Wrist and Hand Injuries
Keep Your Edge: Hockey Sports Medicine 2015
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Disclosure slide:

I have no potential conflicts with this presentation.
Learning Objectives

• Recognize common wrist and hand injuries in the competitive hockey player
• Understand basic evaluation of these injuries
• Provide management strategies for healing and return to play
The epidemiology of professional ice hockey injuries: a prospective report of six NHL seasons

Carly D McKay,¹ Raymond J Tufts,² Benjamin Shaffer,³ Willem H Meeuwisse¹


4598 total injuries

Wrist and hand accounted for 9% of injuries (413)

Figure 1  Game-related injuries by body part.
Mechanism of Injury

- Falls
- Boarding
- Slashing
- Puck blocking
- Fighting
Focus

• Wrist:
  – Scaphoid fractures, ligamentous and tendon injuries
• Thumb:
  – Thumb MP and basal joint ligamentous and bony injuries
• Hand and Finger:
  – Metacarpal and phalangeal fractures
  – Sprains/Dislocations
“I jammed my wrist”

- Bony injuries: 3 most common
  1. Fracture distal radius ± ulna
  2. Fracture scaphoid
  3. Fracture of hook of hamate

Morgan WJ, Slowman LS, JAAOS 2001;9:389-400
"I jammed my wrist"

Soft tissue injuries: 3 most common

1. Scapholunate ligament
2. Dorsal radio-triquetral ligament
   ± fracture dorsal triquetrum
3. TFCC injury

Morgan WJ, Slowman LS, JAAOS 2001;9:389-400
Question:
What factors make this injury ligamentous...bony...or combination?
Unifying concept

• Arc of injury
• Dependent on:
  – Bony anatomy
  – Ligamentous anatomy
Bony Anatomy

- Distal Carpal Row
- Proximal Carpal Row

- Carpal stability: Dependent upon extrinsic and intrinsic ligamentous attachments
Volar extrinsic ligaments:
Ligaments from forearm bone to carpal bone

RSC, LRL
Radiocarpal stabilizers

Short radiolunate

Ulnocarpal complex
Injured in TFC, LT tears
Intrinsic (interosseous) ligaments: Ligament attaching 2 carpal bones

Scapholunate interosseous lig.

Lunotriquetral interosseous lig.
Progressive perilunate instability
(fall on a pronated outstretched wrist)

Mayfield, Johnson & Kilcoyne 1980

- I: scapholunate dissociation
- II: lunocapitate dislocation
- III: lunotriquetral disruption
- IV: lunate dislocation
Arc of Injury
(Mayfield, Johnson, Kilcoyne 1980)

• Lesser Arc Injury
  – Purely ligamentous

• Greater Arc Injury
  • Involves fracture of carpal bone or radial styloid (Transosseous)
  • Can reach ulnar styloid
Clinical Carpal Instability

– Symptomatic mal-alignment (dynamic or static)
– Inability to bear physiologic loads
– Absence of normal kinematics during any portion of movement arc

Wrist Instability; AAOS ICL; March 12, 2004; Chuck Cassidy, M.D.
Scaphoid shift: test for scaphoid stability

68%: predictive of SL instability
32%: incidence of (+) scaphoid shift in asymptomatic wrists

Lane LB. The scaphoid shift test; J Hand Surg. 18A:366-8 (1993)
Treatment algorithm

• Soft tissue injury, stable ligs with normal xrays: splint, then mobilize as pain permits
• If not improving: follow up re-exam (+ MRI)
• If unstable: work up for ligament disruption

Wrist Instability; AAOS ICL; March 12, 2004; Chuck Cassidy, M.D.
Case #1

- 26 year old NHL forward
- Hyperextension injury right wrist
- History of ECU tendonitis
- Pain, tenderness dorsal/ulnar wrist
X-ray series - normal
MRI

- ECU tendinosis
- Dorsal capsule sprain
- UT sprain
Scaphoid fracture

FOOSH
Scaphoid fracture

• Clinical presentation
  – Radial sided wrist pain, snuff box tenderness, ↓ ROM

• Not all fractures are obvious on x-ray
  – Have low threshold to order MRI
    • To confirm presence or absence of fracture
  – Serial CT scan excellent method
    • to assess anatomy of Fx
    • to follow healing progress (or lack thereof)
Low threshold for MRI

Scaphoid fracture

- Non displaced <1mm, cast treatment (short arm thumb spica with IP joint free)
  - 90% heal < 6 weeks
  - 95% heal < 3 months

Case 2: 16 y.o. WM fell playing hockey: c/o wrist pain
X-rays: 16 days post injury.
16 y.o. WM fell playing soccer: c/o wrist pain
Pt presents 16 days post injury.
CT Scan - 21 days post injury
CT Scan- 21 days post injury
CT scan 7 weeks post casting

healed
Scaphoid fracture

- If displaced, angulated
  - ORIF
  - Headless screw
  - If non-union, usually requires bone graft

ORIF with bone graft
Summary: wrist
Acute sports injury

• If exam/xray do not yield diagnosis
• Have low threshold to order MRI
  – To identify/confirm ligament injury
  – To rule out occult scaphoid fracture
• If pain lingers, patient needs careful f/u assessment

“I jammed my thumb”

- MP joint injuries
- Basal joint injuries
Thumb

• MP joint injury
  – Radial collateral ligament tear
  – Ulnar collateral ligament tear
  – Hyperextension, volar plate instability
Thumb MP Joint: Both UCL & RCL injury

- Grade I and II:
  - Usually amenable to splinting with hand-based thumb spica
  - Cast if excessive pain
  - Progressive mobilization as pain subsides

*Journal of Hand Surgery 2008; 33:760-770*
Grade III RCL rupture
Grade III

- If MRI shows no displacement of RCL:
  - Cast or splint immobilization
- Surgery indications:
  - If require rapid return to play
  - If MRI shows displacement of RCL
- Grade III with fracture:
  - Cast if non- or minimally displaced
  - ORIF if displaced

Journal of Hand Surgery 2008; 33:760-770
Ulnar collateral ligament tear
Ulnar collateral ligament tear

Grade III injury

Stress test:
- angulation
- translation
Indications for surgery

- Instability UCL ≥ 30°; or 15° > contralateral UCL
- Stener Lesion
- Fracture is relative indication
  - Dependent on: fragment size/displacement

Stener Lesion

- Proximal stump of UCL avulsion: superficial/outside extensor hood
- Extensor hood interposed between torn ends of UCL
- Distal stump/insertion: Proximal phalanx beneath extensor hood
- Ligament cannot heal
- Absolute indication for surgical repair

Treatment-Complete tear

Surgical treatment
- Direct repair to UCL stump, if present
- Mini suture anchors
- Suture to Add Pollicis tendon

Surgical treatment-Avulsion fracture

- Fix fracture if
  - > 20% of articular surface
  - Displaced
  - Rotated
  - Single large fragment

*Journal of Hand Surgery 2008; 33:760-770*
Surgical treatment-Avulsion fracture

- If fragment is comminuted:
  - Excise fragment
  - advance ligament
Case #3

- 22 yo NHL forward fell running on turf 2 weeks prior
- Pain, swelling thumb MP joint
- No Stener lesion
- Treated with orthosis
Thumb Basal Joint
(carpometacarpal joint)

- Bennett’s fracture
- Rolando’s fracture
- Sprain basal joint
Bennett's fracture

Intra-articular 2 part fracture thumb MC base

Palmar fragment in anatomic position
Dorsal fragment displaced
Step off in joint surface: usual
Displacement is dorsal and proximal
Deforming force: APL, AddPoll
Bennett’s Fracture—Treatment

- Reduction and cast, if non displaced
- Closed reduction, percutaneous K wire if reducible and stable
- ORIF: K wires, Inter-frag screws, plate
Case #4

20 yo professional ice hockey player
Injured dominant right thumb in hockey fight
Presents 10 days later
CT scan

3-D reconstruction
Surgery: ORIF
6 weeks postop
Postop management

- Active ROM
- Hand based thumb spica
- No contact/punching until 3 mos postop
HAND FRACTURES

Fractures in the hand are not just injuries to bone but may be injuries to the surrounding soft tissues as well.
Hand Fractures

Incidence
10% of all fractures occur in the hand

Distribution by location
Distal phalanx 45 - 50%
Metacarpal 30 - 35%
Proximal phalanx 15 - 20%
Middle phalanx 8%
Physical Examination-Key Point

Deformity

a. Angular

b. Rotational: assessment is clinical, **not** radiographic.
Stability

Stable

Unstable
Radiographs

True PA (or, AP if fingers flexed)
Lateral
Request “Hand” for metacarpals

pronation and supination obliques often show metacarpal fractures best
Treatment Options

1. Splint
2. Cast
3. Closed reduction with pin fixation
4. ORIF
5. External fixation
6. w/ or w/o bone graft
7. Combination of techniques
Case #5

• 26 yo professional ice hockey player
• Injured left hand blocking a shot
High energy injury/open fracture
Intra op x-rays
5 weeks postop
Final xrays
Finger Dislocation
PIP Dorsal Dislocation

• Dorsal Dislocation
  – Type I: Hyperextension
    • + joint congruity
  – Type II: Dorsal dislocation
    • Bayonet apposition
  – Type III: Fx-dislocation
PIP Dorsal Fx-Dislocation

• Dorsal fx-dislocation
  – Critical question:
    Stable or not stable?
    • Xray
    • Exam
    • Most important factor – size of volar fragment
Dorsal fracture-dislocation

- Stable: <30%
- Tenuous: 30% - 40%
- Unstable: >40%
PIP Dorsal Dislocation

• Goal of treatment:
  – reduce and maintain concentric reduction
• Early motion beneficial, when possible
• Smooth arc of motion is essential
  – Subluxation = hinge-ing = poor result
PIP dorsal dislocations

• Subluxation MUST be corrected, or arthritis will develop
• Anatomic reduction not essential for small volar lip fractures

PIP Dorsal Dislocation

• Immobilization—prolonged Splinting
  – Results
    • Uniformly poor, if > 3-4 wks
    • Joint stiffness
    • Recurrent instability, if large fragment

PIP Dorsal Fx-Dislocation

• Protected motion
  – If stable: buddy taping
    • Prevents hyperextension
  – If unstable:
    Extension block splinting

PIP Dorsal Fx-Dislocation

- Protected motion-variation
  - Extension block pinning
    - 3 weeks immobilization
      - Allows fx to heal w jt reduced
  - Then begin protected ROM

Volar plate arthroplasty

- Volar buttress reconstruction
  - For volar lip fx’s <40%, or will sublux later
  - Volar plate arthroplasty

Eaton and Malerich J Hand Surg ‘80
Dorsal Fx-dislocation >40%: Unstable, requires salvage

- Hemi-hamate bone graft
- Described by Hastings, 1999
- Principle:
  - Dorsal rim of hamate has same general shape, contour and size as volar portion of proximal phalanx
Hamate bone graft

Distal

hamate

Proximal
Summary: PIP joint

• Uncomplicated injuries:
  – Mobilize to prevent stiffness

• Beware:
  – Unstable fracture dislocation
Distal Phalanx-Tuft

Most common fracture in the hand
Nail bed injury often associated
Most heal uneventfully, though not always solid bony union
Distal Phalanx-Tuft

Beware that the nail bed may become interposed in the fracture

Widely displaced fx’s like this require surgical treatment
Distal Phalanx--Treatment

Splint
Pin if fracture angulates, but do not distract fracture with pin
Open treatment is needed if nailbed interposed in fracture
Note: Transverse shaft fractures may take weeks or months to unite
Distal Phalanx
Base Fracture (bony mallet)

Bony mallet: Intra-articular fracture base distal phalanx
Fracture fragment is extensor tendon insertion
Mild deformity well tolerated
Distal Phalanx-bony mallet Treatment

Splint
- no subluxation
- <30% articular surface

ORIF
- Subluxed
- incongruity
- >50% articular surface

Between 30%-50%, but not subluxed: controversial
Summary

• How to:
  – Recognize hockey injuries of the wrist /hand
    • Ligament and bony wrist injuries
    • Ligament and bony thumb MP/basal joint
    • PIP joint ligament and bony injuries

• How to:
  – Develop strategies for early diagnosis and treatment
Thank You