



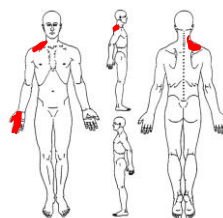
WRIST CASE STUDY

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Orthopaedic Manual Physical Therapy Series
 Charlottesville 2017-2018



VOMPTI_CLINICAL REASONING FORM



Body Chart – Initial Hypothesis:

- CTS
- C6-C7 Radiculopathy
- TOS
- 1st CMC OA
- DM neuropathy
- Pronator Teres Syndrome



SUBJECTIVE EXAM

Subjective *Asterisks* Signs/Symptoms: (Aggravating/Easing factors, Description/location of symptoms, Behavior, Mechanism of injury):

- 50 yo female computer programmer with gradual onset of night time R hand numbness and now daytime pain
- R hand dominant
- Hx of chronic R neck/"upper trap" pain for years which is exacerbated during work
- Unsure of relationship of neck and hand symptoms
- Hand numbness wakes her
- States "clumsy" feeling lately when using her R hand
- Hand pain is intermittent, but becoming more frequent
 - Aggs: night time, typing, gardening, using push mower, prolonged driving—uses L hand only to steer/turn
 - Eases: decreased use of R hand,
 - Pain worse on work days



STRUCTURE at Fault:

Joints in/refer to the painful region	Myofascial tissue in/refer to the painful region	Non Contractile tissue in/refer to the painful region	Neural tissue in/refer to the painful region	Other structures that must be examined – non MSK
C6-7 facets CTJ/Rib 1 midcarpal radiocarpal 1-3 CMC, MCP, IP	Upper Trap Pronator Teres Thenar mm Wrist flexors	C6-7 disc Transverse Carpal Lig	C 6,7 nerve roots Median Nerve	Systemic Neuropathy (DM)

Primary HYPOTHESIS after Subjective Examination: CTS

Differential List (Rank/List in order to rule out):

- C6-7 radiculopathy
- TOS
- De Quervain's Intersection Syndrome
- 1st CMC OA
- PTS
- Scaphoid fracture/instability



Physical Exam *Asterisks* Signs/Symptoms (Special tests, Movement/Joint Dysfunction, Posture, Palpation, etc)

- Observation: Forward head posture, rounded shoulders
- Wrist ROM: (+ pain) end ROM flex, ext
- Wrist strength 4-/5 flex and ext due to pain c/o
- Cervical AROM WNL all planes except L rot 75%
- UE myotomes WNL
- Spurlings, cervical distraction/compression neg
- Weakness with grip strength testing R vs. L

➤ Rate your assessment of Severity & Irritability
Justify your assessment with examples from the Subjective Exam &/or Objective Exam

○ Severity Non Min **Mod** Max

Sleep interruption, work ability affected

○ Irritability Non **Min** **Mod** Max

Can decrease symptoms with activity modification

➤ Stage & Stability?

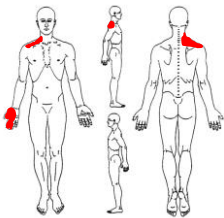
○ Acute Subacute **Chronic** Acute on chronic

○ Stable Improving **Worsening** Fluctuating Red Flags

Identify any potential risk factors (Yellow, Red flags, non MSK involvement, biopsychosocial)

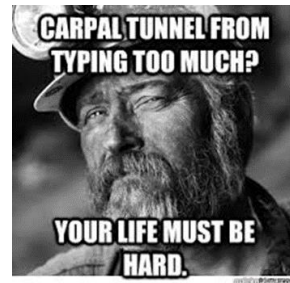
None

➤ Are the relationships between the areas on the body chart, the interview, and physical exam consistent?
"Do the features fit" a recognizable clinical pattern? **Yes** No

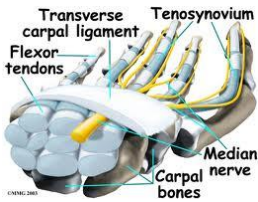


CTS

CTS



Carpal Tunnel



- Tunnel contains 9 flexor tendons and median nerve
- Roof is transverse carpal ligament

CTS

- Any condition decreasing cross sectional area of CT or increasing volume of its contents restricts median n. perineural blood supply
- Examples:
 - Carpal fracture/dislocation
 - Increased fluid
 - Tenosynovitis
 - Sustained wrist flex or ext
 - External wrist pressure
 - Vibration



Wrist Anatomy/Palpation

Palmar

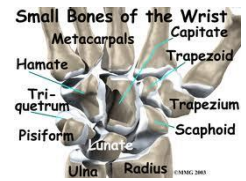


Dorsal



Carpal Palpation Palmar

- 3 creases on wrist
 - Proximal = prox end of synovial flexor tendon sheaths
 - Middle = prox wrist joint
 - Distal = prox. FI retinaculum/transverse carpal ligament
- Follow FCR to scaphoid tubercle, then trapezium
- Follow FCU to pisiform, then to hook of hamate
- Connect the above to show borders of CT
- Between hook of hamate and triquetrum (under pisiform) is Guyon's Canal (motor fibers exit for hypothenar eminence)



Carpal Palpation Dorsal

- Dip at proximal end of
 - 3rd MC –capitate
 - 2nd MC –trapezoid
 - 4th/5th – hamate
- At distal ulnar styloid – triquetrum
- Across distal radio-ulnar – meniscus of wrist
- Between ulnar styloid and triquetrum, palp on radial deviation – TFCC
- 3 palpation sites for Scaphoid –distal radius, snuff box, & tubercle (palmar aspect).



CTS

- Most common Nerve compression in UE
- Peak prevalence females >55 y.o.
- Symptoms:
 - pain, paresthesia or numbness in median nerve sensory distribution
 - Nocturnal paresthesia—may begin as only 3rd digit
 - Sensory impairment affects object recognition, coordination, manipulation
- NO volar wrist symptoms (supplied by palmar cutaneous branch of median n. that does NOT enter CT)

“New”wrist bracing for CTS



CTS

- Differential Diagnosis
 - TOS
 - Cervical radic
 - DM neuropathy
 - C6-7 radiculopathy
 - De Quervain's
 - Intersection Syndrome
 - 1st CMC OA
 - Pronator Teres Syndrome
 - Scaphoid fracture/instability

Cervical Radiculopathy

- Disorder of Cervical Nerve Root
- Commonly caused by disc herniation or space occupying lesion
- Result in nerve root inflammation, impingement or both
- CPR for diagnosis (90% probability with all 4 criteria)
 - (+) Spurling
 - (+) Distraction
 - (+) ULTT (medial nerve bias)
 - Presence of < 60 deg cervical rotation toward involved side



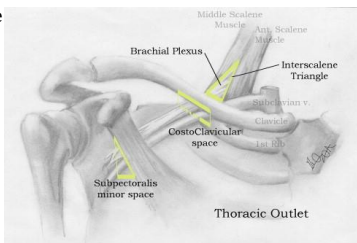
TOS

- Onset age: 20-40 yrs
- Females affected > males
- 2 types-Neurogenic (more common) and Vascular
- Typical s/s:
 - Medial arm pain, numbness, paresthesia of UE, weakness
 - Aggs: OH activity, heavy lifting, repetitive motion disorders, postural issues, or traumatic movements of the neck or shoulder that can cause dysfunction to the scalene musculature.



TOS

- 3 Compression sites
 - Interscalene triangle
 - Costoclavicular space
 - Subpectoralis (subcoracoid) space



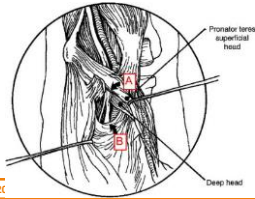
TOS

- Special tests
 - Hyperabduction test
 - Adson test
 - Both have poor false (+) reliability
- No true objective criteria for diagnosis
- Best diagnosis is history combined w/physical exam including palpation of entrapment sites, visual inspection, ROM of spine and UE



Pronator Teres Syndrome

- History
 - Median nerve compression btw heads of pronator teres
 - Paresthasias digits 1-3 increased w/activity
 - Weakness in forearm and hand mm (Med nerve)
- Physical Exam
 - (+)TTP prox PT
 - Pain with RSC elbow flex, forearm pronation and 3rd digit PIP flexion
 - Differentiate pronation w/elbow extension
- Differential Diagnosis
 - Medial epicondylalgia
- Treatment
 - Splint 4-6 weeks
 - Median nerve gliding

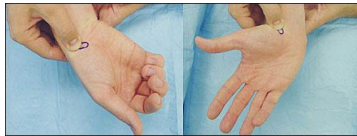


Scaphoid Fracture/Instability

- History
 - Most frequently fx carpal bone bc scaphoid links prox and distal rows
 - Fx upon falling in ext/supination (backward onto hand)
- Physical Exam
 - (+) axial compression of thumb vs scaphoid
 - (+) Scaphoid shift/Watson test
- Differential Diagnosis
 - Thumb CMC Arthritis
 - DeQuervain's Tenosynovitis
 - Radial Styloid Fracture
 - Intersection Syndrome
 - Superficial Radial Sensory Nerve
- Treatment
 - **Decreased blood supply so waiting to treat could lead to necrosis
 - If x-ray (-), immobilize x 2 weeks then re-xray or bone scan

Scaphoid Fracture/Instability

- Diagnosis
 - Axial Load of Thumb
 - Scaphoid Shift/Watson's Test
- Dorsal directed pressure on scaphoid as wrist moves from UD to RD. (+) if relocating clunk as scaphoid flexes and strikes radius



DeQuervain's Tenosynovitis

- History
 - Most common overuse injury of hand
 - Common activities of forceful grip + UD (tennis serve)
 - Pain dorsal/radial wrist along 1st dorsal compartment w/ROM
- Physical Exam
 - (+) Finkelstein's Test
 - Painful RSC Thumb Extension
 - TTP APL/EPB tendons, radial styloid, swelling, thickening



DeQuervain's Tenosynovitis

- Finkelstein's Test
 - Flex the thumb into the palm and close the fingers around the thumb
 - Ulnar deviate the wrist
 - Positive test results in pain at the 1st dorsal compartment
 - Sn 100%, Sp 100%



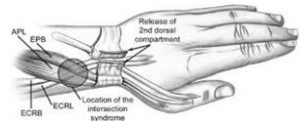
DeQuervain's Tenosynovitis

- Differential Diagnosis
 - Thumb CMC Arthritis
 - Scaphoid Fracture
 - Radial Styloid Fracture
 - Intersection Syndrome
 - Superficial Radial Sensory Nerve
- Treatment
 - Thumb spica splint worn 2 weeks all day/night and at night 6-8 weeks



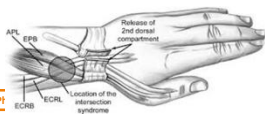
Intersection Syndrome

- History
 - Pain/swelling at radial wrist where 1st/2nd dorsal compartments meet due to inflammation of wrist extensors vs. APL and EPB
 - Mechanism: repetitive grip w/thumb abd activity (rowing, racket use, pulling rake vs. ground, holding ski poles)
- Physical Exam
 - TTP radial wrist at site of 1st/2nd dorsal compartments
 - Crepitus with thumb and wrist ROM



Intersection Syndrome

- Differential Diagnosis
 - Thumb CMC Arthritis
 - Scaphoid Fracture
 - Radial Styloid Fracture
 - De Quervain's Syndrome
 - Superficial Radial Sensory Nerve Injury
- Treatment
 - PT for education of activity modification, treatments for reducing inflammation
 - NSAIDS
 - Thumb Spica
 - Surgical Release



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Lateral Wrist Pain

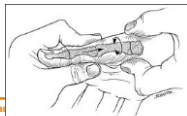


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1st CMC OA

- History
 - 30-40% of post-menopausal females and men 40-50 y.o.
 - Degeneration at 1st trapezio-MC joint
- Physical Exam
 - Joint assessment
 - 1st CMC grind test
- Differential Diagnosis
 - DeQuervain's Tenosynovitis
 - Radial Styloid Fracture
 - Intersection Syndrome
 - Superficial Radial Sensory Nerve
- Treatment
 - Distraction mobs
 - Median nerve glides



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The use of joint mobilization to improve clinical outcomes in hand therapy: A systematic review of the literature

R. Heiser et al. / Journal of Hand Therapy 26 (2013) 295–310

- First CMC OA mobilization evidence:
 - Some limited evidence joint mobilization will reduce short term pain symptoms
 - Villafane 2011 JMPT study

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HYPOALGESIC AND MOTOR EFFECTS OF KALTENBORN MOBILIZATION ON ELDERLY PATIENTS WITH SECONDARY THUMB CARPOMETACARPAL OSTEOARTHRITIS: A RANDOMIZED CONTROLLED TRIAL

Journal of Manipulative and Physiological Therapeutics October 2011

- Female pts with 1st CMC OA (70-90yrs old)
 - Treatment Gp: 1st CMC Gr III PA w/distraction
 - Control Gp: sham US
- Results
 - Treatment Gp: significant pain relief immediate post mobilization and positive trend in both improved pain and grip strength at 1-2 week f/u visit
 - Control Gp: no change in pain or grip strength



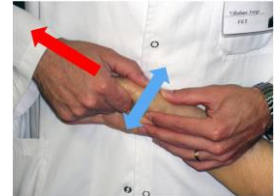
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HYPOALGESIC AND MOTOR EFFECTS OF KALTENBORN MOBILIZATION ON ELDERLY PATIENTS WITH SECONDARY THUMB CARPOMETACARPAL OSTEOARTHRITIS: A RANDOMIZED CONTROLLED TRIAL

Journal of Manipulative and Physiological Therapeutics October 2011

- Pt seated w/arm in anatomical position, elbow 90° flex
- PT grasps prox end of 1st MC and performs PA w/distraction while stabilizing trapezium with other hand
- Pt medial hand stabilized vs. PT's body
- 3 min mobs, 1 min break x 3



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SHORT-TERM EFFECTS OF NEURODYNAMIC MOBILIZATION IN 15 PATIENTS WITH SECONDARY THUMB CARPOMETACARPAL OSTEOARTHRITIS

Journal of Manipulative and Physiological Therapeutics September 2011

- 15 pts with 1st CMC OA (70-90yrs old)
 - Median n. sliders— elbow ext + wrist flex → elbow flex + wrist ext
 - 4 sessions over 2 wks
- Results
 - Improved pain pressure threshold at 1st CMC and grip strength



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Radial Nerve Mobilization Decreases Pain Sensitivity and Improves Motor Performance in Patients With Thumb Carpometacarpal Osteoarthritis: A Randomized Controlled Trial

Arch Phys Med Rehabil Vol 93, March 2012

- Female pts with 1st CMC OA (70-90yrs old)
 - Treatment Gp: radial nerve sliders
 - Control Gp: sham US
- Results
 - Treatment Gp: PPT increased at 1st CMC, scaphoid, and hamate and improved tripod and tip pinch grip strength
 - Control Gp: no change in pain or grip strength



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The Effectiveness of a Manual Therapy and Exercise Protocol in Patients With Thumb Carpometacarpal Osteoarthritis: A Randomized Controlled Trial

204 | APRIL 2018 | VOLUME 43 | NUMBER 4 | JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY

- 60 pts with 1st CMC OA (65-90yrs old)
 - Treatment Gp: radial nerve sliders, median n sliders, 1st CMC distraction/mobilization, hand therex
 - Control Gp: sham US
 - Treatment 3x/week x 4 weeks
- Results
 - Treatment Gp: improvement in VAS pain at 1st CMC, no change in PPT or grip strength
 - Control Gp: no change in any variable

The Effectiveness of a Manual Therapy and Exercise Protocol in Patients With Thumb Carpometacarpal Osteoarthritis: A Randomized Controlled Trial



- Radial n slider:
 - Wrist flex/elbow flex → elbow ext/wrist ext



- Median n slider:
 - Wrist flex/elbow ext → elbow flex/wrist ext

204 | APRIL 2018 | VOLUME 43 | NUMBER 4 | JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY

The Effectiveness of a Manual Therapy and Exercise Protocol in Patients With Thumb Carpometacarpal Osteoarthritis: A Randomized Controlled Trial

204 | APRIL 2018 | VOLUME 43 | NUMBER 4 | JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY

- Gr III PA at 1st CMC w/distraction
- PT grasps R thumb MC of pt w/R thumb and index finger and distracts joint retracting the thumb and gliding 1st MC in PA direction
- 3min on, 1 min rest for 3 sequences



FIGURE 1. Posterior/anterior glide with distraction of the first carpometacarpal joint (ONLINE VIDEO).

The Effectiveness of a Manual Therapy and Exercise Protocol in Patients With Thumb Carpometacarpal Osteoarthritis: A Randomized Controlled Trial

TABLE 1		HAND EXERCISES
Exercise	Description	
Tabletop	The hand and wrist are held in a neutral position; the subject flexes the second to fifth MCP joints only, then returns to neutral.	
Small fist	From neutral position, the subject flexes at the second to fifth proximal interphalangeal joint and distal interphalangeal joint only, then returns to neutral.	
Large fist	From neutral position, the subject flexes all joints to form a fist, then returns to neutral.	
Okay signs	From neutral position, the subject flexes to form an "O" with the tip of the thumb to the tip of each finger, in turn, returning to neutral after each.	
Finger spread	From neutral position, the hand is placed on a flat tabletop and the fingers are spread apart as wide as possible before returning to neutral.	
Thumb reach	From neutral position, the subject reaches across the palm of the hand and touches the tip of the thumb to the fifth MCP joint and then returns to neutral.	
Gripping	Subject holds the Thera-Band Hand Exercise ball in the palm of the hand and squeezes until the ball is about 50% depressed.	
Key pinch	Subject holds the Thera-Band Hand Exercise ball between the side of the thumb and the side of the index finger and squeezes until the ball is about 50% depressed.	
Finger tip pinch	Subject holds the Thera-Band Hand Exercise ball between the tip of the thumb and the tip of the index finger and squeezes until the ball is about 50% depressed; this is repeated for digits 3 to 5.	

Abbreviations: MCP, metacarpophalangeal.

CPR for CTS

Arch Phys Med Rehabil Vol 86, April 2005

- Wainner, 2005
- CPR
 - Age > 45
 - Reports shaking hands relieves symptoms
 - Wrist Ratio Index >.67
 - Symptom Severity Scale Score > 1.9
 - Reduced Median Nerve Sensory Field First Digit



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CPR for CTS

- Wrist Ratio Index
 - indicator of carpal canal volume
 - larger ratios (>.67) suggested a predisposing factor for CTS.
 - calipers was used to measure AP and ML wrist width in centimeters.
 - wrist ratio index calculated by dividing AP by ML width



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CPR for CTS

- Symptom Severity Scale (SSS)
 - 11 statement items related to 6 domains thought critical for the evaluation of CTS.
 - scored by calculating the mean of the individual items.
 - A higher overall SSS score represents more severe symptoms.



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Clinical Diagnosis of Carpal Tunnel Syndrome: A Systematic Review

J HAND THER 2004;17:309-319.

- Phalen's: 68% Sn, 73% Sp
- Tinel's: 50% Sn, 77% Sp
- Carpal compression 64% Sn, 83% Sp
- Two-point discrimination 24% Sn, 95% Sp
- Semmes-Weinstein Monofilament 72% Sn, 62% Sp



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Diagnosing CTS

J Hand Surg Am 2014 Jul;39(7):1403-7

- Phalen's: 68% Sn, 73% Sp
- Tinel's: 50% Sn, 77% Sp
- Carpal compression with wrist flexion 80% Sn, 92% Sp
- Abductor pollicis brevis strength 80 % Sp, 29% Sn
- Abductor pollicis brevis atrophy 94% Sp, 80% Sn



Objective Examination for CTS

- Phalen's Maneuver
- Tinel's Sign
- Carpal Compression
- Semmes-Weinstein Monofilament

Phalen's Maneuver

- Rationale:
 - Flexion increases pressure in CT
 - Median n compressed by high P in CT
- Method
 - Wrists held in max flexion x 30-60 sec
- Positive Result:
 - Paresthesia in Median N distribution



Tinel's Test

- Rationale:
 - Regenerating nerve fibers are susceptible to mechanical deformation
- Method:
 - PT taps along the median nerve at CT
- Positive Result:
 - Tingling felt along median nerve



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Carpal Compression

- Rationale:
 - Direct pressure on median n. compromises impaired nerve
- Method:
 - PT compresses median n. by pressing
- Positive Result:
 - Paresthesia along Median n.



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Effectiveness of Hand Therapy Interventions in Primary Management of Carpal Tunnel Syndrome: A Systematic Review

J HAND THER 2004;17:210-228

- Current evidence shows “Grade B” evidence from splinting, pulsed US, nerve/tendon gliding, carpal bone mobilization, and yoga for people w/CTS

Treatment planning

Impairments	Functional limitations	Goals
Limited, painful AROM	Difficulty sleeping, tolerating driving and job activity	Sleep w/o waking due to numbness
Postural Deficits		
Grip weakness	Impaired object manipulation	RTW and driving painfree
Nerve irritability		



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➤ What is your primary treatment Objective after initial evaluation?

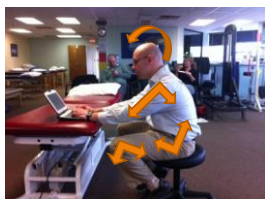
• Education:

- Condition
- **Posture
- Activity modification
 - Hand tools promoting neutral wrist-large, padded handles
 - Avoidance of tight fist posture, especially in max wrist flex or ext and intrinsic plus position
 - These positions pull lumbricals into the CT and dec space
 - Avoidance of direct palm/wrist pressure, vibration
 - Use of padded gloves



Postural Education

• Poor posture



- Posterior pelvic tilt due to hips 'lower' than knees
 - Promotes
 - FHRS posture
 - Excessive CS lordosis
 - Reverses LB lordosis
- No stable base with feet
- UE reaching out

Postural Education

• Corrected posture



- FIRST CORRECTION: Hips higher than knees
 - May add LB roll next to accentuate LB lordosis and reduce CS lordosis
- Feet flat on floor
- Computer/steering wheel closer (reduce shldr flex)
- Pretend a string is pulling the crown of their head UP
 - Adjust rear view mirror slightly above normal

➤ What is your primary treatment Objective after initial evaluation?

• Education

– Splinting

- Neutral splint: Purpose is to immobilize the wrist in a neutral position to avoid flexion or extension, which reduces compression of the median nerve
- Night time vs. Sustained?

Splinting is effective for night-only symptomatic carpal tunnel syndrome patients

J. Phys. Ther. Sci. Vol. 27, No. 4, 2015

- 40 CTS pts divided into 2 groups: Night only symptoms or day and night
- Purpose of splinting: immobilize the wrist in a neutral position to avoid flexion or extension, which reduced compression of the median nerve
- After 3 months of splinting, VAS pain levels of night-only symptom pts were lower than those in sustained splints
- No difference found in severity level, functional capacity, and electrophysiological findings.
- Splinting alone for night-only symptomatic patients seemed to decrease pain but combined therapy may be needed for sustained symptomatic patients



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RANDOMISED CLINICAL TRIAL ON EFFICACY OF COMBINING HANDSPLINTING WITH PHYSIOTHERAPY OR ULTRASOUND TREATMENT FOR PATIENTSWITH CARPAL TUNNEL SYNDROME

Research Report Platform Presentation Number: 888-91-654 Issue: 3 May 2015 88-41 88-40
Physiotherapy 2015; Volume 101, Supplement 1 e51238-e51642

- Adding nocturnal hand splinting to either MEX or MEX + US showed no added improvements
- Pts with CTS undergoing MEX or MEX + US treatment received no additional benefits with hand splinting in the short term (7weeks) or long term (52 weeks).
- MEX and therapeutic ultrasound were beneficial and could be recommended for patients with CTS.

➤ What is your primary treatment Objective after initial evaluation?

• Manual Therapy

– Cervical Mobilization?

– Median nerve gliding

- Local or at more proximal (less irritable) location

– Carpal mobilization

- AP
- PA



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Link between CTS and Cervical Spine involvement? (Double Crush)

Women With Carpal Tunnel Syndrome Show Restricted Cervical Range of Motion

JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 41 | NUMBER 5 | MAY 2011

Females with min/mod/severe CTS exhibited significantly dec Cerv AROM compared to those w/o CTS

Increased Forward Head Posture and Restricted Cervical Range of Motion in Patients With Carpal Tunnel Syndrome

JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 39 | NUMBER 9 | SEPTEMBER 2009

Pts with mid/mod CTS exhibited > FHP and dec Cerv AROM than healthy individuals



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An investigation to compare the effectiveness of carpal bone mobilisation and neurodynamic mobilisation as methods of treatment for carpal tunnel syndrome

Manual Therapy (2000) 5(4), 214-222

A. Tal-Akabi*, A. Rushton†

- Investigated differences in CTS outcomes with 3 groups:
 - No treatment
 - Median Nerve mobilization
 - Carpal mobilization (PA or AP--restriction dependent-- and flexor retinaculum stretch)
- Both mobilization groups had statistically significant decrease in pain compared to no intervention and less surgery
- No significant difference of benefit btw nerve/carpal mobilization groups



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Manual Physical Therapy versus Surgery for Carpal Tunnel Syndrome: a Randomized Parallel-Group Trial.

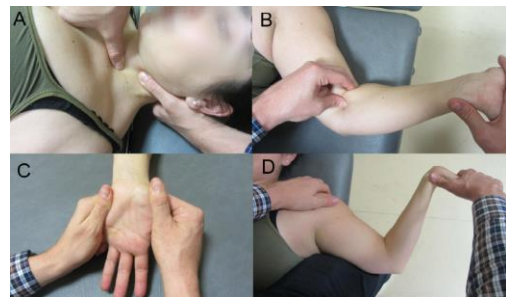
J Pain. 2015 Aug 14.

- PT consisting of manual therapies was more effective at 1 and 3 months, but equally effective at 6 and 12 months than surgery for improving pain and function in women with CTS
 - desensitization maneuvers of the central nervous system
 - soft tissue mobilization
 - nerve and tendon gliding



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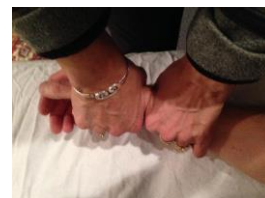
Carpal Mobilization Radiocarpal A-P/P-A

- **Pt. Position:** Supine, anatomical position for A-P, pronated forearm for P-A
- **P.T. Position:** Standing, stabilizing hand holds distal radius/ulna. Mobilizing hand holds prox row of carpals
- **Indications:**
 - A-P: restricted flexion.
 - P-A: restricted extension



Carpal Mobilization Radiocarpal Ulnar and Radial Glide

- **Pt. Position:** Supine, arm at side, neutral pronation/supination
- **P.T. Position:** Standing, stabilizing hand holds distal radius/ulna. Mobilizing hand holds prox row of carpals
- **Indications:**
 - Ulnar glide: restricted radial deviation
 - Radial glide: restricted ulnar deviation



Carpal Mobilization Radiocarpal – Physiological Extension

- **Pt. Position:** Supine, arm at side, forearm pronated
- **P.T. Position:** Standing, holding wrist with index and middle fingers supporting palmar aspect of carpals. Tips of thumbs on proximal row of carpals at location where emphasis is indicated by evaluation findings
- **Indications:** restricted extension



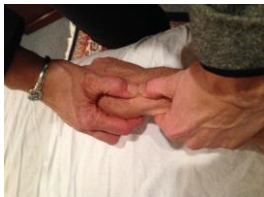
Carpal Mobilization Midcarpal A-P, P-A

- **Pt. Position:** Supine, anatomical position for A-P, pronated forearm for P-A
- **P.T. Position:** Standing, stabilizing hand holds proximal row of carpals. Mobilizing hand holds distal row of carpals
- **Indications:**
 - A-P: restricted flexion.
 - P-A: restricted extension



Carpal Mobilization Intercarpal A-P, P-A

- **Pt. Position:** Supine, arm at side, pronated forearm
- **P.T. Position:** Standing, stabilizing hand holds carpal with index finger and thumb. Mobilizing hand holds neighboring carpal with index finger and thumb.
- **Indications:**
A-P: restricted flexion.
P-A: restricted extension.



Nerve and Tendon Gliding Exercises and the Conservative Management of Carpal Tunnel Syndrome

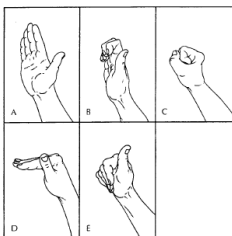
J HAND THER 11:171-179, 1998.

- Group I: std CTS care (splinting + NSAIDS)
- Group II: std CTS care + nerve and tendon glides
 - Gr I: 71.2% had CTS surgical release
 - Gr II: 43% had CTS surgical release
 - Gr II interviewed at 23 mo. f/u.
 - 70.2% reported good or excellent results

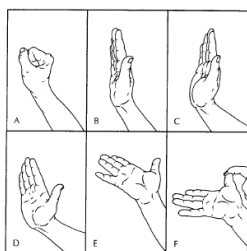
Nerve and Tendon Gliding Exercises and the Conservative Management of Carpal Tunnel Syndrome

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Tendon Glides



Median Nerve Neural Glides



Median Nerve Glides



Hand flat against the wall at shoulder height
 Rotate forearm so the elbow crease faces the ceiling. Do not move your hand
 Slowly rotate your body away from your hand until you feel a gentle stretch in the hand or arm

Pattern Recognition

Identify the key subjective and physical features (i.e. **clinical pattern**) that would help you recognize this disorder in the future.

Subjective	Physical
<ul style="list-style-type: none">• Pain, numbness, paresthesias in median nerve distribution on palmar aspect of hand• Night symptoms• Exacerbated with ADLs• C/o impaired object recognition, manipulation, coordination	<ul style="list-style-type: none">+ Phalen's Maneuver+ Tinel's Sign+ Semmes-Weinstein Monofilament+ EMG testing