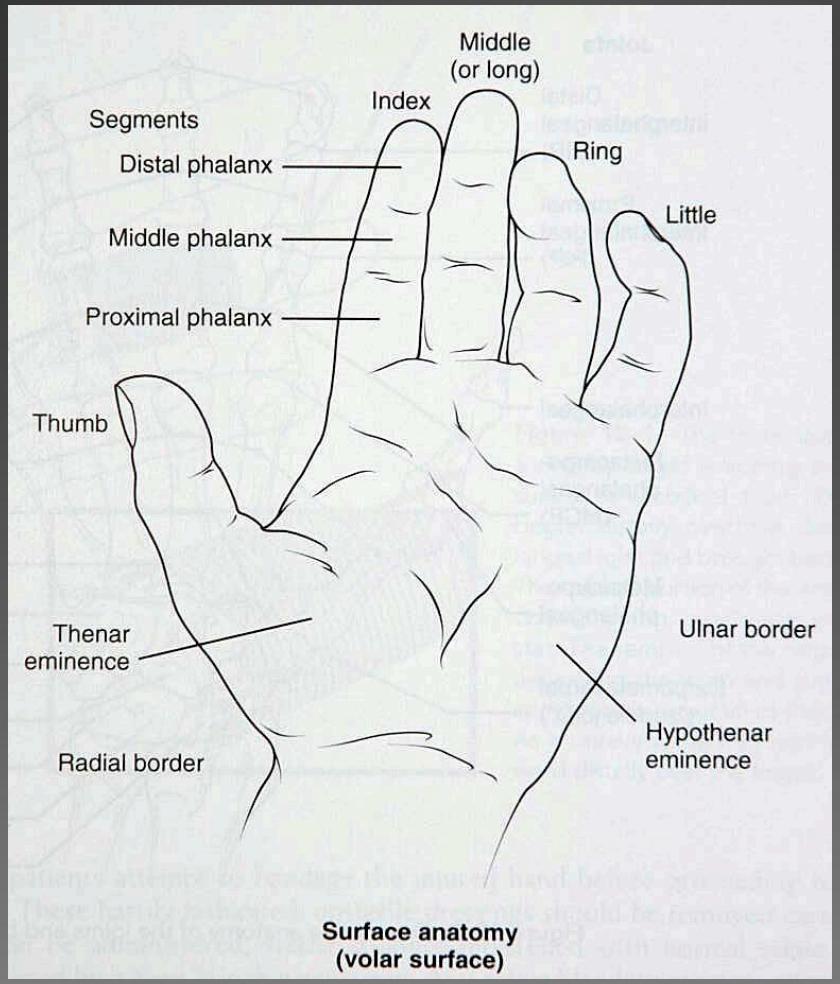
Hand, Fingers and Toes Assessment and Injuries

Kurt Ortwig, NP

Surface Anatomy



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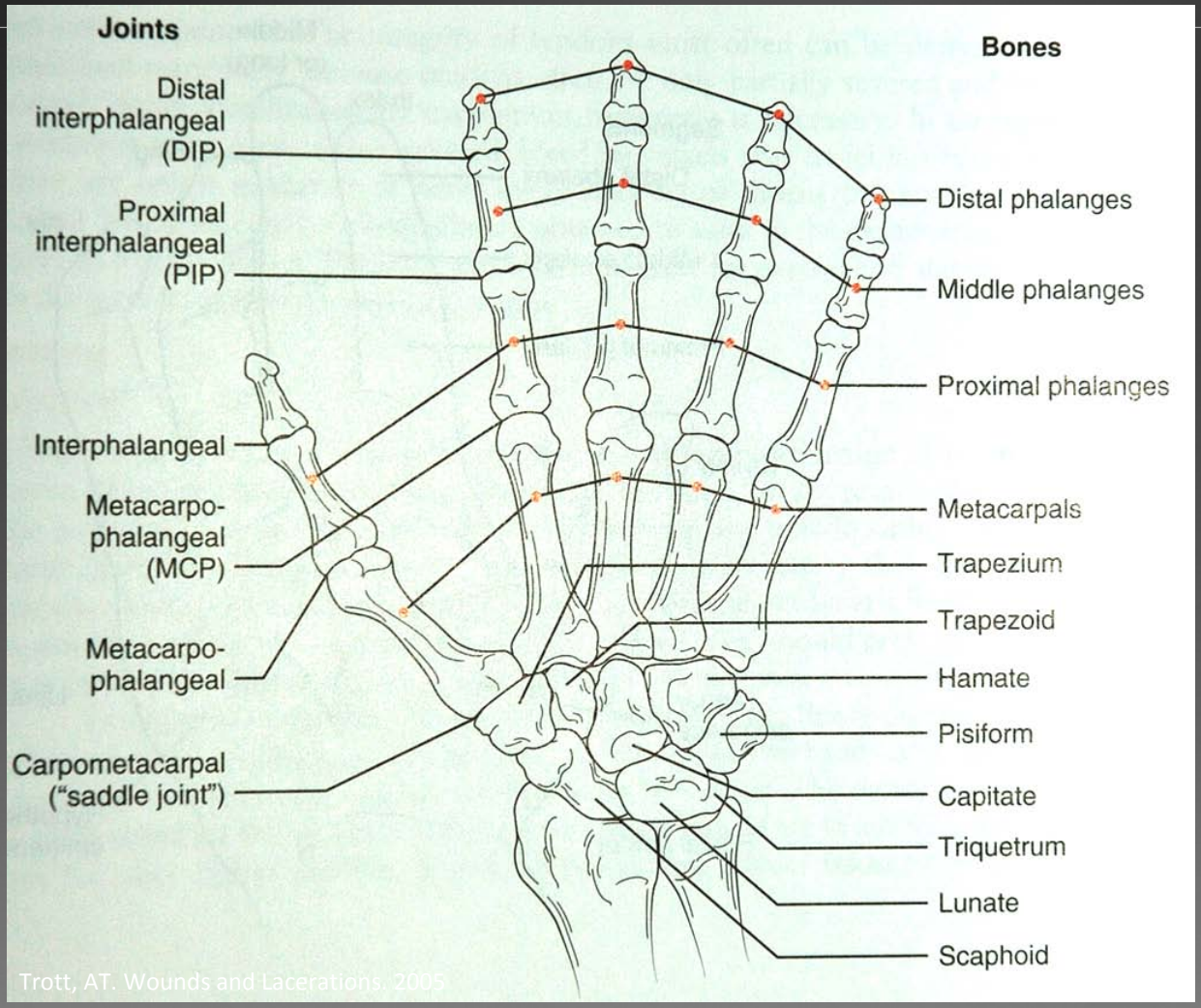
Bones of the Hand



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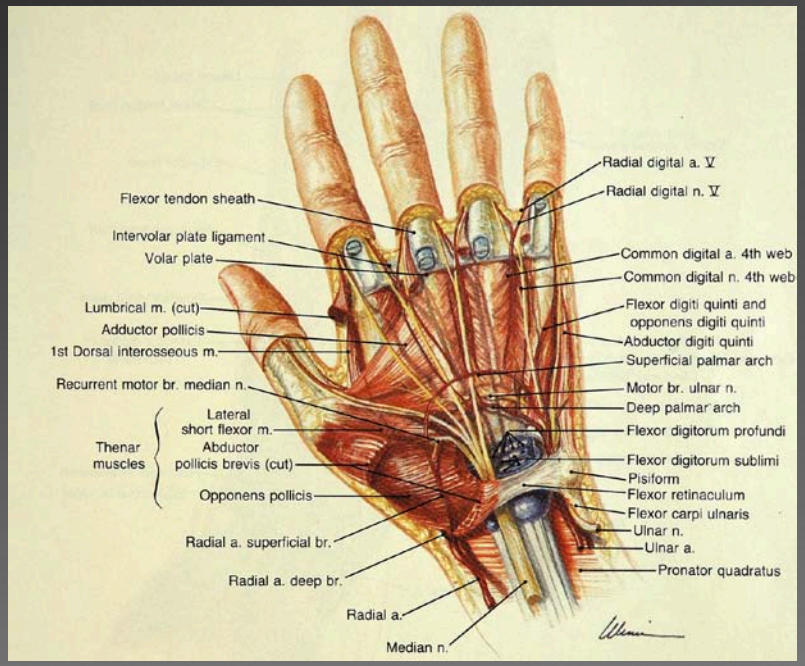
Soft Tissue Views

Volar View



Dorsum View

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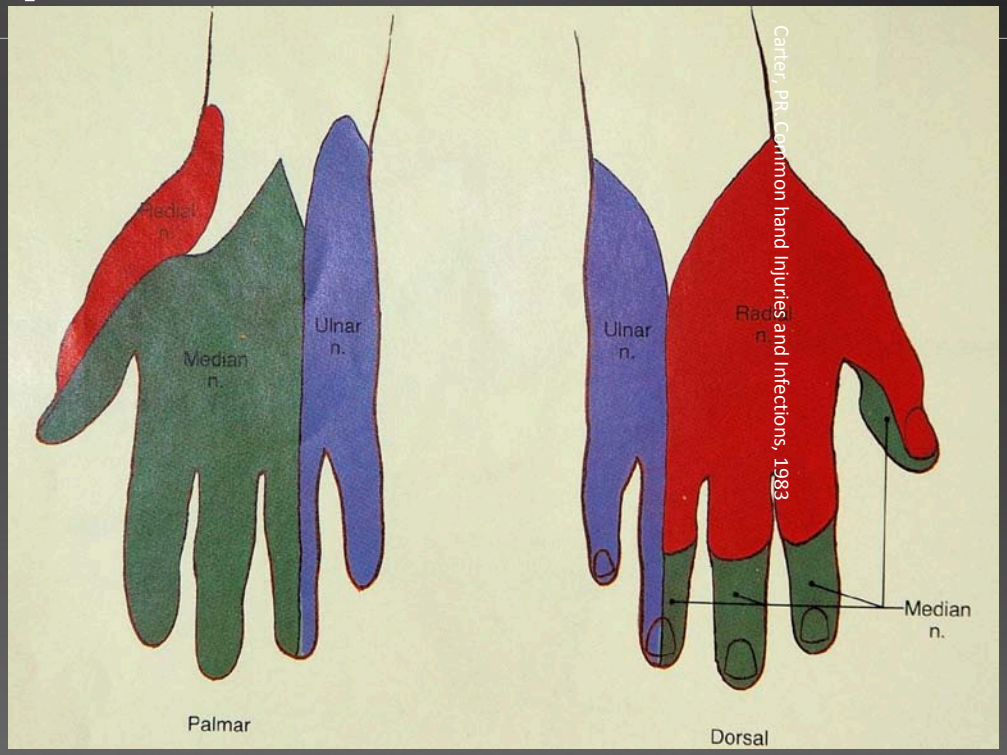
Key Points in the History

- Demographics
  - Age
  - Occupation
  - Hand Dominance
- History of injury
  - How the injury occurred
  - Time of injury
  - Any Deficits?
- PMHx/PSHx
  - Prior hand injuries
  - Prior neuropathy

The Physical Exam

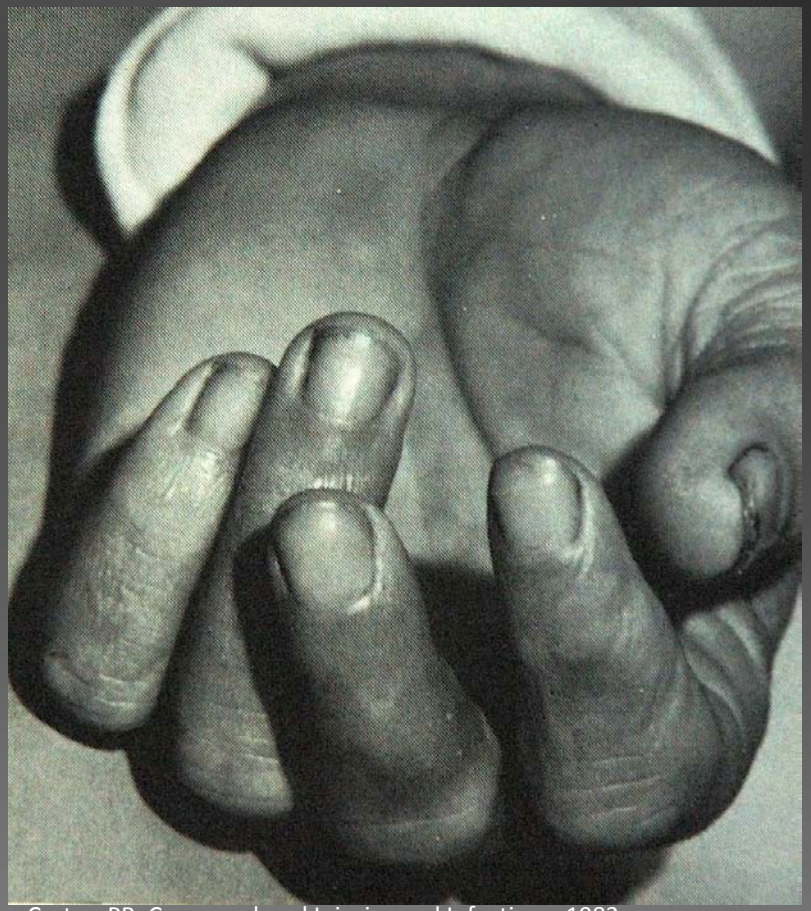
- Inspection
- ROM
- Strength
- Sensation
- Vascular Integrity



The 2 Minute Drill

- General
  - General appearance
  - Obvious deformities
- Vascular
  - Ulna/radial pulses
  - Capillary refill <2 seconds
  - Hemorrhage control

A Quick Glance



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2 Minute Drill

Neurological

- Ulna
  - Sensation: light touch distal volar pinky finger
  - Motor: abduction index finger
    - spread fingers apart
- Median
  - Sensation: light touch distal volar index finger
  - Motor: thenar eminence: adduction thumb
    - thumb and pinky together
- Radial
  - Sensation: light touch to dorsal web space between index/middle finger
  - Motor: wrist extension

2 Minute Drill

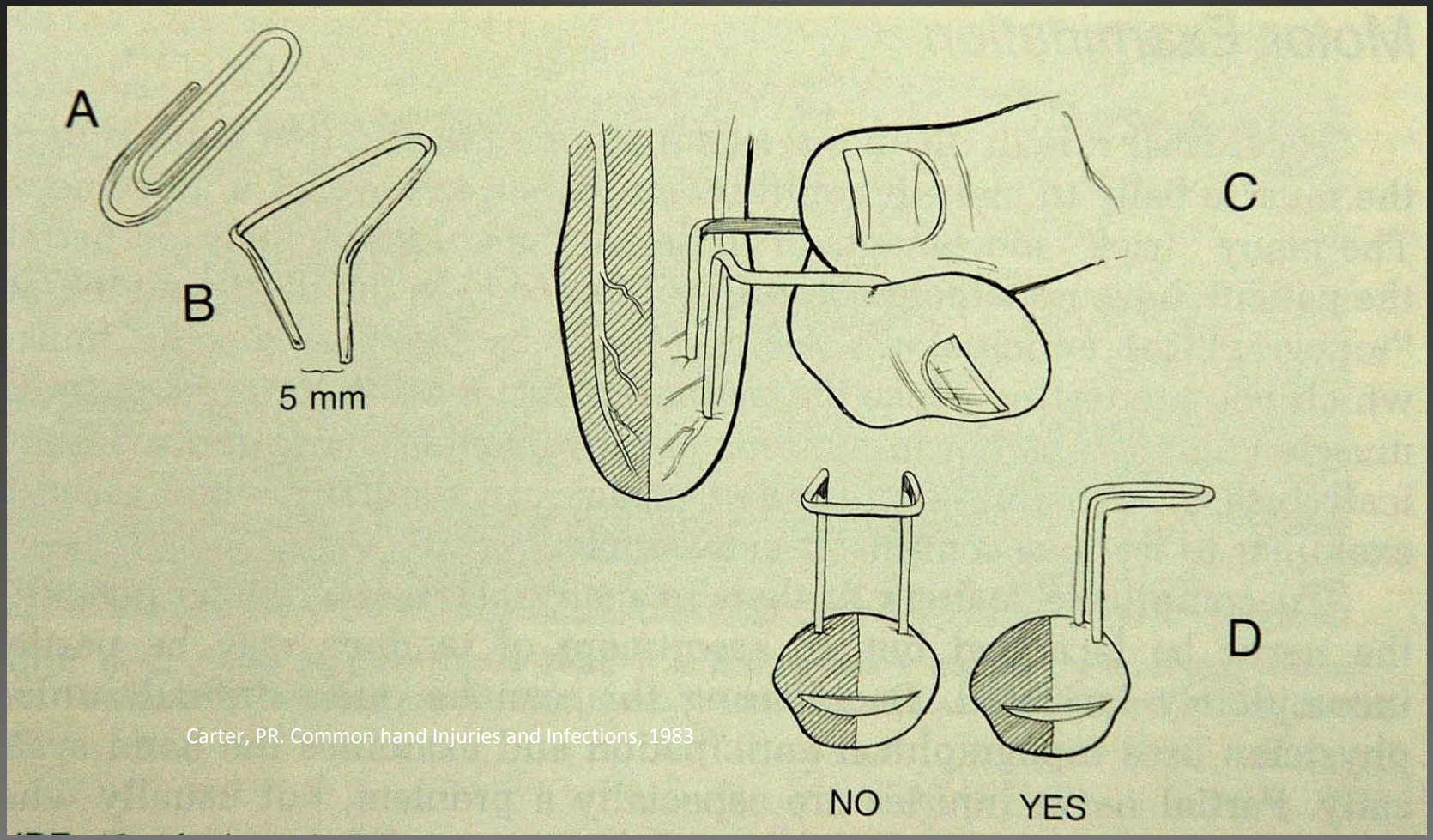
Musculoskeletal

- Bony palpation of all digits and joints
- Active and Passive ROM with and without resistance

Ligamentous

- Flexor digitorum profundus tendon: finger tip flex against resistance
- Flexor digitorum sublimus tendon: PIP joint flex against resistance
- Extensor tendons: palm down, extend digit with resistance at nail bed
- Ulnar collateral: adduct thumb against resistance

2 point discrimination



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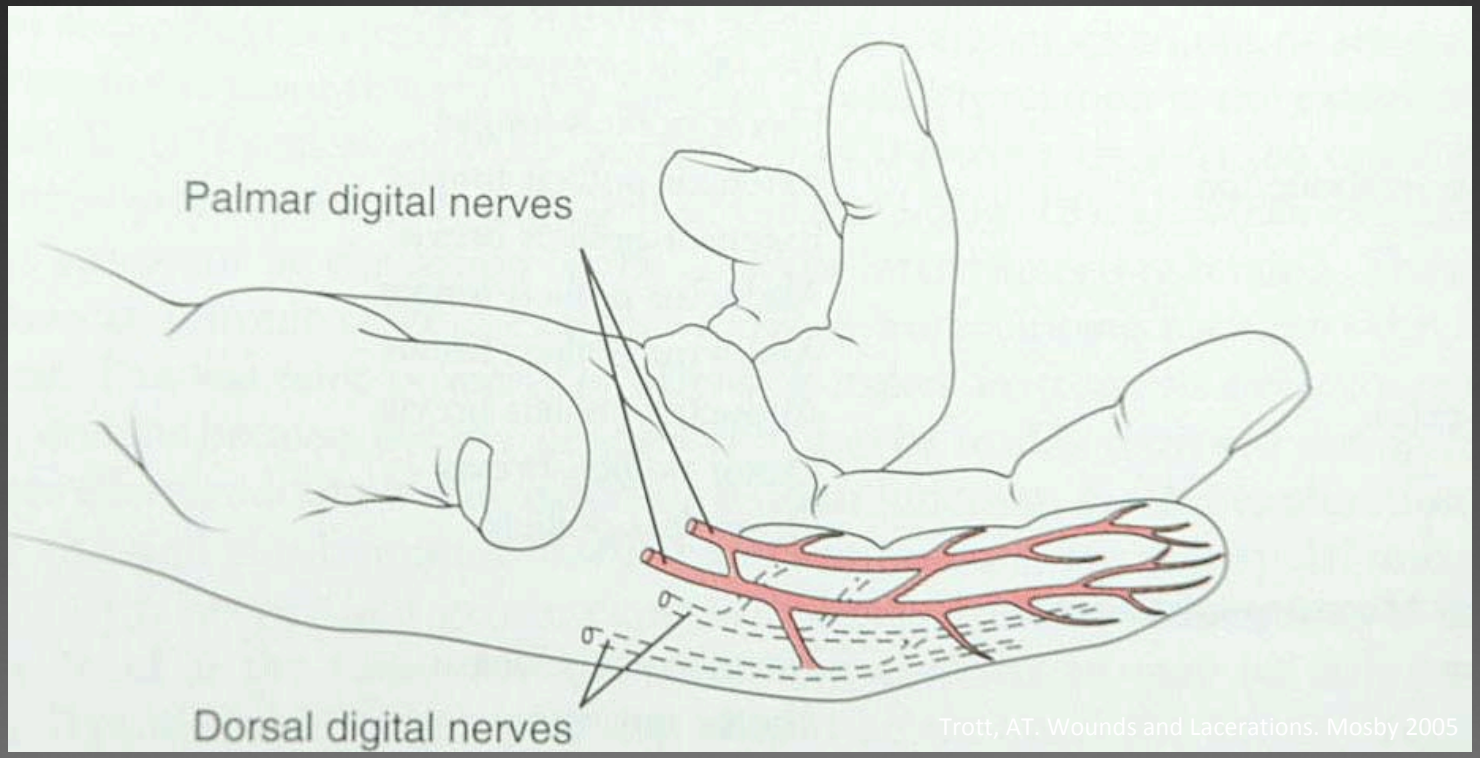
Nerve Anatomy



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Laceration Repairs

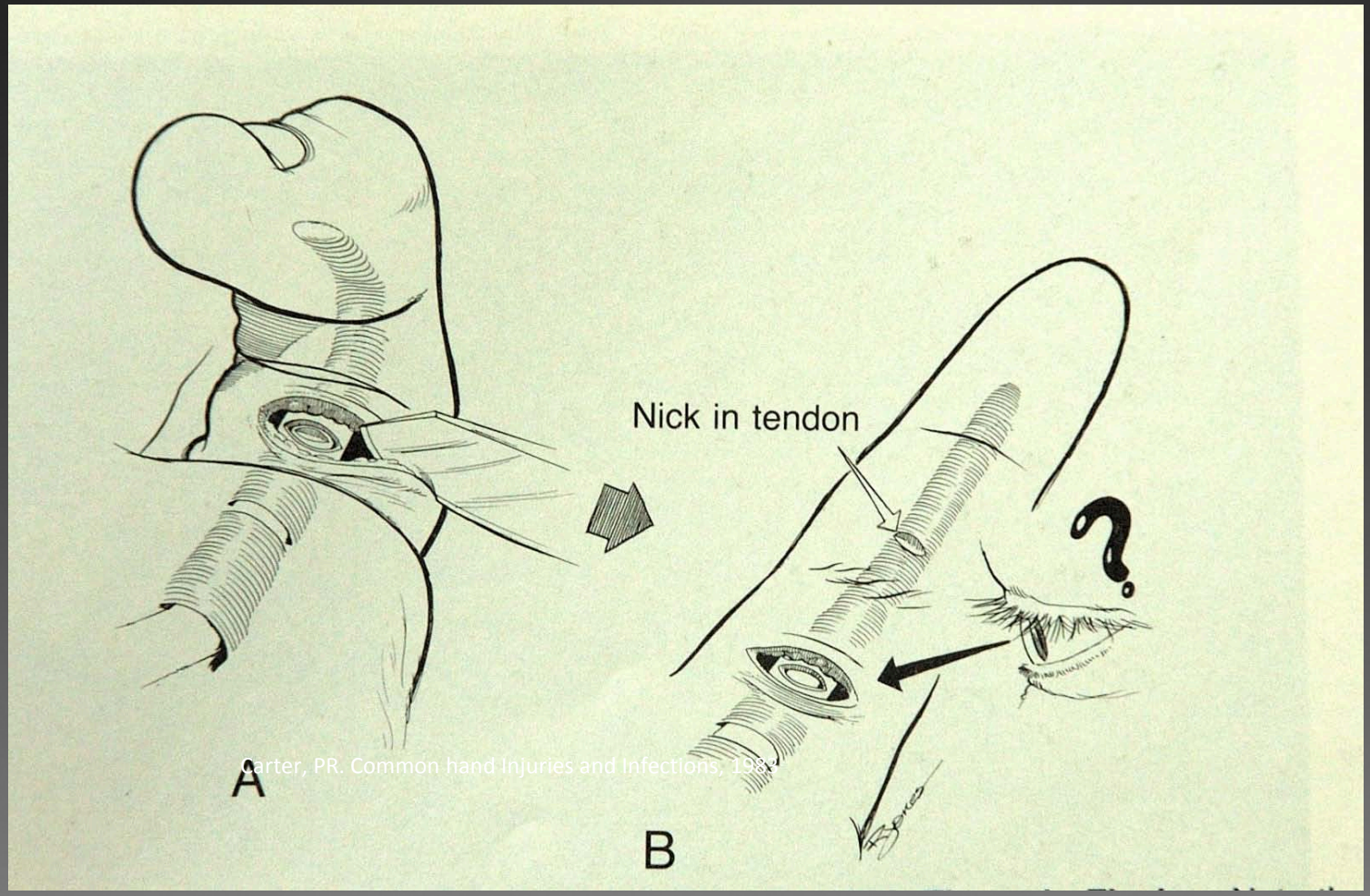
- Simple interrupted
- Vertical and horizontal mattress sutures
- Corner sutures
- Tissue adhesive
- Steri strips and paper tape

Homeostasis

A bloody field is an invitation to disaster!!!

- Blood pressure cuffs
- Penrose
- Fingers from a latex glove

Tendon Lacerations continued



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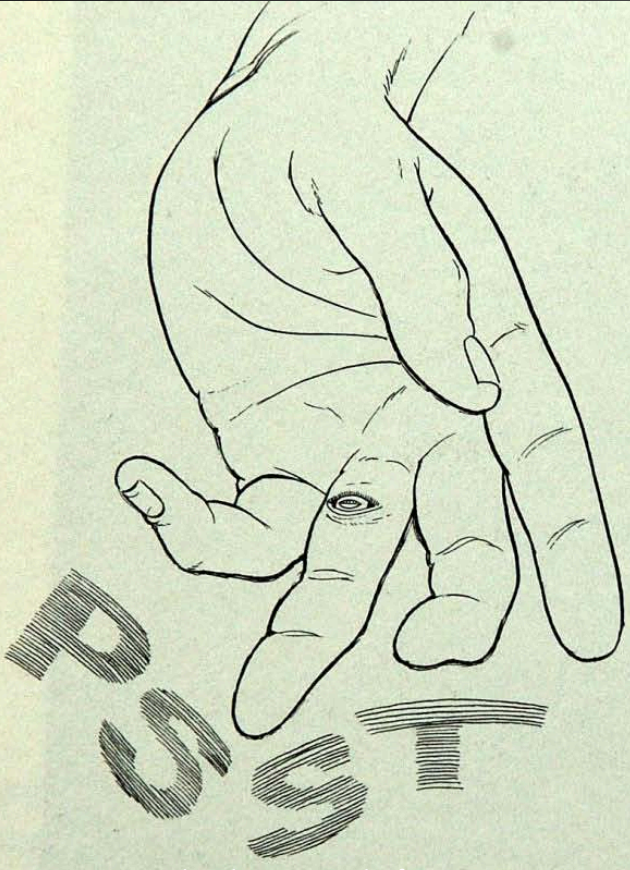
Tendon Lacerations

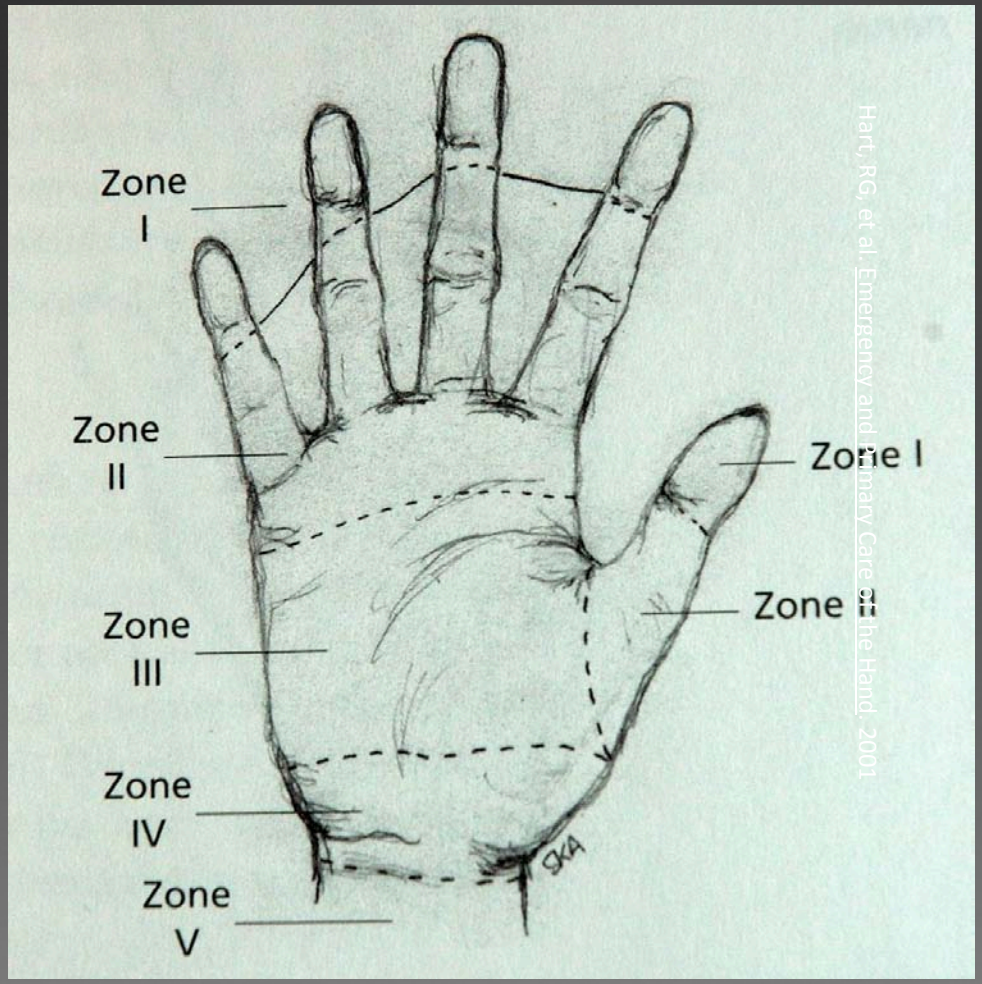


- *P*ain
- *S*trength
- *S*tance
- *T*endon sheath

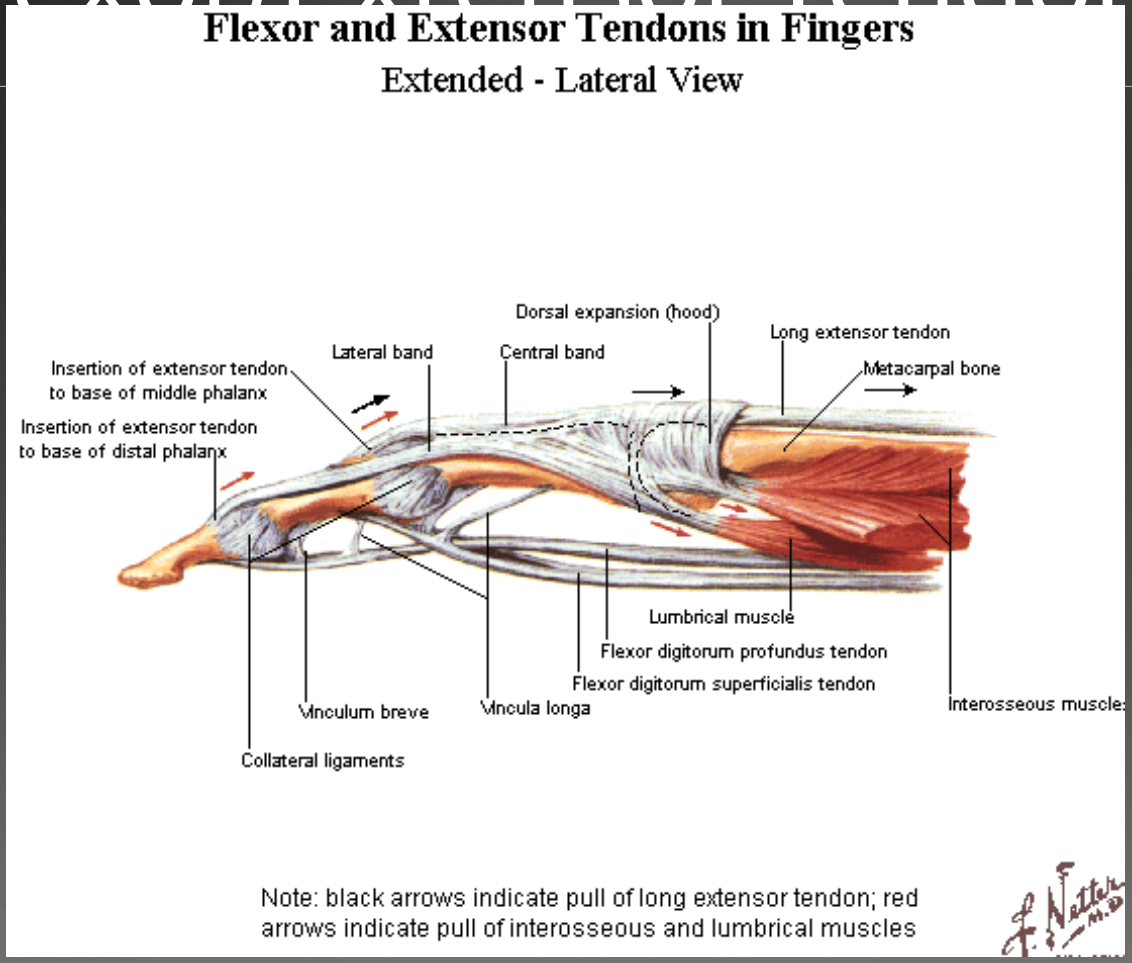
FIGURE 11–16. **"PSST!"** The signs of partial tendon laceration are (1) pain on active contraction of the partially lacerated tendon, (2) decrease in strength, (3) slight alteration of stance, and (4) laceration in the tendon sheath. The tendon and the tendon sheath fit like a piston and a cylinder, and Murphy's law ("If anything can go wrong, it will") makes sure that lacerations in the sheath almost never occur without at least partial laceration of the tendon.

Carter, PR. Common hand Injuries and Infections, 1983

Tendon Zones of the Hand



Flexor/Extensor Tendons



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Tendon Injuries Continued

- Delayed repair safest for patient
- 5-7 days post injury and after PO antibiotics
- May repair up to 2 weeks
- Post 2 week window, 2 part tendon reconstruction required.

Care of Flexor Tendon Injuries

- Antibiotics if open tendon sheath
- Splint in mild flexion (limp wristed)
- Wrist flex 30-40 degrees
  - MCP 50-60 degrees
  - PIP 30 degrees
  - DIP 0

Tenosynovitis

- Tendon sheath infection require immediate surgical drainage (OR procedure)
- Kanavel's cardinal signs for tenosynovitis
  - Swelling along the entire flex surface
  - Tenderness over the tendon sheath
  - Pain with passive extension
  - Flexed position of finger at rest

Tenosynovitis

Extensor Tendon: Zone I

- Zone I: DIP
- Mallet finger or baseball finger
- Direct blow to tip of finger
- 3 classifications:
  - class I: tendon
  - class II: small avulsion fx
  - class III: intra-articular fx
- Splint in hyperextension for 6 weeks or surgically pinned joint (k wired)
- avoid severe hyperextension—skin ischemia

Mallet Finger

Extensor Tendon: Zone II

- Zone II: Middle Phalanx
- Common lacerations or direct blow/crush injuries
- < 50% tendon lac: primary closure, splint for 10-14 days, allowed to heal conservatively
- > 50%: tendon repair and 6 weeks splinting in full extension

Extensor Tendon: Zone III

- Zone III: PIP Joint
- Direct blow, acute flexion force while PIP actively extended
- Injury most commonly involves central slip of extensor tendon
- boutonniere deformity
- Acute findings: 15-30 degrees from full extension
- Dx with PIP at 90 degrees and attempt to straighten: table top test (removes lateral bands from PIP extension)
- Often missed and present 10-14 days to ortho with deformity

Boutonniere Deformity

Extensor Tendon: Zone IV & V

- Zone IV: Proximal Phalanx
- Typically involve only extensor tendon

- Zone V MCP Joint
- Occurs over the dorsum of MCP
- Fight bites—high suspicion in males presenting morning after injury
- Blunt trauma—closed hand/fist injuries
- Weak extension of finger against resistance, may palpate deformity

“Fight Bite”

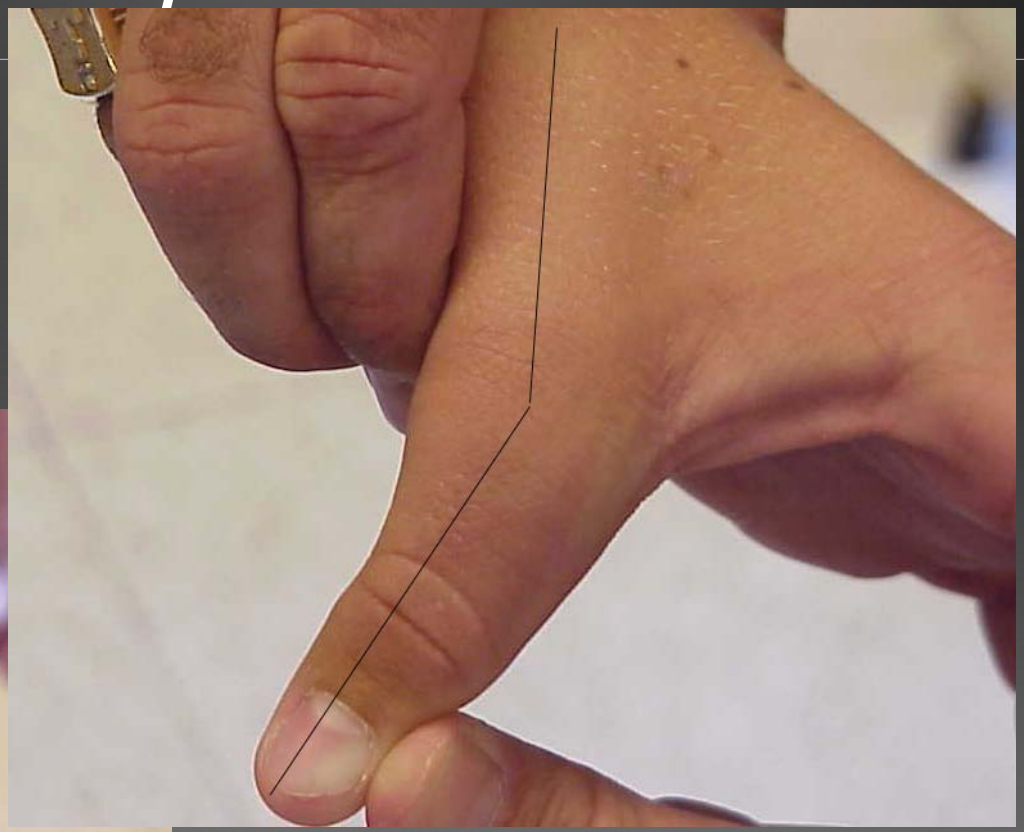
Extensor Tendon Care

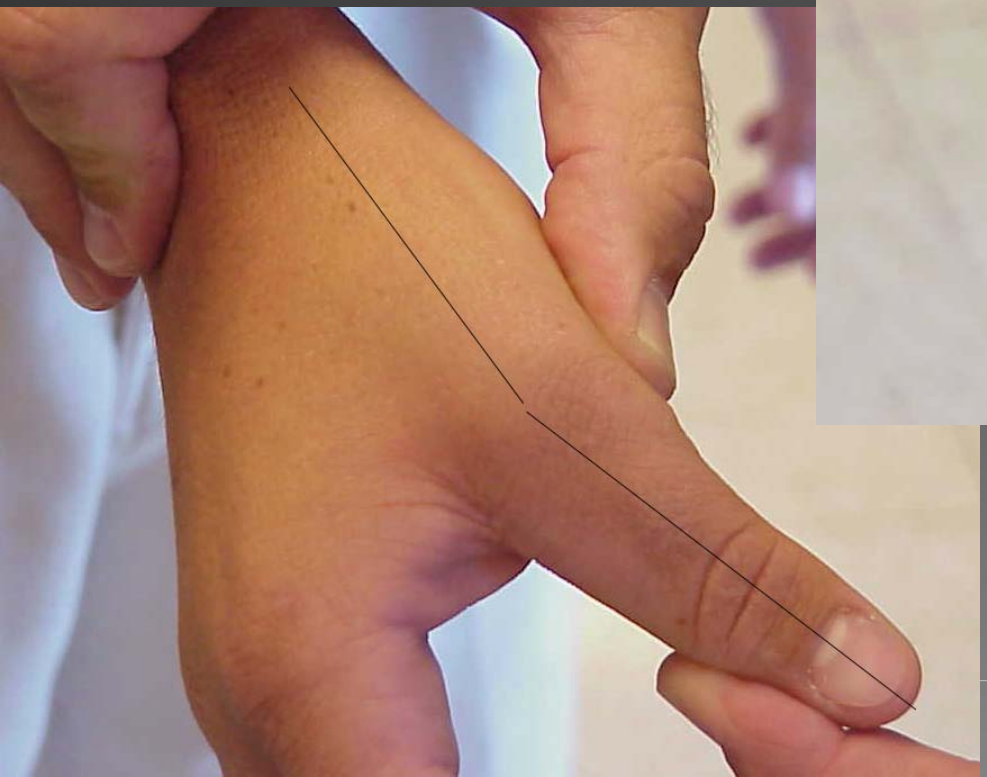
- Zone I
  - DIP joint in slight hyperextension
  - PIP and MCP do not require immobilization
- Zone II, III and IV
  - PIP in extension
- Zone V and VI
  - Adjacent fingers splinted
  - Wrist at 35 degrees extension
  - MCP at 15 degrees flexion
  - IP joints slight flexion

Gamekeeper's or Skier's Thumb

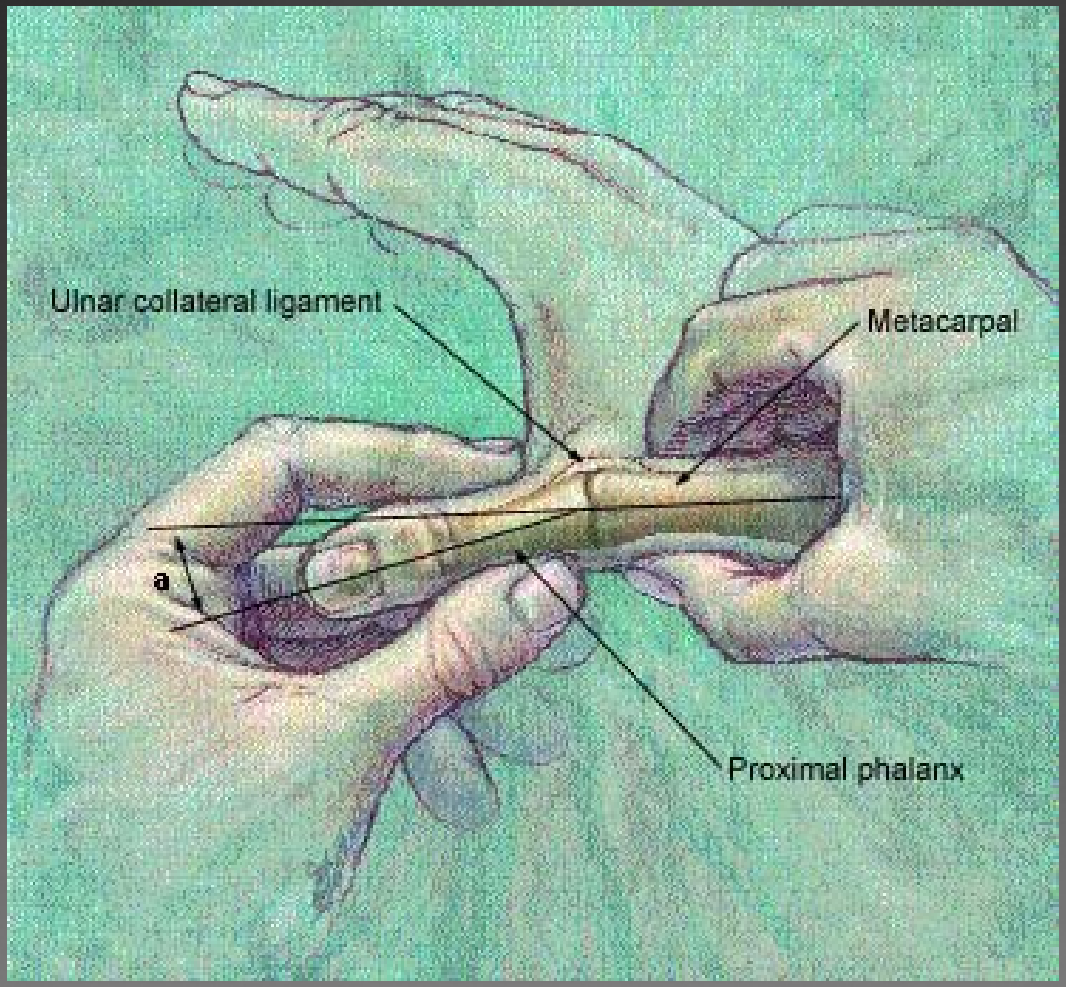
- Acute or chronic rupture of Ulnar Collateral Ligament of thumb @ MCP Joint
- Common injury with skiers and snowboarders
- Test by straining ulnar aspect of thumb's MCP
  - Compare to opposite thumb
  - Thumb spica and follow-up

Game Keeper's/Skier's Thumb





Ulnar Collateral Ligament



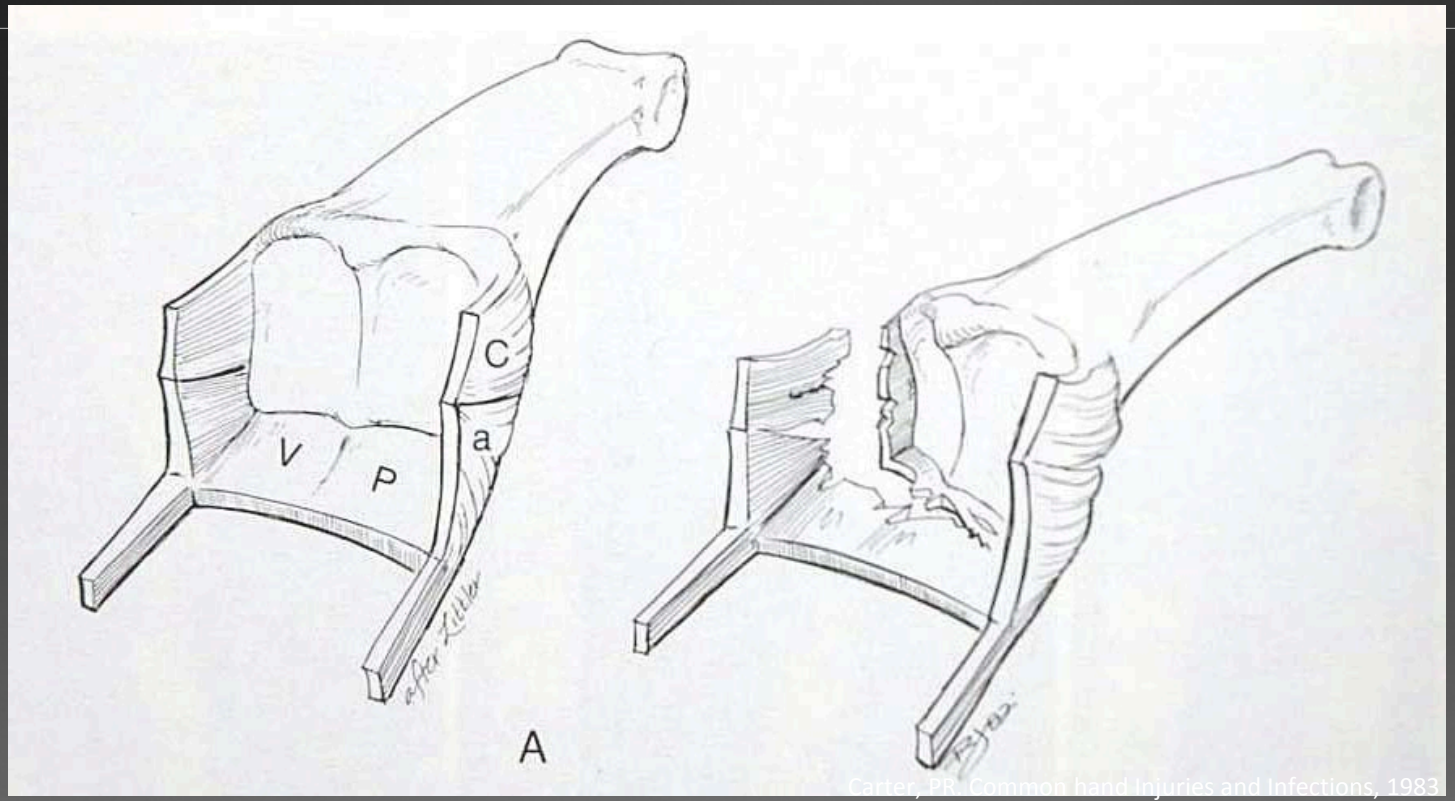
Dislocations

- Closed dislocations
  - Most common PIP joint
  - Reduction technique for dorsal dislocation: hyperextend and longitudinal traction
- Open dislocations
  - Consult ortho
  - Irrigate, antibiotics, reduction, and primary closure

Dislocations

Dislocations

PIP Dislocation

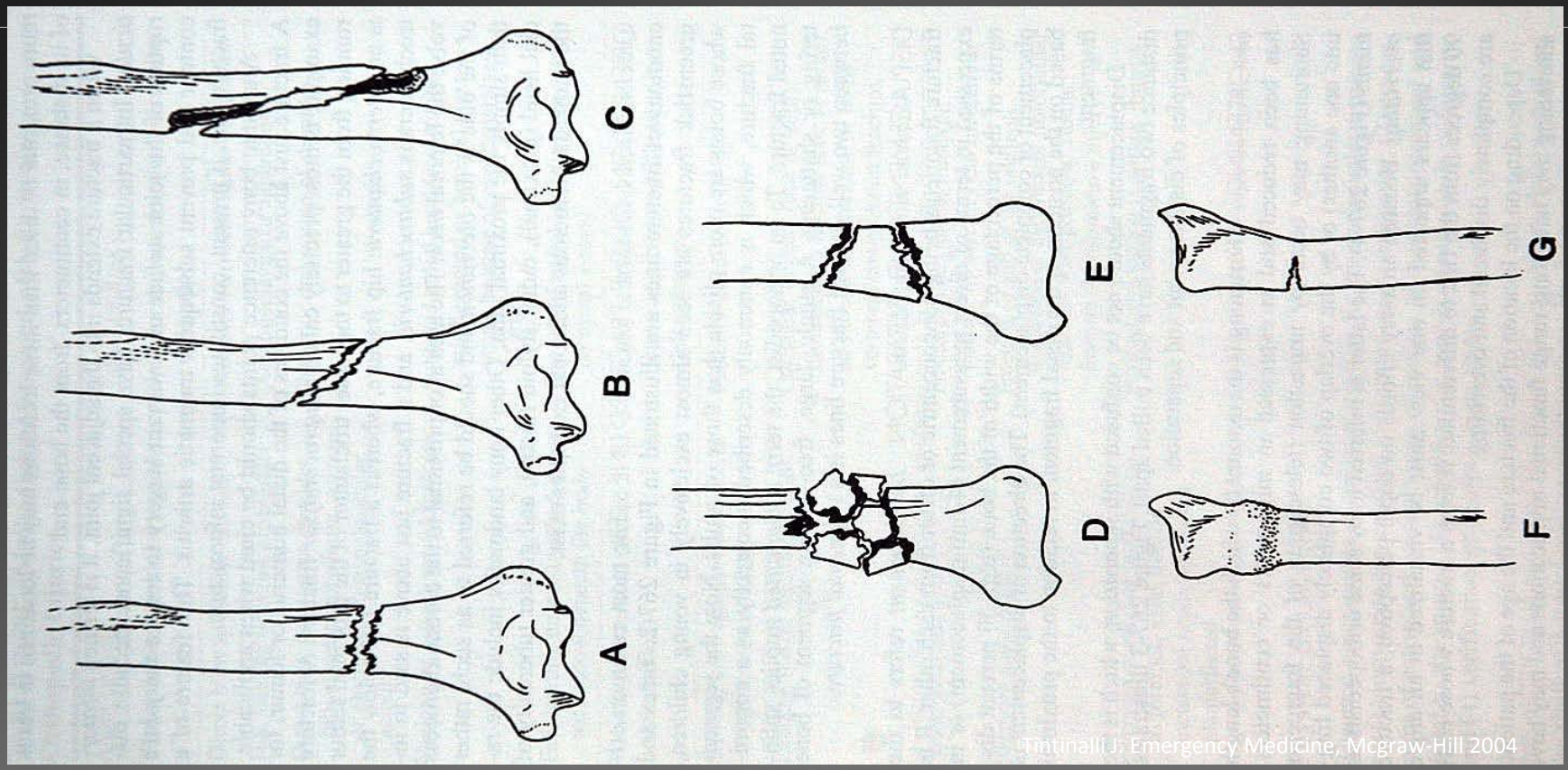


Carter, PR: Common hand Injuries and Infections, 1983

Types of Fractures

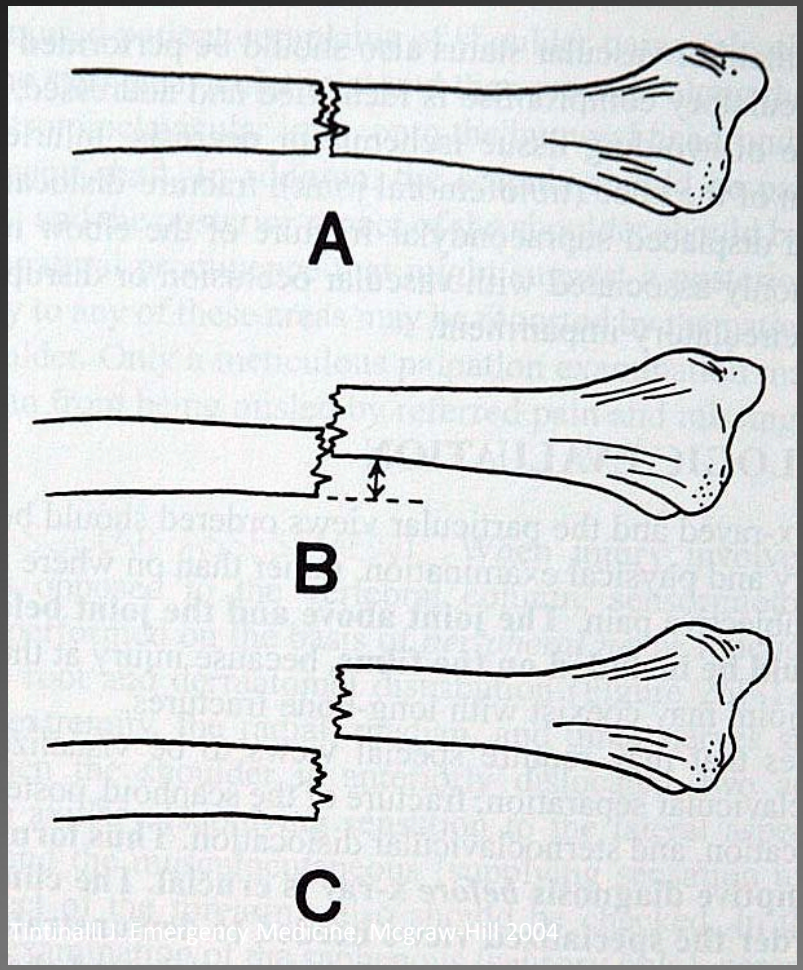
- Transverse, oblique, spiral, linear, segmental, comminuted, torus, greenstick
- Displaced vs. non displaced
- Angulated, impacted, intra-articular

Types Fractures



Tintinalli J: Emergency Medicine, Mcgraw-Hill 2004

Fractures continued



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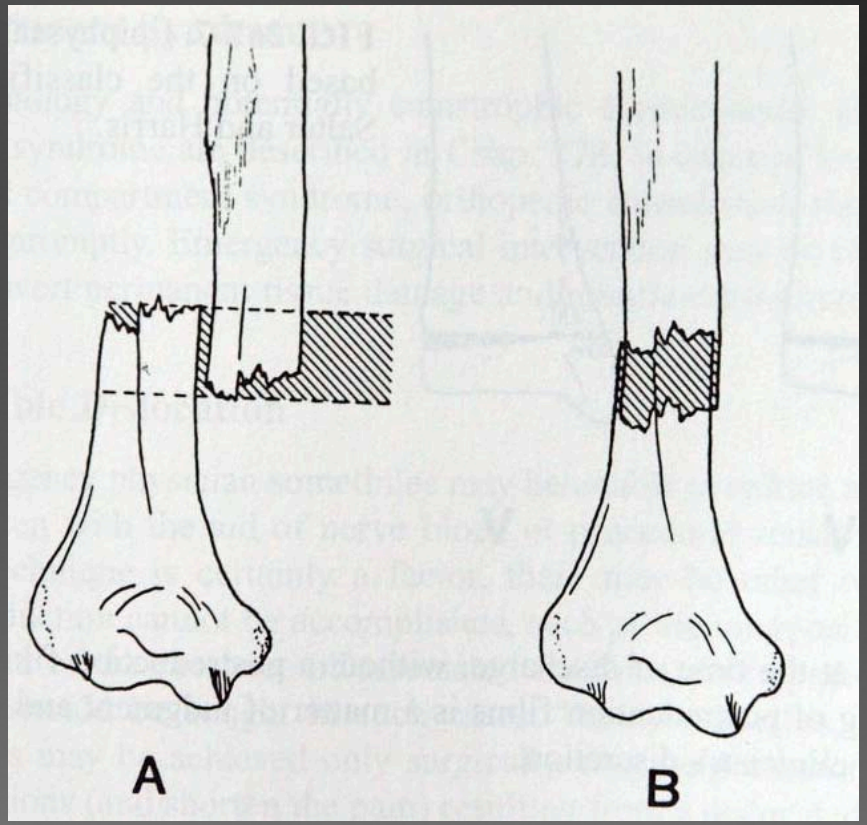
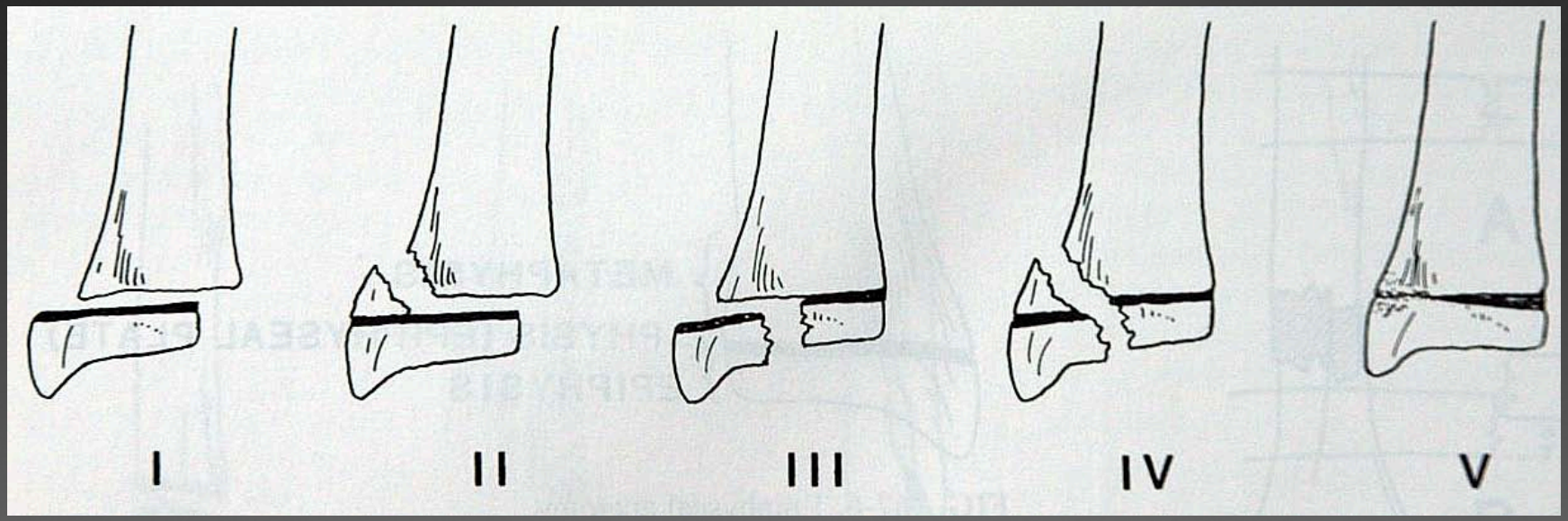


Harris-Salter Fracture Classification



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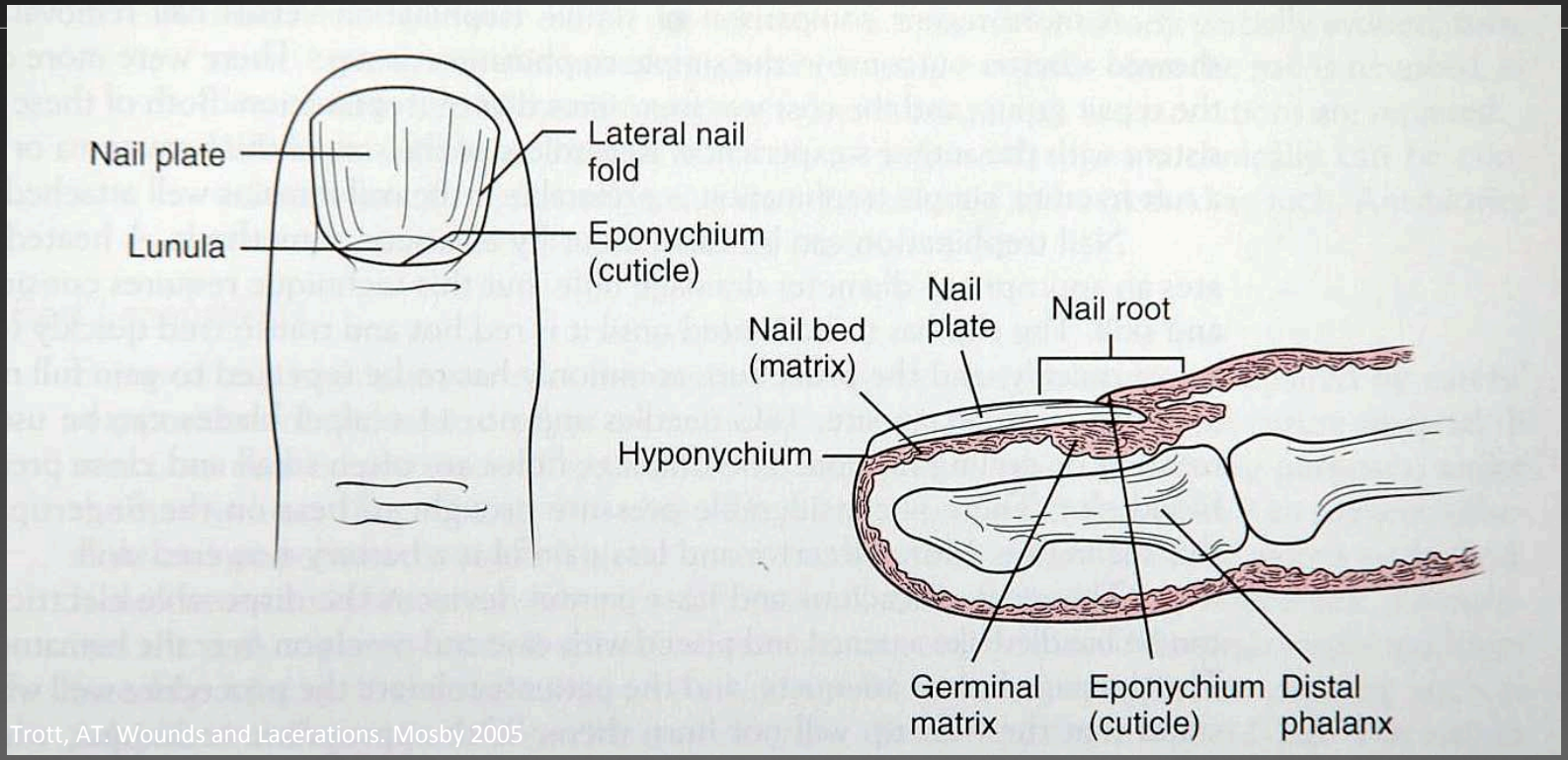
I	II	III	IV	V
6%	75%	8%	10%	1%

Fracture Reduction

- Anesthesia (digit block or hematoma block)
- Have to duplicate the injury in reverse
- Usually will require gentle traction and/or rotation
- "A Pen in hand"
- Oblique fractures have tendency to slip
- Buddy tape in place to prevent slipping

Finger Tip Injuries



Trott, AT. Wounds and Lacerations. Mosby 2005

Avulsion Injuries

Just how to get that bleeding under control

- Partial flaps
  - Can use flap/avulsed tissue as biological bandaide
    - Full thickness graft
  - Tack down with a few sutures (the fewer the better)
  - Mild compression to hold in place
  - Remove flap altogether and tx as total avulsion
- Total Avulsions
  - Silver nitrate or electrical cautery along epidermal layer
  - Surgifoam or fibrogen product
  - Non adhering dressing (removed for 2 days)

Nail Bed Repairs

- Usually a traumatic crush or knife injury
- Various degrees of injury
  - Subungle hematomas
  - Nail separation
    - Proximal—from nail fold
    - Distal
  - Nail bed lacerations
  - Open Tuft fractures

Nail Bed Injuries Continued

- Subungle hematomas
  - < 25% leave alone
  - >25% need to trephinate nail
    - +tufts fx consideration
    - Nail bed lacerations consideration

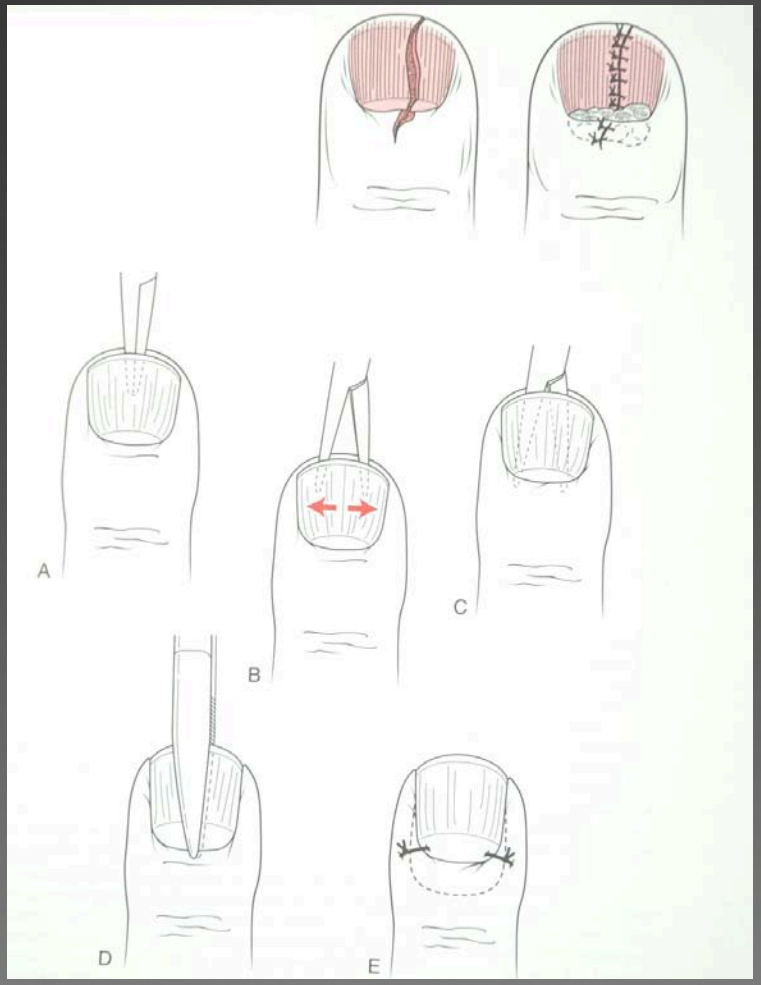
May use heated paper clip or electric cautery or twirl a needle (18g)

Finger Tip Injuries

Nail Bed Repairs

- Use long acting anesthesia
- Apply tourniquet
- Remove nail and retain
- Irrigate
- Repair of nail bed using 5.0 or 6.0 short acting dissolvable sutures
- Trim nail (non sterile portion)
- Re-insert into germinal matrix fold
- Suture in place using 5.0 nylon or glue

Nail Bed Repairs



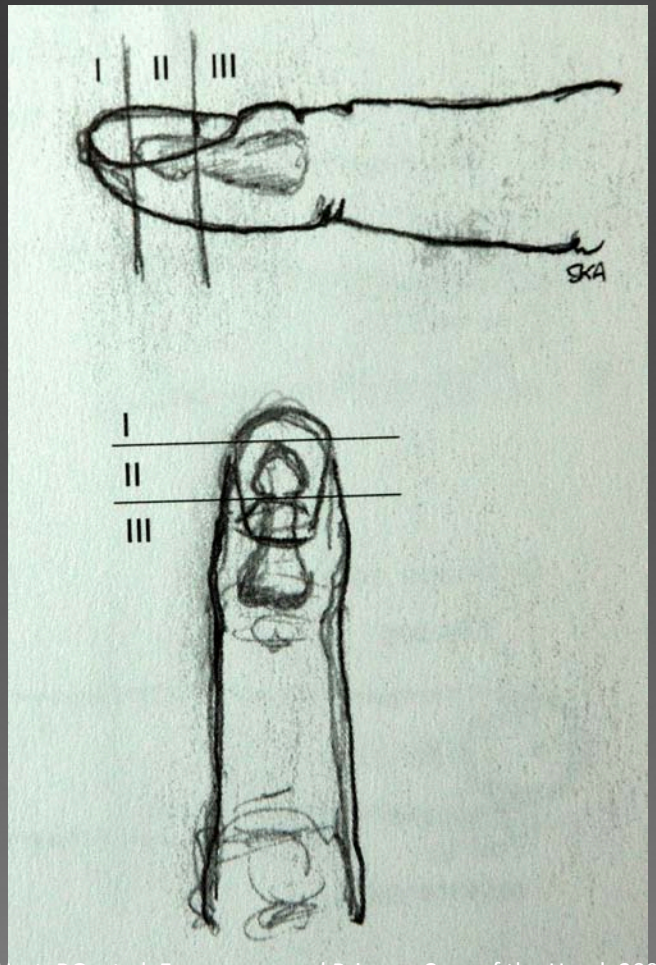
Trott, AT. Wounds and Lacerations. Mosby 2005

Amputations

- Acute ER Management
  - Anesthesia
  - Irrigation
  - Antibiotics
  - X-ray's of finger and amputated portion
  - Chill the amputation 4 degrees C.

- Call Ortho consult immediately
  - Anatomical point of amputations
  - When
  - How
  - Occupation
  - Dominance

Finger Tip Zones



Hart, RG, et al. Emergency and Primary Care of the Hand. 2001

What Zone?

What Zone?

Paronychias

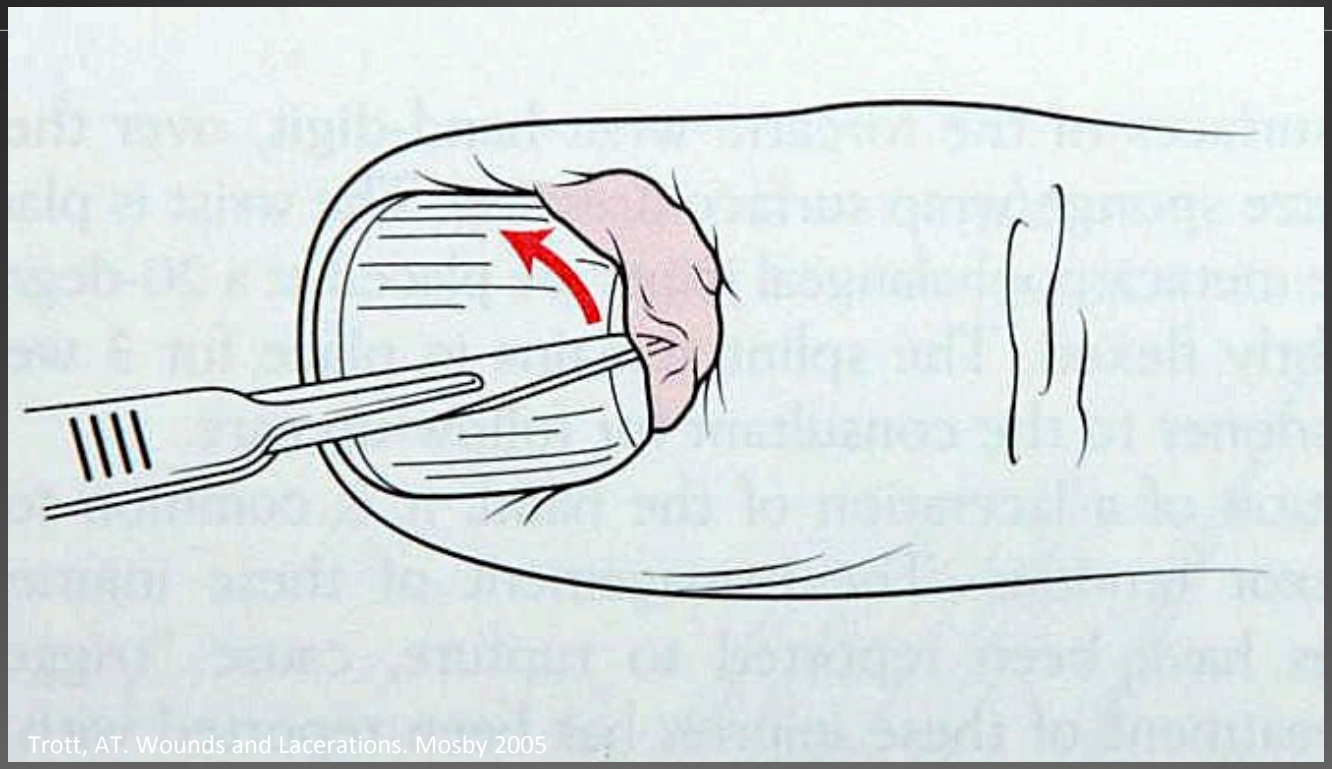
Infection below the eponychium and follow the nail fold

Common in nail bitters, hang nail pullers, and freshly manicured nails.

- Digit block anesthesia
- "J" incision using #11 blade scalpel held parallel to the nail bed
- Warm soapy soaks and antibiotics
- Follow up 1-2 days
- Elevate

Paronychias

I&D



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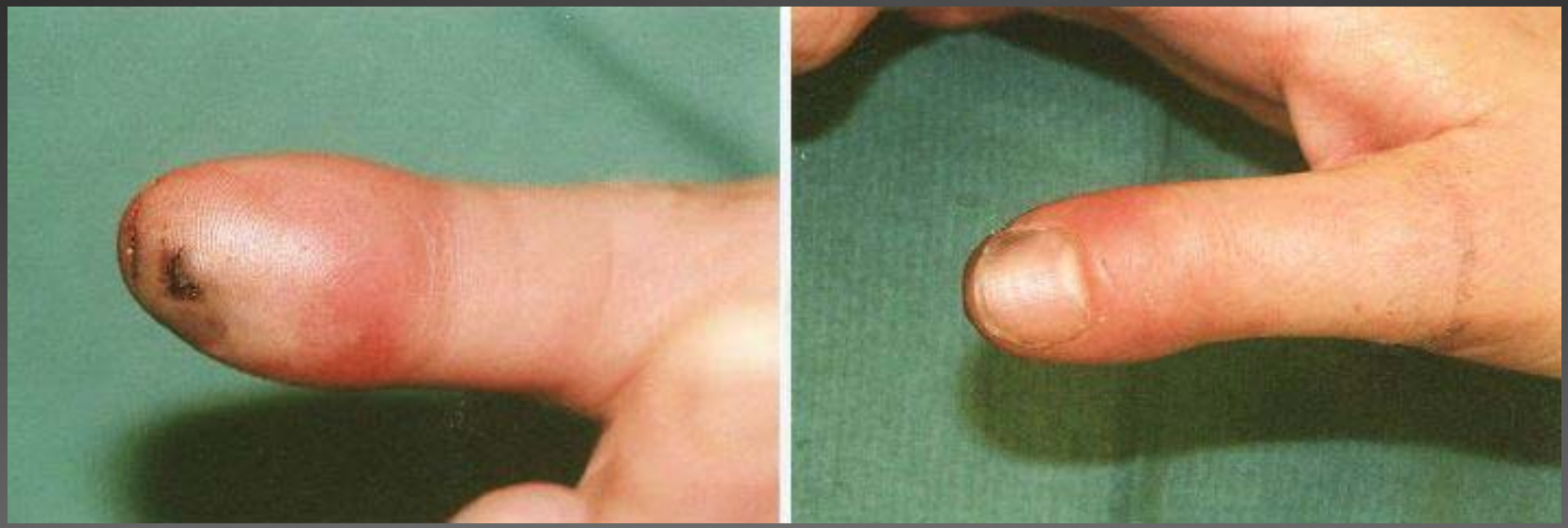
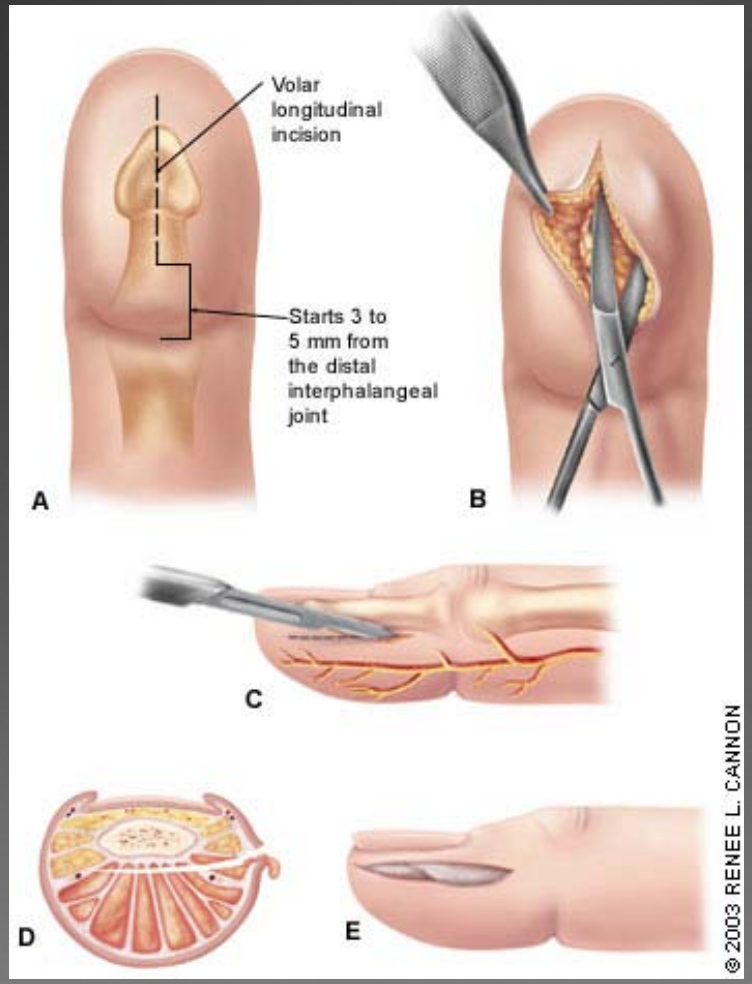
Felon

- Infection of the distal pulp space
- Usually occurs after minor trauma
- Localized to the volar pad of distal phalynx
- Midvolar vs unilateral approach and incision
- High risk for neurovascular injury and painful scar formation with drainage

Felon



Felon


Volar longitudinal incision
Starts 3 to 5 mm from the distal interphalangeal joint
A
B
C
D
E
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Felon

Herpetic Whitlow

- Cause: herpes virus I or II
  - Confirmed by viral culture or clinical dx.
- Do not I&D
  - Not indicated
  - Can cause super infection
- Tx: antiviral therapy
  - Acyclovir/famciclovir/valacyclovir
- Contagious until lesions heal

Herpetic Whitlow

Herpetic Whitlow

Figure

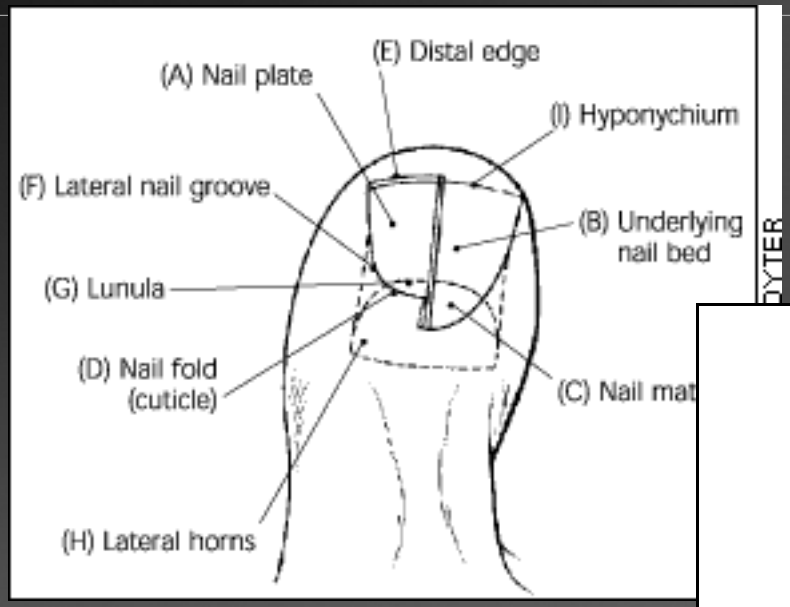
Ingrown Nail

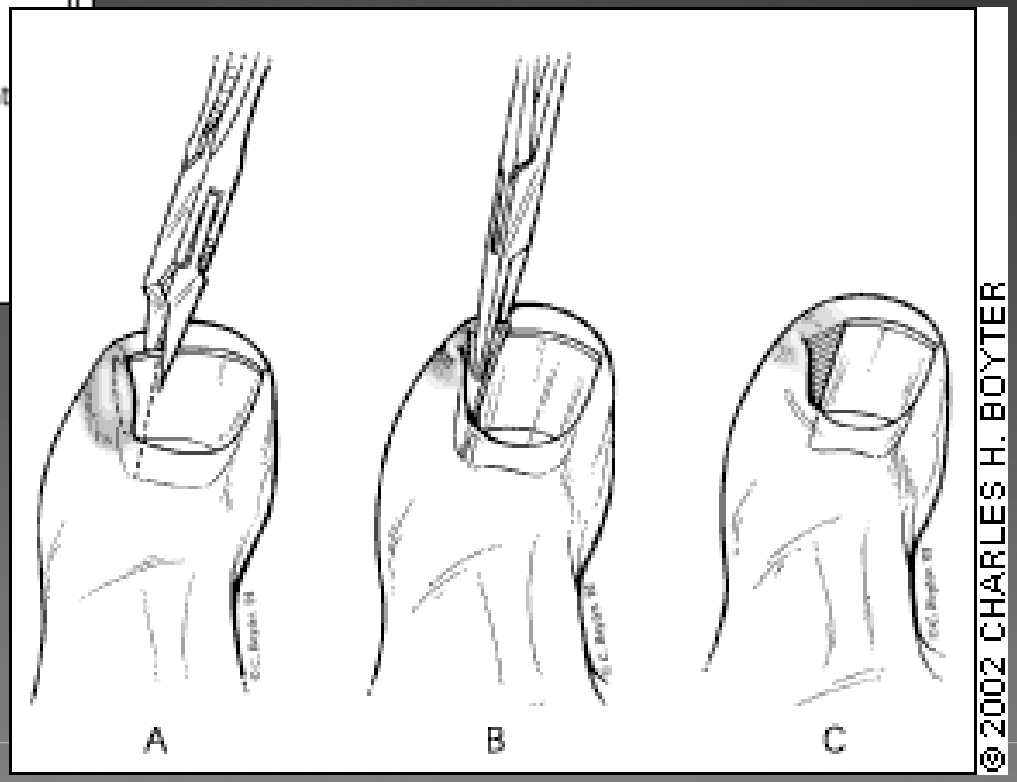
Ingrown Nail

Ingrown Nail Procedure

- Digit block
- Lift affected nail edge and separate nail from nail bed.
- Cut smooth straight edge to the prox aspect of nail
- Grasp nail and removed
- Cauterize with silver nitrate.

Ingrown Nail





When Ortho Needs to Come In

- Open Fractures and amputations
- Open Dislocations
- Vascular compromise
- High pressure injection injuries

When to Consult with Ortho

- Intra-articular fx
- Displaced/impacted/angulated fx
- Tendon involvement
- Sensory loss
- Animal bites that are infected (admit vs dc)
- Other…

High Risk Areas

- Missed fractures
- Wound infections
- Retained foreign body
- Tendon Injury
- Change of shift
- Intoxicated patients / Injuries with ETOH involved
- Return visits

Review

- Always assess and document
  - Sensations
  - vascular integrity
  - Strength, function, and alignment

- Lacerations need a bloodless field to explore
- Explore the laceration in a full ROM

Review Continued

- Always evaluate your patient after a splint/restrictive dressing has been applied for vascular integrity
- Make "nice" with your ortho hand consults
  - Know how to describe the problem in **their** lingo
  - Be succinct
  - Coming in or a phone consult?

Review Continued

- Bites—DO NOT SUTURE
  - Steri strips
  - Bulky dressings
  - Splint
  - Antibios and elevate
  - Follow up