Common Hand & Wrist Injuries

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Disclosure

- Company Name:
  - Ascension Ortho- Consultant
Common Disorders of the Hand

- General Classification
  - Fractures
  - Dislocations
  - Infections
  - Lacerations
  - Neuropathies
  - Vascular disorders
  - Tendonopathies
  - Tumors

Other

Injuries

Hand

• Common Disorders of the Hand

- Review of Anatomy
  - Surface
  - Bones and Joints
  - Ligaments
  - Muscles and Tendons
  - Nerves
  - Vessels
Common Disorders of the Hand

- Evaluation
  - History
    - Details of complaint
    - PMHx
    - PSHx
    - Social Hx
    - Rx

Common Disorders of the Hand

- Physical Examination
  - General
  - Focused
    - Upper extremity
    - Begins at the neck
    - Focused examination of the Hand and Wrist
    - Related distant physical finding
      - Systemic
      - Other musculoskeletal anomalies
Common Disorders of the Hand

- Examination
  - Inspection
  - Palpation
  - Range of motion
    - Active
    - Passive
  - Provocative maneuvers

- Sensory Exam
  - Light touch
  - Sharp/dull discrimination
  - Threshold
    - Vibration
    - Semmes-Weinstein
  - 2 point discrimination
    - Static
    - Moving
Lacerations:

Common Disorders of the Hand

- Lacerations
  - Evaluation
    - History
    - Clean or contaminated
    - Td status
    - Mechanism
      - Penetrating injury?
      - Bite?
      - Beware dorsal MCP injuries
Common Disorders of the Hand

- Lacerations
  - X-rays
    - Orthogonal views
  - Fractures
  - Dislocation
  - Foreign material
  - Soft tissue
  - Air
    - Joint
    - Soft Tissue

Common Disorders of the Hand

- Lacerations
- Examination
  - Wound evaluation
  - Recognized extent of injury
  - Retained foreign material
  - Neurovascular status
    - Before anesthesia
  - ROM
    - Passive/active
  - Motor
    - Ability
    - Resting posture
    - Tenodesis
    - Pain?
Common Disorders of the Hand

- Lacerations
  - Recognize flexor and extensor lacerations
    - Repair appropriately
  - Recognize joint penetration
  - Recognize nerve injuries

Common Disorders of the Hand

- Lacerations
  - Flexor injuries
    - Pain with resisted flexion may herald injury
    - Generally require OR for exploration and repair
    - Beware Zone 2 injuries
  - >50% repaired
  - <50% trim
  - Rehabilitation protocols
Common Disorders of the Hand

- Flexor Zones
  - 5 Zones
  - Correlate with underlying anatomy
  - Zone 2: “No man’s land”

Common Disorders of the Hand

- Lacerations
  - Extensor lacerations
    - Consider position of hand at time of injury
    - Presume “fight bite”
    - Pain may indicate injury
    - Junctura tendinae may allow partial/weak extension and create false sense of security in MCP level injuries
Common Disorders of the Hand

- Lacerations
  - Extensor lacerations
    - Often under-appreciated
    - Be aware of anatomy
    - >50% repair
    - May be done in ER at times

Common Disorders of the Hand

- Extensor Zones
  - 8 Zones
  - Correlate with underlying anatomy
  - Odd numbers over joints
Common Disorders of the Hand

- Laceration
  - Wound closure
    - Adequate I and D
    - Loose closure
    - Consider drain for contaminated or deep wounds
    - Abx for contaminated wounds
    - <24 hours
    - Beware bites
    - Wound check

Infections:
Common Disorders of the Hand

- Infections
  - Paronychia
  - Felon
  - Herpetic whitlow
  - Septic Tenosynovitis
  - Deep space infections
    - Thenar space
    - Mid-palmar space
    - "Horseshoe abscess"
    - "Collar button abscess"

- Infections
  - Group A Strep most common
  - Special considerations
    - Exposure to marine environment
      - Fishermen
      - Mycobacterium marinum
      - I and D
      - Rifampin, ethambutol, TCL
    - Gardening
      - Rose thorn
        - Sporotrix shenckii
        - KISS (Super saturated potassium iodine)
Common Disorders of the Hand

- Infections
  - Bites
    - History
    - Xrays
    - Cat and Dog
      - Paturella multocida
        - Rx: Augmentin
    - Human
      - Eikenella corrodens
      - Rx: PCN, Augmentin

Common Fractures:
Common Disorders of the Hand

- Common fractures
  - Phalanx
    - Shaft, Condyles
  - Metacarpals
    - Head, Neck, Shaft, CMC
  - Carpus
  - Distal Radius

Common Disorders of the Hand

- Fractures
- Evaluation
  - Open v. closed
  - Displaced v. undisplaced
  - Stable v. Unstable
  - Associated injuries
Common Disorders of the Hand

- X-ray interpretation
  - Patient information
  - Skeletal maturity
  - Orthogonal views
  - Anatomic location
  - Soft tissue assessment
  - Bones imaged
  - Fracture or dislocation
  - Location of injury

- X-ray interpretation
  - Identify bone
  - Fracture pattern
  - Angulation
  - Displacement
  - Articular involvement
  - Articular Congruity
  - Direction
Common Disorders of the Hand

- **Tuft fracture**
  - Often associated with nail bed injury
  - Address nail injury
  - Displaced
  - Reduce
  - Splint
  - Open injuries more forgiving than elsewhere

Common Disorders of the Hand

- **Distal phalanx fracture**
  - Address nail injury
  - Alignment to improve contour and nail injury
  - Splint or pinning
  - Assess FDP and Extensor insertion
Common Disorders of the Hand

- Nail bed injury
  - With or without bone injury
  - Evacuate hematoma
  - If >50% consider nail removal and nail bed repair
    - 6.0 monolyl
    - Return nail or stent to nail fold
  - Stabilize

- Phalangeal fractures
  - Deformity is predictable with knowledge of anatomy
  - May be unstable
  - Be aware of intrarticular fractures
Common Disorders of the Hand

- Proximal phalanx fracture
  - Dorsal pull of extrinsic extensor mechanism combined with volar pull of intrinsics
  - Volar angulation
  - Potentially unstable

Common Disorders of the Hand

- Metacarpal shaft fracture
  - Intrinsic muscle pull
  - Dorsal angulation
Common Disorders of the Hand

- “Mallet finger”
  - Disruption of insertion of extensor terminal tendon
  - History of resisted forceful extension
  - Swelling, pain, inability to extend DIP
  - Bone or pure ligamentous

Common Disorders of the Hand

- “Mallet finger”
  - Closed v. Open
  - +/- Bone
  - Joint reduced vs. dislocated
Common Disorders of the Hand

“Mallet finger”

Tendinous
- Closed
- Acute
  - 6 - 8 weeks of full time extension splinting
  - 6 weeks of night splinting
  - 6 weeks of protection and return to splinting
- Chronic
  - 8-12 weeks initial splinting
  - Increased chance of tx failure

Common Disorders of the Hand

“Mallet finger”

Bony
- Assess size and displacement of fragment
- Assess joint congruity
Common Disorders of the Hand

- Bony “Mallet finger”
  
  **Treatment**
  
  - Non-displaced, congruent
    
    - Extension splint
  
  - >40% Joint surface, subluxed
    
    - Closed pinning v. open reduction and pinning

Recognition and Treatment of Hand and Wrist Injuries

- Central Slip Injury
  
  - Rupture or avulsion of insertion of the extensor insertion at the middle phalanx
  
  - Resisted, forced hyperextension
  
  - Inability to extend PIP in isolation
Recognition and Treatment of Hand and Wrist Injuries

■ Central Slip Injury
  ■ Treatment
    ■ Acute
      – PIP extension splint x6 weeks/until competent central slip
      – DIP motion
    ■ Chronic
      – Attempt closed tx
      – May requiree reconstruction if progressive swan neck deformity from over-pull of terminal tendon

Common Disorders of the Hand

■ FDP Avulsion
  ■ “Rugger Jersey” finger
  ■ History of forcible/resisted flexion of FDP
  ■ More often ring finger
    ■ Proposed reason
      – Exposed location
      – Watershed area/weak area of tendon
  ■ Inability to flex DIP
  ■ Often present late
Common Disorders of the Hand

- FDP Avulsion
  - Leddy Classification
  - Governed by level of tendon retraction and associated bone fragment
  - Determines treatment interval

Recognition and Treatment of Hand and Wrist Injuries

- Fractures and Dislocations
- Open Fractures
  - Orthopedic Emergency
  - Require expeditious cleansing and debridement
  - Do not close wound
  - Td, and Broad spectrum Abx
  - Early referral
Recognition and Treatment of Hand and Wrist Injuries

- Intra-articular Fractures
  - Early Referral
  - Attention to articular congruity
  - More likely to require fixation

Recognition and Treatment of Hand and Wrist Injuries

- Finger Fractures
  - Diaphyseal
  - Metaphyseal
  - Intra-articular
  - Avulsion Type
  - Unstable, Incongruent patterns
Recognition and Treatment of Hand and Wrist Injuries

- Phalangeal condyle
- PIP fracture/dislocation
  - Treatment
    - Stable
      - Buddy tape
      - Short period of immobilization followed by buddy taping and ROM
    - Unstable
      - Small fragment, stable zone
      - Large fragment, persistent instability Potentially unstable
  - Treat closed with caution
  - May require operative stabilization

Common Disorders of the Hand

- Proximal interphalangeal fracture/dislocation
  - Pain and swelling at PIP
  - History of “jamming” injury common
  - May present delayed
  - Patients often self reduce
Common Disorders of the Hand

- PIP fracture/dislocation
  - Commonly dorsal dislocation
  - Assess for volar fragment and subluxation
  - Potentially disabling
  - May displace late if volar fragment >25%
  - Look for Dorsal Subluxation
  - If volar (palmar) subluxation - referral

Common Disorders of the Hand

- PIP fracture/dislocation
  - Treatment
    - Stable
      - Buddy tape
      - Short period of immobilization followed by buddy taping and ROM
    - Unstable!!
Common Disorders of the Hand

- PIP fracture/dislocation
  - Treatment
    - Unstable
      - Small fragment, stable zone
        - Dorsal extension block splint in stable zone with close follow up
      - Large fragment, persistent instability
        - ORIF

Recognition and Treatment of Hand and Wrist Injuries

- Avulsion Type
  - Small, marginal avulsions
  - Usually proximal, middle phalanx or MC
  - Attachments of Collateral ligament and/or volar plate
Recognition and Treatment of Hand and Wrist Injuries

- Marginal avulsion fractures
  - If joint is stable and congruent
    - Buddy tape, early ROM, splinting

Recognition and Treatment of Hand and Wrist Injuries

- Metacarpal and Phalangeal Fractures
  - Assessment
    - Predictable patterns of deformity
    - Rotational and angular alignment assessment critical
    - Look for overlap, deviation, change in plane of nail beds
Recognition and Treatment of Hand and Wrist Injuries

- Metacarpal Neck fractures
  - History of axial load or blow to MCP
  - 5th MC neck most common
    - “Boxer’s Fracture”
    - Forgiving Fx (accept up to 50 deg. Angulation)
  - Pain, swelling
- Assess
  - Displacement
  - Stability
  - Angulation
  - Rotation

Common Disorders of the Hand

- Metacarpal neck fracture
  - Treatment
    - Closed reduction
    - Ulnar gutter splint or gauntlet cast with outriggers 4 to 6 weeks if acceptable
    - Some favor early ROM for stable fractures
Common Disorders of the Hand

- Metacarpal neck fractures
  - Acceptable alignment
    - Extra-articular
    - Index to small angulation
      - 10, 20, 30, 40 degrees
      - Mobility of 5th CMC allows for more angulation
    - < 10 degrees rotation
      - No cross-over or impingement
      - Assess nail bed alignment, alignment of digits with flexion

- Metacarpal diaphyseal fractures
  - Closed v. open treatment
  - Most isolated MC treated closed
  - Reduction parameters
    - Avoid rotation
    - <4-5 mm shortening
    - Angulation Index to small
      - 10, 10, 20, 20
      - Less angulation tolerated proximally
Common Disorders of the Hand

- CMC fracture/dislocation
  - 1st: Bennett’s fracture, Rolando’s fx
  - 5th: “Baby Bennett’s”
  - Unopposed force of APL, ECU

Common Disorders of the Hand

- Bennett’s Fracture
  - Non-displaced
    - Unusual
    - Thumb spica cast
    - Close follow-up
  - Displaced
    - Closed v. Open reduction and internal fixation
    - Many different variations of operative treatment
Common Disorders of the Hand

- Rolando’s Fracture
  - Comminuted, intra-articular fracture of base of 1st MC
  - May be mistaken for Bennett’s fracture
  - Unstable
  - Prone to displacement, articular incongruity, early arthritis
  - Operative treatment

- Scaphoid Fractures
  - Most commonly fractured carpal bone
  - Vascular supply at risk with fracture
  - May be missed as presentation with “normal x-rays”
Common Disorders of the Hand

- Scaphoid fracture

  - Presentation
    - Fall on outstretched hand
    - Snuff box tenderness
    - Scaphoid tubercle tenderness
    - May present late as “sprained wrist”

- X-ray
  - 5 or 6 view “scaphoid” or “navicular” series
    - PA, lateral, oblique
    - Ulnar deviation, radial deviation, clenched fist PA
  - May be missed on initial films
Common Disorders of the Hand

- Scaphoid fracture
  - Special studies
    - Bone scan
    - MRI
    - CT
    - Tomograms

Common Disorders of the Hand

- Scaphoid fractures
  - Diagnosis
    - High index of suspicion
    - If in doubt
      - Additional views
      - Immobilize and repeat x-rays in 7-10 days
      - Bone scan or MRI
Common Disorders of the Hand

- Scaphoid fractures
  - Types
    - Distal pole
      - Most likely to heal
    - Middle 1/3
    - Proximal pole
      - Concerning
      - May warrant acute surgical treatment even if non-displaced

- Scaphoid fractures
  - Treatment
    - Non-displaced
      - thumb spica cast, IP free x 6 weeks
      - Short arm, thumb spica cast until united
      - Average time to healing - 12 weeks
Common Disorders of the Hand

- Scaphoid fractures
  - Treatment
    - Displaced
      - $>$ 1mm displacement
      - Flexion
      - Rotation
      - Surgical

- Non-union
  - Fibrous union
  - Non-union
  - Avascular non-union
Common Disorders of the Hand

- Scaphoid Fractures
  - Non-union
    - Treatment
      - ORIF
      - Bone grafting
        - Iliac crest
        - Distal radius
        - Vascularized graft
    - Fixation
      - None
      - Pins
      - Screws

Recognition and Treatment of Hand and Wrist Injuries

- Kienbock’s disease
  - Avascular necrosis of the lunate
  - 4 stages
    - No x-ray changes to global collapse and arthrosis
  - May present as pain
  - Often missed in early stages
  - Diagnoses early with MRI
  - Treatment:?
    - Immobilization early
    - Multiple surgical options depending upon stage
Common Disorders of the Hand

- Metacarpal phalangeal joint dislocation
  - Usually secondary to forceful hyperextension
  - MCP volar plate disruption
Common Disorders of the Hand

- **MCP dislocation**
  - Must have true lateral x-ray view
  - Closed reduction usually possible
  - Likely requires open reduction if button-holed
  - Dorsal approach

- **Ulnar Collateral Ligament Disruption**
  - Most common is UCL of thumb
    - “Gamekeeper’s thumb”
    - “Skier’s thumb”
  - Finger Collaterals
    - Usually treated closed
    - Buddy tape, ROM
Recognition and Treatment of Hand and Wrist Injuries

- UCL Thumb
  - "Gamekeeper’s Thumb"
  - Diagnosis
    - History of acuter radial deviation of thumb
    - Tenderness over UCL
    - Assess for fullness
      - Stener’s lesion
      - Retracted UCL ligament with interposed aponeurosis
      - Poor prognosis for closed treatment

Common Disorders of the Hand

- UCL Thumb
  - Stress evaluation of Thumb MCP
    - Clinical evaluation
      - End point
      - Asymmetry
      - Extension and 20-30 degrees flexion
      - Anesthetic
    - Radiographs
      - >30 degrees deviation
      - >15 degrees deviation compared to uninjured side
Common Disorders of the Hand

- UCL Thumb - “Gamekeeper’s thumb”
  - Stable UCL
    - Thumb spica cast or splint
  - Unstable UCL
    - Consider surgical repair

Common Disorders of the Hand

- Ligaments of the Wrist
  - Radiocarpal
  - Ulnocarpal
  - Interosseous
Common Disorders of the Hand

- Mayfield Classification of wrist ligament injuries
  - Progressive injury pattern
  - Greater and lesser arc injuries
  - Associated fractures
    - Radial styloid
    - Scaphoid
    - Ulnar styloid

Common Disorders of the Hand

- Carpal Instability - Dissociative (CID)
  - Disruptions of SL or LT connection
  - DISI
    - Dorsal Intercalated Instability
  - VISI
    - Volar Intercalated Segmental Instability
Common Disorders of the Hand

- Perilunate/Lunate Dislocation
  - Result of progressive disruption about the lunate
  - Not infrequently missed
  - Must assess median nerve
  - Reduction and surgical treatment indicated
    - May require surgical reduction, especially if delayed presentation
Common Disorders of the Hand

- Triangular Fibrocartilage
  - Major stabilizer of the distal radioulnar joint (DRUJ)
  - Traumatic/acute or Degenerative

Common Disorders of the Hand

- TFCC
  - Presentation
    - Ulnar sided wrist pain
    - Insidious onset
    - Acute onset
      - May have history of abrupt, rotational injury e.g. striking ground with golf club
Common Disorders of the Hand

- **TFCC**
  - Degenerative
    - Progressive pain
    - Tenderness over ulnocarpal joint
    - Positive ulnar impaction test
    - Ulnar positive variance

Common Disorders of the Hand

- **TFCC injury**
  - Acute
    - Traumatic injury
    - May be associated with distal radius fracture
      - Higher association with ulnar styloid avulsion on x-ray
    - Tenderness at ulnar snuff box, distal ulna
    - Instability or pain with distal ulnar stress
Common Disorders of the Hand

**TFCC injury**

- Differential diagnosis
  - Hook of hamate fracture
  - LT ligament injury
  - Pisotriquetral injury or DJD
  - Ulnar styloid injury or non-union
  - ECU tendonitis or subluxation
  - FCU tendonopathy
  - DRUJ injury or DJD
  - Ganglion cyst

**TFCC evaluation**

- X-ray
  - Assess ulnar variance
  - May be normal
- MRI
  - Increased signal
  - May be normal
- Arthrogram
  - TFCC leak
    - Also seen in asymptomatic wrists
  - May be normal
- Arthroscopy
  - Gold Standard
Common Disorders of the Hand

- TFCC injury
  - Treatment
    - Immobilization
      - Eliminate Pro/Sup
      - Long arm splint or cast
    - Injection
    - Arthroscopy
    - Repair
      - Peripheral
    - Debridement
      - Central
    - Ulnar shortening

Common Disorders of the Hand

- Carpal Ligament Disruption - Acute
  - History of injury
  - Tenderness
  - Pain and instability on exam
  - Often missed

Normal SL Gap

Widened SL Gap
Common Disorders of the Hand

- Carpal Ligament Disruption - Acute
  - X-Ray evaluation
    - SL, LT gap and alignment
      - 3mm or greater (Terry Thomas sign)
        - suspicious
      - >5mm
        - confirmatory
      - >1mm larger than contralateral side
    - SL angle
      - Normal: 30 to 60 degrees

- Carpal Instability - Acute
  - Treatment
    - Dynamic
      - Immobilize
    - Static
      - Surgical reconstruction
  - Treatment of chronic injuries not as favorable
  - Untreated injuries go on to progressive arthritis
  - SLAC: ScaphoLunate Advanced Collapse
Thank You

Common Disorders of the Hand

- Compression Neuropathies
  - Carpal Tunnel Syndrome
  - Cubital Tunnel Syndrome
  - Pronator Syndrome
  - Ulnar Tunnel Syndrome
  - Radial Tunnel Syndrome
  - DRSN Neuritis
Common Disorders of the Hand

**Benign Tumors and Masses**
- >95% Benign
- Most common
  - Cysts
    - Ganglion
    - Retinacular
    - Mucinous
  - Soft tissue
    - Giant Cell Tumors
    - Hemangiomas
- Bone
  - Carpal Boss
  - Osteophytes

**Ganglion Cysts**
- Synovial cyst
- 60-70% of soft tissue tumors of the hand
- Predominantly dorsal wrist (70%)
  - Most often arise from SL ligament
- Volar (20%)
  - Commonly arise from STT or RC joint
- Also seen at volar MCP
  - Retinacular cyst
  - Arising from flexor sheath
Common Disorders of the Hand

- Ganglion Cysts
  - Gelatinous substance filled cyst
  - High concentration of hyaluronic acid

Common Disorders of the Hand

- Ganglion Cysts
  - Treatment
    - Observation
    - Aspiration
      - Higher recurrence rates (20%)
      - Steroids ineffective
    - Excision
      - With stalk and portion of capsule
      - Recurrence rates as low as 10%
Common Disorders of the Hand

- Carpal Boss
  - Osteoarthritic spur occurring at the base of the 2nd and/or 3rd CMC
  - Often confused with ganglion cyst
  - Firm, non-mobile, occasionally tender mass seen on slightly supinated, oblique x-ray
  - May be excised if symptomatic