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Evaluating the Wrist: Back to the Basics

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Overview

Objectives
- Identify Special Tests and Objective Measurements used in wrist evaluation, proper technique for administration, and interpret results of testing.
- Identify subjective assessments appropriate for use in wrist evaluation and interpret results
- Identify anatomical structures most likely affected according to symptoms present.

Outline
- History and Patient Complaints
- Testing
- Subjective Assessments
- Objective Assessments
- Palpation and Special Testing
- Plan of Care: Putting it all together
Wrist Evaluation Checklist =
- Patient Report
- Review of Testing
- Self Reports
- Measurable Restrictions
- Points of Tenderness
- Positive Provocative Tests
- Game Plan

History and Patient Complaints

The witnesses story is often the best place for a good detective to start........
What are your marching orders?

Vague Script

Specific Script

Mechanism of Injury

- FOOSH
- Punch
- Repetitive Injury
- Unknown Etiology
- Fracture, acute ligamentous injury/sprain
- Tendinopathies and neuropathies
- Chronic ligamentous injury/wear/tear
- OA
Symptoms

- Paresthesia's
- Pain complaints
- Force Transmission
- Coordination

Innervation Pattern Hand
Wrist Evaluation Checklist =

- Patient Report

Medical Testing

Collaborative Care
Tricky, Tricky, Tricky…. Mentoring

Radiography
Visualizing the Fracture

Boney anatomy of wrist

Tm = trapezium
Td = Trapezoid
C = Capitate
H = Hamate
S = Scaphoid
L = Lunate
T = Triquetrum
P = Pisiform
R = Radius
U = Ulna
Force Transmission

- As force travels through wrist from
  - 3rd MC
  - To CSL joint primarily at MC joint
  - To Radiocarpal joint
    - RS: 50-56%
    - RL: 29-35%
    - UL: 10-21%


Anatomy of the Distal Radius

Radial Inclination

Radial Height

80% of Force Transmission

Palmar Tilt
TFCC Anatomy Picture

Visualization of PRUL and DRUL tensioning with Forearm Rotation
What Makes a Stable or Unstable Wrist?

Carpal Arcs
Lines of Gilula

There is much more this is the basics ©

Carpal Ligaments Extrinsic

Dorsal

Volar

UT

UC

RSC

LRL

SRL

DRC
Extrinsic Ligaments

- Palmar Radiocarpal
  - RS (Radioscaphoid)
  - RSC (Radioscaphocapitate)
- LRL (Long radiolunate)
- SRL (Short Radiolunate)

- Dorsal Radiocarpal
  - DRC (dorsal radial carpal)

- Palmar Ulnocarpal
  - UC (ulnocapitate)
  - Utq (ulnotriquetral)
  - UL (ulnolunate)

Carpal Ligaments Intrinsic

- Dorsal: CT, TT, SL, DIC, CH, TqHC
- Volar: CT, TT, STT, SC, SL, LT
Intrinsic Ligaments

- S-L (scapholunate)
  - Dorsal portion stronger
- L-T (lunotriquetral)
  - Palmar portion stronger
- DCR interosseous ligs (dorsal radiocarpal)
  - Very strong
- Midcarpal
  - DIC (dorsal intercarpal)
    - Helps to stabilize LC joint
  - TqHC
    - Stabilizer of PCR
- STT (scaphotriapeziodal)
  - Stabilizes scaphoid tuberosity
- SC (scaphocapitate)
  - Stabilizes Scaphoid tuberosity

MRI and CT

- Full Tears vs Partial Tears
- Cysts
- Fractures
  - CT used to confirm scaphoid not visible on radiographs
- Tendinopathy
EMG/NCS

- Severity of compression (mild, moderate, severe)
- Level of compression
- Peripheral nerves involved

Wrist Evaluation Checklist =
- Patient Report
- Review of Testing
Subjective Assessments

Measures of Disability

- DASH (Disability of Arm Shoulder and Hand)
- Quick DASH
- PRWE (patient rated wrist evaluation)
Pain Assessments

- Intensity
  - Numeric Rating Scale
  - Verbal Rating Scale
  - Visual Analogue Scale
- Pain Catastrophizing Scale
- Pain Anxiety Symptom Scale
- Brief Pain Inventory
- McGill Pain Questionnaire
Objective Assessments

Make sure you know how you are to apply these standard assessments. Did you have to vary from this????

Range of Motion

- First, is there anything about the diagnosis that would preclude any of this testing?
- For boney and ligamentous injuries generally AROM is less stressful than PROM
  - Need MD approval to progress to PROM particularly in fractures and ligamentous repairs
- Tendon repairs protected PROM is less stressful than AROM
Range of Motion

- AROM – tells us about effectiveness of musculotendinous units
- PROM – tells us about tightness, now ask yourself?
  - Is it tightness across multiple joints?
  - Is it tightness at just one joint?
  - This tells us what anatomical structures should be addressed

Range of Motion

- We must always start with clearing above and below
Range of Motion
Wrist Flexion and Extension

Flexion       Extension

Range of Motion
Wrist Radial and Ulnar Deviation

RD       UD
Range of Motion
Forearm Pronation

Range of Motion
Forearm Supination
Intrinsic Tightness

- Metacarpal phalangeal joint (MCP) flexed and Proximal interphalangeal joint (PIP) is flexed.
- Then MCP extended and PIP flexed.
  - If there is a notable difference intrinsic tightness is present
  - Intrinsic tight = greater tightness with MP ext

Long Extensor Tightness

- Extrinsic extensor tightness: wrist flexion + digital flexion < wrist ext + digital flexion
Long Flexor Tightness

- Extrinsic flexor tightness:
  - wrist ext + digital extension
  - < wrist flexion + digital extension

Strength

- Again ask yourself is there anything in this diagnosis that would preclude this testing?
- Generally strength is one of the last measures to be performed as any acutely injured structure must be entirely healed to accept this level of force
- Generally test strength with grip dynamometry in wrist diagnoses sometimes pinch and rarely MMT
Grip Strength Testing

Pinch Strength Testing
- Lateral Pinch
- Tip Pinch
- 3 point pinch
Scars

- Minimally
  - Location
  - Size
  - Hypertrophic, keloid
  - Color
  - Adherence

- Detail
  - Vancouver Scar Scale
    - Vascularity
    - Pigmentation
    - Pliability
    - Height

Sensation

- Semmes Weinstein – threshold test

- 2.83 = normal sensation
- 3.61 = diminished light touch
- 4.31 = diminished protective sensation
- 4.65- 6.65 = loss of protective sensation
- >6.65 = untestable
Sensation

- Two Point Discrimination (moving and static)
- Innervation density
  - 7 of 10 correct
  - Scoring
    - < 6 mm = normal
    - 6-10 mm = fair
    - 11-15 mm = poor

Wrist Evaluation Checklist =
- Patient Report
- Review of Testing
- Self Reports
- Measurable Restrictions
Palpation and Special Testing

Guided by symptoms

Palpation

- Start with palpation
- This tells us where it hurts and drives any special testing along with symptoms that are present
Dorsal Extensor Compartments of Hand

Palpation

- EDC (extensor digitorum communis)
  - Four tendons visible and palpable over MCP’s of IF – SF with MCP’s in extension and IP’s Flexed.
  - EDC tendinitis will create pain in central wrist
Palpation

- **Anatomical Snuffbox**
  - 1st dorsal compartment. With full maximal thumb extension all tendons bordering snuffbox can be visualized. Scaphoid can be palpated in snuffbox.
  - Tenderness different/more intense than contralateral side suspect scaphoid FX
  - Tendons on Radial Border are involved in Dequervains tenosynovitis

- **Radial Styloid**
  - Boney prominence on lateral side of distal radius
Palpation

- Scaphoid
  - Carpal bone in articulation with radius. Poor blood supply. Can be palpated if one drops off radial styloid and ulnarily deviates.

Palpation

- Lister’s Tubercle
  - Boney prominence in center of wrist. Medial, dorsal, distal radius. EPL passes around lister’s tubercle.
Palpation

- Wrist
  - Lunate – Carpal bone that also articulates with the radius. Drop off Lister’s tubercle and flex the wrist you will feel lunate fill the space that was empty in extension.
  - Just Radial to lunate is the SL ligament
  - Just Ulnar to lunate is the LT ligament

Palpation

- Capitate
  - Just above lunate. With the wrist in extension, follow 3rd MC proximally until you feel a space this is the location of the capitate bone.
Palpation

- Ulnar Styloid
  - Boney prominence at distal end of ulna. Most prominent in pronation.

- Triquetrum
  - Slide off ulnar styloid moving just a little distal, this is the triquetrum
Palpation

- Wrist
  - TFCC – Located between head of ulna and triquetrum.

Palpation

- Wrist
  - Pisiform – Volar to triquetrum. Prominent carpal bone ulnar volar wrist enclosed by the fibers of FCU.
Palpation

- Wrist
  - Hook of Hamate – follow 4th MC proximally until you palpate boney point this is the hook.

Palpation

- Wrist
  - Carpal Tunnel – just distal to distal wrist crease.
Wrist Evaluation Checklist =
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Special testing
- Now we know where it hurts, let’s see if any of the special/provocative test associated with suspected injury are positive
- When would you not do this??
Testing for Ligament Injuries

SL Provocative Test

- Scaphoid Shift Test/Watson’s:
  - Patients wrist placed in ulnar deviation and slight extension. Examiner places thumb on tubercle of scaphoid and flexion of scaphoid is blocked as patients wrist is moved into radial deviation slight flexion.
  - Instability will cause scaphoid to sub lux dorsally.
  - When pressure is removed a painful clunk will be noted in a positive test.
  - There is a 30% rate of false positive.
  - False positives can be decreased by clenching fist during testing.
Scaphoid Shift/Watson’s Test

UD and slight extension to....  RD and slight flexion

Tests for L-T involvement

- Ballott test
- Stab through the palm
- Wire (bacterial unit)
- Pole squeeze (palpation)
Derby Relocation Test

- 3 parts – forearm pronated
  - Part 1 = Wrist ext/RD – moving to neutral
    - Pressure on triquetrum from volar surface force provided dorsally
    - Positive = relief of symptoms and click

Derby Relocation Test

- 3 parts – forearm pronated
  - Part 2
    - RD moving to UD
    - Pressure on triquetrum from dorsal surface force provided volarly
    - Positive = pain
Derby Relocation Test

- 3 parts – forearm pronated
  - Part 3
    - RD moving to UD
    - Pressure on triquetrum from volar surface force provided dorsally
    - Positive = relief of pain

Test for L-T Involvement

- Ulnar Snuffbox compression test/Linscheid’s Test
  - Compression is applied at the ulnar snuffbox
  - Compress the triquetrum against the lunate
  - This creates pain in a positive test
**Test for DRUJ Instability**

- Piano Key Test
- Distal ulna is grasped and moved passively in volar and dorsal direction at extremes of pronation and supination
- Done initially in neutral (up to 5mm may be noted)
- Pain, tenderness, and increased mobility relative to uninjured side

**Test for TFCC Injury**

- Fovea Sign/Sulcus Sign
  - Palpate between head of ulna and the triquetrum (ulnar snuffbox)
  - Fovea is a groove at base of ulnar styloid that serves as an attachment for TFCC
Test for Tendinopathies

Test for Dequervains Tendinitis

- Finkelstein’s
- Positive test with exquisite pain at radial wrist near 1st dorsal compartment
Test for ECU Tendinopathy

- Diffuse ulnar sided wrist pain
- Palpate ECU coming out of the ulnar groove when moving form sup-pro
- ECU Synergy Test – Tester holds thumb and MF with one hand and palpates ECU with other; then patient radially abducts thumb
  - Positive with pain

Tests for Neuropathies
Remember = Innervation Pattern
Hand

- Median
- Ulnar
- Radial

Tinel’s

- Carpal Tunnel
- Cubital Tunnel

Positive with paresthesia’s or electrical sensation
Median Nerve/Carpal Tunnel Tests

Phalens

Reverse Phalens

Hold one minute, positive with paraesthesia's

Ulnar Nerve/Cubital Tunnel Test

Bent Elbow Test = hold one minute, positive with paraesthesia’s
Wrist Evaluation Checklist =
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- Points of Tenderness
- Positive Provocative Tests

Plan of Care: Putting it all Together
Identify Areas of Limitations

- ROM
- Strength
- Sensation
- Coordination
- Functional Restriction

Thoughts on Wrist Rehabilitation

- Let’s not just think of the wrist as motion and strength
- What do we need from our wrist?
  - Be able to accept and transfer force
  - Functional range
  - Protective reflexes
Thoughts on Rehabilitation

- What is functional Motion in the wrist?
  - Palmer et. al: 30 degrees ext., 5 degrees flexion, 10 degrees RD, 15 degrees UD
  - Ryu et. al: 40 degrees ext., 40 degrees flexion, 40 degrees combined rd/UD
  - Gartland and Werley: 45 degrees ext., 30 degrees flexion, 15 degrees RD, 15 degrees UD and 50 degrees of each sup/pro

Thoughts on Rehabilitation

- Consider what is the injured structure
- What are the established guidelines to promote healing of that structure
- What are the needs of your patient?
  - Athlete vs Knitting Guru
- What has happened to the protective proprioceptive reflexes due to immobilization?
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Any Questions

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Summary and Q & A
Thank You!!!!!