HAND & WRIST REHAB AFTER SPORTS INJURY
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Overview

Why do ATCs Need to Know Hand Injury Info?
Incidence of Hand Injury in Sports

- NFL Combine Review 1987-2000
  - Ankle Sprain 29.1% of all injuries
  - Next was wrist/hand injuries 17.7%

(Brophy et al., 2007)

High School Athletes

- Incidence of Dislocation Injuries from 2005-2009
  - most common Shoulder
  - Second most common Wrist/Hand

(Kerr et al., 2011)

Anatomy Review

- Wrist Joints
  - Distal Radioulnar Joint
  - Radiocarpal Joint
  - Intercarpal joints/Midcarpal joints
Anatomy Review

Hand Bony Anatomy

- Hand
  - Carpometacarpal joints (CMC)
  - Metacarpophalangeal joints (MCP)
  - Interphalangeal joints (PIP, DIP)
Ligament Complexes

- Wrist
  - Multiple volar, dorsal and collateral ligaments (too many to mention)
  - TFCC
    - Triangular Fibrocartilage Complex
      - Triangular shaped "disc" Ulnar wrist
      - Like meniscus in knee- stability

TFCC

- Provides shock absorption
- Adds stability to the wrist

Wrist Ligaments- Dorsal
Volar/Palmar Ligaments

Finger Ligaments

Volar Ligaments of Hand
Dorsal Ligaments - Hand

- Hand

Forearm, Wrist, Hand

- Whole UE is Kinetic Chain
  - allows hand to be functional
  - Starts at thoracic spine
  - Involves scapulothoracic joint, shoulder, elbow and wrist/hand

Biomechanical Considerations - Kinetic Chain

- “Core strength” - Transverse Abdominus, Multifidus, Gluteals, Hip External Rotators
- Scapulothoracic Stability/Mobility
  - Rhomboids, Traps, Serratus Anterior
  - Thoracic spine/ribs
  - Posterior Capsule GH Joint
Weak Hip/Core Effect?

Common Wrist Injuries

- Fractures
- Ligament Sprains
- Tendonitis
- Nerve Injury
- Cartilage Injury

Wrist Fractures- Scaphoid

- Mechanism- fall on outstretched hand
- Symptoms
  - Swelling over snuffbox
  - Snuffbox tenderness
  - Limited ROM
  - Pain with axial compression of thumb towards radius
Scaphoid Fracture

• X-ray may be negative until 2-3 wks after injury
• MRI/Bone scan definitive diagnosis early
• When in doubt, immobilize in thumb spica splint until confirmation

Treatment- Scaphoid Fx

• Stable Fracture
  – Immobilized in Scaphoid cast for up to 8 weeks
• Unstable Fractures
  – Percutaneous fixation
  – ORIF
  – Rehab starts sooner than cast only

Rehabilitation:

• Initial stage (0-3 wks post cast)
  – ROM exercise
  – Pain and edema reduction
  – Wear thumb spica splint
• Stage 2 (3-5 wks)
  – Begin strengthening, splint
• Stage 3 (5-12+ wks)
  – Continued strength, wean from splint
  – Work with MD on return to sport
Radius/Ulna Fractures

- Similar mechanism of Injury to Scaphoid Fractures

- Symptoms
  - Deformity noted with injury
  - Pain, swelling, loss of motion

Radius/Ulna Fractures

- Cast immobilization

- ORIF
Radius/Ulna Fracture

• Rehabilitation after Casting
  – Stage 1 (wks 1-2)
    • ROM, edema reduction, tendon gliding
  – Stage 2 (wks 2-4)
    • Continue ROM, add light strengthening
  – Stage 3 (>4wks)
    • Gripping, lifting, gaining end ROM
    • Sports Specific training

➢ Special note- finger exercise can start IN cast

Tendon Gliding Exercise

• Functional motions of Hand/Digits
  – Edema management
  – ROM
  – Functional Grip improvement

Tendon Gliding Exercises
Ligament Sprains

- Special Issues
  - Scapholunate Dissociation
    - After a “sprain” with falling on outstretched hand, continues to have pain and limited function
    - Feels clicking sensation in wrist
    - May be little or no swelling with these
    - Scapholunate joint tender dorsally to palpation

Scapholunate Instability

- Diagnosis
  - Stress x-ray to measure gap between scaphoid and lunate
  - Watson Scaphoid Test
    - Sensitivity 69%, Specificity 66%
    - Stress x-ray is definitive here

Watson Scaphoid Test

- Pts arm in pronated position
- Grab wrist from radial side with thumb on scaphoid tubercle
- Move wrist from ulnar deviation and extension to radial deviation and flexion
- If present, will feel a “thunk” as the scaphoid moves back in place
Treatment

• Current review of Evidence-based Medicine recommends
  – Surgical fixation for active patients
  – No information regarding prolonged conservative care vs surgery in regards to arthritis, function
    (Kalaninov & Cohen, 2009)

DeQuervain’s Tenosynovitis

• Synovial inflammation
  – APL
  – EPB
  – At level of Radial Styloid
• Repetitive use injury
  – Racket Sports
  – Rowers, Canoeists
  – Bowlers

DeQuervain’s Diagnosis

• Palpation
• Finkelstein’s test
  – Sensitivity 81% (good to rule it out)
  – Specificity 50% (not so specific-other pathologies may be present with a positive test)
  – but it’s all we’ve got, so use it!
    (Alexander et al, 2002)
**Finkelstein’s Test**

**DeQuervain’s Treatment**
- Splinting
  - Thumb Spica
  - May need custom splinting with a prominent Radial styloid, or with significant edema
- Local Modalities
  - Conflicting evidence on efficacy of physical modalities in the literature
- Manual therapy–friction massage

**DeQuervain’s Considerations**
- Proximal stability/strength
  - Overuse of distal muscles for compensation
  - Look at periscapular muscles, rotator cuff
- Grip size vs grips with racket sports
- Eccentric strengthening
Carpal Tunnel Syndrome

- Median Nerve Compression in Carpal Tunnel
- Symptoms
  - Nocturnal burning, paresthesia
  - Pain may radiate to forearm, shoulder
  - Mm atrophy with prolonged compression

Diagnosis of Carpal Tunnel Syndrome

- History is Key- listen to the athlete
- NCV/EMG
- Physical Tests
  - Not great for specificity/sensitivity- mixed reports in literature
    - Phalen’s
    - Tinel’s
  ➢ Best diagnosis based on symptoms

Phalen’s Test
Tinel’s Test (Carpal Tunnel)

Treatment Carpal Tunnel Syndrome

- NSAIDS
- Splinting with wrist neutral
  - Most over the counter splints at 20 degrees wrist extension, actually increase pressures in carpal tunnel
  - Custom neutral splint for night wear
- Nerve gliding exercises, local modalities

TFCC Injuries

- The Wrist Meniscus- ulnar side of wrist
- Can occur with
  - Sprains/strains
  - Fractures
  - Wrist instabilities
  - As a repetitive injury in compressive loading of the wrist
TFCC Injuries

- Who gets this?
  - Gymnasts
  - Divers
  - Golf and other racket sports athletes

TFCC Symptoms

- Pain with Ulnar deviation and extension of the wrist
- Pain with compression and weight bearing activities
- Pain and clicking with loaded supination/pronation
- Reduced grip strength

TFCC Treatment

- NSAIDS
- Local modalities
- Wrist stabilization training
  - Strengthening while avoiding symptoms
  - Wrist taping/splinting for activities
  - Wrist Widget
Common Hand Injuries

- Tendon Injuries
- Ligament /Pulley Injuries
- Fractures/Dislocations

Tendon Injuries

- Jersey Finger
- Mallet Finger
- Boxer’s Knuckle
- Boutonniere Deformity
Jersey Finger

Mechanism of injury
- Occurs when grabbing a jersey
- Profundus tendon ruptures
- Ring finger affected 75% of time

Jersey Finger

Symptoms
- Cannot flex the DIP actively
- Will present with swelling, pain
- Swelling may camouflage the injury

Jersey Finger Diagnosis

Clinical Exam
- Unable to flex DIP
- DIP with less resistance into passive extension (not always)

Ultrasound evaluation
- MRI
Treatment of Jersey Finger

- Important to identify this within 7-10 days
- Surgical reconstruction of tendon
- If untreated, result in DIP instability which can lead to problems with PIP and further disability
- Grip strength following surgery approaches normal, expect 10-15 degree extension loss

ReturnTo Play

- Depends on Physician Protocol
  - May return with splinting/casting earlier than expected
  - Takes 8-10 weeks to rehabilitate post surgery
  - Goals to restore normal DIP mechanics and strength

Mallet Finger

- Mechanism of Injury
  - Direct blow to the tip of the extended finger
  - Distal phalanx is forced into flexion
  - Disruption of the extensor mechanism over the dorsum of the DIP joint
Mallet Finger

• Symptoms
  – Swelling on dorsum of DIP
  – Inability to extend DIP
  – "Drop Finger"

Diagnosis

• Based on clinical exam
• Bony Avulsions may be seen on Radiographs

Treatment of Mallet Finger

• Continuous Splinting of DIP in extension or slight hyperextension for 6 weeks (at least)
• Then additional night splinting for 2 to 4 more weeks
• Athlete can usually participate in their sport unless baseball pitcher or quarterback
Boxer’s Knuckle

• Mechanism
  – Subluxation or dislocation of extensor tendons from direct blow
  – Mostly in middle finger
  – Happens on Ulnar side more than radial

Boxer’s Knuckle

Sagittal Band Rupture allows extensor tendon to sublux

Boxer’s Knuckle Treatment

• Conservative treatment
  – Splint MCP joint in extension for 4-6wks

• Surgery to repair sagittal band
  – MCPs immobilized 3-4wks
  – Start active motion at MCP in dynamic extension splint next 2-3 wks
  – Discontinue splint at 6wks
  – Return to sport with full ROM/Strength
Boutonniere Deformity

• Mechanism
  – Occurs as a result of central slip injury
  – Head of proximal phalanx goes through the extensor mechanism
  – Occurs with Palmar dislocation of PIP joint
  – If left untreated, disabling deformity can result
  – Missed at times when dislocations are reduced on the field

Boutonniere Deformity

Diagnosis
  – May present as a “jammed finger”
  – A rupture of the central slip must be considered in these cases
  – Study (Leddy & Coyle, 1989)
    • 16 athletes had “simple” PIP dislocations reduced on the field
    • 6 of these athletes had undetected central slip injuries (38%)

Treatment

• Recommend conservative treatment
  – Extension splinting at PIP joint as early as possible post injury
  – 5 weeks of continuous splinting with DIP free for motion
  – At 5 weeks, start AROM/PROM
  – 2 additional weeks of nighttime splinting
  – Chronic injuries require surgery
Ligament/Pulley Injuries

- Skier’s Thumb
- Pulley Injuries

Skier’s Thumb

- Mechanism
  - Forced abduction and hyperextension of the MP joint
  - Sprain of the UCL of the thumb

Skier’s Thumb

- Symptoms
  - Swelling and tenderness over the ulnar aspect of 1st MP joint
  - Pain Ulnar MP joint
Skier’s Thumb

• Stress Test

Skier’s Thumb Treatment

• Grade I – painful and stable
  – Tape, Splint, ROM exercises, Ice, protect. Have some commercially available splints. (6wks)
• Grade II – painful with some laxity, possible fracture
• Grade III – it’s over, the ligament is gone, probable avulsion fracture

• Grade II – same as above, unless bony fracture involved (6-8wks)
• Grade III – usually require surgical intervention then (6-8wks)
Pulley Injuries

- Rock Climbing mechanism
  - A2 pulley of ring finger most often
  - Happen with falls in the “crimp grip” position

Pulley Injuries

- Symptoms
  - Pain localized
  - Swelling
  - Difficulty moving finger, gripping
  - Unable to crimp grip

Pulley Injuries

- Crimp Grip
Pulley Injuries

- A2 pulleys

Pulley Injury Treatment

- Most Pulley Injuries
  - Immobilize for 1wk
  - Start ROM exercises
  - Strengthening (isometric), avoid crimping for up to 6wks until painfree

- If do not respond to conservative treatment - Surgery

Fractures/Dislocations

- Symptoms
  - Traumatic, deformity usually noted, not always in the case of fracture
  - Pain
  - Swelling within the hour
Fractures/Dislocations

- Types
  - PIP joint (middle joint) most common
  - DIP joint
  - MCP joint- most severe, usually high impact

Many dislocations have associated fractures...How do you know?
X-Ray for Definitive DX

Common Fractures

• Boxer’s Fracture
  – Fracture of 5th metacarpal
  – Hand vs object usual cause

Metacarpal Fractures
Phalanx Fractures

Treatment

• Timeline is generally 4-6 weeks for bony healing

• Many of these can be immobilized, buddy taped and return to play per MD guidelines earlier

Treatment/Rehab

• Restore ROM
  – Timeline based on healing
  – Fracture line into joint will be harder recovery

• Strengthening
  – Putty, clothes pins, etc.

• Return to play - buddy taping, splinting for protection
Ideas for Strengthening

• Putty resistance
  – Varying degrees of resistance
• Digiflex/grip strengthening devices
• Therabar
• Theraband
• Rice, beans, sand for resistance

Putty Exercises

• Gripping, Pinching, etc.
• Sammons Preston, Alimed, others

Strength Options
Theraband

Remember, strengthen the entire UE, and Core, not just the hand!

Buddy Taping Options

In Review…

• The Hand is Complicated…but…
  – Same goals of return ROM, strength and function as in other joints of body
  – Smaller graded forces with manual therapy
  – Specific exercise protocols based on physician
Return to Play - Protect

- Tape
- Splinting
- Casting
- Athlete Education
- Communicate with Physician, PT/OT in regards to healing status

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Thanks for Listening!
References/Credits


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