Give Me Back My Hand and Fingers - Part 2

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Learning Goals
Attendees will be able to develop skills in the assessment of …………

• Hand/Finger Extensor Tendon Injuries
• Hand/Finger Flexor Tendon Injuries
• Human/Fight Bite wounds to the Fingers
• Finger High Pressure Injection Injuries
• Metacarpalphalangeal (MCP) joint dislocations
• Phalanx fractures
• Finger tip trauma
Boutonniere Finger Injuries
• **Boutonniere Deformity**
  
  • Zone II extensor injury
  
  • Affects PIP & DIP joints
    – Extrinsic mechanism: Extensor Digitorium Communis (EDC)
    – Intrinsic mechanism: Lumbricals
  
  • Injury Mechanism
    – Rupture central slip extensor tendon/hood @ PIP joint
      » Laceration
      » Avulsion fracture/rupture – eccentric load
      » Rheumatoid Arthritis (RA)
• **Boutonniere Deformity**
  – Injury Mechanism:
    - Rupture central slip causes loss of extrinsic extension mechanism
    - Lateral Bands sag palmar position
    - Loss PIP joint extension
    - Intrinsic muscles (Lumbricals) act as flexors @ PIP joint
    - Lumbricals become extensors @ DIP joint 2nd to palmar migration of Lateral bands
    - PIP joint flexes DIP joint extends due to unopposed motion of lumbricles
Boutonniere Deformity

- **Injury Mechanism:**
  - Middle phalanx flexes on proximal phalanx @ the PIP joint
  - Distal phalanx hyperextend on the middle phalanx
  - due to rupture central slip and sag of the lateral bands
Treatment

- **Acute Injury**
  - Recognize injury
  - Correct exam assessment
  - Splint PIP & DIP joints in full extension
  - Splint on all times till follow up appt.
  - Pain management
  - Activity modification
  - Ortho/Plastics F/U appt. 24-72 hrs.
Mallet Finger Injuries
General: Mallet Finger

- Occurs 2nd to disruption of terminal extensor tendon @ insertion into distal phalanx
- Injury Mechanism
  - Traumatic blow tip of finger causing eccentric flexion @ DIP jt.
  - Laceration dorsal finger over area to EDC insertion into distal phalanx
  - All injury mechanisms result in droop at DIP jt.
- 2 types injury
  - Soft tissue
  - Bone
Mallet Finger Deformity

Soft-tissue

Laceration

Bone

Pictures courtesy T Gocke, PA-C
Physical Examination – Mallet Finger

- Inspection:
  - Obvious droop deformity DIP jt.
  - Swelling DIP joint
- Palpation: tender dorsal finger DIP jt. region
- ROM:
  - diminished 2\textsuperscript{nd} to pain @ DIP jt.
  - Inability to actively extend finger @ DIP jt.
- Strength:
  - weak or absent finger extension @ DIP jt.
- Neurovascular
- Orthopaedic Tests
Radiology-Mallet Finger

• X-ray views AP, Lateral & Oblique finger
  – Soft tissue Mallet finger – negative x-ray
  – Bony Mallet Finger
    • Size bone fx/avulsion variable
    • >50% joint surface involvement consider surgery
    • Fragment alignment with joint surface
    • X-ray finger in extension to assess fx relocation

Salter-Harris II fx

Picture courtesy TGocke, PA-C
Treatment: Emergent care

- **Soft-tissue or Bony injury (<50%)**
  - Splint injuries in extension DIP jt.
    - Avoid hyperextension & skin blanching
    - Allow free movement @ PIP jt.
    - Stax splint/aluminum finger
  - Must wear splint 6-8 weeks to achieve adequate healing
  - Remove daily to minimize skin issues
  - RICE
  - Analgesia

- **Bony injury (>50%)** – splint & Hand referral 3-5 days

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Flexor Tendon Finger Injuries
Flexor Tendon Injury

- Injuries occur 2nd to lacerations volar aspect hand & fingers
- Common to have neurovascular injury due to laceration
- Flexor tendon injuries classified by zone
- Zone flexor tendon injury affects healing process

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Zones of the Palmar Hand:

Zone I: Distal to FDS insertion
- Tendon laceration & NV injury

Zone II: FDS insertion to mid-palmar crease
- Higher rate NV injury

Zone III: Palm-distal palmar crease to transverse carpal ligament
- Higher rate NV injury

Zone IV: Carpal Tunnel base of the wrist
- Focal area flexor tendons & Median Nerve

Zone V: Wrist to forearm

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Zones of the Palmar Thumb

Zone I: Distal to Flexor Pollicis Longus (FPL) insertion

Zone II: FPL insertion to just proximal to thumb MCP
  • Tendon laceration & NV injury

Zone III: Thenar region
  • Higher rate NV injury
  • Recurrent motor branch Median N

Zone IV & V: same as hand
Flexor Pulley system

- A1: proximal to MCP joint
- A2: proximal portion P1
- A3: at level of PIP joint
- A4: mid portion P2
- A5: just distal to DIP joint on P3

Flexor Tendons:

- FDS & FDP

Musculoskeletal Images are from the University of Washington
Physical Examination: Flexor Tendon Injuries

– Inspection:
  • Deformity to involved finger(s)
  • Lacerations flexor surface hand/fingers

– Palpation:
  • Tenderness along injured area

– ROM/Strength
  • Loss of active flexion ROM
  • Normal wrist extension cause passive flexion @ MCP/PIP/DIP
  • Assess RROM/Strength @ each joint in flexion

– Neuro/Vascular:
  • High rate of vascular and nerve injuries with finger lacerations that traumatize the flexor tendons
Treatment

• Recognize possible tendon laceration/nerve injury
  • Treat acute wound
  • Document neuro exam
  • Laceration > 60% flexor tendon width Surgery
• Chronic flexor tendon injury/Untreated
  • Rupture following conservative treatment or surgery
• Dorsiflexion blocking splint/volar splint finger tips
• Prompt Ortho/hand F/U <24-36hrs

Photo courtesy TGocke, PA-C
Jersey Finger Injuries
General- Jersey finger

- Occurs 2\textsuperscript{nd} to avulsion fx insertion Flexor Digitorium Profundus (FDP) into distal phalanx
- Ring finger involved more often
  - Increased force placed on ring finger with grasping motion
  - Weaker than other fingers with grasp
- Rupture Vincula disrupts blood supply to distal FDP tendon
- Injury Mechanism
  - FDP contracted and forceful extension of flexed FDP @ DIP jt.
Jersey Finger Deformity

- Symptoms
  - A pop or rip felt in the finger with injury
  - Pain when moving the injured finger
  - Inability to bend @ DIP joint
  - Tenderness, swelling, bruising and warmth
  - Occasionally a lump felt in the palm
Physical Examination

- **Inspection:** obvious swelling distal finger
- **Palpation:** tender DIP jt. region
- **ROM:**
  - diminished 2\textsuperscript{nd} to pain @ DIP jt.
  - Inability to actively flex finger @ DIP jt.
- **Strength:**
  - weak or absent finger flexion @ DIP jt.
- **Neurovascular
- **Orthopaedic Tests**
Hoppenfeld JB: Physical Examination of the Spine and Extremities
X-ray views:

- AP, Lateral & Oblique finger
  - Alternative: AP, Lateral & oblique Hand
  - Jersey Finger
    - Size bone fx/avulsion variable
    - Bone fragment not always present
Treatment

- **Acute Injury**
  - Recognize injury
  - Volar splint include fingers/dorsiflexion blocking splint
  - Prompt f/u Ortho/Plastics 24-36hrs

- **Concerns for operative care**
  - FDP tendon difficult to repair if retracts to palm
    - > 7 days
    - Tendon edema/swelling
    - Vincula avulsed
    - Difficulty rethread tendon thru pulley system

- **Non-operative treatment: not usual in flexor tendon injuries**
Trigger Finger Injuries
General – Trigger Finger

- **Trigger finger is a stenosing tenosynovitis**
  - 2nd to repetitive inflammatory cycles of the flexor tendon sheath
  - Thickened flexor tendon has trouble sliding thru A1 pulley
- More common in diabetic patients
- Ring Finger most often involved (THUMB)
- Conditions of concern
  - Diabetes
  - Rheumatoid arthritis (RA)
  - Dupuytren's Contracture
Physical Examination

- **History:**
  - episodes of finger pain with flexion
  - palmar tenderness area MCP joint

- **Inspection**
  - Early: no deformities
  - Advanced: locked flexed finger (PIP)

- **Palpation**
  - Tender A1 pulley region palm
  - Thickened flexor tendon (bulbous)

- **Range of Motion (ROM)**
  - Early – FROM w/o limits
  - Progression – painful ROM occasionally - constant

- **Motor Function**
  - No real limits until advanced disease and finger gets stuck in flexed “locked” position

- **Neuro/Vascular**

- **Specific Ortho tests**
Treatment-

- Conservative measures
  - Lessen stresses on involved finger flexion
    - Splints
    - NSAIDS
    - Modify activities
  - Local steroid injection
    - Better treatment option than conservative measures alone
    - Diminishing returns with increased frequency injections
    - Injection placed inside flexor tendon sheath
    - Increased risk tendon rupture with repeated injections
    - Poor response in pts with diabetes
Finger Tip Trauma/Infection
Finger Tip Injuries

• General
  – Result from some type trauma to the finger tip
  – Comprised of:
    • Subungual hematoma
    • Nail Bed laceration (matrix)
    • Nail Bed/Plate Avulsion (partial vs. complete)
  – Germinal matrix
    • Responsible for nail growth & development
    • Extensor tendon inserts 1-2mm proximal to germinal matrix
Finger Tip Injuries

Physical Examination: History

• Mechanism of Injury
  – Crush
  – Laceration
    • Often drives treatment for finger injury
    • Complex laceration with extensive tissue loss
    • Avulsion injury – tissue loss with nail, leaves exposed bone

• Age
• Hand dominance
• Work/recreational activities
• Associated Factors: diabetes, tobacco, peripheral vascular disease
• Wound contamination
Finger Tip Injuries

Physical Examination

• Inspection
  – Laceration appearance will drive treatment choices
  – Exposed bone
  – Deformities to finger and finger tip
  – Amputations

• Palpation
  – Joint structures MCP, PIP, DIP

• ROM
  – Specifically DIP joint function flexion & extension
Finger Tip Injuries

Physical Examination

• Strength
  – Assess Hand and all fingers
  – Specifically DIP joint function flexion & extension
  – Isolated flexor & extensor test (AROM, RROM)

• Neurovascular
  – Determine base line sensory function
  – Partial tissue loss with create sensory deficits
  – Capillary refill for blood supply
    • Bleeding does not insure adequate blood supply

• Orthopaedic Tests
  – Isolated finger flexion and extension tests
Distal Phalanx Anatomy

- The bony anatomy of the distal phalanx is comprised of 3 zones.
  - Tuft (ungual tuberosity)
  - Waist
  - Base
Finger Tip Injuries

• Revision amputation
  – $< 5$ mm sterile matrix
  – age & systemic factors
  – ablate rest of matrix
  – tendon involvement, disarticulate @ DIP

• Prevent “hooked nail”
  – need to trim nail bed to same level of bone for support
Acute bacterial paronychia

- Hangnail, manicure, nail biting
- Tenderness, erythema paronychial fold
- Eponychia: nail base
- *Staph aureus* common organism
Acute bacterial paronychia
Acute bacterial paronychia

- Elevation of paronychial fold without incision
- Eponychium involved → remove nail base
- Incise at right angles to nail fold
- Packing x 24 - 48°
- Warm water soaks and antibiotics
Bacterial Felon

- Usually follows penetrating trauma
- Intense throbbing, swelling, pain of volar pulp
- *Staph aureus*
Bacterial Felon

- Longitudinal volar incision
  DIP flexion crease not crossed
- Longitudinal unilateral incision
  $\leq 3$ mm from nail border
- Blunt dissection of septae
  No proximal probing
- Warm water soaks and antibiotics
Herpetic Whitlow

- Healthcare workers exposed to oral secretions
- Prodromal pain / itching followed by painful vesicles
- HSV 1 or 2
- Tzanck smear / culture for diagnosis
- Nonoperative Tx
  - Oral antiviral agents acyclovir
- Lesions May reoccur
Finger Tip Injuries

• Subungual hematoma
  – Results form blunt trauma to the finger tip
  – Matrix trauma results in bleeding under the nail

• Hematoma < 50 % area nail
  – decompress with heated paper clip, electrocautery or 18 G needle
  – Soak warm H2O daily to facilitate continued drainage
Finger Tip Injuries

Subungual Hematoma

- > 50 % area nail
  - remove nail plate & repair nail bed
  - periostial elevater aids in nail removal
  - Preserve nail plate to replace into eponychium
    - Aluminum or petroleum guage
  - Use absorbable suture to repair wound
  - Copious lavage if open fx
  - Stabilize open fx is needed
  - Check Tetanus status and Abx prophylaxis

Photo from Tom Gocke PA-C Library
Finger Tip Injuries

- Nail plate/matrix avulsion
  - High energy injury to remove all or portion of nail
  - Distal Phalanx fx possible
  - Associated nail-bed laceration or avulsion germinal matrix
  - Concerns for long-term nail deformities
Finger Tip Injuries

**Nail Avulsion complete**
- Germinal matrix injured
- Higher risk nail deformities
- Increased chance nail bed laceration
- Good chance no nail returns
- Granulation healing
- Tetanus and abx prophylaxis

Photo from Tom Gocke PA-C Library
Finger Tip Injuries

• Nail Avulsion Partial
  – Germinal matrix injured
  – Higher risk nail deformities
  – Increased chance nail bed laceration
  – High risk distal phalanx fx
  – High risk extensor tendon laceration (Mallet deformity)
  – Granulation healing & primary repair lacerations
  – Splint immobilization
  – Wound re-checks
  – Tetanus and abx prophylaxis
High Pressure Injection Injuries
• Common injury among labor-related jobs
• High pressure fluids forced into tissues cause extensive soft-tissue damage
• Frequently affects non-dominant hand (index finger)
• Paint, solvents, water & petroleum products
• Amount tissue injury based on:
  – PSI force
  – Volume injected material
  – Specific material injected
    • Latex paint, grease, water less toxic to tissue
    • Solvents, oil-based paint more toxic to tissue
      – High rate amputations 2nd to oil based paint
• Time of injury to definitive treatment crucial to recovery
Physical Examination

- Inspection: obvious swelling distal finger
- Palpation: tender DIP jt.
- ROM:
  - diminished 2\textsuperscript{nd} to pain.
  - Inability to actively flex finger
- Strength:
  - weak or absent finger flexion

- Neurovascular - KEY Orthopaedic Tests
X-ray views

- Hand & Fingers AP, Lateral & Oblique
- Forearm AP & Lateral
  - Oil based paint & solvents seen on plain x-ray
  - Fluid travels along tissue planes and tendon sheath
  - Can be seen proximal despite small volume of small injury site
Treatment

• *Early recognition of injection injury is key to recovery*

• *Surgical I&D necessary – can not treat conservatively*
  
  – May need to incise large area finger into forearm depending on amount of fluid injected
  
  – Full exploration of Tendon sheath and neurovascular bundle
  
  – Repeat I&D maybe necessary (prevent tissue necrosis)

  – Admission for monitoring and IV abx mandatory

  – Prompt surgical intervention leads to lower rate complications & reduces chance of amputation

Fight/Human Bite Injuries
Clenched fist striking mouth/tooth
(“Fight bite“)

- Tooth penetrates skin/joint/tendon-sheath/periosteum
- Third most common bite injury
- More common in adult males & boys
- Dorsal aspect hand
  - 3rd/4th MCP joint common location
<table>
<thead>
<tr>
<th>Aerobic Bacteria</th>
<th>Anaerobic Bacteria</th>
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<tbody>
<tr>
<td>• Strep species</td>
<td>• Prevotella species</td>
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<tr>
<td>• Staph species</td>
<td>• Fusobacterium species</td>
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<tr>
<td>• Eikenella corrodenes</td>
<td>• Eubacterium species</td>
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<tr>
<td>• Haemophilus species</td>
<td>• Veillonella species</td>
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<tr>
<td>• Enterobacter species</td>
<td>• Peptostreptococcus species</td>
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<tr>
<td>• Neisseria species</td>
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Most wounds are polymicrobial
• **HIV:**
  – Not usually transmitted by saliva alone
  – Increased risk transmission via blood contamination
  – Suspicion of HIV – CDC recommends:
    • 28 day course antiviral medication
    • Baseline HIV testing then retest @ 3 & 6 months

• **Hepatitis (HBV) & HCV**
  – Post exposure testing recommended for both parties involved
  – HBV can be transmitted by saliva
  – Check HBV surface antigen titer regardless vaccination status
  – Titers absent or low recommend HBV vaccination
  – Post-exposure HCV testing recommended and retest @ 4 & 6 months
Physical Examination

• **History:**
  – Vague accounts of injury: suspect fight bite
  – Delay present for exam – symptoms worsen/intensify

• **Exam:**
  – small (puncture) wound dorsum hand (MCP)
    • 3rd / 4th MCPs, can involve any digit
    • erythema, warmth, edema wound/joint
    • ± purulent drainage
  – must assess for integrity of extensor tendon function
  – possible pain with passive ROM of MCP joint
  – typically no involvement of volar/flexor surface of digit
  – neurovascular status typically preserved
Clenched Fist Injury

- Flexion
- Extension

Tendon
Capsule
• Radiographs
  – 2 views affected areas:
    • suspected fracture
    • suspected foreign body
• Laboratory Studies/Culture
  – Indications variable
    • CBC w/diff
    • Sed rate, CRP
    • Glucose
    • Wound Cultures
    • Blood Cultures
Treatment

• Perform initial evaluation
• Recognize possibility “fight bite”
• Due to delayed presentation most patients need surgical I&D
  – Debridement wound/joint capsule
  – Wound drain
  – Gram stain & wound culture in OR
Who benefits from Inpatient therapy:

- Hand, foot or face wounds
- Patients > 50 years
- Immunosuppressed patients
- Bone/joint involvement/Puncture wounds
- Chronic alcoholism/IV drug use
- Diabetes mellitus
- Crush injuries/Vascular disease
- Delayed treatment
- Pre-existing edema of the affected extremity

Antibiotics choices: Human Bites: Adults/Children - PO

• **Primary Drug of choice**
  – Amoxicillin/Clavulanate Potassium (Augmentin) 875/125mg PO BID or 500/125mg PO TID x 7-10 days
  – Eikenella/Pasteurella – susceptible to PEN/ Ampicillin
  – Staph/Anaerobes – produce Beta-lactamase = Beta-lactam inhibitor (Clavulanate) makes more effective

• **Penicillin Allergy**
  – Clindamycin or Metronidazole plus;:
    • Cefuroxime (Ceftin) 500mg PO BID
    • Doxycycline 100mg PO BID
    • Moxifloxacin (Avelox) 400mg PO Daily
    • TMP-SMX 800/160 PO BID

http://www.globalrph.com/antibiotic/bites.htm

Human and Other Mammalian Bite Injuries of the Hand: Evaluation and Management; JAAOS January 2015
Antibiotics choices: Human Bites: Adults/Children - IV

- **Primary Drug of choice**
  - Amoxicillin-clavulanate
  - Piperacillin-tazobactam
  - Ticarcillin-clavulanate
  - Ceftriaxone plus Metronidazole
    - Eikenella/Pasteurella – susceptible to PEN/Ampicillin
    - Staph/Anaerobes – produce Beta-lactamase = Beta-lactam inhibitor (Clavulanate) makes more effective

- **Penicillin Allergy**
  - Fluoroquinolone plus Metronidazole or Carbapenem
  - Imipenem or Meropenem or Ertapenem (monotherapy)

[http://www.globalrph.com/antibiotic/bites.htm](http://www.globalrph.com/antibiotic/bites.htm)

*Human and Other Mammalian Bite Injuries of the Hand: Evaluation and Management; JAAOS January 2015*
Phalangeal Joint Injuries
“Finger Dislocations”
Phalangeal Joint Injuries

• Finger dislocations
  – Common finger injury
  – Collateral Ligaments and volar plate ligaments injured
  – Occurs all levels MCP, PIP & DIP
    • Displacement - dorsal/volar, radial/ulnar
    • Fractures – intra-articular & extra-articular
  – Associated Injuries
    • Mallet finger (DIP)
    • Swan Neck Deformity (PIP)
    • Boutonniere Deformity (PIP)
    • Nail bed injury
Phalangeal Joint Injuries

Musculoskeletal Images are from the University of Washington "Musculoskeletal Atlas: A Musculoskeletal Atlas of the Human Body" by Carol Teitz, M.D. and Dan Graney, Ph.D."
Phalangeal Joint Injuries

• Physical Examination
  – Inspection:
    • obvious swelling
    • Look for dorsal or volar deformity
  – Palpation: global diffuse tender finger
  – ROM:
    • diminished 2nd to pain or deformity
    • Inability to actively flex/extend 2nd to deformity
  – Strength: weak or absent 2nd to pain or deformity
  – Neurovascular: usually intact
  – Orthopaedic Tests
    • Ligament instability: collaterals & volar plate
    • Flexor – Extensor tendon integrity
Phalangeal Joint Injuries

• Radiology review
  – Plan x-ray: PA, Lateral & oblique
    • Include with hand for better overall view
    • Need true lateral – clear view joint surfaces
  – MRI & CT not indicted most cases
  – Hastings Classification – dorsal fx-dislocation PIP
    • Based middle phalanx articular surface injury
      – Type I - < 30 % joint surface involved
      – Type II – 30-50% joint surface involved
      – Type III - > 50% joint surface involved

Berger RA, Weiss A-P C, Hand Surgery , Volume 1 , 2004
Finger Dislocation

Dorsally displaced PIP joint dislocation

- **AP View:**
  - Double shadow P2 over P1
  - Appears normal alignment

- **Lateral View:**
  - P2 dorsally displaced @ PIP joint
  - Finger shortened 2\textsuperscript{nd} to pull lumbricles and flexor/extensor tendons
  - Gross dorsal deformity on clinical exam
Phalangeal Joint Injuries

PIP joint dislocation & fracture-dislocation

- **Volar PIP joint dislocation**
  - Volar less common vs. dorsal
  - Central slip extensor tendon injury and collateral ligament
  - Untreated can lead to Boutonnière deformity

- **Treatment**
  - **Dislocation:** Non-operative
    - reduce and splint extension
    - 1-2 weeks initial then if start gentle ROM (variable)
    - Grossly unstable after reduction may need longer immobilization PIP joint
Phalangeal Joint Injuries

Volar PIP joint fractures-dislocation

Treatment: Fracture-dislocation:

- Non-operative:
  - < 40% joint surface involved proximal or middle phalanx
    - reduce and splint extension
    - 2-3 weeks initial then start gentle ROM
    - Grossly unstable after reduction or displacement of fx fragments needs surgery

- Operative:
  - > 40% joint surface involved proximal or middle phalanx
    - ORIF or Closed Reduction Percutaneous Pinning (CRPP)
    - Reduce P2 onto condyles of P1 primary goal


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Phalangeal Joint Injuries

Dorsal PIP joint Dislocation
- Most common injury to volar plate and collateral ligaments
- Can lead to Swan Neck deformity if incorrectly treated

- **Simple Dislocation-condyle** base P2 contact condyle distal P1 (hinged appearance)

- **Complex Dislocation-Bayonet** apposition of P2 on P1
  - Volar plate can be barrier to reduction
  - Need to reproduce hyper extension and longitudinal traction for reduction to unlock volar plate ligament
Phalangeal Joint Injuries

Dorsal PIP joint dislocation

- Treatment
  - Non-operative
    - Easily reducible dislocation (patient reduced)
    - Splint extension 1-3 weeks (variable)
    - Start gentle ROM stable fx sooner (buddy tape)
    - Grossly unstable after reduction may need longer immobilization PIP joint
  - Operative
    - Volar plate ligament (closed) or Flexor Digitorium Profundus (open) interposed into jt. blocking reduction
    - Surgery focused on correcting these issues
Phalangeal Fractures
Phalangeal Fractures

General

- Common hand fractures
- Sports injuries, labor and fall related injuries
- Distal phalanx fx most common phalanx fx
- Crush injury finger tip results in:
  - Laceration nail bed and nail plate injury
  - Nail matrix injury possible
  - Open vs. Closed fx distal phalanx (Tuft fx)
- Finger phalanx divided into:
  - Proximal
  - Middle
  - Distal
Phalangeal Fractures

• Physical Examination
  – Inspection: obvious swelling
  – Palpation: tender fx region
  – ROM:
    • diminished 2\textsuperscript{nd} to pain.
    • Inability to actively flex/extend finger 2\textsuperscript{nd} pain & deformity.
  – Strength: weak or absent
  – Neurovascular:
    • Usually intact
    • Laceration – swelling – fractures can impair either or both
  – Orthopaedic Tests
    • Collateral ligament stability
    • Flexor – Extensor tendon integrity
Phalangeal Fractures

Radiology

- X-ray views AP, Lateral & Oblique finger
  - Alternative: AP, Lateral & oblique
    Hand - include fingers
  - Supinated lateral – better look @ Ulnar sided hand
  - Look @ whole finger

Pictures courtesy T Gocke, PA-C
Phalangeal Fracture

Comminuted & impacted base proximal phalanx fx

Comminuted & displaced base proximal phalanx fx

Pictures courtesy T Gocke, PA-C
Phalangeal Fractures

- Intra-articular, displaced fracture base proximal Phalanx

Transverse fx. Proximal phalanx

Pictures courtesy T Gocke, PA-C
Phalangeal Fractures

Non-displaced Distal Phalanx fracture – base, Apex volar
Lateral Finger x-ray

- Crush injury finger
- Open vs. closed fx
- Nail matrix injury?
- Nail Bed laceration
- Subungual hematoma
- Soft tissue Mallet finger injury?

Pictures courtesy T Gocke, PA-C
Tuft Fracture
Fracture Non-displaced Distal Phalanx

Pictures courtesy T Gocke, PA-C
Phalangeal Fractures

- **Proximal Phalanx fx**
  - Apex volar angulation 2\textsuperscript{nd} proximal fx component pulled volar by interossi muscles
  - Distal component pulled into extension 2\textsuperscript{nd} to pull of extensor tendon

- **Middle Phalanx fx**
  - Fx deformity either apex dorsal or volar
    - Apex dorsal: fx proximal to Flexor Digitorium Superficialis (FDS) insertion P2
    - Apex volar: fx distal to FDS insertion
    - Neutral fx alignment: transverse fx thru mid-1/3 (inherently stable)
Phalangeal Fractures

- Treatment: Proximal & Middle phalanx
  - Non-operative
    - Extra-articular
    - < 10 degrees angulation
    - <2mm shortening
    - NO rotational deformity
      - Nondisplaced Fx:
        » Rigid finger splint: comfort 2\textsuperscript{nd} pain 2-3 weeks then move
        » Buddy tape protection & allows gentle ROM
        » No sports or strenuous activity
    - Displaced Fx:
      » Digital block and relocation
      » Rigid finger splint: comfort 2\textsuperscript{nd} pain 2-3 weeks then move
Phalangeal Fractures

• Treatment: Proximal & Middle phalanx
  – Operative
    • Extra-articular
    • > 10 degrees angulation, >2mm shortening
    • Rotational deformity
    • Long oblique fx, Intra-articular comminuted fx
  – ORIF vs. CRPP
    » Rigid finger splint: comfort 2nd pain 2-3 weeks then move
    » Buddy tape protection & allows gentle ROM
    » No sports or strenuous activity
  – Displaced Fx:
    » Digital block and relocation
    » Rigid finger splint: 2-3 weeks then move
Phalangeal Fractures

- Treatment: Distal phalanx
  - Non-operative
    - Extra-articular
    - < 10 degrees angulation
    - < 2mm shortening
    - No Rotational deformity
      - Dorsal Finger splint DIP joint vs. Stack Splint
        » Swelling may limit stack splint use
        » Monitor for Nail matrix injury vs. nail bed laceration
        » > 50% subungual hematoma assume nailbed laceration
        » Look for possible open fx w/ crush injury and/or nailbed laceration
        » Open fx needs copious lavage prior to nailbed repair & D/C on oral abx
        » Replace removed/avulsed nail plate over laceration to protect Eponychia fold and nail regeneration
Take Away Points

- Think beyond local injury site/local anatomy
- Most finger extensor tendon injuries treated with conservative management
- Immobilize extensor finger tendon injuries with dorsal extension splint
- Immobilize flexor finger tendon injuries with extension blocking splint or volar splint include hand/fingers – **URGENT REFERRAL**
- High Pressure Injection and “fight bite” injuries treated **URGENTLY - SURGICALLY**