

# Hand Injuries 101



**Sonu A. Jain, MD, FACS**

Associate Professor of Plastic Surgery and Orthopaedic Surgery

Hand and Upper Extremity Center

The Ohio State University Wexner Medical Center

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So what are the basic steps when  
evaluating a hand injury?



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## Step 1:

### Contextualize the hand injury

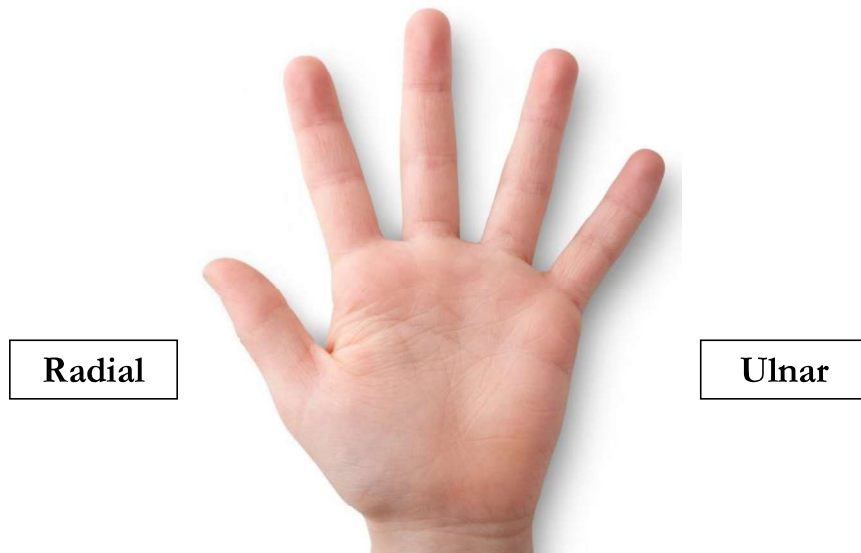
- Patient age
- Handedness
- Occupation
- Smoker or Diabetic
- Mechanism of injury
- How is this problem affecting their life?

## Step 2:

### Identify and be able to describe the injury location



# Ulnar/radial....not medial/lateral



Thumb, index, middle,  
ring, small fingers...  
Not 1-5th



## Step 3:

Get good x-rays

- **What constitutes good PA and lateral wrist views?**

## The PA view of wrist

- **3<sup>rd</sup> MC inline with radial shaft**
- **ECU groove projects radial to ulnar styloid**





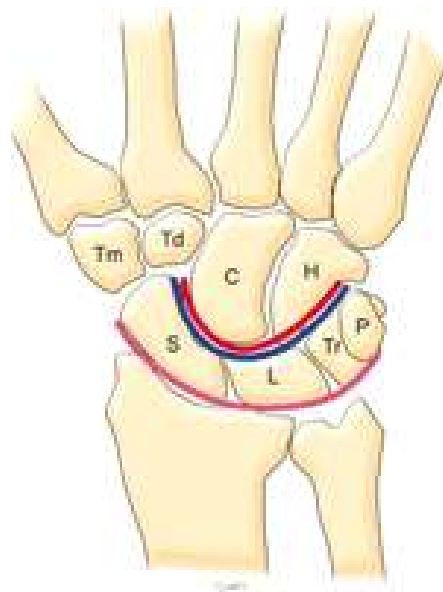
## Lateral view of wrist

- Appreciate the carpals on the lateral
- Pisiform overlaps scaphoid tubercle



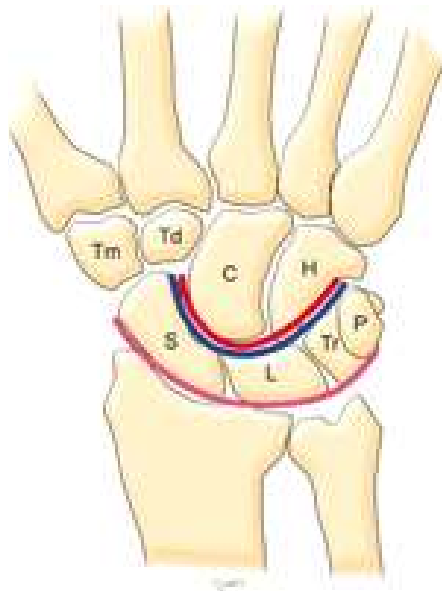
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What are these lines?



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## Gilula's arcs



**-Broken arc, strongly suggestive of injury**

- No fracture. Ok to f/u PRN?



## ■ Terry Thomas sign



- Will develop arthritis!
- “ACL injury” of the wrist!



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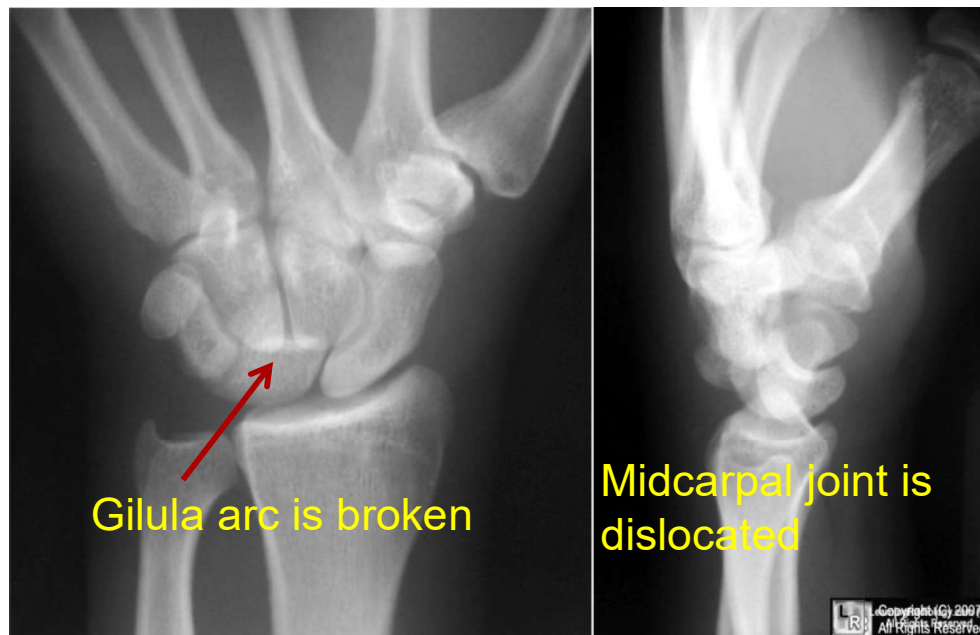
## ■ No fracture. Ok to f/u PRN?



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- No fracture. Ok to f/u PRN?



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## Step 4:

Anatomy is complex!

- The hand exam is just applied anatomy
- If there is a laceration/injury, think about what may be in that area.



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## Step 5:

### Describe the exam

- **The hand/wrist exam can be challenging**



# Hand/Wrist Exam 101

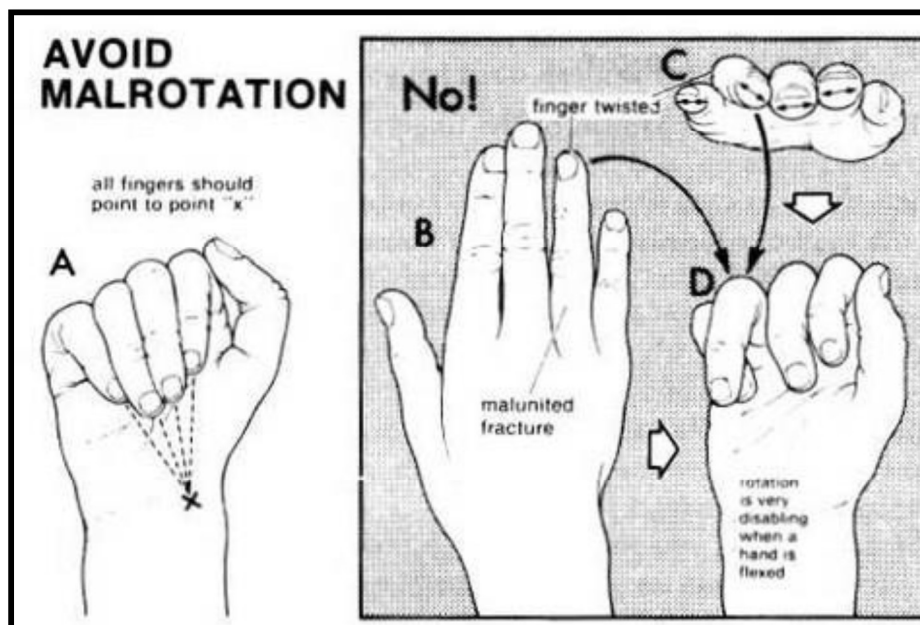
# Bone Examination

- Exposed bone?
- Exposed joint?



- Assess digit malrotation if indicated:
  - How?

- When flexing fingers, all digits should point toward the scaphoid tubercle



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# ■ Nerve Exam



## ■ What motor nerves do you test?

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# ■ What motor nerves do you test?

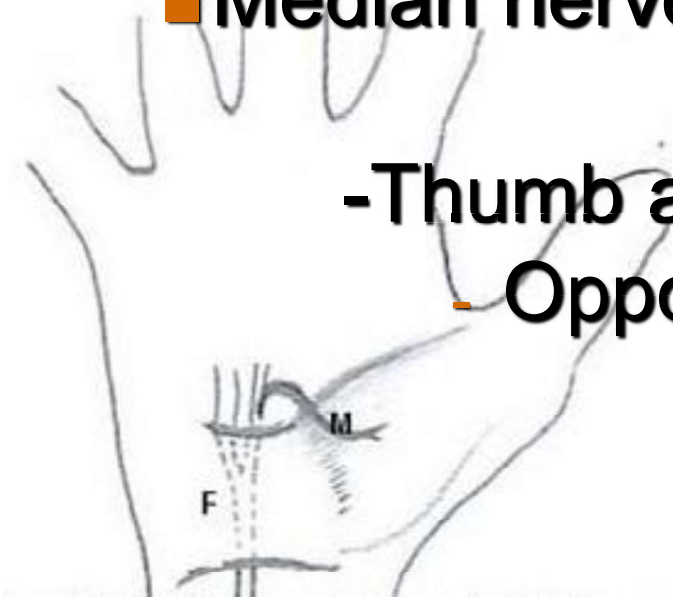
- Median
- Radial
- Ulnar
- PIN
- AIN

## ■ How do you test the median nerve?

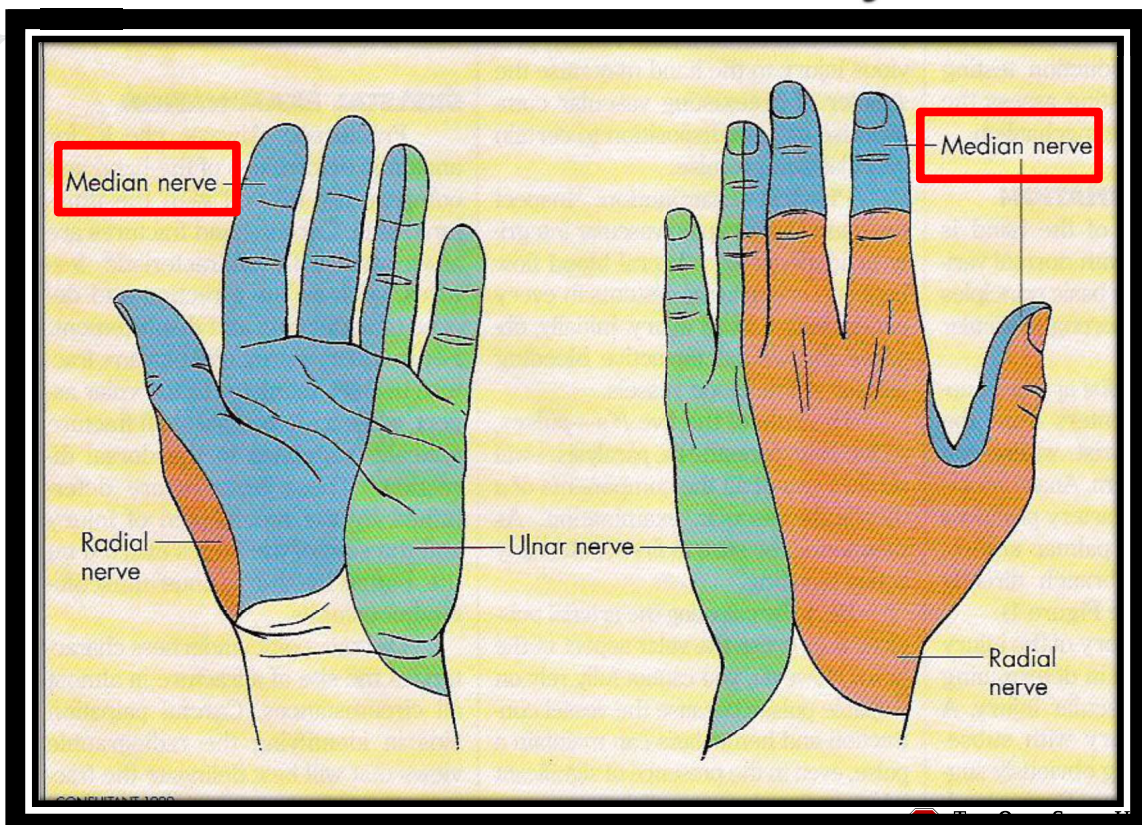


## ■ Median nerve motor exam:

- Thumb abduction
- Opposition



## ■ Median nerve sensory exam:



# ■ How do you test the radial nerve?

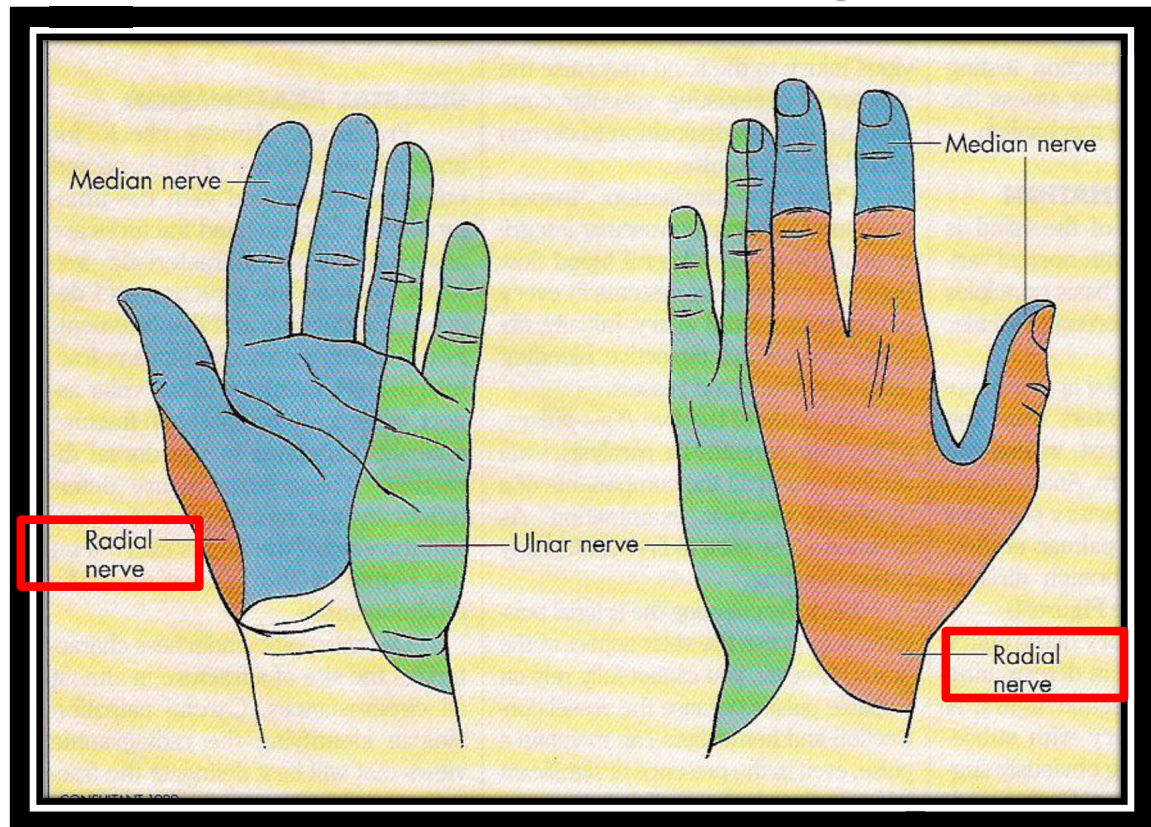
## ■ Radial nerve motor exam:

### -Wrist extension



Extensor carpi radialis longus  
Extensor carpi ulnaris

## ■ Radial nerve sensory exam:

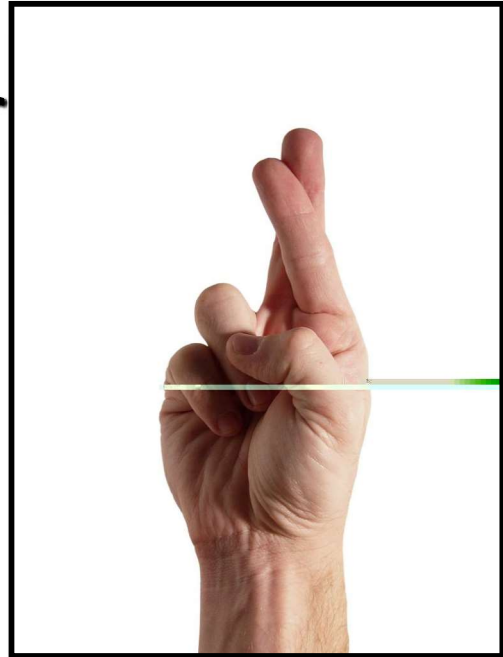


## ■ How do you test the ulnar nerve?



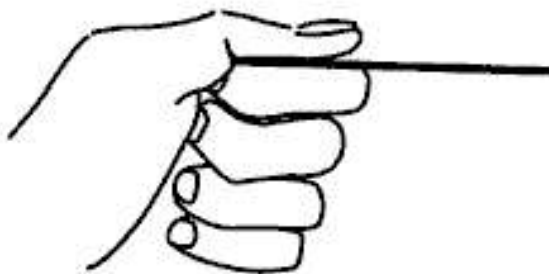
## ■ Ulnar nerve motor exam:

- Finger adduction
- Finger abduction



## ■ Froment's sign

**Normal**



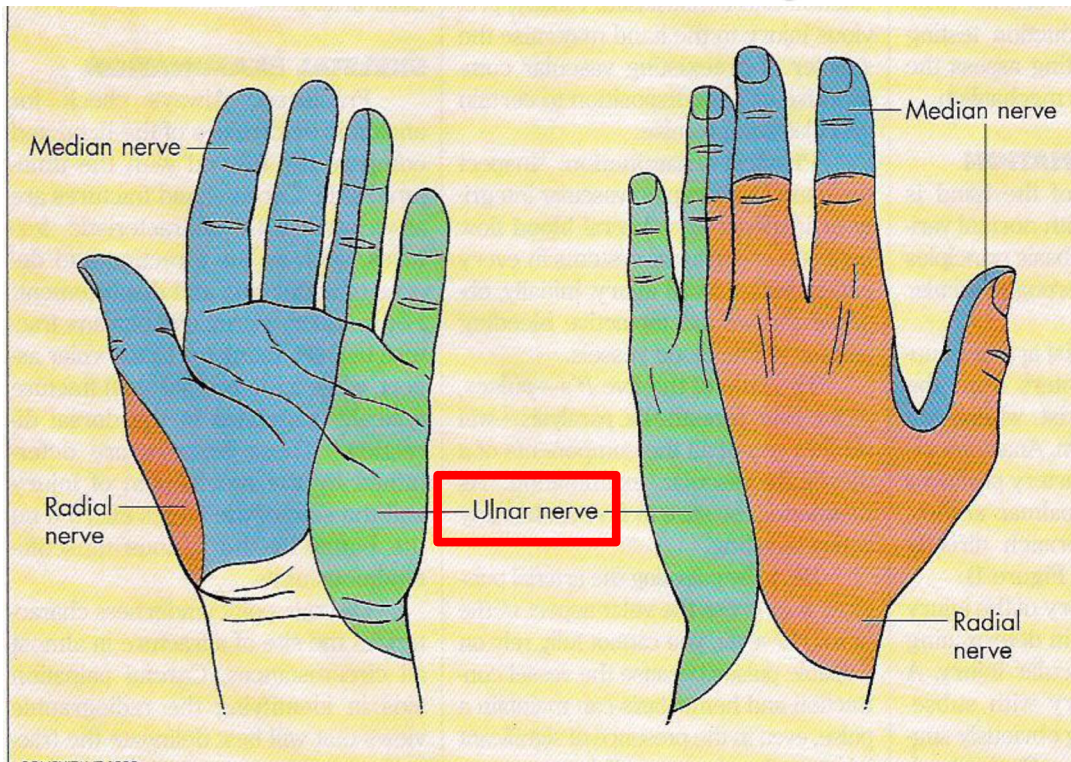
Using Adductor Pollicis

**Froment's positive**



Using Flexor Pollicis Longus

## ■ Ulnar nerve sensory exam:



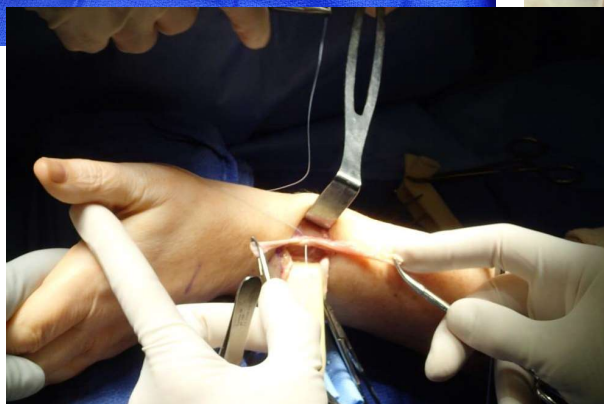
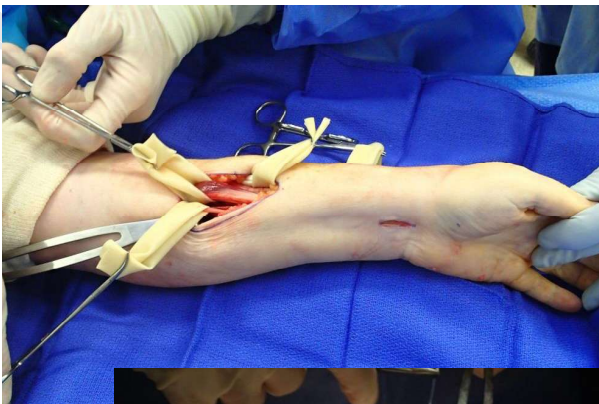
## ■ How do you test the PIN?

## ■ PIN motor exam:

- Finger extension at MP joint
- Thumb extension (lift thumb off table)



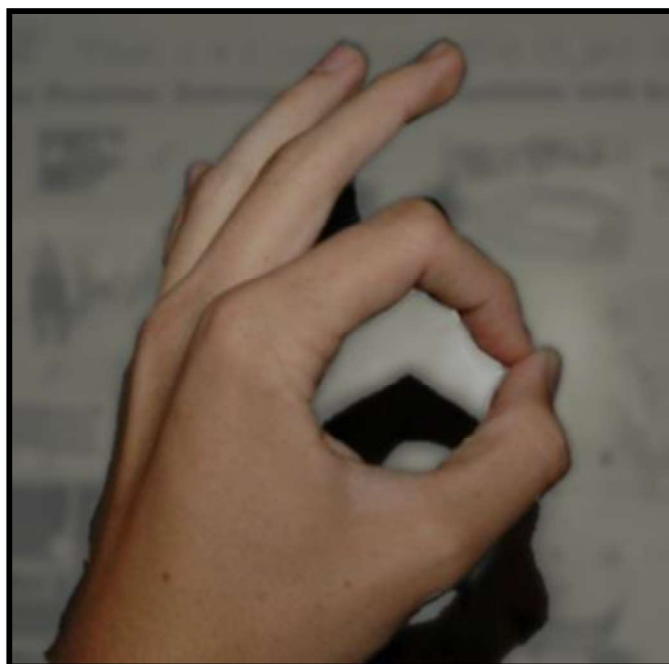
## Radial Nerve Injury – Tendon Transfers



## ■ How do you test the AIN?

## ■ AIN motor exam:

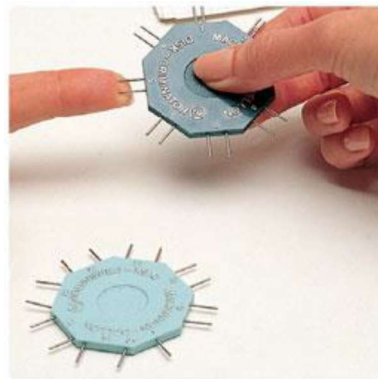
**OK SIGN**





## ■ How do you test sensation for each digit?

### 2 point discrimination





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■ What is a normal static 2 PD?

5 mm

(>15mm absent)

■ Vascular exam

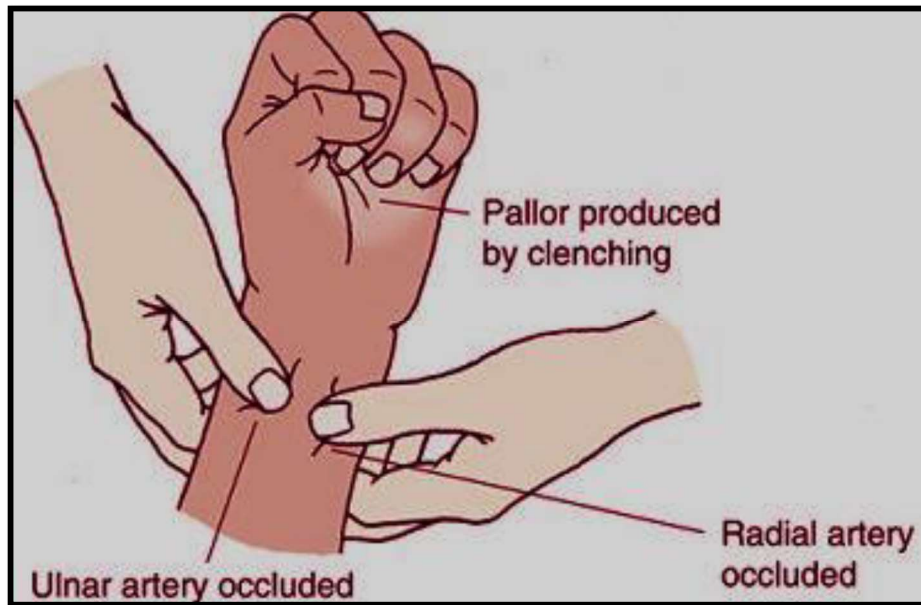
# Vascular Exam

- Brisk capillary refill in digit?  
(subjective)
- Pulse ox measurement



- To confirm there is a complete arch:
- How do you perform the Allen's test?

## ■ Allen's test



## ■ Tendon Exam:

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■ What are the finger flexor tendons?

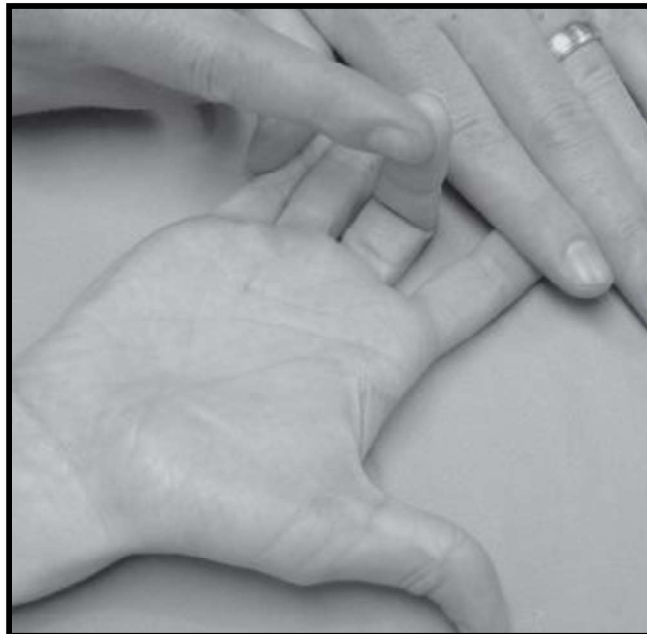
■ FDS

■ FDP

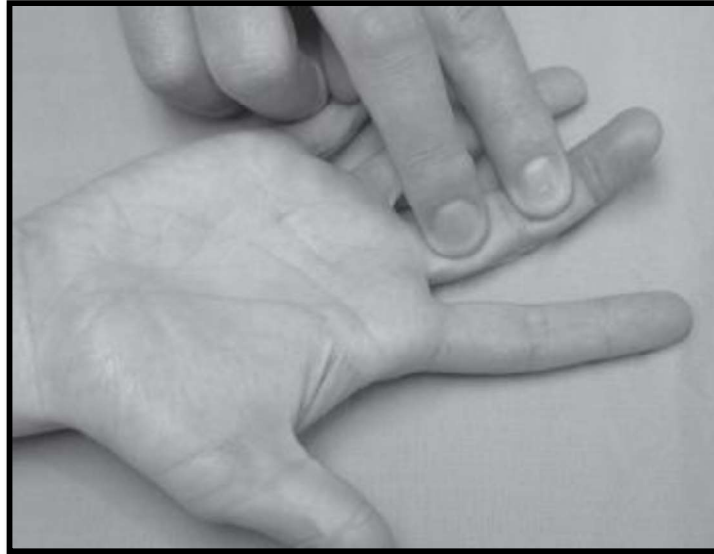
■ How do you test for each one?

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## FDS



# FDP



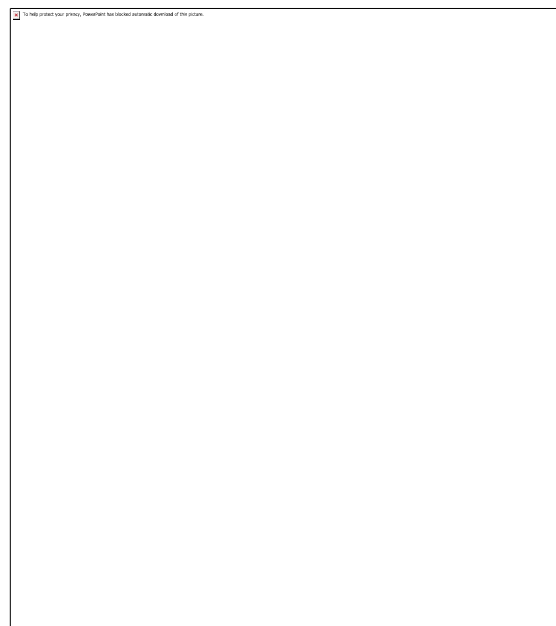
■ “The FDS to the S.F. is not working, even though there’s no injury there”

■ What’s the deal??

- 15 % of patients have no FDS to the S.F.

## ■ Finger extensor anatomy

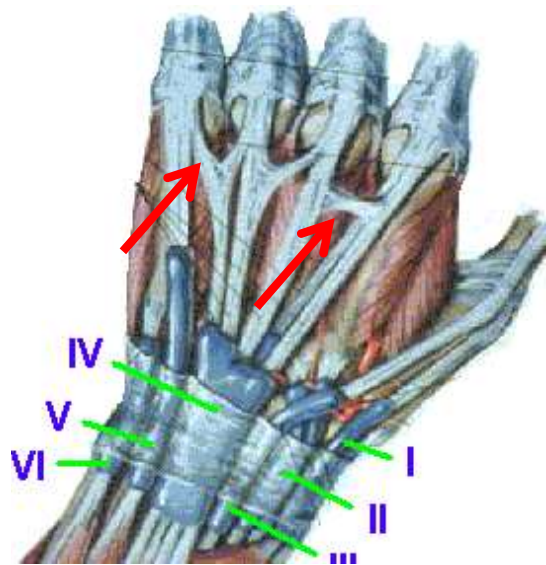
- Complicated!



■ The patient has a lacerated extensor tendon over the dorsum of the hand but can still extend that finger.

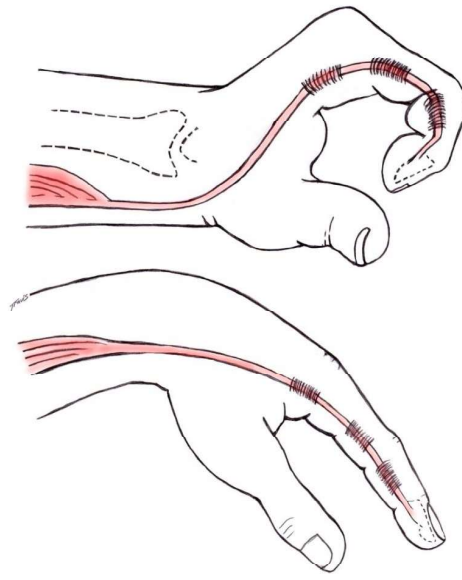
■ How???

■ The patient can still extend because of the junctura tendinae



## ■ Tenodesis effect

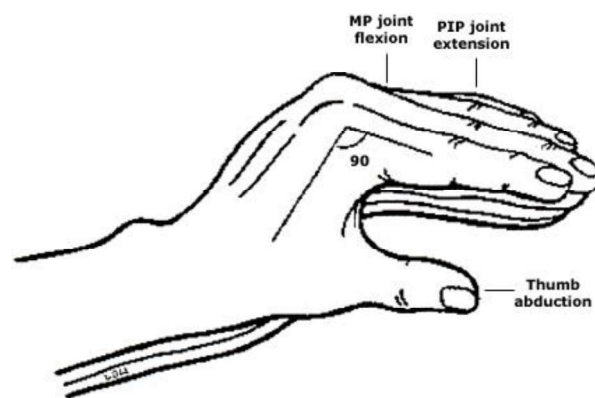
## ■ Tenodesis effect



- Can help distinguish b/w tendon and nerve injury



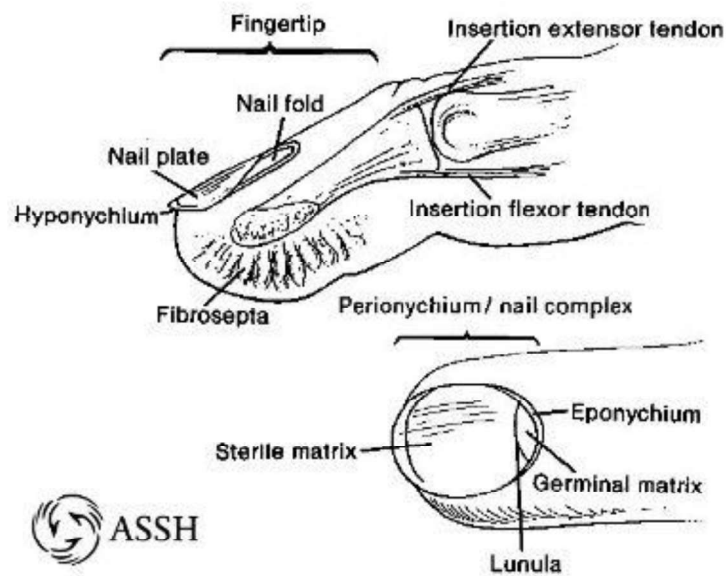
# ■ What is the safe position for splinting the hand?



- **Why is this the safe position?**
  - **Because it helps prevent contractures**

- MP joint is a cam joint, and collateral ligaments are at stretch with flexion.
- PIP joint: the volar plate is at stretch with extension

# Nailbed Injuries



## Treatment of Nailbed injuries

- Mechanism
  - Crush, avulsion, laceration
  - 50% have distal phalanx fracture
- Subungual hematoma
  - Recommend unroofing nail (if greater than 50%)
  - Repair nail bed laceration
- Goal
  - Identify any nail bed injury
  - Repair nail bed injury to avoid post-traumatic deformity of fingernails

Management of a patient with an acute nail bed laceration should consist of

- 1: soaks and oral antibiotics (debatable)
- 2: volar splinting.
- 3: removal of the nail plate.
- 4: repair of the nail bed with 6-0 fast gut suture or skin adhesive (Dermabond)
- 5: can interpose nonstick dressing or suture foil between nailfold and nailbed to prevent adherence.

## ■ Digital blocks

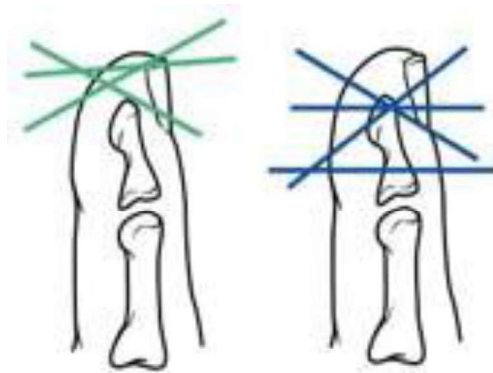
- I would add dorsal and volar block in most cases to be safe
- 1% lidocaine without or with epinephrine is fine.



# FINGERTIP INJURIES

## Fingertip injury

- Goal of Treatment
  - Restore coverage to protect underlying bone, tendon, nerve
  - Maximize sensation
  - Preserve digit length



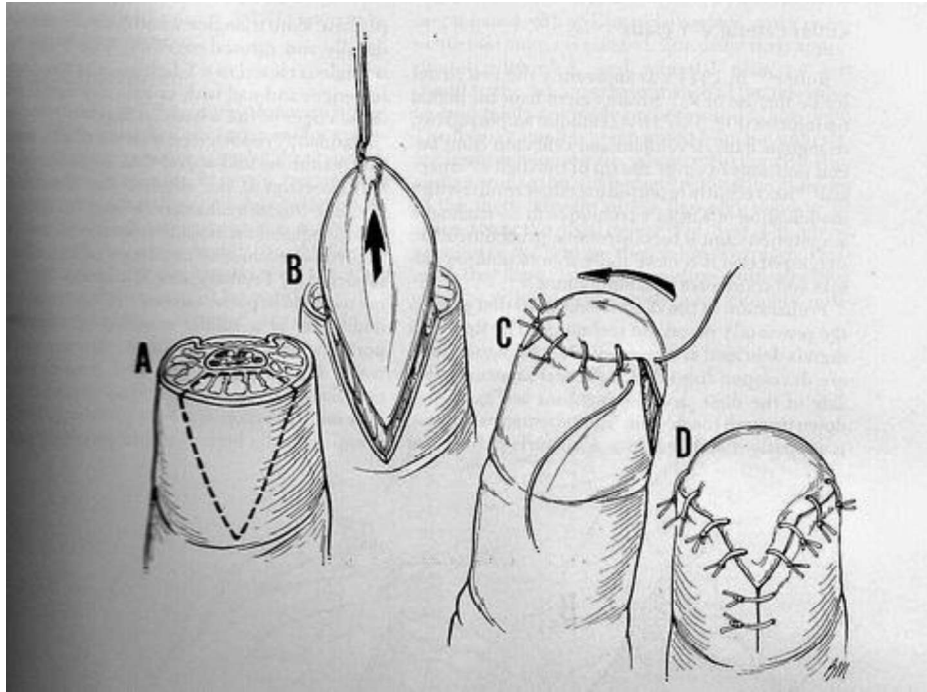
## Fingertip injury

- Treatment:
  - Anesthesia: Digital Block
  - Bloodless field: Digital tourniquet
  - Thorough irrigation
- Can remove any protruding bone and close skin primarily without tension
- Can always just put a non-adherent dressing on and let it granulate in.
- Don't repair any flexor tendons.

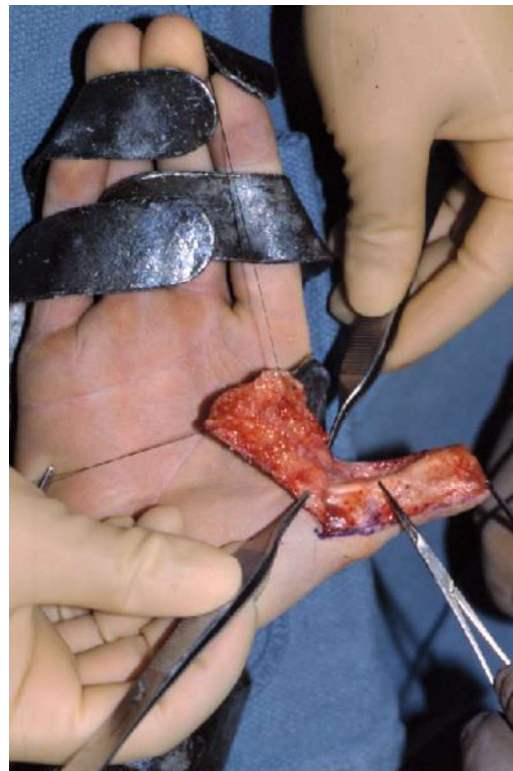
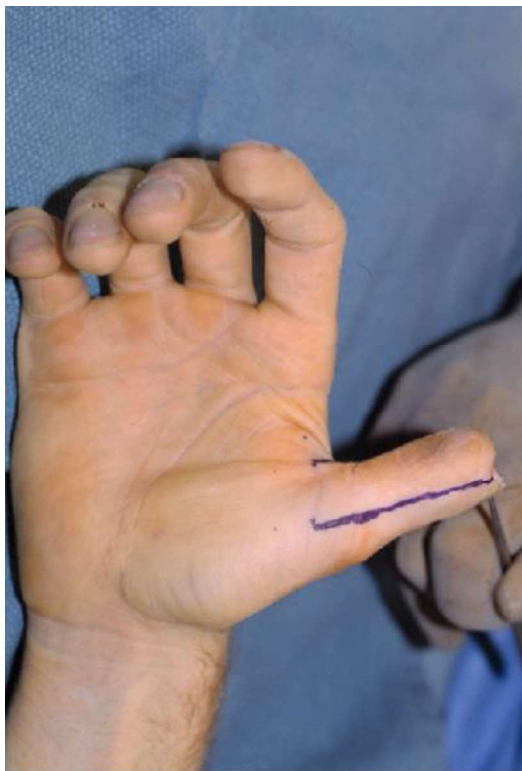
## Management of Open Wounds

- “Solution to pollution is dilution”
- Irrigation:
  - 1000cc bottle sterile NS
  - Can add 10 cc of Betadine
  - Puncture cap with 18g needle
  - Squeeze on bottle for pressurized irrigation

## V-Y advancement

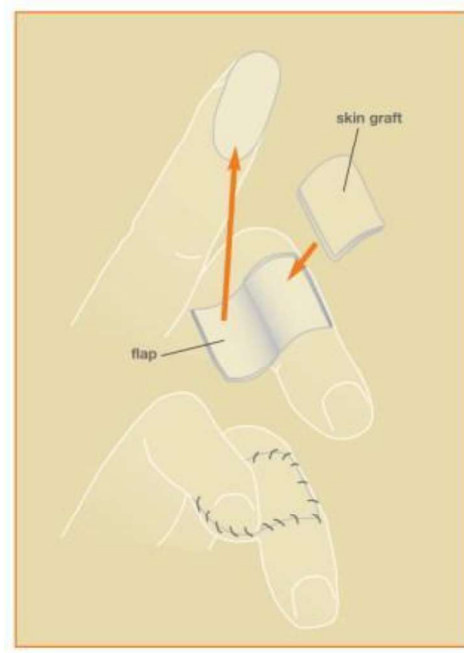


## Moberg flap

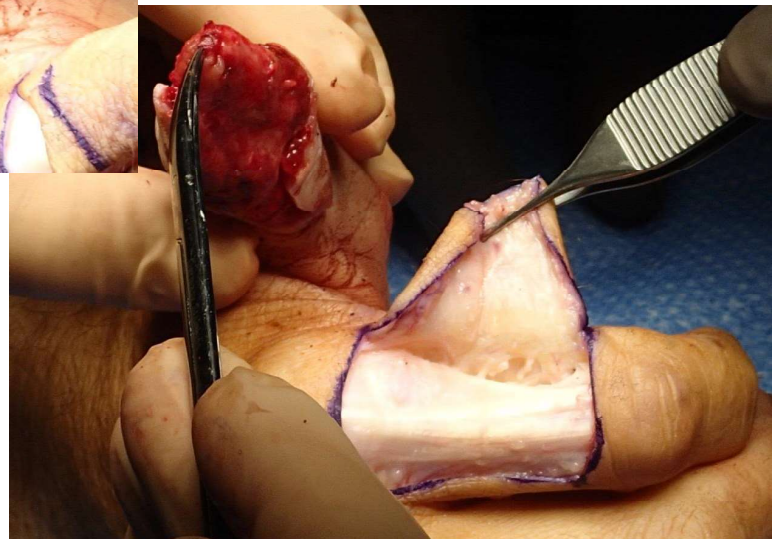




## Cross finger flap



## Large thumb defect











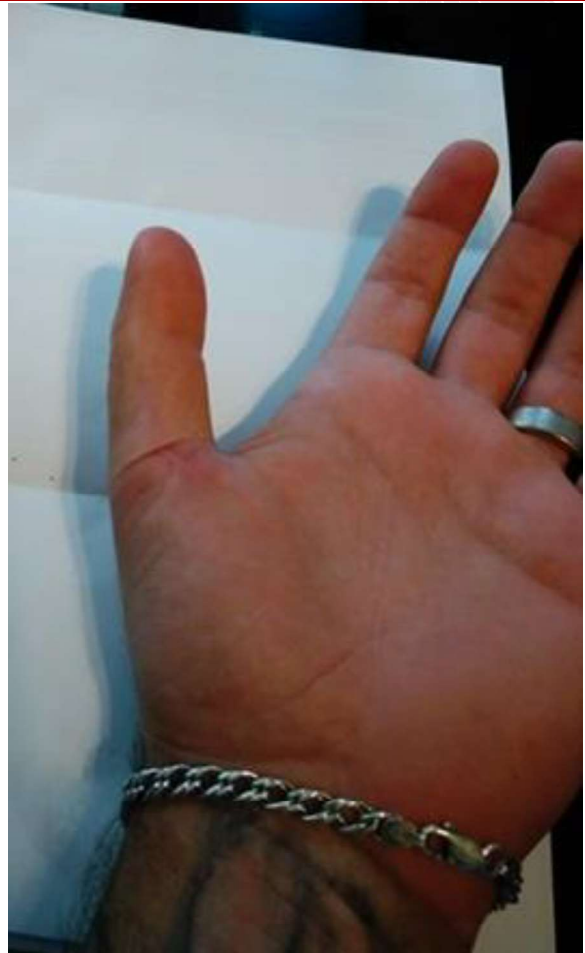
75



76

If he wants more length:

- Metacarpal lengthening
- First webspace deepening
- Toe to thumb
- Thumb prosthesis



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## REPLANTATION



# Replantation

- Favorable indications for replantation
  - Any part in a child
  - Multiple digits
  - Individual digit **distal to the FDS insertion**
  - Thumb
  - Wrist or proximal



# Replantation

- Unfavorable indications
  - Mangled, crushed parts
  - Individual finger proximal to FDS insertion
  - Amputations at multiple levels
  - Arteriosclerotic vessels
  - Other serious injuries (life-threatening)
  - Mentally unstable patients
  - Severe vessel trauma



# Replantation

- Care of amputated part
  - Typically, do not attempt replant if:
    - Warm ischemia time is > 6 hr for level proximal to carpus or > 12 hr for a digit
    - Cold ischemia time > 12 hr (prox to carpus) or > 24 hr for a digit
  - Amputated part should be wrapped in moist gauze (lactated Ringer's solution)
    - Place in sealed plastic bag
    - Bag is placed on regular ice (not dry ice)

## Recent 3 digit replant



2 hand surgeons  
1 hand fellow  
9 hours of surgery



# FRACTURES AND DISLOCATIONS

## Hand fractures

- Evaluation:
  - x-ray affected hand
  - history and mechanism
- Classification:
  - wound status: open vs. closed
  - stability: stable vs. unstable

# Hand fractures

- ▣ Open fractures
  - I&D
  - Antibiotics, tetanus
  - stabilization (address wound and splint)
  - Most can be operatively stabilized within the following week if washed out in the ED
  - will require immediate fixation if vascular compromise or severe contamination
- ▣ Closed fracture
  - splint
  - f/u in 1-3 days

## Bad Index Finger Injury





1 day later



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## Bad Index Finger Injury



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1 month later



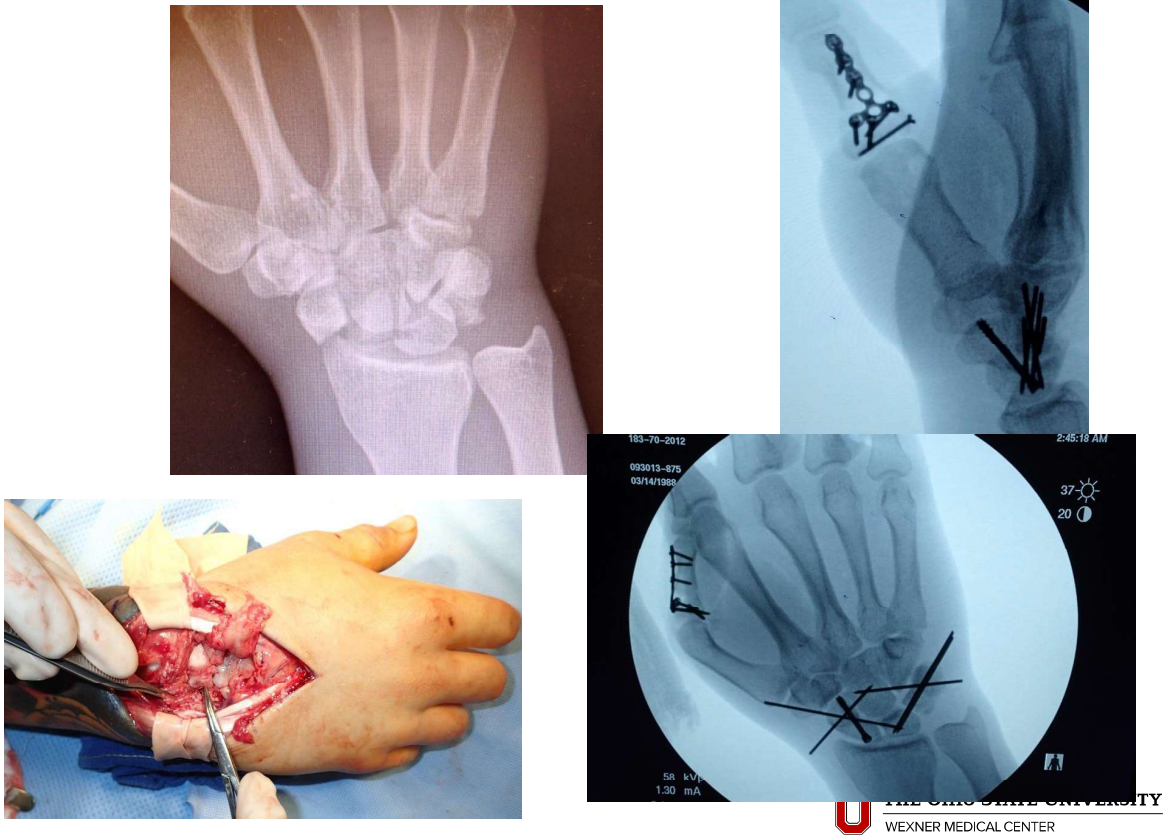
89

Does this look right?



90

# Perilunate Fracture Dislocation



91

## Dislocations

- Perilunate dislocations
  - Often a missed injury
  - Initial emergent treatment should consist of attempted closed reduction and splinting, **especially if the patient exhibits symptoms of median nerve compression.**
  - Open reduction and pinning or ligament repair are necessary but are not emergent (should repair within a few days).
  - If closed reduction fails, should be reduced as quickly as possible, even in the OR.



- 28 yo fell onto his IF



## MCP dislocation

- Dorsal approach and split the volar plate



## Diagnosis?

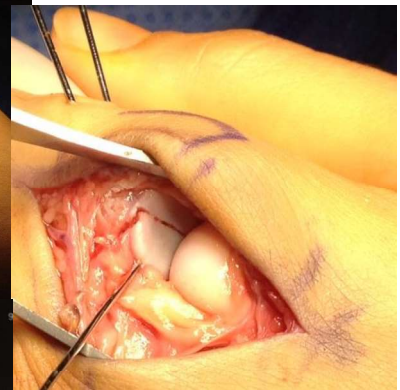
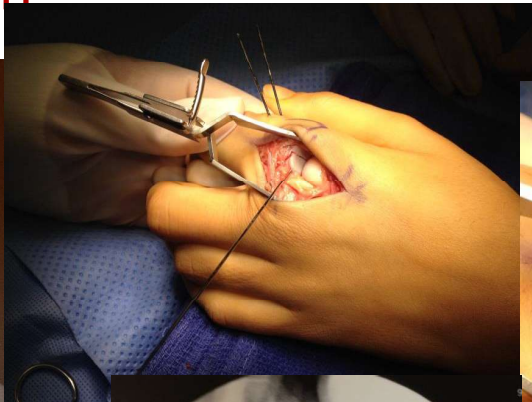


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## UCL Avulsion



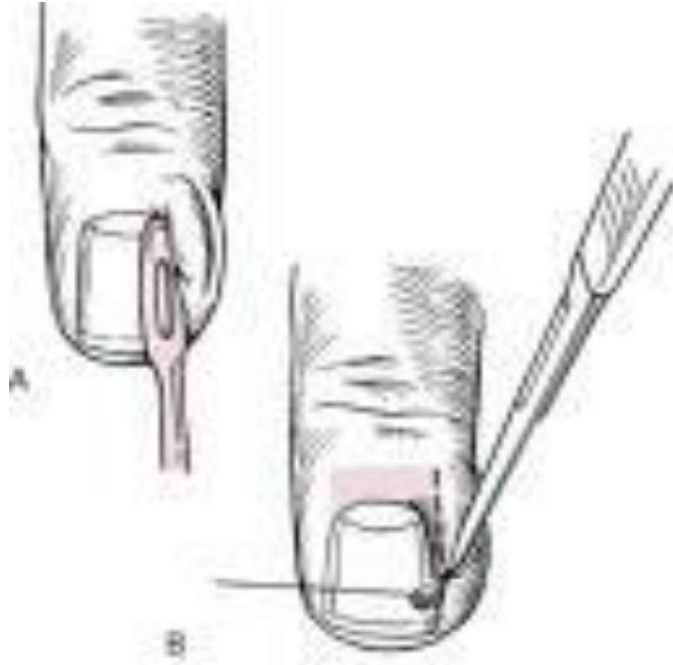
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# INFECTIONS

## Hand Infections

- Paronychia infection (within eponychial fold)
  - Bacterial: staph
  - Treatment: digital block  
unroof eponychial fold with 18g  
needle  
incise angle of eponychial fold  
leave in nuga gauze wick x1d  
PO antibiotics



## Hand infections

- Felon
  - infection distal palmar phalanx results in local compartment syndrome
- Treatment:
  - decompression by releasing septae
  - avoid digital nerve/arteries
  - Soaks bid (1/2 strength hydrogen peroxide)



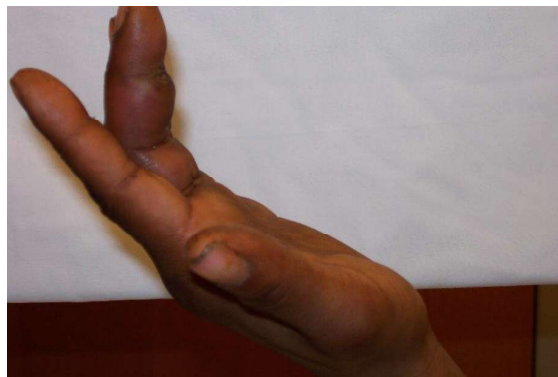


## Hand infections

- Dorsal MP joint wound
  - suspect human bite unless proven otherwise
  - organism: **Eikenella**, anaerobes, aerobes
- Treatment:
  - copious irrigation
  - antibiotics: PCN and Cephalosporin or Augmentin
  - If subacute (>24h), deep wound, or signs of active infection will need operative arthrotomy and admission



Fight Bite:  
Often times may  
need surgery

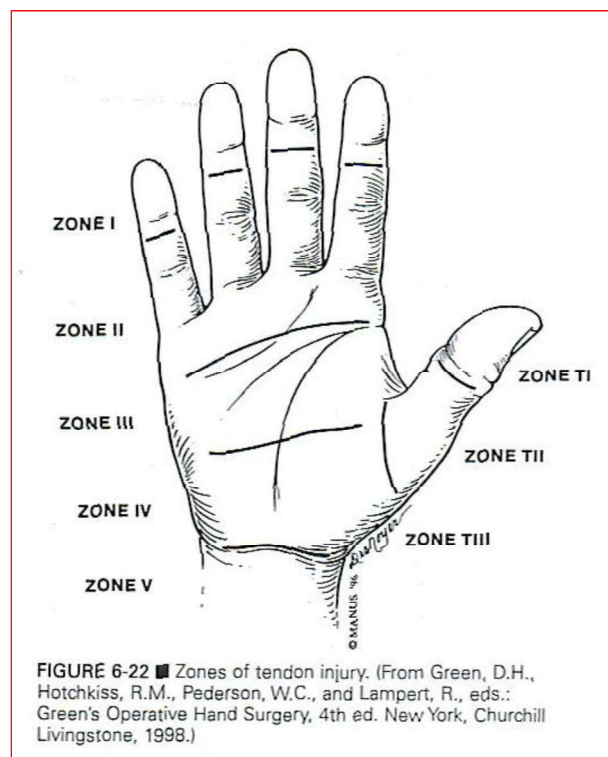


- Flexor tenosynovitis Knavel signs:
- 1) Tenderness along flexor tendon
- 2) Flexed finger
- 3) Sausage finger
- 4) Pain with passive extension

# Hand Infections

- Flexor Tenosynovitis
  - Treatment (early = <24hr)
    - IV antibiotics
    - arm splinting and elevation
  - **Treatment (operative)**
    - if failed non-op (most)
    - operative incision and drainage

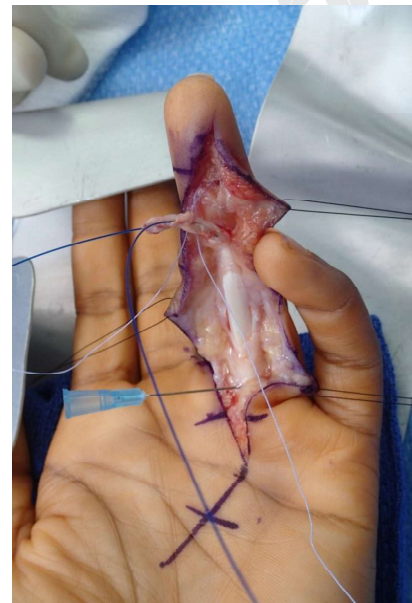
## Flexor tendon injuries

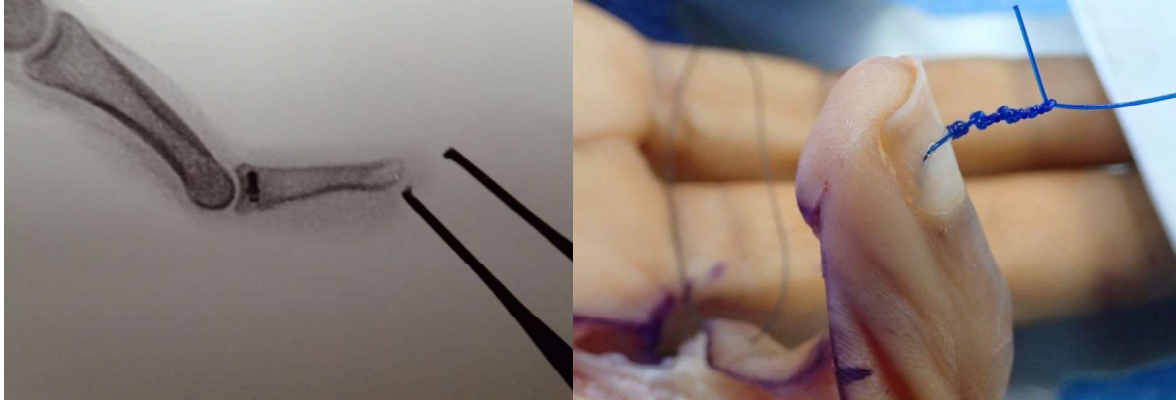
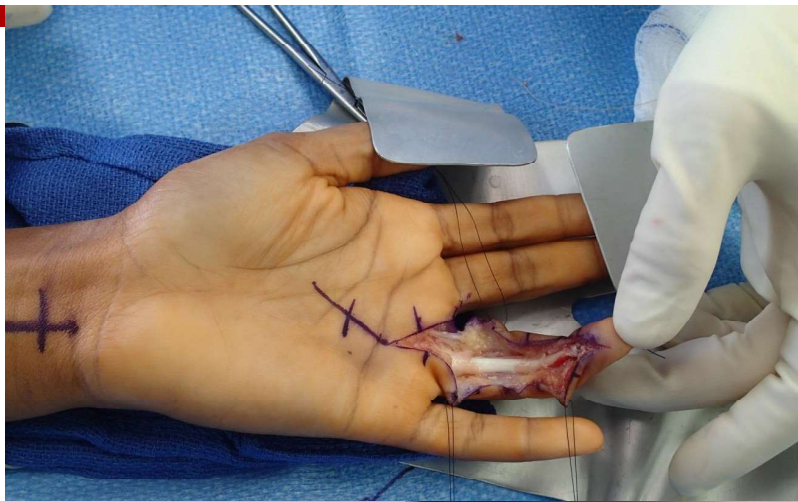


# Flexor tendon injury

- Management
  - irrigate wound
- Operative repair
  - not emergent unless associated with vascular compromise to finger or extremity or multiple injuries
  - Ideally within a week

## Jersey Finger





## Extensor tendon injury

- Management:
  - irrigate open wound
- Operative repair:
  - not emergent unless vascular compromise or multiple injuries
  - should be repaired within 1-2 weeks of injury
  - isolate tendon injury to dorsum hand can be done in ER
    - partial lacs distal to MP need to be repaired



## Fireworks!



36 yo man, laborer  
On July 4th



111



112

3 months postop



113

16 yo







115

6 mo postop



116

## Take home points

- Some hand presentations require more immediate operative intervention
  - Contaminated open fracture
  - Irreducible dislocation
    - Perilunate with impending acute carpal tunnel
  - Amputated parts
    - Know the indications for replant
  - Purulent flexor tenosynovitis
  - Compartment syndrome
  - Acute carpal tunnel syndrome
  - Dysvascular extremity



**Thank you!**

**If unsure of what you have or how to manage it, get a hand surgeon involved. We are always available.**

**(614) 366-HAND**