LSUHSC
Occupational Therapy
Carpal Tunnel Treatment Protocol

[Diagram of wrist anatomy with labels: CAPITATE, HAMATE, TRIGUETRUM, SCAPHOID, FPL, MN, PISIFORM, RADIAL BURSA, ULNAR BURSA]

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Carpal Tunnel

* Impingement of the Median nerve under the transverse carpal ligament
* Inflammation or swelling about the flexor tendon synovium, thickening of ligament
* Risk factors:
  - Demographics: Female, middle aged, smoker
  - Obesity, ↑ body mass index
  - Genetics: Related to inherited characteristics, thickened transverse carpal ligament
  - Inherited medical conditions - diabetes, thyroid disorder
  - Medical conditions: wrist fracture (Colles), dislocation of carpal bone
  - Space occupying lesions (ganglions, tumors, edema)
  - Rheumatoid arthritis
  - Renal dialysis
  - Vocational / Avocational:
    - High amount of repetitive movements, exposure to vibration/cold may aggravate the carpal tunnel
Symptoms patients typically complain of

* Awakening at night. Note frequency
* Patient may report numbness, tingling
* Complaints of weakness of grip or pinch
* Complaints of dropping things
* Complaints of difficulties with fine motor ADL’s
* Patients may report numbness with flexed wrist activity such as driving or reading
* Patient may report fingers feel swollen
* Patients may report feeling the need to “shake out” the hand or wrist
* Patients may complain of tingling during the day
* Some people are unable to tell between hot and cold by touch

Pertinent (-)
* Patient should not complain of numbness in foot, face, forearm
* Patient should not complain of neck pain
Carpal Tunnel Classification

Grade I  Mild

* Awakening at night. Usually intermittent
* Tingling and numbness
* Positive Phalens
* Symptoms increase with activity
* No muscle wasting
* Middle finger most commonly involved

Grade II  Moderate

* Positive provocative tests. Tinels and Phalens
* Weakness of thenar muscles, but not atrophy
* Decreased sweat noted Median Nerve distribution
* Semmes Weinstein monofilament test will be abnormal
* Decreases in grip and pinch strengths

Segmental demyelination and destruction of axons is found
Grade III    Severe

* Thenar atrophy
* Sensory symptoms are persistent
* Abnormal Semmes Weinstein threshold test
* Phalens and Tinels may now be negative
* Nerve is tender to deep pressure
* Patient complains of constant numbness both during the day and at night

Nerve fibers undergo Wallerian degeneration
The compressed nerve becomes a fibrous cord
For the Resident

Screening for CTS to rule out peripheral neuropathy, nutritional, metabolic or infections:

Labs
CBC / d, Hep Panel, HgA1C, HD250 (Vit D), CMP, UA

Ultrasound of the wrist to assess median nerve
Measure cross section proximal to ligament rule out inflammation, arthritis or mass in carpal canal

Referral to Occupational Therapy:

Evaluation to include Semmes Weinstein monofilament testing
Grip and pinch
ADL assessment
Moberg (If Semmes is non physiologic)
Trial of night splints
Nerve glide exercises
Arrow points to Median Nerve

Median Nerve compression
Occupational Therapy Evaluation

Subjective:
- Patient c/o of awakening at night and frequency
- Duration of symptoms
- ADL related factors

Objective:
- Muscle atrophy or weakness of the LOAF muscles
  - L = 1st and 2nd Lumbricals
  - O = Opponens pollicis
  - A = Abductor pollicis brevis
  - F = Flexor pollicis brevis
- Sudomotor changes, ↓ sweat in median nerve distribution
- Trophic changes noted of fingertips
- ROM - active and passive
- Edema
- Strength
  - MMT of LOAF muscles
  - Grip and pinch evaluation
Occupational Therapy Evaluation

Objective evaluation continued:

Provocative tests
- Phalens: Wrist flexion test. Positive test elicits tingling/numbness in radial 1/3rd fingertip

- Tinels: Tapping on the median nerve. Positive test elicits tingling in the fingers

Sensory mapping
- Semmes Weinstein monofilament testing

Moberg

ADL evaluation

Vocational / Avocational
Semmes Weinstein Monofilament Test

* A sensory touch pressure threshold test
* Can be used to correlate nerve damage with patients ADL function
* Allows for “mapping” of the extent and degree of the sensory problem
* Has been shown to be reliable and repeatable
* Hand screening kit consists of 5 monofilaments
* Testing starts with the 2.83 monofilament. If detected, it is not necessary to test that same area with a heavier monofilament
* For the 2.83 and 3.61 monofilaments one response out of three is considered a correct response
<table>
<thead>
<tr>
<th>Value</th>
<th>Color</th>
<th>Description</th>
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<tbody>
<tr>
<td>2.83</td>
<td>Green</td>
<td>Normal sensation</td>
</tr>
<tr>
<td>3.61</td>
<td>Blue</td>
<td>Diminished light touch, diminished texture discrimination</td>
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<tr>
<td></td>
<td></td>
<td>Earliest sign of nerve involvement</td>
</tr>
<tr>
<td>4.31</td>
<td>Purple</td>
<td>Diminished protective sensation</td>
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<tr>
<td></td>
<td></td>
<td>Absent texture, impaired stereognosis and usually impaired temperature.</td>
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<tr>
<td></td>
<td></td>
<td>Patient c/o of dropping things and decreased ability to perform fine motor ADL’s such as buttoning</td>
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<tr>
<td>4.56</td>
<td>Red</td>
<td>Loss of protective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Absent protective sensation, absent stereognosis</td>
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<tr>
<td></td>
<td></td>
<td>Patient cannot manipulate objects outside line of vision</td>
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<td></td>
<td></td>
<td>Increased risk of injury secondary to slowed response to hot and sharp objects</td>
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<tr>
<td></td>
<td></td>
<td>Present deep pressure sensation</td>
</tr>
<tr>
<td>6.65(Orange)</td>
<td>Deep pressure sensation</td>
<td>Present deep pressure, rudimentary deep cutaneous peripheral nerve response</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor response to hot or sharp objects</td>
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<tr>
<td></td>
<td></td>
<td>Patient can recognize a pin prick</td>
</tr>
<tr>
<td>Untestable</td>
<td>Red-lined</td>
<td>Unresponsive to any filament/Nonfunctional sensibility</td>
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</table>
Dellons’ Modification of the Moberg

* A standardized assortment of 12 every day objects (wing nut, screw, key, nail, large nut, nickel, dime, washer, safety pin, paper clip, small hex nut, small square nut).
* Use to assess the patient’s ability to manipulate small objects with and without vision.
* Therapist observes and notes prehension pattern used and which digits
* Timed test with both hands tested
* Performed with eyes open and again with eyes closed
Conservative Treatment

* Patient education to include conservative treatment
* Night time volar wrist splints. Wrist splinted in neutral. Patient is cautioned to avoid strapping the splint too tight
* ROM exercises
* Tendon/nerve gliding
* Home and job modifications
* Inflammation control
* Strengthening
* MD may recommend NSAIDs
Median Nerve Glide Exercises
**Occupational Therapy Pre-op Treatment**

- Patient education in the post up care and expected clinical course:
  
  ROM exercises/isolated tendon glide
  Wound care progressing to scar massage
  Incision tenderness
  ADL’s. How to manage post surgery
   - Patient will not be able to wash dishes until wound is completely healed
  Cocoa butter for massage, skin hydration. Patient should avoid lotions which can irritate wound/skin
  Desensitization for dysesthesia's- should this develop
  Return of sensation
  Return of grip and pinch strength
  Role of diabetes in wound healing
  Activity modification
Post Carpal Tunnel Release OT Treatment

* Patient education and provide written HP sheet
* Active composite flexion fistling and full extension. This allows the median nerve to regain normal excursion without adhering to the tendons 15 reps hourly.
* Avoid wrist flexion. Prevent bow-stringing of the flexor tendons
* Wound care progressing to scar massage
* Cocoa butter for massage and skin hydration
* Edema control with elevation and AROM exercises
* Begin lightweight ADL’s
* No soaking of the hand
* No washing dishes for one month to prevent suture irritation
* No heavy lifting, pushing or pulling for one month
* Begin soft yellow foam sponge squeezing at 5 days post surgery
Carpal Tunnel Release
One Month Follow Up

* Patient is seen in Ortho clinic and by OT
* OT repeats Semmes Weinstein, grip and pinch. Checks AROM
* Watch for symptomatic neuroma
* Continue program for dysesthesias as needed

Occupational Therapy continues to follow patient for:

* AROM/PROM exercises
* Differential flexor tendon glide and nerve gliding exercises
* Scar massage and scar management
* Desensitization for dysesthesias. Sensory re-education
* Patient may report increased numbness
* Hand strengthening can begin at 3-4 weeks post op.
* Caution patient against over exercising
* Grip strength slowly increases over a two to three month period
* Patients with sedentary jobs requiring <10# lift may return to work by week 8 post surgery.

* Work hardening can be initiated at week 8 post surgery.

* MD may request use of volar elastic wrist splint post surgery for return to work -- day wear only.
2 Month Post Op Follow Up

* Patients need to be seen by both Orthopedics and Occupational Therapy for re-assessment

*** Patients with grade 3 CTS may require more than 2 months to regain sensation and hand strength.

They may also develop dysesthesias which can require several months of desensitization/sensory reeducation to resolve
Treatment Goals  Conservative

- Decrease pain and paresthesias with custom splinting
- Improve grip and pinch strengths and thenar muscle strength
- Improve function of the hand in daily living tasks
- Instruct patient in nerve glide exercises
- Patient education in injury avoidance with decreased sensation
- ADL and or job modifications to eliminate or reduce exposure to causative factors

Treatment Post Operative Release

- Increase ROM to decrease edema, stiffness, tendon adherence
- Instruct patient in wound care to promote healing
- Maintain tendon excursion and prevent median nerve adherence
- Prevent bowstringing of the flexor tendons by instructing patient to avoid simultaneous wrist and finger flexion
- Instruct patient in massage for scar pliability
- Instruct patient in desensitization techniques
- Instruct patient in sensory re-education
- Increase hand and grip strengths for ADL’s
- ADL and or job modifications/ergonomic evaluation
References

Rehabilitation of the Hand: Hunter and others. Mosby 1995

Stanley, B.; Tribuzi, S. Concepts in Hand Rehabilitation F.A. Davis 1992

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