FUNCTIONAL APPROACH TO THE TREATMENT OF TFCC PROBLEMS: EXTENSION RADIAL DEVIATION SYNDROME OF THE WRIST

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Objectives
1. Discuss the structure and function of the TFCC
2. Describe TFCC dysfunction in relation to a movement syndrome
3. Define an examination process to identify relevant impairments
4. Demonstrate intervention strategies to address identified impairments
5. Describe home exercises to match designated treatment objectives

APTA Vision Statement for the Physical Therapy Profession (beyond 2020)
Transforming society by optimizing movement to improve the human experience.

The physical therapist will be responsible for evaluating and managing an individual's movement system across the lifespan to promote optimal development; diagnose impairments, activity limitations, and participation restrictions; and provide interventions targeted at preventing or ameliorating activity limitations and participation restrictions.

The movement system is the core of physical therapist practice, education, and research.
Guiding Principles

• Painful conditions of the upper extremity are often a response to faulty mechanics and overuse.
• Faulty alignment, inadequate muscle length/strength/motor recruitment, and impaired movement can result in cumulative stresses that lead to pain and dysfunction.
• This presentation will focus on examination of the upper extremity with emphasis on alignment, tissue status, and movement patterns to identify factors that contribute to TFCC dysfunction.
• Intervention will emphasize manual techniques and specific exercises to address impairments and correct faulty movement patterns.

TFCC Injury:
Disruption of the ulnar-sided capsuloligamentous structure of the wrist by way of trauma or degeneration.

Description

- MOI:
  - FOOSH with pronated hyperextended wrist
  - Distraction injury that pulls ulnar side of wrist
  - Repeated microtrauma

- Pain with loaded end-range:
  - Wrist extension
  - Wrist ulnar deviation
  - Forearm rotation

- Pain/Weakness with grip and/or rotation

Facts of Interest:
1. Incidence: up to 80% of individuals post distal radius fracture (Bombaci et al. 2008)
2. Vascular supply: inner portion avascular; periphery vascular (Steinberg et al. 1995)
Injury Classification

- **Traumatic** (Type 1) lesions include axial loading with or without rotation, pure rotational type injuries, or wrist distraction. May occur with fractures.

- **Degenerative** (Type 2) lesions include overuse syndromes. Factors include excessive ulnocarpal impaction, ulnar variance (length of the ulna relative to the radius) and age.

### Palmar Classification of Acute TFCC Injuries

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Radiocarpal joint involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>wrist flexed</td>
<td>0%</td>
</tr>
<tr>
<td>B</td>
<td>wrist extended</td>
<td>20%</td>
</tr>
<tr>
<td>C</td>
<td>wrist flexed</td>
<td>80%</td>
</tr>
<tr>
<td>D</td>
<td>wrist extended</td>
<td>100%</td>
</tr>
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### Palmar Classification of Degenerative TFCC Injuries

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Radiocarpal joint involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>chronic</td>
<td>0%</td>
</tr>
<tr>
<td>F</td>
<td>chronic</td>
<td>20%</td>
</tr>
<tr>
<td>G</td>
<td>chronic</td>
<td>80%</td>
</tr>
<tr>
<td>H</td>
<td>chronic</td>
<td>100%</td>
</tr>
</tbody>
</table>

Anatomy

Radiocarpal joint

Midcarpal joint

Implications of Joint Position & Joint Mobility

- Scaphoid
- Lunate
- Triquetrum
Anatomy
Joint Structure
Distal Radio-carpal jt
• Triangular fibro-cartilage complex (TFCC)

Functions of the TFCC:
• Primary stabilizer of the distal radio-ulnar and ulnar wrist joints
• Reinforces the ulnar side of the wrist
• Forms part of the concavity of the radiocarpal joint
• Helps transfer compression forces that cross the hand to the forearm

Anatomy
Components of TFCC:
• fibrocartilage (articular disc)
• dorsal and palmar radioulnar ligaments
• meniscus homologue
• sheath of the extensor carpi ulnaris
• Ulnar collateral ligament
• Origins of the ulno-lunate and ulno-triquital ligaments

Distal attachments at the triquetrum, hamate, and base of fifth metacarpal

Anatomy
Wrist Ligaments
– Maintain intercarpal alignment
– Transfer forces within and across the carpus
Examination

Patient Body Diagram & Subjective Report

“When I pick up a gallon of milk.”

“When I use my hand to push such as sitting or performing a push-up.”

“When I swing a bat or racquet.”

“When I play sports.”

“When I use hand tools such as a hammer or screwdriver.”

“When I pick up a gallon of milk.”

Impaired Movement Pattern

Extension with Radial Deviation
- Dominant ECRB & ECRL
- Dominant thumb & digit extensors

Muscle Imbalance

Imbalance Patterns

Forearm, Wrist & Hand
- Strong & Dominant
  - ECRL & ECRB
  - EPL, EPB, APL
  - ED, EDM
Muscle Imbalance

Imbalance Patterns

<table>
<thead>
<tr>
<th>Forearm, Wrist &amp; Hand</th>
<th>Weak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ECU</td>
</tr>
<tr>
<td></td>
<td>Lumbricales</td>
</tr>
<tr>
<td></td>
<td>Interossei</td>
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</table>

Muscle Length

Muscle Length Restrictions

<table>
<thead>
<tr>
<th>Forearm, Wrist &amp; Digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Radial wrist extensors</td>
</tr>
<tr>
<td>Digit extensors (extrinsic)</td>
</tr>
<tr>
<td>Thumb extensors</td>
</tr>
<tr>
<td>? Pronators</td>
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Joint Accessory Mobility

Joint Mobility

<table>
<thead>
<tr>
<th>Forearm &amp; Wrist</th>
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<tbody>
<tr>
<td>Hypomobility/ Hypermobility</td>
</tr>
<tr>
<td>Radio-ulnar joints (radial head)</td>
</tr>
<tr>
<td>Ulno-triquetral joint</td>
</tr>
<tr>
<td>Scapholuno-radial joint</td>
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<tr>
<td>1st CMC joint</td>
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The imbalance pattern leads to sustained and/or repeated anterior glide of the medial column of the hand, which can result in excessive stress on the TFCC and eventual tissue breakdown.

POSTURE ANALYSIS

Weight-bearing
Non-weight bearing

Posture Analysis

Weight-bearing
Scapula, Elbow, Forearm, Wrist, Palm
• Scapula stability loss
• Elbow hyperextension
• Forearm hypersupination
• Wrist radial compression/ulnar distraction
• Palm arch collapse

Courtesy Brandi Smith-Young, PT
Board Certified Orthopaedic Manual Physical Therapist
Posture Analysis

Weight-bearing

Scapula, GH, Elbow, Forearm, Wrist, Palm

- Scapula winging
- Elbow hyperextension
- Forearm hypersupination
- Wrist radial compression/ulnar distraction
- Palm arch collapse

Courtesy: Brandi Smith-Young, PT
Board Certified Orthopaedic Specialist Fellow, American Academy Orthopaedic Manual Physical Therapists

Posture Analysis

Non-Weight-bearing

Cervical Spine, Scapula, Humerus, Wrist, Thumb

- Cervical flexion
- Scapula depression, abduction, downward rotation
- Humeral anterior glide, medial rotation
- Wrist extension/radial deviation
- Thumb extension
**EXAMINATION**

Forearm, Wrist, Hand

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**Physical Examination**

**Common Clinical Tests**
- TFCC stress test
- TFCC stress test w/compression (TFCC comp test)
- Gripping rotary impaction test (GRIT)
- Piano key sign
- Supination lift test

**Suggested Clinical Tests**
- Press test
- Weight-bearing tolerance test
- Functional load test

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**Examination**

**Press Test**

- Patient places both hands on arms of a stable chair or chair arm and pushes off to suspend the body using only hands.
- Positive test is the reproduction of wrist pain while pressing up the body’s weight.

<table>
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<th>Reliability</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>+LR</th>
<th>-LR</th>
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<tbody>
<tr>
<td>NT</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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Examination

Special Tests

Wrist Weight Bearing Test

- Equipment: NON digital scale
- Test on the unaffected wrist first
- Test the affected wrist slowly
- Stop at the point of pain
- Take 2 pieces of non elastic tape, squeeze wrist together without compression on the ulna head (or fit with Wrist Widget).
- RETEST with the tape or Widget on. There should be an immediate change in weight bearing tolerance.

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Functional Load Test

- Equipment: 3, 4, 5 lb barbell wt
- Patient holds the head of selected barbell weight at end-range positions of ulnar deviation or supination (or pronation)
- Positive test is the reproduction of wrist pain while maintaining end-range position.
- Selection of testing position based upon patient’s report of aggravating movements/positions.

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Physical Examination

Muscle Length Assessment

Forearm, Wrist & Digits

Short
- Radial wrist extensors
- Digit extensors
- Thumb extensors

ECRB & ECRL

EPL, EPB, APL

ED, EI, EDM examples of tightness
**Physical Examination**

**Muscle Strength Assessment**

- Forearm, Wrist & Hand
  - Weak
  - ECU
  - Lumbricales
  - Interossei

**Joint Mobility Assessment**

- Forearm & Wrist
  - Hypomobility/Hypermobility
    - Ulno-triquetral joint
    - Scapholunoradial joint
    - Proximal Radio-ulnar joint (radial head)
    - 1st CMC joint

**Examination Palpation**

- TFCC, Ulno-triquetral joint & DRUJ

Assess for TTP:
- Distal radio-ulnar joint
- Ulno-triquetral joint
- Ulno-lunate joint
Intervention

Address primary impairments, movement dysfunction and provide external support as indicated.

Local & Proximal

Intervention Manipulations - Local
• Radial head thrust
• Ulno-triquitral thrust

Intervention Manipulations - Local
• Scapholuno-radial thrust
• 1st CMC
Intervention
Manipulations - Proximal
- Cervical-thoracic
- Upper thoracic

Intervention
Mobilizations
- PRUJ & DRUJ
- Radio-carpal joints
- Intercarpal joints

Intervention
Exercise
- Wrist extension strength training (ECU emphasis)

Avoid excessive activity of: a. radial extensors, b. thumb ext/abd, c. extensor digiti minimi
Intervention Exercise
• Lengthen

Wrist & extrinsic digit extensors

Wrist radial extensors & thumb extensors/abductors

Intervention Exercise
• Lumbricale hold

Correct

Incorrect

Lumbricale hold with active wrist flexion-extension

Intervention – Cuff Control

Glenohumeral Joint Core Stabilization
• Supraspinatus
• Infraspinatus
• Teres minor
• Subscapularis

Elevate

Compress
Intervention

- Strap, Wrist Support, Tape

Description: TFCC Injury

References


25. Sauer K. Ulnar-sided wrist pain: Evaluation and Treatment of triangular fibrocartilage...