Sports Related Injuries of the Hand, Wrist and Elbow

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Injury triage

• History, mechanism of injury (MOI)
• Assess extent of swelling, pain, deformity, functional deficits & neurovascular status
  – Determine if xray needed (fracture)
  – Determine if stabilization needed (dislocation, deformity)
• Disposition
  – Can you safely treat and manage?
  – Is ER evaluation needed?
    • open fracture, deformity, dislocation, neurovascular compromise
    • sling/splint and refer
Sprains/Strains

- Can be managed on site
- R.I.C.E.
- NSAIDs, analgesics
- Short-term reassessment
- Most progressively improve w/in 1-3 wks
- Home rehab exercise program
Be prepared

• Supplies
  – finger splints (stax), aluminum foam splints
  – athletic tape, coban (self-adherent wrap), elastic bandage
  – wrist braces (regular & thumb spica)
  – slings
  – misc: trauma shears (scissors), ring cutter
Dorsum of hand
Palmar aspect of hand
Bony anatomy of wrist
Finger anatomy

A
- Proximal interphalangeal joint
- Collateral ligament
- Metacarpophalangeal joint
- Middle phalanx
- Volar plate
- Proximal phalanx
- Metacarpal bone
- Distal interphalangeal joint
- Distal phalanx

B
- Lateral band of extensor tendon
- Central slip of extensor tendon
- Flexor digitorum profundus tendon
- Flexor digitorum superficialis tendon

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Distal phalynx fracture

• MOI: crush injury
  – MC fx’d bone of hand

• Exam
  – painful, swollen fingertip
  – assess for soft tissue & nail bed injury

• Xray: AP, lat, oblique

• Treatment
  – nondisplaced: splint x 3 wks
  – refer: unstable fx, irreducible, involves ≥ 1/3 of articular surface
Subungual hematoma

• MOI: crush injury
  – hematoma betw nail & distal phalynx
• Exam
  – painful, throbbing fingertip w/ discolored nail
• Xray
  – AP, lat, oblique to r/o fx
**Treatment: Subungual hematoma**

- **Subungual decompression**
  - drainage via 2-3 small holes in nail w/ cautery tip or heated paperclip
    - Splint until tenderness resolves
  - large hematoma (>= 50%) likely nail bed laceration
    - may need nail removal/nail bed suturing
    - full growth of new nail ~5-6 months
Exam principles

- All fingertips should point toward scaphoid (A)
- If rotation present (B) - referral indicated
  - Fracture or tendon injury
Collateral ligament injuries

• MOI: jammed finger
  – forced ulnar or radial deviation at any IP joint
• Exam
  – pain at ligament
  – w/ MCPJ flexed at 90°, apply varus/valgus stress in 30° flexion
    • compare laxity w/ unaffected finger
• Xray: AP, lat, oblique
  – normal, or avulsion fx at ligament insertion
Collateral ligament injuries

• Treatment
  – Stable joint w/o large fx: buddy taping x 2-4 wks
    • Buddy taping: above and below joint
    • if ring finger involved, tape to 5th digit
    • may participate in athletics (as symptoms allow)
  – Referral criteria: unstable joint
Dorsal PIP joint dislocation

• MOI: jammed finger on ball (basketball)
• PIP: MC dislocated joint
• Exam: obvious deformity, pain, swelling
• Treatment
  – Can attempt reduction during athletic event
    • if reduced, splint PIPJ w/ buddy tape in slight flexion
    • reevaluate and obtain xrays
  – Referral criteria
    • avulsion fx involving > 1/3 joint
    • irreducible
Reduction technique: Dorsal PIP joint dislocation

- Maintain distal tension on injured finger
- Apply volarly directed pressure to middle phalynx
- Hold proximal phalynx in place while applying counterpressure
Mallet finger

• MOI: impact of fingertip on ball
  – extensor tendon rupture
  – (+/-) avulsion fx of distal phalynx

• Exam
  – painful, swollen fingertip
  – flexion deformity of DIP joint
  – inability to extend DIP joint

• Xray: AP, lat, oblique
Mallet finger

- **Treatment**
  - apply dorsal padded splint to DIP joint x 6-8 wks in continuous extension
  - keep PIP joint free
  - f/u q 2 wks, assess compliance

- **Referral criteria**
  - avulsion fracture involving >30% joint
  - inability to achieve full passive extension
Flexor digitorum profundus tendon injury (Jersey finger)

- **MOI**
  - forced extension of DIP joint during active flexion (when grabbing another player’s jersey)
  - tackling sports (football, rugby)
- **MC:** ring finger
- **Exam**
  - TTP at volar aspect of DIP joint
  - inability to flex DIP joint
- **Treatment:** surgery
  - splint & refer to hand surgeon
Central slip extensor tendon injury

• MOI
  - PIP joint forcibly flexed when actively extended (basketball)
• Complication: Boutonniere deformity
  - Flexion of PIP joint w/ hyperextension of DIP & MCP joints
Central slip extensor tendon injury

• Exam
  – TTP dorsal aspect PIP joint
  – inability to actively extend PIP joint
  – examiner can passively extend joint

• Treatment
  – XR: AP, lateral, oblique
  – Splint PIPJ in full extension x 6 wks
    • (if no avulsion fx, or fx < 1/3 joint)
  – Referral criteria
    • inability of full passive extension
    • avulsion fracture involving >30% of joint
Boxer’s fracture of 5th metacarpal neck

- **MOI**
  - missed punch (boxing)
  - punching a wall, locker
- **Exam**
  - pain, swelling, ecchymosis
  - assess alignment & rotation
- **XR:** AP, lat, oblique
Boxer’s fracture

• Treatment
  – ulnar gutter splint/cast x 6 wks
  – f/u x-rays to assess healing & alignment
  – Referral criteria:
    • Rotation/angulation (>70°)
    • Reduction may be attempted (upto 40° angulation can be tolerated)
Scaphoid fracture

- MC fractured carpal bone
- Blood supply
  - radial artery distally
  - proximally no direct supply
- Complications
  - nonunion, avascular necrosis
  - decreased grip strength/ROM, OA
- MOI: FOOSH
Scaphoid fracture

- Exam
  - swelling, bruising, pain w/ gripping, squeezing
  - TTP at anatomic snuffbox
    - highly sensitive
Scaphoid fracture

• Treatment
  – Xrays: AP, lat, oblique, (scaphoid view)
    • initial xrays may be (-)
    • f/u xrays to assess healing
  – Nondisplaced
    • short-arm thumb spica cast x 6 wks
    • if XR (-), but suspect fx, tx w/ cast & repeat XR in 2 wks
    • fx fragments may displace - need motionless contact to heal
  – Displaced: surgery
Distal radius fracture

- MOI: FOOSH
- Exam
  - swelling, ecchymosis
  - TTP at distal radius
  - assess for scaphoid injury
- Xray: AP, lat, oblique
- Treatment
  - **Nondisplaced**: short arm cast x 4-6 wks
  - **Displaced**: reduction/cast or surgery
Elbow

A

Humerus
Lateral epicondyle
Captellum
Head
Radius

B

Olecranon fossa
Medial epicondyle
Head
Radius
Ulna

C

Humerus
Captellum
Head
Radius
Ulna
Elbow injury

- History, mechanism of injury
- If swelling, guarding, not using arm
  - place sling, obtain xrays
    - fat pad sign suggest fracture (even if appears neg)
    - continue sling, repeat xrays in 7-10 days
    - limit sling use to 7-10 days (for comfort)
- ER: dislocation; gross deformity; neurovascular compromise
Little Leaguer’s elbow

- Medial epicondyle apophysitis due to overuse
  - MC baseball, softball
  - ~age 9-12
  --medial elbow pain w/ throwing*
  - may have decreased pitch velocity/control

- Throwing
  - tension forces medial elbow, compression forces lateral elbow
Little Leaguer’s elbow

• History taking
  – Position
  – Change in technique
  – Increase in amount/intensity of throwing
  – Pitch counts
  – Number of teams plays on
  – Time off from throwing during year
Little Leaguer’s elbow

• **Xrays:** AP, lateral, oblique
  – May be normal; fragmentation of medial epicondyle

• **Treatment**
  – NO throwing/pitching x 4-6 wks
  – stretching, core strengthening
  – gradual interval throwing program after rest period
  – most RTP at 12 weeks
  – Refer: persistent symptoms, (loose bodies, avulsion fx, OCD)

• **Prevention**
  – Pitch guidelines, preseason conditioning, proper mechanics
  – Proper warmup, gradual throwing, rotate positions
  – Avoid pitching on multiple teams/overlapping seasons
  – Do NOT pitch on consecutive days OR w/ elbow pain
# Pitching recommendations

## Maximum Pitch Counts

<table>
<thead>
<tr>
<th>Age</th>
<th>Pitches/Game</th>
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<tbody>
<tr>
<td>7-8</td>
<td>50</td>
</tr>
<tr>
<td>9-10</td>
<td>75</td>
</tr>
<tr>
<td>11-12</td>
<td>85</td>
</tr>
<tr>
<td>13-16</td>
<td>95</td>
</tr>
<tr>
<td>17-18</td>
<td>105</td>
</tr>
</tbody>
</table>

*Source: Little League Baseball*

## Age Recommended for Various Pitches

<table>
<thead>
<tr>
<th>Pitch</th>
<th>Age</th>
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<tbody>
<tr>
<td>Fastball</td>
<td>8 ± 2</td>
</tr>
<tr>
<td>Slider</td>
<td>16 ± 2</td>
</tr>
<tr>
<td>Change-up</td>
<td>10 ± 3</td>
</tr>
<tr>
<td>Forkball</td>
<td>16 ± 2</td>
</tr>
<tr>
<td>Curveball</td>
<td>14 ± 2</td>
</tr>
<tr>
<td>Knuckleball</td>
<td>15 ± 3</td>
</tr>
<tr>
<td>Screwball</td>
<td>17 ± 2</td>
</tr>
</tbody>
</table>

*Source: From work by James R. Andrews, MD, Glenn S. Fleisig, PhD*
## Rest periods required

*Source: Little League Baseball*

<table>
<thead>
<tr>
<th>Age 14 and under</th>
<th>Age 15-18</th>
<th>Required # of rest pitches (calendar days)</th>
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<tbody>
<tr>
<td>66+</td>
<td>76+</td>
<td>4</td>
</tr>
<tr>
<td>51–65</td>
<td>61-75</td>
<td>3</td>
</tr>
<tr>
<td>36–50</td>
<td>46-60</td>
<td>2</td>
</tr>
<tr>
<td>21–35</td>
<td>31-45</td>
<td>1</td>
</tr>
<tr>
<td>1-20</td>
<td>1-30</td>
<td>None</td>
</tr>
</tbody>
</table>
Summary

• Assess injury and determine disposition
  – Treat or Refer?
    • Stabilize (for safety & comfort) and refer

• Referral criteria
  – Xray needed?
  – ER: dislocation (elbow), gross deformity, open fracture, neurovascular compromise
  – Pain out of proportion
  – Anything you are NOT comfortable treating
Return to sports/activity considerations

• Short-term periodic reevaluation to monitor progress
• Asymptomatic
  – Pain-free
  – No swelling
  – Normal ROM and strength
  – No functional deficits
Resources

- AAFP: American Family Physician Journal
  - www.aafp.org
- AAOS: www.stopsportsinjuries.org
- Fracture Management for Primary Care (Eiff, et. al.)
- The 5-Minute Sports Medicine Consult (2nd ed)