Workplace Hand Injuries & Disorders: Evaluation and Treatments

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Outline

• Hand Anatomy and Function
• Workplace injuries & Case examples
• Fractures / Traumatic injuries
• Compressive neuropathies
• Soft tissue disorders
  – Tendinopathies
  – Ganglions
• Outcomes of treatment
Hand Anatomy: Muscles & Tendons
Hand Anatomy: Bones
Workplace Disorders/Injuries

• Different than Non-Work Related
  – Causes
  – Psychosocial factors
  – Job issues
  – Treatment
Workplace Disorders/Injuries

Treatments:
• Education
• Expectations
• Attempt work prior to surgery
• ? permanent job modification
Workplace Disorders/Injuries

- Surgery less successful
- More Pain = Less Gain
The Bureau of Labor Statistics is a unit of the United States Department of Labor. It is the principal fact-finding agency for the U.S. government in the broad field of labor economics and statistics ... Wikipedia

Number of employees: 2,500
Headquarters: Washington, D.C.
Founded: 1884
Annual budget: 609 million USD
Agency executives: William J. Wiatrowski (Acting), Commissioner; William J. Wiatrowski, Deputy Commissioner;
Parent organization: United States Department of Labor
Nonfatal occupational injuries and illnesses involving days away from work by nature of injury or illness, private and state and local government, 2014

- **Sprains, strains, tears**
- Fractures
- Amputations
- Cuts, lacerations, punctures
- Bruises, contusions
- Chemical burns and corrosions
- Heat (thermal) burns
- Multiple traumatic injuries
- Soreness, pain
- Carpal tunnel syndrome
- Tendonitis (other or unspecified)
- All other natures

The incidence rates represent the number of injuries and illnesses per 10,000 full-time workers.
Nonfatal occupational injuries and illnesses involving days away from work by nature of injury or illness, private and state and local government, 2014

The incidence rates represent the number of injuries and illnesses per 10,000 full-time workers.
Hand Function: Basic Concepts

1. Hand must be positioned in space
2. Wrist motion, stability allow for optimal function of fingers
3. Hand proprioceptive sensation allows for manipulative dexterity
Hand Function: Basic Concepts

4. Thumb must be stable with appropriate 1\textsuperscript{st} web space for grasp

5. Three point pinch must be possible
Hand Function: Basic Concepts

6. Power grip relies primarily with ring and small fingers

7. While taking hold of objects is key, it is equally important to have a precise control release mechanism
Assessment of the Injured Hand

• When and how injury occurred
  – Crush concern for edema

• Clinical Exam
  – Open wounds
  – Division of tendons or nerves
  – Presence of fracture or dislocation
Principals of Care for Hand Injuries

- Elevation to control edema
- Avoid stiffness of unaffected joints
- **Safe position** for splinting
Splints for Immobilization
Common Mistakes in Management Hand Injuries

• Edema and stiffness resulting from improper splinting
• Prolonged immobilization
• Unrecognized malalignment or rotation of finger(s)
• Delayed referral to Hand Surgery
When to Consult Hand Surgery?

- Acute lacerations
  - Typically skin can be sutured
  - Delayed tendon nerve repair
- Fractures
- Ligament tear or dislocations
- Peripheral compression or traumatic neuropathies
- Vascular disorders
Role of Hand Surgeon

Primary provider of hand and upper extremity musculoskeletal disorders
Clinic Case 1

45 yo Culinary Instructor
– Traumatic crush injury dominant hand
– ER day of injury
– Radiographs of hand
– Splinted
Clinic Case 1

Examination

– Swelling
– Abrasions
– Limited motion
– Rotation of index finger
Phalanx & Metacarpal Fractures

• Most stable
• Treatment
  • Cast 3 to 4 weeks
  • ROM and Splint
Phalanx & Metacarpal Fractures

• Surgery if rotation or unstable
Phalanx & Metacarpal Fractures

• Surgery: Fracture Reduction & Fixation

• **Post-op Care**
  • Splint 2 to 4 wks
  • ROM to avoid stiffness and contractures
  • Hand Therapy
Phalanx fracture
Clinic Case 1: Percutaneous Pin Fixation
Clinic Case 2

40 yo F ultrasonographer

- 3 months wrist pain, intermittent paresthesias
- Associates with use of transducer at work
- Past treatment splinting, NSAIDs
Clinic Case 2

Examination

– Wrist volar and dorsal radial tenderness
– No carpal instability, normal motion
– No swelling or tenosynovitis
– Pain with CTS testing but no paresthesias
Clinic Case 2

Differential Diagnoses

– Carpal tunnel syndrome
– Wrist tendinitis
– Occult ganglion
– Transducer use syndrome
Occupational musculoskeletal pain in cardiac sonographers compared to peer employees: a multisite cross-sectional study

- Electronic survey of Mayo clinic employees
- 516 control and 66 cardiac sonographers
- Cardiac sonographers sought medical care for their work-related pain more often (55% vs 21%) and missed more work due to pain (35% vs 12%)
A pilot study to precisely quantify forces applied by sonographers while scanning: A step toward reducing ergonomic injury.

- A force-measuring probe used by sonographers for real-time measurement of forces, and angles
- the mean maximum force applied for subjects with high BMI (25.3 N) was significantly higher than force applied for subjects with normal BMI (17.4 N)
“No wonder your arm aches. Shackles should be placed at eye level. Man, it’s an ergonomic nightmare down here.”
Carpal Tunnel Syndrome

- Hand Paresthesias
  - Median nerve distribution
  - Night symptoms
  - Intermittent
- Hand / forearm pain
Transverse carpal ligament
Median nerve
Palmar carpal ligament
Carpal tunnel
Transverse carpal ligament (roof of carpal tunnel)
Median nerve inside carpal tunnel
Flexor tendon
Extensor tendon
Distribution of median nerve branches in hand
Carpal Tunnel Syndrome

- **Incidence**
  - 3% women, 2% men

- **Risk Factors**
  - Female
  - Age: older
  - BMI
  - Diabetes
  - Biopsychosocial
Carpal Tunnel Syndrome

• Non-operative treatment
  – Intermittent symptoms
  – No atrophy
  – Normal or Mild abnormal NCS
Carpal Tunnel Syndrome

- Non-operative Treatment
  - Job modification
  - Wrist splints
  - Steroid injection
    - 60-80% respond
    - may recur 2-4 months
Carpal Tunnel Syndrome

• Operative Treatment
  – Endoscopic vs. Open
  – Indications
    • Failed conservative mgmt.
    • Atrophy
    • ≥ Moderate rating by NCS
Endoscopic Carpal Tunnel Release
• Return to work
  – **Endoscopic** 9 days earlier
  – Improved strength early postop period
  – Less scar tenderness

• Overall improvement of carpal tunnel syndrome symptoms was equally likely after endoscopic and open releases with outcomes after 6 months similar
deQuervain’s Tenosynovitis

- First extensor compartment
- Radial side wrist
  - Pain
  - Swelling
deQuervain’s Tenosynovitis

- Finkelstein’s Test
deQuervain’s Tenosynovitis

• Incidence
  – Women > Men
    • 8:1 in some reports

• Risk Factors
  – Combination of factors: some evidence
  – Post partum
deQuervain’s Tenosynovitis

- Splinting
- NSAIDs
- Therapy modalities
  - Iontophoresis
  - Phonophoresis
- Cortisone injection
deQuervain’s Tenosynovitis

- Surgical Release
deQuervain’s Tenosynovitis

• Post op
  – 1 to 3 weeks splinting
  – Tendon gliding, avoid maximal flexion

• Return to work
  – 1-2 weeks for modified
  – 6 to 12 weeks full duty
Trigger Finger

- Inflammation at tendon sheath
- Digit
  - Pain
  - Swelling
  - Locking
Trigger Finger

• Incidence
  – 2-3% population

• Risk Factors
  – Female
  – Diabetes
    • 10% incidence
  – Combination of factors
Trigger Finger

- Splinting
- NSAIDs
- Cortisone Injection
- Surgical Release
Trigger Finger

• Post op
  – Early ROM

• Return to work
  – Job dependent
    • days to 3 weeks

• Complications
  – recurrence
  – stiffness
Wrist Ganglion

• Cyst from joint or tendon sheath
• Etiology
  – Joint stress
  – Capsular tear
  – Mucoid degeneration
Wrist Ganglion

- 1-2 cm mass
- Most painless
- Size may change
- Rarely develop after specific trauma
Wrist Ganglion

- Firm mass
- May be tender
- Mild decrease in
  - ROM
  - Grip strength
- Trans illumination
Wrist Ganglion

- Occult Ganglia
  - Dorsal wrist pain
  - MRI
  - Associated with scapholunate lig. dorsal tear
Wrist Ganglion

- Splinting
- Aspiration successful in:
  - Sheath 60 to 70%
  - Dorsal 30 to 50%
  - Volar < 30%
Wrist Ganglion Excision

- Gold standard
- 1 to 10% recur
- Short term post-op splint
Wrist Ganglion Excision

• Return to work
  – 2 to 8 weeks

• Complications
  – scar
  – stiffness
  – neurovascular injury
  – carpal instability
Arthroscopic Ganglion Excision
Arthroscopic Ganglion Excision
TFCC Injuries

- Traumatic
  - Fall in pronation
  - Twisting
  - Peripheral location
TFCC Injuries

- Degenerative
  - Ulnar positive
  - Central location
TFCC Anatomy

- Triangular Fibrocartilage Complex
TFCC Injuries

• Ulnar wrist pain
• + / - clicking
• Point tenderness
  – Fovea sign
• Pain with rotation
  – Pronated grip
TFCC Injuries

• Diagnosis
  – MRI
  – Arthrogram
TFCC Injuries

• Acute Tears
  – Cast 4- 6 weeks

• Chronic
  – Splint / cast
  – Cortisone injection
TFCC Injuries

Acute & chronic tears: majority are without wrist instability

• Return to work
  – Modified duty 1-2 wks in splint / cast
  – Therapy for ROM / Strengthening
    • Begin at 6 wks
  – Full duty return 2-3 months
TFCC Injuries

Surgery Indications:

- Acute instability DRUJ
  - Fracture of styloid
- Failed conservative management over several months in stable wrist
TFCC surgery
TFCC surgery
TFCC Injuries

• Peripheral tear repair
  – 4 weeks cast without rotation
  – Splint and therapy

• Chronic tear debrided
  – Splint / cast 3 weeks
  – Therapy
Wrist Fractures

• 1/6\textsuperscript{th} of all fractures treated in ED
• 15% of all fractures in adults
• Workplace incidence
  • 25% female 75% male
  • Fall most common
  • Labor / transportation / handler

\textit{USDL 1995}
Distal Radius Fractures

- Most common wrist fracture
- Fall on outstretched arm
Distal Radius Fractures

- Deformity
- Pain, swelling, paresthesias
Distal Radius Fractures
Distal Radius Fractures
Distal Radius Fractures

- Nonoperative
  - Cast 4-6 weeks
  - Closed Reduction
    - Long arm cast
    - Monitor for displacement
Distal Radius Fractures

• Surgery
  – Displaced
  – Unstable pattern
  – Neurovascular injury
Distal Radius Fractures
Distal Radius Fractures

Post op:
- Splint / cast ≤ 4 weeks
- Therapy
  - ROM / Strengthening
- Return to work
  - 2 to 4 months if laborer
time lost from work 9.2 weeks average
21% reported no lost time
Self-reported disability and occupational demands were the strongest predictors of time lost
“It’s a sick note from Benson... Looks like he’s going for the long haul”
– younger age
– higher education
– higher income
– strong social support
– employment not physically demanding
– Receipt of disability compensation had a strong negative effect on RTW
Return to Work Following Upper Extremity Surgery

*Other Factors…*

- patient recovery expectations
- mental health
- preop functional status
- ability to accommodate work
Factors influencing RTW:

- Self-efficacy (92.2 %)
- Mental health (91.8 % / 86.6 %)
- Supportive employer (91.4 %)
  - If job can be modified (86.3 %)
- Worker’s recovery expectations (88.3 %)
- Post-operative pain level (86.4 %)
Work Related Disorders

Primary musculoskeletal disorders with...

Secondary psychosocial & economic issues
Work Related Disorders

• Multi-specialty involvement
  – Physicians, RNs, PAs, NPs
  – CHT, OT, PT
  – Case managers

• Collaborate and manage conflicts
• Facilitate return to work
• Improved outcomes
KEEP CALM AND WORK ON
References


