Hand and Wrist Injuries

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ORTHOPAEDIC SURGERY OF THE
SHOULDER, ELBOW, AND HAND

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Outline

- History
- Anatomy of Hand and Wrist
  - Applied pertinent anatomy as it relates to the condition
- How trauma occurs in the different types of injuries
- How the injury affects function
- What to look for in the medical record
Outline

- What are pertinent diagnostic tests and their limitations
- New injury vs. recurrence vs. aggravation of injury
- Acute injury vs. pre-existing condition
- Common medical treatment
Conditions we will Cover Today

- Carpal tunnel syndrome
- Ganglion Cyst; Dorsal and Volar
- DeQuervain’s tenosynovitis
Conditions we will Cover Today

- Epicondylitis of the elbow; medial and lateral
  - Tendinitis and Tendinitis
- The triggering finger
- Thumb basal joint arthritis
- Wrist pain
  - Triangular fibrocartilage complex tears
  - Scapholunate ligament tear
Study the past if you would define the future

- Confucius

### Table 1-1 Arabic Law

<table>
<thead>
<tr>
<th>Injury</th>
<th>Compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain damage</td>
<td>100 camels</td>
</tr>
<tr>
<td>Both eyes</td>
<td>100 camels</td>
</tr>
<tr>
<td>All digits of a hand</td>
<td>100 camels</td>
</tr>
<tr>
<td>Penis injury</td>
<td>Relative to length</td>
</tr>
<tr>
<td>Ear</td>
<td>Relative to length</td>
</tr>
</tbody>
</table>

### Table 1-2 Chinese Law, Manchu Dynasty, Around 1644

<table>
<thead>
<tr>
<th>Injury</th>
<th>Rod Strokes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Striking</td>
<td>20–40</td>
</tr>
<tr>
<td>Bloody nose</td>
<td>80</td>
</tr>
<tr>
<td>Dung in the face</td>
<td>80</td>
</tr>
<tr>
<td>Fracture of arm or leg</td>
<td>100*</td>
</tr>
<tr>
<td>Ear</td>
<td>Relative to length</td>
</tr>
</tbody>
</table>

* And banishment for three years
Prevalence

- Injuries of the hand and wrist account of 9% of all work place injuries and 19% of lost work

<table>
<thead>
<tr>
<th></th>
<th>5,030</th>
<th>4,926</th>
<th>4,482</th>
<th>4,753</th>
<th>5,013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hands, except fingers</td>
<td>4,405</td>
<td>4,638</td>
<td>4,430</td>
<td>4,831</td>
<td>5,063</td>
</tr>
<tr>
<td>Wrist</td>
<td>3,947</td>
<td>3,812</td>
<td>3,714</td>
<td>4,184</td>
<td>4,286</td>
</tr>
<tr>
<td>Upper extremities, unspecified, NEC 861</td>
<td>793</td>
<td>766</td>
<td>746</td>
<td>809</td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td>24,793</td>
<td>24,679</td>
<td>23,662</td>
<td>25,099</td>
<td>25,970</td>
</tr>
<tr>
<td>Total All Injuries</td>
<td>103,080</td>
<td>101,806</td>
<td>97,190</td>
<td>100,726</td>
<td>104,154</td>
</tr>
</tbody>
</table>

NEC, not elsewhere classified.

*This table shows the number of allowed lost-time claims by part of body injured or affected for each year as of March 31 of the following year. At the time of this writing, 2003 data were not available.


Demographic
Carpal tunnel syndrome

- Most common work related hand condition
- 15% of hand injury claims
- 1/70 people
- Job duration 7+ years
Carpal tunnel syndrome

- Jobs requiring repeated or sustained flexion, extension, or ulnar or radial deviation doubles risk of developing CTS
  - Assembly work
  - Food processing
  - Vibrating tools (eg, foresters, grinders, masonry, quarry)

- Washington State study showed that the 5 professions most commonly affected by CTS included meat dealers, supermarket employees, hair stylists/barbers, wood product manufacturing workers, and sawmill workers.
Carpal Tunnel Syndrome

**Anatomy**
- Increased pressure on the median at the wrist
- It is a pinched nerve at the wrist
Carpal Tunnel Syndrome

- **Associated factors**
  - Obesity
  - Hormonal changes,
  - Renal insufficiency
  - Hypothyroidism
  - Congestive heart failure
  - Pregnancy
Carpal Tunnel Syndrome

How the injury affects function
- Pain
- Numbness, tingling
- Weakness
- Clumsiness, dropping objects
- Can lead to permanent loss of strength if left untreated
- Loss of sleep—numbness in the hand awakens them from deep sleep
Carpal Tunnel Syndrome

- What to look for in the medical record
  - Description of pain, numbness, tingling
  - Complaints involving the thumb, index, middle and half the ring finger
  - Night numbness
  - Numbness while driving, reading
  - Weakness, clumsiness, dropping things
Carpal Tunnel Syndrome

- What to look for in the medical record
  - Thenar muscle atrophy
    - Difficulty with pinch
  - Laboratory studies indicating diabetes, rheumatoid arthritis, lupus or thyroid disease
Carpal Tunnel Syndrome

- What to look for in the medical record
  - X-rays documenting evidence of a previous fracture
Carpal Tunnel Syndrome

- What to look for in the medical record
  - X-rays documenting arthritis
Carpal Tunnel Syndrome

- What are pertinent diagnostic tests and their limitations
  - X-rays
  - EMG/NCS
    - Electromyelogram/Nerve conduction study
    - Confirms the diagnosis if there is clinical suspicion
    - Measures the speed of the signal through the carpal tunnel
    - Limitation: May not pick up early disease, the physician who performs the test must know the data needed to make the diagnosis
Carpal Tunnel Syndrome

- New injury vs. recurrence vs. aggravation of injury
  - New injury
    - Can come about as a result of an acute injury such as a fracture
  - Recurrence
    - Can improve with treatment (bracing, activity modifications) and return when inciting activity re-initiated
  - Aggravation of injury
    - May have mild symptoms that are then worsened to the point of severe symptoms with certain activities (prolonged driving, holding phone)
Carpal Tunnel Syndrome

- **Acute injury vs. pre-existing condition**
  - Acute injury
    - Fracture, any injury that causes swelling
  - Pre-existing condition
    - Prior documentation of numbness
Carpal Tunnel Syndrome

- **Common medical treatment**
  - Job modification
    - Avoid vibration, awkward posture
  - Injection with steroid (no more than 2)
  - Splinting: Day and night
  - Release of the transverse carpal ligament
  - Principle: Increases space for the nerve
The Ganglion Cyst

- A lump that occurs in the hand or wrist or next to joints or tendons
- The most common is on the back of the wrist or dorsum
- All ages affected
The Ganglion Cyst

- **Anatomy**
  - Balloon on a stalk
  - Hole in the joint, fluid leaks out through the capsule and creates the cyst
The Ganglion Cyst

- How trauma occurs
  - Often this is unknown
  - Joint or tendon irritation
  - Mechanical changes (hammering, repetitive load)
  - Fall or other forceful injury to the hand causes a joint capsule injury
The Ganglion Cyst

- How the injury affects function
  - Pain
  - Limit movement of the wrist
The Ganglion Cyst

- **What to look for in the medical record**
  - Description of the lump
  - Location of the lump
  - The mass ‘transiluminates’
  - Is it causing pain?
  - Is it limiting function?
The Ganglion Cyst

- What are pertinent diagnostic tests and their limitations
  - X-rays are often obtained but are frequently normal
    - Not all obtain x-rays
  - MRI’s are sometimes obtained but are not usually necessary unless there is concern that the mass is something else like a tumor
  - Transillumination
The Ganglion Cyst

- **New injury vs. recurrence vs. aggravation of injury**
  - **New injury**
    - These can come about and become very large over a short period of time and can be triggered by repetitive or forceful injury
  - **Recurrence**
    - These ganglions can grow and shrink in size on a daily basis and can completely disappear and return at any time
  - **Aggravation of injury**
    - Certain activities can cause the cyst to grow in size. Increased forceful or light use of the hand can make the ganglion cyst become larger, smaller and in some cases cause the cyst to rupture
The Ganglion Cyst

- **Acute injury vs. pre-existing condition**
  - **Acute injury**
    - Cyst appears spontaneously after repetitive wrist movement or after an acute injury
  - **Pre-existing condition**
    - Prior documentation of cyst in the same location
    - Cysts can be in multiple places and the location must be well documented
The Ganglion Cyst

- **Common medical treatment**
  - Bracing
  - Observation
  - These are not dangerous and do not cause permanent damage
  - Surgical removal if they are painful or limiting movement of the wrist.
  - Small cysts on the surface can be quite large below the skin—iceburg concept
De Quervain’s Tenosynovitis

- Painful tendons on the thumb side of the wrist
- If you straighten your thumb, you can see the tendons on the back of your hand
- In de Quervain syndrome, the tunnel where the tendons run narrows as the tissue that makes up the tunnel thickens
De Quervain’s Tenosynovitis

How trauma occurs
- Thought to be repetitive injury
- Assembly line workers-tasks repeated with similar motion
- Repeated pinching
De Quervain’s Tenosynovitis

- How the injury affects function
  - Very painful
  - Limits use of thumb
  - Decreased ability to pinch and grasp
  - Unable to move wrist normally
De Quervain’s Tenosynovitis

• What to look for in the medical record
  ○ Description of pain on the thumb side of the wrist
  ○ Difficulty with pinch, grasp
  ○ Swelling over the thumb side of the wrist
  ○ Positive ‘finklestein’s’
  ○ Immediate improvement in pain and increase in function after injection—while in the doctor’s office
De Quervain’s Tenosynovitis

- What are pertinent diagnostic tests and their limitations
  - Usually none
  - MRI is rarely indicated and is obtained only if the diagnosis is not clear
De Quervain’s Tenosynovitis

**New injury vs. recurrence vs. aggravation of injury**

- **New injury**
  - Usually insidious onset resulting from repetitive stress

- **Recurrence**
  - Can completely resolve with conservative treatment and return with greater or lesser severity

- **Aggravation**
  - Certain activities can worsen the symptoms and mild tolerable disease can quickly progress to difficulty with using the hand and thumb
DeQuervain’s Tenosynovitis

- Acute injury vs. pre-existing condition
  - Acute injury
    - Typically insidious
  - Pre-existing condition
    - If there is documentation of previous thumb sided wrist pain or history of injection for treatment of this problem
De Quervain Tenosynovitis

- **Common medical treatment**
  - Bracing that keeps the thumb and wrist from moving freely
  - Anti-inflammatories such as aspirin can help with the discomfort
  - Steroid injection into the tendon sheath
  - Surgery to open the tunnel and increase room for the tendons to glide through
Epicondylitis of the Elbow

- Lateral epicondylitis—outside of elbow
  - Tennis elbow
- Medial epicondylitis—inside of elbow
  - Golfer’s elbow
- Painful overuse condition
Epicondylitis of the Elbow

- **Anatomy**
  - Inflammation of the tendons that join the forearm muscles to the humerus
  - Forearm muscles and tendons become damaged from overuse
Epicondylitis of the Elbow

- How trauma occurs
  - Repetitive injury
    - In sports—playing tennis or golf
    - In work repeating the same activity where the wrist must be flexed or extended against force
Epicondylitis of the Elbow

- **How the injury affects function**
  - Painful
  - Limit strength
  - Causes the person to drop objects
  - Inability to do the same level of rigorous work
Epicondylitis of the Elbow

- **What to look for in the medical record**
  - Description of the activity that causes pain
  - Pain over the inside or outside of the elbow
  - Pain with resisted wrist flexion (medial epicondylitis) or extension (lateral epicondylitis)
  - Point tenderness over the medial or lateral elbow on exam
  - X-rays with calcifications in the tendon
  - MRI showing tendon degeneration
What are pertinent diagnostic tests and their limitations

- X-rays
- MRI
- Limitation
  - Often normal
Epicondylitis of the Elbow

- **New injury vs. recurrence vs. aggravation of injury**
  - **New injury**
    - Usually insidious in onset over many weeks to months
  - **Recurrence**
    - Can completely resolve and then return with greater or lesser severity
  - **Aggravation of injury**
    - Likely the most common
    - Minimal bothersome symptoms then acutely worsen with activity
Epicondylitis of the Elbow

- **Acute injury vs. pre-existing condition**
  - **Acute injury**
    - Most common insidious onset
  - **Pre-existing condition**
    - If there is prior documentation of the condition or treatment of this problem
    - Those who smoke cigarettes can have more vulnerable tissue
    - Systemic illness (diabetes, autoimmune disease) can also increase the likelihood of developing this problem
Epicondylitis of the Elbow

- **Common medical treatment**
  - Unloader brace
  - Injection with steroid—may or may not be helpful
  - Surgical removal of the degenerated tendon
Thumb Basal Joint Arthritis

- Degeneration of the thumb joint where the metacarpal and wrist bone meet
- Cartilage wears out
- Very common
- Age >40
Thumb Basal Joint Arthritis

- **Anatomy**
  - Junction between the first metacarpal and trapezium
Thumb Basal Joint Arthritis

- How trauma occurs in the different types of injuries
  - Repetitive injury
  - Can be heavy or light work
Thumb Basal Joint Arthritis

How the injury affects function

- Limits thumb mobility
- Difficulty with pinch, grasp
  - Cannot open jars
- Painful

![Image of a hand holding a jar, possibly illustrating the difficulty in opening it due to basal joint arthritis.]
Thumb Basal Joint Arthritis

What to look for in the medical record:
- Description of pain at the thumb base
- Positive grind test
- Thumb deformity
- X-rays documenting arthritis
- Decreased pinch strength
Thumb Basal Joint Arthritis

- What are pertinent diagnostic tests and their limitations
  - **X-rays**
    - Limitation: Severity of arthritis on the x-ray does not correlate with how badly the patient hurts
    - If normal, likely not arthritis
  - **Pinch and grip testing**
    - Measure the strength and compare to the other side
    - May have arthritis in both thumbs
Thumb Basal Joint Arthritis

- New injury vs. recurrence vs. aggravation of injury
  - New injury
    - Likely injury of already compromised joint
      - May be painless before injury, however, after injury to an abnormal joint pain may persist and not resolve
    - Recurrence
      - This typically tends to worsen
      - Can be improved with injection/bracing to tolerance but often worsen over time
    - Aggravation of injury
      - In general, stress on an arthritic thumb should be avoided as it will aggravate the symptoms
Thumb Basal Joint Arthritis

- **Acute injury vs. pre-existing condition**
  - This is a pre-existing condition aggravated by the acute injury
  - The arthritis could have come about from repetitive work related activity but in general it is pre-existing and does not acutely develop
Thumb Basal Joint Arthritis

**Common medical treatment**
- Bracing
- Injections—don’t help much
- Activity modification—avoid what hurts
- Surgery—remove or fuse the arthritic bone
The Triggering Finger

- Painful catching and locking of the finger or thumb
The Triggering Finger

- **Anatomy**
  - The tendon becomes enlarged or the pulley (A1) becomes narrowed which limits the mobility of the finger
The Triggering Finger

How trauma occurs in the different types of injuries

- Repetitive injury
- Injury to the hand that causes swelling can lead to the development of finger triggering
  - These cases respond well to anti-inflammatories and injection
The Triggering Finger

- How the injury affects function
  - Injury leading to triggering of the fingers or thumb leads to:
    - Inability to release after making a fist
    - Inability to work with the hand in small spaces as finger becomes stuck
    - Can be painful
The Triggering Finger

- What to look for in the medical record
  - Documentation of pain over the A1 pulley region
  - Near complete relief of pain after an injection
  - Description of catching and locking of the finger
    - Often this is worse in the morning and improves as the day goes on
The Triggering Finger

What are pertinent diagnostic tests and their limitations

- Mainly clinical exam
- MRI rarely indicated—only if diagnosis is unclear
  - MRI is indicated if there is a history of impalement injury to the hand that then led to triggering of the digit
- X-rays not usually obtained unless there is a history of trauma or fracture
The Triggering Finger

- **New injury vs. recurrence vs. aggravation of injury**
  - **New injury**
    - Mainly in the event of trauma to the hand leading to swelling. These individuals likely predisposed to this problem.
  - **Recurrence**
    - Triggering can come and go.
    - The triggering can resolve and then return with more or less severe symptoms.
  - **Aggravation of injury**
    - Repetitive activity with recurrent locking of the finger can increase the pain and swelling leading to worsening symptoms.
The Triggering Finger

- **Acute injury vs. pre-existing condition**
  - Typically insidious in onset with waxing and waning symptoms
  - Individuals can be predisposed to this condition such as diabetics
The Triggering Finger

- **Common medical treatment**
  - Injection
    - Works 50% of the time
    - Less in diabetics
  - Surgery works 99% of the time to relieve symptoms completely
## Return to work

<table>
<thead>
<tr>
<th>Condition</th>
<th>Expected healing time</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medial or lateral epicondylitis</td>
<td>6-12 weeks if causative activity is stopped</td>
<td>This condition may become chronic. Removal of the causative activity in the acute phase generally results in control or resolution of symptoms.</td>
</tr>
<tr>
<td>Sprain/strain</td>
<td>6 weeks</td>
<td>Most strain/sprain injuries should heal in 2-4 weeks.</td>
</tr>
<tr>
<td>Bruises/contusions</td>
<td>2 weeks</td>
<td>If there is significant associated tissue injury, particularly with a crush injury, healing may be slower.</td>
</tr>
<tr>
<td>Fracture</td>
<td>4-12 weeks</td>
<td>The rate of healing for a fracture depends on the type and location of the fracture and whether surgical intervention is required.</td>
</tr>
<tr>
<td>Laceration involving skin and subcutaneous tissues</td>
<td>Up to 2 weeks</td>
<td>Generally activity can continue while healing occurs, particularly if the affected area can be kept dry.</td>
</tr>
<tr>
<td>Condition</td>
<td>Expected healing time</td>
<td>Notes</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>--------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Wrist sprain/strain</td>
<td>Up to 6 weeks</td>
<td>Most wrist sprains recover in 2-4 weeks. Splinting will often assist.</td>
</tr>
<tr>
<td>Laceration involving skin and subcutaneous tissues</td>
<td>Up to 2 weeks</td>
<td>Activity can continue while healing occurs, particularly if the affected area can be kept dry.</td>
</tr>
<tr>
<td>Laceration involving tendons</td>
<td>Up to 6 weeks for extensor tendons</td>
<td>Particularly after flexor tendon repair, specific therapy to restore function will generally assist recovery.</td>
</tr>
<tr>
<td></td>
<td>Up to 12 weeks for flexor tendons</td>
<td></td>
</tr>
<tr>
<td>Carpal tunnel syndrome – medically managed</td>
<td>Not applicable</td>
<td>A reduction in symptoms may occur. Exposure to vibration should be limited.</td>
</tr>
<tr>
<td>Carpal tunnel syndrome – surgically decompressed</td>
<td>2 weeks</td>
<td>Decompression reduces the pressure on the nerve and thus should enable rapid reduction in symptoms.</td>
</tr>
<tr>
<td>Bruises/contusions</td>
<td>2 weeks</td>
<td>If there is significant associated tissue injury, particularly with a crush injury, healing may be slower.</td>
</tr>
<tr>
<td>Tendonitis/Tenosynovitis</td>
<td>2-4 weeks or longer</td>
<td>If the precipitating activity is ceased, resolution generally occurs in 2-4 weeks. If not, symptoms may continue indefinitely.</td>
</tr>
<tr>
<td>Fracture</td>
<td>4-12 weeks</td>
<td>The rate of healing for a fracture depends on the type and location of the fracture and whether surgical intervention is required.</td>
</tr>
<tr>
<td>Ganglion treated conservatively</td>
<td>0-2 weeks</td>
<td>Most ganglions are symptom-free. If there are symptoms, a short period of rest may assist symptom resolution.</td>
</tr>
<tr>
<td>Ganglion treated surgically</td>
<td>2 weeks</td>
<td>Recovery should occur without further treatment.</td>
</tr>
</tbody>
</table>
Thank you.