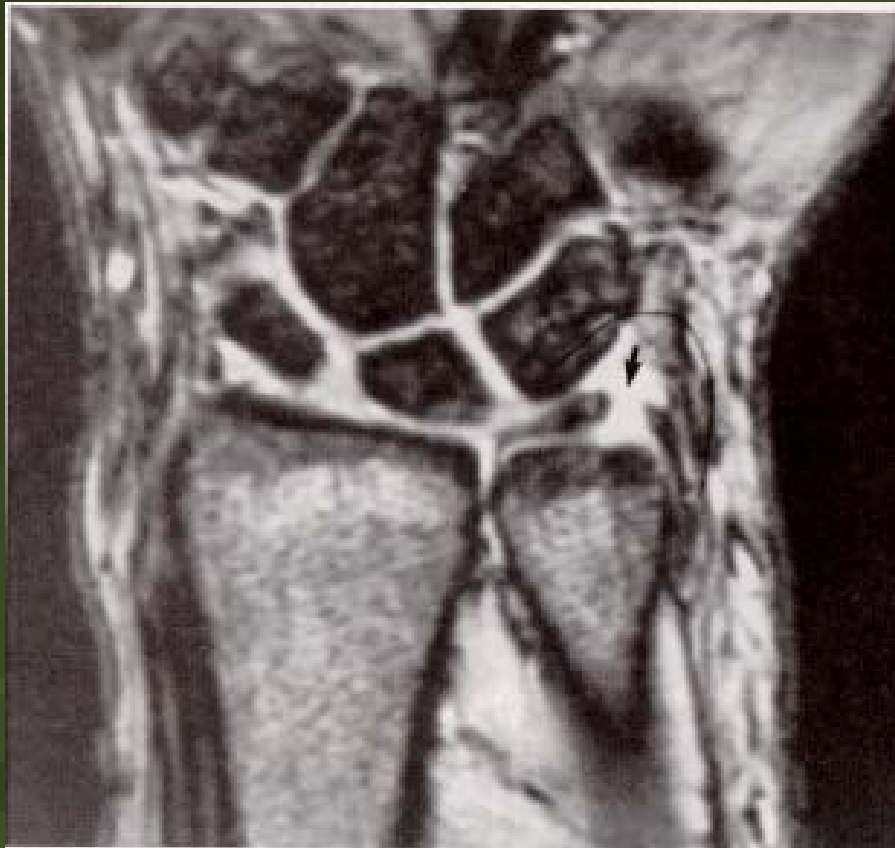


TFCC Tear Physical

- 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

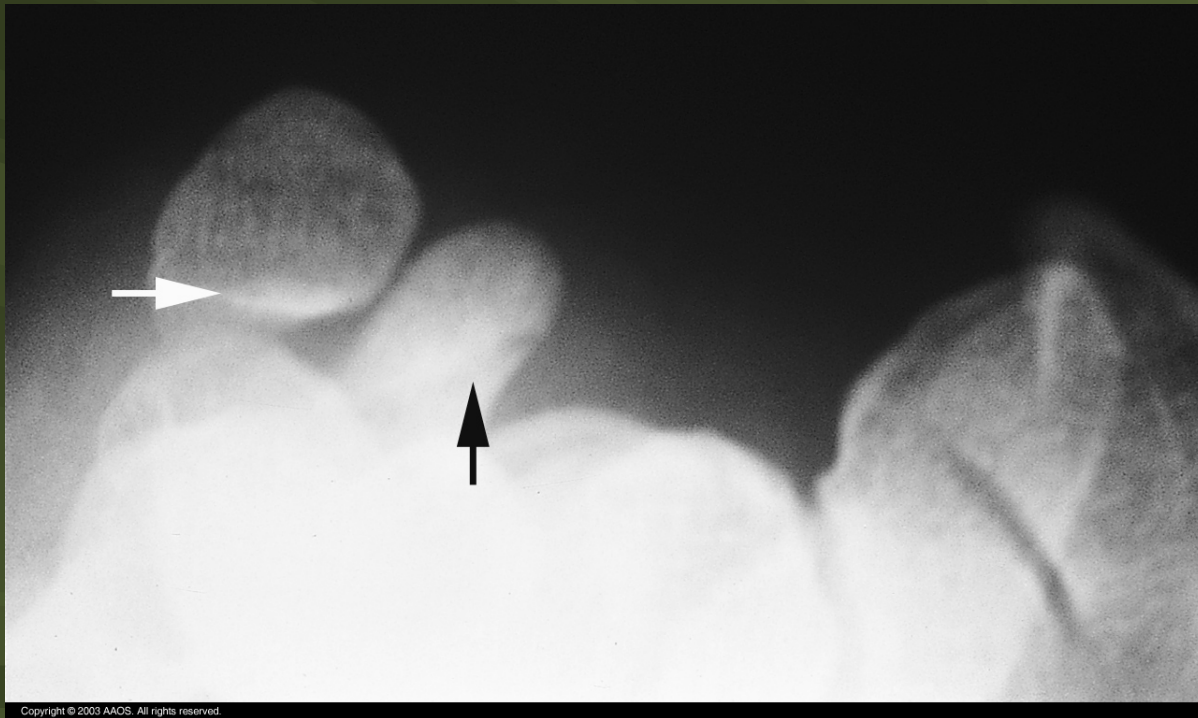


GOLFER'S FRACTURE

- 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



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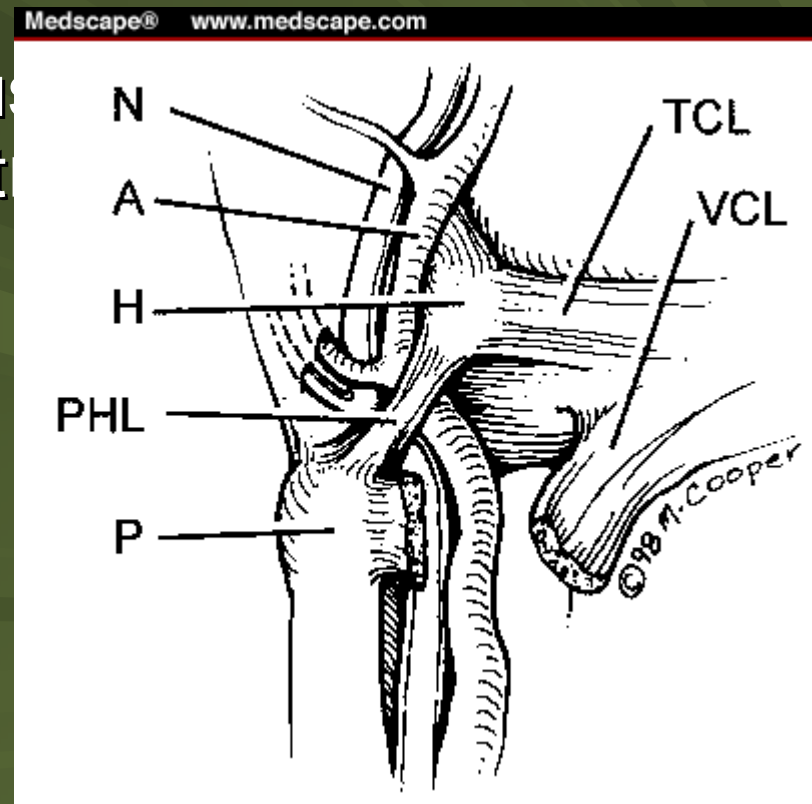
GUYON'S CANAL SYNDROME

■ ANATOMY

- Ulnar nerve rides between pisiform and hamate
- Feeds interosseous muscles, lumbricals (int)

■ 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 interosseus median nerve branch from deep fascia of pronator teres or flexor digitorum superficialis tendon
- Innervates:
 - flexor pollicis longus
 - flexor digitorum profundus
 - pronator quadratus