

# **Carpal Tunnel Syndrome Medical Treatment Guidelines**

**Proposed by the  
State of New York  
Department of Insurance  
to the  
Workers' Compensation Board**



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# CARPAL TUNNEL SYNDROME

## Medical Treatment Guidelines

### I. INTRODUCTION

This document is a guideline for physicians who treat injured patients with carpal tunnel syndrome (“CTS”). Both documentation of appropriate symptoms and signs and a statement attesting to probable work-relatedness must be present for a CTS claim.

II. HISTORY TAKING AND PHYSICAL EXAMINATION establish the foundation/basis for and dictate subsequent stages of diagnostic and therapeutic procedures. When findings of clinical evaluations and those of other diagnostic procedures are not complementing each other, generally the objective clinical findings should have preference. The medical records should reasonably document the following:

#### A. History of Present Injury:

- i. Age, hand dominance, gender.
- ii. Onset: date of onset, triggering event (if present) versus gradual onset. Activity at/or before onset of symptoms.
- iii. Nature of symptoms: pain, numbness, tingling, weakness, swelling, stiffness, temperature change, moisture change, color change.
- iv. Any history of pain, intermittent or constant, and intensity. A pain scale (0 = no pain, and 10 = worst imaginable pain) may be used. The use of a patient completed pain drawing, Visual Analog Scale (VAS) is highly recommended.

Use comprehensive pain diagrams to better localize pain symptoms.

Evaluate the patient’s overall pain behavior. The behavior should be consistent with the current pain levels reported by the patient.

- v. Provocative and alleviating factors (occupational and non-occupational): identify the specific physical factors that are aggravating or alleviating the problem,
- vi. Sleep disturbances.
- vii. Other associated signs and symptoms noted by the injured worker.

- viii. Ability to perform work activities and activities of daily living (ADL's). Assess the overall degree of restriction or combination of restrictions.
- ix. Discussion of any symptoms present in the uninjured extremity.

**B. Past History:**

- i. Prior injuries to the same area including specific prior treatment and any prior supportive devices.
- ii. Past injury/symptoms involving the upper extremities, trunk and cervical spine.
- iii. Past personal injury or disease that resulted in temporary or permanent job limitation.
- iv. Medical conditions associated with CTS: The following are examples of medical conditions which have been commonly seen in association with CTS conditions. These require treatment and may impact the recovery of the work-related injury.
  - A) Amyloidosis;
  - B) Arthropathies including connective tissue disorders, rheumatoid arthritis, systemic lupus erythematosus, gout, osteoarthritis and spondyloarthropathy;
  - C) Cancer;
  - D) Diabetes mellitus, including family history or gestational diabetes;
  - E) Hypothyroidism, especially in older females;
  - F) Obesity;
  - G) Pregnancy.
- v. History of smoking and alcohol use; history of substance abuse;
- vi. Medication history including, birth control pills, corticosteroid use, and other prescription and non-prescription medication, and
- vii. Psychosocial history.

### C. Physical Examination:

The evaluation of any patient with suspected CTS should begin at the neck and upper back and then proceed down to the fingers and include the contralateral region. It should include evaluation of vascular and neurologic status, and describe any dystrophic changes or variation in skin color or turgor. A description of the patient's general posture (e.g., neck rotation, shoulder depression, spine kyphosis), and anthropometric measurements, (e.g. body mass index [BMI]) may prove useful. Behavioral adaptations to symptoms should be documented. Additional physical exam components may be necessary based on past medical history.

A neurological examination typically includes bilateral assessments of light touch sensation, pinprick, 2 point sensation as applicable, motor strength and reflexes. Similar assessments of the upper extremities including a vascular assessment may be performed. Special care to evaluate for polyneuropathic processes such as diabetic neuropathy is recommended. Vibratory sense and Achilles reflexes are frequently lost in diabetic neuropathy.

For purposes of differential diagnostic discrimination, Appendix A provides a list of other common upper extremity conditions including pertinent signs and symptoms.

### III. LABORATORY TESTING

Laboratory tests are generally accepted, well-established and widely used procedures. Patients should be carefully screened at the initial exam for signs or symptoms of diabetes, hypothyroidism, pregnancy, arthritis, and related inflammatory diseases.

Laboratory tests are rarely indicated at the time of initial evaluation unless there is reasonable clinical suspicion of a specific condition listed above.

### IV. ESTABLISHING WORK RELATEDNESS

CTS may result from numerous conditions, including inflammatory or non-inflammatory arthropathies, recent or remote wrist trauma or fractures, diabetes mellitus, obesity, hypothyroidism, pregnancy, and genetic factors.<sup>1 2</sup> In the unusual instance that CTS is acutely, traumatically induced, e.g. a patient has both CTS and concomitant trauma (fracture or dislocation), the treatment may require prompt carpal tunnel release. Work related activities may also cause or contribute to the development of CTS. To establish a diagnosis of work-related carpal tunnel syndrome, all of the following are required:

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<sup>1</sup> Stevens J, Beard CM, O'Fallon WM, Kurland LT. Conditions associated with carpal tunnel syndrome. *Mayo Clin Proc* 1992; **67**: 541-548.

<sup>2</sup> Hakim AJ, Cherkas L, El Zayat S, MacGregor AJ, Spector TD. The genetic contribution to carpal tunnel syndrome in women: a twin study. *Arthritis and Rheumatism* 2002; **47**: 275-279.

1. Exposure: Workplace activities that contribute to or cause CTS, and
2. Outcome: A diagnosis of CTS that meets the diagnostic criteria under Section V, and
3. Relationship to work: This includes a statement of the probability that the illness or injury is work-related. The presence of concurrent disease does not eliminate the possibility of work-relatedness of any specific case.

Work related CTS is most often associated with activities requiring extensive, forceful, repeated or prolonged use of the hands and wrists, particularly if these potential risk factors are present in combination (e.g., force and repetition or force and posture). Usually, one or more of the following work conditions occurs on a regular basis to support work relatedness:

1. Forceful use, particularly if repeated
2. Repetitive hand use combined with some element of force, especially for prolonged periods
3. Constant firm gripping of objects
4. Moving or using the hand and wrist against resistance or with force
5. Exposing the hand and wrist to strong regular vibrations
6. Regular or intermittent pressure on the wrist

## V. MAKING THE DIAGNOSIS

### A. Signs and Symptoms

A diagnosis of CTS requires symptoms suggestive of median nerve entrapment at the wrist supported by physical examination findings. Prior to surgery, confirmation of the diagnosis by electrodiagnostic studies (EDS) is required. Typical symptoms of CTS may include numbness, tingling, or pain in the volar aspects of one or both hands, especially noted after work or at night. Nocturnal symptoms are prominent in a majority of patients. Patients frequently awaken at night or early morning and shake their hands to relieve these symptoms. The location of these symptoms may be reported as involving the entire hand or localized to the palmar surfaces of the thumb and first two or three fingers. A hand pain diagram may be useful in localizing sensory symptoms of CTS.

### B. Specific Physical Exam Findings:

No single physical finding is diagnostic of CTS. Multiple tests should be recorded with the patient's exact response. Final diagnosis is dependent on a correlation of symptoms, physical exam findings and EDS testing, where appropriate, as any of these alone can be false positive or false negative.

- i. The clinical diagnosis should be suspected whenever there are: 1) patient's history of paresthesia in one or more of the following

digits: thumb, index and middle finger; and 2) at least one of the physical exam signs listed below. Provocative tests must recreate symptoms in the median nerve distribution.

- Phalen's sign/reverse Phalen's sign.
  - Tinel's sign over the carpal tunnel.
  - Weakness of the abductor pollicis brevis. (see discussion EDS studies)
  - Thenar atrophy may be present, usually late in the course. (see discussion of EDS studies)
  - Sensory loss to pinprick, light touch, two-point discrimination or Semmes Weinstein monofilament test in a median nerve distribution.
- ii. Evaluation of the contralateral wrist should be performed.
- iii. Evaluation of the proximal upper extremity and cervical spine for other conditions cervical radiculopathy, thoracic outlet syndrome, other peripheral neuropathies, and other musculoskeletal conditions.
- iv. Myofascial findings requiring treatment may present in additional soft tissue areas these should be identified and treated in accordance with medical treatment guidelines.

#### C. Diagnostic Testing Procedures:

- i. Electrodiagnostic (EDS) Testing: are well-established and widely accepted for evaluation of patients suspected of having CTS. The results are sensitive and specific for the diagnosis when clinical symptoms are present. Studies may confirm the diagnosis or direct the examiner to alternative conditions. In those cases where EDS studies are indicated, they should be conducted in accordance with the CTS practice parameters of the American Association of Neurometer and Electrodiagnostic Medicine. The EDS study is to include median, motor and median sensory conductions (NCV). If abnormal, than comparison to ipsilateral ulnar motor/sensory and contralateral median motor/sensory should be made. Needle electromyography (EMG) of a sample of muscles innervated by the C5 to T1 spinal roots, including paraspinal muscles and a thenar muscle innervated by the median nerve of the symptomatic limb, is required. EDS findings in CTS reflect slowing of median

motor and sensory conduction across the carpal tunnel region due to demyelination or axonopathy (axonal loss). Axonal loss, when present, is demonstrated by EMG in median nerve supplied thenar muscles.

- A) To assure accurate testing, hand temperature should be maintained at 30 to 34C preferably recorded from the hand/digits. For temperature below 30C, the hand should be warmed.
  
- B) Positive Findings – Any of these nerve conduction study findings must be accompanied by median nerve symptoms to establish the diagnosis.
  - 1) Slowing of median distal sensory and/or motor conduction through the carpal tunnel region.
  - 2) Electromyographic changes in the median thenar muscles in the absence of proximal abnormalities.
  - 3) Suggested guidelines for the upper limits of normal latencies:
    - a) Median distal motor latency (DML) at onset - 4.5msec/8cm
    - b) Median distal sensory peak latency (DSL) – 3.6msec/14cm
    - c) Median intrapalmar peak latency (palm/wrist) – 2.2msec/8cm
    - d) Median-ulnar palmar sensory latency difference greater than – 0.3msec.
  - 4) Because laboratories establish their own norms, a degree of variability from the suggested guideline values [as described in 3 above] is acceptable.
  
- C) In all cases, normative values are to be provided with the neuron diagnostic evaluation.

When there is clinical suspicion of polyneuropathy supported by history or physical examination, it may be worthwhile to perform electrodiagnostic testing in the lower extremities; however, lower extremity studies are not otherwise indicated in the routine

evaluation of suspected CTS. Studies require clinical correlation due to the occurrence of false positive and false negative results. Symptoms of CTS may occur with normal EDS studies, especially early in the clinical course.

When expedited surgical intervention is contemplated because of the presence of the following findings:

- 1) thenar atrophy
- 2) motor weakness in the muscles supplied by the median nerve

an EDS (NCV and EMG) study should be scheduled. For patients who decline surgery, it may be of value in the course of treatment to obtain EDS studies to establish the diagnosis.

D) The following EDS studies are not recommended:

- 1) multiple median F wave parameters
- 2) median motor nerve residual latency

E) The following EDS studies are not recommended and not acceptable to confirm a clinical diagnosis of CTS:

- 1) hand held conduction devices such as electroneurometer
- 2) portable automatic electrodiagnostic devices
- 3) sympathetic skin response
- 4) current perception threshold measurements
- 5) quantitative sensory testing

F) Frequency of Studies/Maximum Number of Studies:

- 1) Indications for Initial Testing:
  - a) Patients with clinically significant CTS who do not improve symptomatically or functionally with conservative measures for CTS over a 3 to 4 week period.

- b) Patients in whom the diagnosis is in question and who are symptomatic for at least 3 weeks.
  - c) To rule out other nerve entrapments, or alternative radiculopathy.
  - d) Patients for whom surgery is contemplated in accordance with Section VII
- 2) A repeat study may be performed:
- a) At 3 months or longer when the initial studies were normal and CTS is still suspected.
  - b) At 8 to 12 weeks for inadequate clinical improvement with non-surgical treatment.
  - c) Post-operative 3 to 6 months for persistent or recurrent symptoms following carpal tunnel release, unless an earlier evaluation is required by the surgeon.

ii. Other Tests:

Imaging, MRI, and sonography are not recommended at this time unless a space occupying lesion is suspected.

## VI. NON-OPERATIVE TREATMENT PROCEDURES

- A. Initial Treatment: Medications such as analgesics and over the counter medications for symptomatic relief; wrist splint at night, and restriction of activities such as forceful gripping, awkward wrist posture, and repetitive wrist motion.
- B. Patient education should include instruction in self-management techniques including sleeping postures which avoid excessive wrist flexion; ergonomics; and a home therapy program to provide symptomatic relief that includes heat treatment, stretching exercises and nerve gliding.
- C. All patients should be encouraged to return to work as soon as possible. This process may be best facilitated with modified duty particularly when the job demands exceed the patient's capabilities due to the workplace injury. Recommendations for ergonomic assessments to evaluate or reduce exposure may be of value for treatment and future intervention/prevention.

- D. Medications and Medical Treatment: Use of medications in the treatment of CTS is appropriate for controlling acute and chronic pain and inflammation. All drugs should be used according to patients needs. A thorough medication history, including use of alternative and over the counter medications, should be performed at the time of the initial visit and updated periodically.

Use of non-steroidal anti-inflammatory medications (NSAIDs), oral steroids, and diuretics, have not been shown to have significant long-term beneficial effect in treating CTS. Although NSAIDs are not curative, they and other analgesics may provide symptomatic relief.

Vitamin B6: Randomized trials have demonstrated conflicting results. Higher doses may result in development of a toxic peripheral neuropathy. In the absence of definitive literature showing a beneficial effect, use of Vitamin B6 cannot be recommended unless there is a documented medical condition that results in the interference of the effects of Vitamin B6 or a significant nutritional problem.

Oral Steroids: have been shown to have short-term symptomatic benefit but no long-term functional benefit. There is good evidence that local steroid injection is superior to oral steroids at 3 months. Given this and the problematic systemic effects of oral steroids, they are not recommended. It may occasionally be appropriate to use them for patients with severe CTS symptoms who refuse injections and who have no risk factors for adverse effects.

- E. Orthotics/Immobilization with Splinting: There is some evidence that splinting leads to more improvement in symptoms and hand function than watchful waiting alone. Because of limited patient compliance with day and night splinting in published studies, evidence of effectiveness is limited to nocturnal splinting. Splints should be loose and soft enough to maintain comfort while supporting the wrist in a relatively neutral position. This can be accomplished using a soft or rigid split with a metal or plastic support. Some splints include immobilization of the metacarpal-phalangeal joints. Splint comfort is critical and may affect compliance. Off-the-shelf splints are usually sufficient, although custom thermoplastic splints may provide a better fit for certain patients.

Splints may be effective when worn during sleep hours or during portions of the day, depending on activities. Most studies show that full time night splinting for a total of 4 to 6 weeks is the most effective protocol. Depending on job activities, intermittent daytime splinting can also be helpful. Splint use is rarely mandatory. Providers should be aware that over-usage is counterproductive, and should counsel patients to avoid over-usage.

Splinting is generally effective for milder cases of CTS. Long-term benefit beyond 3 months has not been established. An effect should be seen in 1 to 4 weeks. It is more likely to have some long-term benefit in patients who have less severe paresthesias during sleep hours (less than 6/10) and who have had symptoms for less than 1 year.

- Time to Produce Effect: 1 to 4 weeks. If after 4 weeks, the patient has partial improvement, continue to follow since neuropathy may worsen, even in the face of diminished symptoms.
- Frequency: During sleep hours. Daytime intermittent, depending on symptoms and activities.
- Optimum Duration: 4 to 8 weeks.
- Maximum Duration: 2 to 4 months. If symptoms persist, consideration should be given to either repeating electrodiagnostic studies or to more aggressive treatment.

F. Steroid injections: may decrease inflammation and allow the therapist to progress with rehabilitation therapy. Steroid injections under significant pressure should be avoided as the needle may be penetrating the tendon and injection into the tendon can cause possible tendon breakdown, tendon degeneration, or rupture. Injections should be used with caution for patients under 30 years of age.

After steroid injections, some patients can have improved symptoms for one year.

Lower doses of steroids appear to be as effective as higher doses. There is good evidence that injections have better results at 3 months than oral steroids. If following the first injection, symptomatic relief is followed by recurrent symptoms, the decision to perform a second injection must be weighed against alternative treatments such as surgery. Surgery may give more definitive relief of symptoms.

- Time to Produce Effect: 1 to 2 injections. If the first injection is unsuccessful and symptoms continue, the second injection should be performed by a specialist with expertise in the anatomy of the upper extremity.
- Maximum Frequency: 3 injections in one year.

Steroid injections should be used cautiously in diabetic patients. Diabetic patients should be reminded to check their blood glucose levels at least daily for 2 weeks after injections.

- G. Nerve Gliding: exercises consist of ROM of the upper extremity and neck that produce tension and longitudinal movement along the length of the median and other nerves of the upper extremity.

These exercises are based on the principle that the tissues of the peripheral nervous system are designed for movement, and that tension and glide (excursion) of nerves may have an effect on neurophysiology through alterations in vascular and axoplasmic flow. The exercises are simple to perform and can be done by the patient after brief instruction. Biomechanical principles have been more thoroughly studied than clinical outcomes. Large, well-designed randomized trials have been lacking. There is some evidence from a systematic review that nerve gliding is more effective than no treatment.

- Time to Produce Effect: 2 to 4 weeks.
- Frequency: Up to 5 times per day by patient (patient-initiated).
- Optimum Duration: 2 provider-directed sessions.
- Maximum Duration: 3 provider-directed sessions.

- H. Manual Therapy Techniques: There is no evidence supporting manipulation of the spine for treatment of CTS. There is no clear evidence supporting carpal bone mobilization or manual therapy. However, other myofascial components that may occur with CTS may be treated with manual therapy.

- I. Ultrasound: There is some evidence that ultrasound may be effective in symptom relief and in improving nerve conduction in mild-to-moderate cases of CTS. No studies have demonstrated long-term functional benefit. This treatment may be used in conjunction with an active therapy program for non-surgical patients who do not improve with splinting and activity modification. It is not known if there are any long-term deleterious neurological effects from ultrasound. It is suggested that treatment be limited to 12 sessions over 6 weeks.

- J. Low Level Laser: There is no evidence that low level laser therapy alone is beneficial in changing the outcome for patients with CTS and therefore it is not recommended.

- K. There is no evidence for the use of iontophoresis, magnets or laser acupuncture. Therefore these interventions are not recommended.

## VII. SURGICAL INDICATIONS/CONSIDERATIONS

Since cumulative trauma conditions often involve several areas in an upper extremity, surgical treatment of one problem should be performed in conjunction with conservative treatment of other problems in the upper extremity.

Overall it is probably reasonable to expect that 40 to 50% of patients with mild exam findings may improve or remain stable over time without surgery.

There is strong evidence that surgery is more effective than splinting or injections in producing long-term symptom relief and normalization of median nerve conduction velocity for those patients with clinically significant CTS with positive NCV findings. There is also a positive cost utility for surgery over conservative care for patients with positive nerve conduction studies. There is good evidence that surgery improves symptoms more effectively than steroid injection for up to five months.

In one prospective study, duration of symptoms prior to surgery, up to 5 years, did not affect the ability to achieve symptom or functional outcome success with surgery. Patients with more severe symptoms and longer duration of symptoms showed significant improvement with surgery. Patients with thenar atrophy, weakness of the abductor pollicis brevis, and fixed sensory deficits may still improve with surgery. Patients with mild symptoms and functional deficits demonstrated the smallest changes from pre- to post-operative scores. However, their post-operative scores were higher than the post-operative scores of those with more severe symptoms.

- A. Surgery should be considered as an initial therapy in situations where clinical evidence of CTS is present based on the criteria below.
  - i. Median nerve trauma has occurred; “acute carpal tunnel syndrome”, or
  - ii. Thenar atrophy is present and due to median nerve compression; or
  - iii. Electrodiagnostic evidence of moderate to severe compressive neuropathy of the median nerve is present. EMG findings showing evidence of acute or chronic motor denervation suggest the possibility that irreversible damage may be occurring. There is good evidence that surgery is more beneficial than non-surgical treatment for patients with a motor latency of more than 5.0 ms.
- B. For cases with positive EDX findings (see sub-paragraph B) of Section V.C.i at page 6) and with a motor latency less than 5.0 ms, non-surgical treatment may be beneficial in some cases; therefore, conservative management, including job alterations, should be tried over 4 to 6 weeks before surgery is considered.
- C. A clinical impression of moderate to severe CTS with normal EDS studies is very rare and generally indicates a mistaken diagnosis. Surgery may be

considered in cases where electrodiagnostic testing is normal and initial non-operative therapy has failed. The following criteria must be met in deciding whether to proceed to surgery:

- i. The patients signs and symptoms are specific for CTS;

AND

- ii. The patient experiences significant temporary relief following steroid injection into the carpal tunnel.

Under these CTS Guidelines, only carpal tunnel surgeries under this subparagraph C must be pre-authorized by the carrier.

#### VIII. OPERATIVE PROCEDURES:

Endoscopic and open carpal tunnel release have low rates of serious complications. The most commonly seen serious complications are incomplete transection of the transverse carpal ligament and inadvertent nerve or vessel injuries. Choice of technique should be left to the discretion of the surgeon.

- A. Neurolysis: has not been proven advantageous for CTS. Internal neurolysis should never be done. Very few indications exist for external neurolysis.
- B. Tenosynovectomy: For routine cases of CTS, tenosynovectomy has not proven to be of benefit in CTS. Tenosynovectomy may be considered at the time of carpal tunnel release in the unusual case in which CTS is accompanied by rheumatoid arthritis. Performance of tenosynovectomy in such cases is subject to the existing pre-authorization requirement contained in regulations (12 NYCRR 324.2(d)(3)).

#### IX. POST-OPERATIVE TREATMENT:

- A. Patients may receive a home therapy protocol involving stretching, ROM, scar management and resistive exercises. Patients should be encouraged to use the hand as much as possible for daily activities, allowing pain to guide their activities.
- B. There is some evidence showing that immediate mobilization of the wrist following surgery is associated with less scar pain, and faster return to work. Final decisions regarding the need for splinting post-operatively should be left to the discretion of the treating physician based upon the surgical technique used and the specific conditions of the patient.

- C. An individualized rehabilitation program may be helpful in patients who do not show functional improvements post-operatively or in patients with heavy or repetitive job activities. At least 2 visits are recommended to insure appropriate scar management and return to function.

The post-operative rehabilitation program should be based upon communication between the treating physician and the therapist. In all cases, communication between the physician and therapist is important to the timing of exercise progressions.

Communication is essential between the patient, employer and physician to determine appropriate restrictions and return-to-work dates. It is the responsibility of the physician to provide clear concise restrictions, and it is the employer's responsibility to determine if temporary duties can be provided within the restrictions.

Considerations for repeat surgery: The single most important factor in predicting symptomatic improvement following carpal tunnel release is the severity of preoperative neuropathy. Patients with moderate electrodiagnostic abnormalities have better results than those with either very severe and/or mild findings. Incomplete cutting of the transverse carpal ligament or iatrogenic injury to the median nerve are rare.

If median nerve symptoms do not improve following initial surgery or symptoms improve initially and then recur, but are unresponsive to non-operative therapy, consider the following:

- Repetitive work activities may be causing recurrent CTS;
- Scarring;
- Work-up for systemic diseases.

A second opinion by a hand surgeon and repeat nerve conduction studies are required if repeat surgery is contemplated. The decision to undertake repeat surgery must factor in all of the above possibilities. Results of surgery for recurrent CTS vary widely depending on the etiology of recurrent symptoms. A repeat surgery is subject to the existing regulations (12 NYCRR 324.2(d)(3)) regarding the pre-authorization requirement.

Appendix A

Physical Examination for Differential Diagnostic Discrimination Purposes

Specific Musculoskeletal Diagnosis		
DIAGNOSIS	SYMPTOMS	SIGNS (Common Findings)
Aggravated Osteoarthritis of the Wrist.	Pain usually in the carpal-metacarpal joints; or in metacarpal-phalangeal joints.	<p><u>At least one of the following:</u></p> <ul style="list-style-type: none"> <li>• Positive grind test resulting in pain; crepitus;</li> <li>• Subluxation of the metacarpal may be induced in advanced cases;</li> <li>• Swelling;</li> <li>• Reduced motion;</li> <li>• Angular deformities;</li> <li>• Tenderness with palpation of thumb phalangeal-metacarpal or carpal-metacarpal joint.</li> </ul>
de Quervain's Disease	Tenderness over the first dorsal extensor compartment(anatomical snuff box).	<p><u>At least one of the following:</u></p> <ul style="list-style-type: none"> <li>• Pain worsened by resisted thumb abduction and/or extension with or without resistance;</li> <li>• Positive Finkelstein's test.</li> </ul>
Epicondylitis-Lateral (Epicondylalgia)	Elbow pain over the lateral epicondyle increased with gripping.	<p>Tenderness to palpation at/near lateral epicondyle and pain over the lateral epicondyle and/or extensor mass of the forearm with one of the following maneuvers:</p> <ul style="list-style-type: none"> <li>• Active or resisted wrist extension;</li> <li>• Active or resisted middle finger extension;</li> <li>• Active or resisted supination.</li> </ul>
Epicondylitis-Medial (Epicondylalgia)	Elbow pain over the medial epicondyle.	<p>Tenderness to palpation at/near medial epicondyle and pain over the medial epicondyle and/or flexor mass of the forearm with one of the following maneuvers:</p> <ul style="list-style-type: none"> <li>• Active or resisted wrist flexion;</li> <li>• Active or resisted pronation.</li> </ul>
Extensor Tendon	Pain localized to the affected tendon(s) worsened by wrist or finger extension.	Pain and/or tenderness with active or resisted wrist/digit extension, specific to

Specific Musculoskeletal Diagnosis		
Disorders of the Wrist		the extensor mechanism involved.
Flexor Tendon Disorders of the Wrist	Pain/tenderness localized to affected tendons.	Reproduction of pain with active or resisted wrist/digit flexion or ulnar deviation specific to the flexor mechanism involved.
Triangular Fibrocartilage Complex Tear (TFCC)	Symptoms mainly on ulnar side of the wrist.	<p>Tenderness over the TFCC complex and localized pain, clicking, or findings of abnormal motion with one of the following movements:</p> <ul style="list-style-type: none"> <li>• Forced supination and pronation with axial pressure on an ulnar deviated wrist;</li> <li>• The patient pushes up from a seating position using the hand, and/or</li> <li>• Ballotment of the distal ulna with the wrist supinated causes abnormal motion as compared to the asymptomatic side.</li> </ul>
Trigger Finger	Difficulty flexing the finger with a catching or triggering sensation.	<p>One of the following:</p> <ul style="list-style-type: none"> <li>• Tenderness at the A-1 pulley with finger flexion;</li> <li>• Triggering of the digit;</li> <li>• Difficulty flexing and extending the finger with a palpable nodule.</li> </ul>

Specific Peripheral Nerve Diagnosis		
DIAGNOSIS	SYMPTOMS	SIGNS (Common Findings)
Carpal Tunnel Syndrome	<ul style="list-style-type: none"> <li>• Specific paresthesias in 2 of the following digits: thumb, index, and middle finger.</li> <li>• Shaking of the hand (to relieve symptoms) and nocturnal symptoms are common.</li> </ul>	<p>At least one of the following:</p> <ul style="list-style-type: none"> <li>• Positive Phalen's sign;</li> <li>• Positive Tinel's sign over the carpal tunnel;</li> <li>• Positive closed fist test;</li> <li>• Positive compression test;</li> <li>• Thenar atrophy may be present later in course;</li> <li>• Weakness of abductor pollicis brevis;</li> <li>• Sensory loss to pinprick, light touch, two-point discrimination or Semmes-Weinstein monofilament tests in a median nerve distribution.</li> </ul>
Cubital Tunnel Syndrome	Paresthesias or dull, aching sensations in the 4 <sup>th</sup> and 5 <sup>th</sup> digits (ring and small fingers) and discomfort near the medial aspect of the elbow.	<p>Paresthesias or dull, aching in the 4<sup>th</sup> and 5<sup>th</sup> digits and at least one of the following exam findings:</p> <ul style="list-style-type: none"> <li>• Diminished sensation of the fifth and ulnar half of the ring fingers, which may sometimes include sensory loss to pinprick, light touch, two-point discrimination or Semmes-Weinstein monofilament tests in an ulnar nerve distribution;</li> <li>• Positive elbow flexion/ulnar compression test;</li> <li>• Later stages manifested by: intrinsic atrophy and ulnar innervated intrinsic weakness; Wartenberg's sign; Froment's sign.</li> </ul>
Guyon Canal (Tunnel) Syndrome	Paresthesias in the 4 <sup>th</sup> and 5 <sup>th</sup> digits (ring and small fingers) without proximal ulnar complaints.	<p>At least one of the following exam findings:</p> <ul style="list-style-type: none"> <li>• Positive Tinel's at hook of hamate;</li> <li>• Numbness or paresthesias of the palmar surface of the ring and small fingers;</li> </ul>

<b>Specific Peripheral Nerve Diagnosis</b>		
		<ul style="list-style-type: none"> <li>Decreased strength of the adductor pollicis, abductor digiti minimi, and/or lumbricals.</li> </ul>
Posterior Interosseous Nerve Entrapment (PIN)	Weakness of finger and thumb extension	Weakness or inability to extend fingers or thumb;
Pronator Syndrome	Pain/paresthesias in the median nerve distribution distal to the elbow.	Paresthesias in the median nerve distribution and at least one of the following reproduces median nerve symptoms: <ul style="list-style-type: none"> <li>Resisted pronation with elbow flexed at 90 degrees or elbow extended;</li> <li>Positive Tinel's at the proximal edge of the pronator teres muscle over the median nerve.</li> </ul>
Radial Tunnel Syndrome	Pain over the lateral posterior forearm. May occur in conjunction with and must be distinguished from lateral epicondylitis.  May include paresthesias over the dorsal radial hand and wrist.	The following two elements are required: <ul style="list-style-type: none"> <li>Tenderness over the radial nerve near the proximal edge of the supinator muscle;</li> <li>Resisted supination or resisted middle finger extension with the forearm pronated and extended reproduces symptoms.</li> </ul>