

Practice parameter for carpal tunnel syndrome

(Summary statement)

Report of the Quality Standards Subcommittee of the American Academy of Neurology

Background. Carpal tunnel syndrome (CTS) is a combination of hand and arm pain, often with median nerve sensory and motor impairment, and most commonly occurring in adults over age 30, particularly women. There is a 10% lifetime risk of developing CTS. CTS involves compression of the median nerve at the wrist. The carpal tunnel, bounded by the carpal bones and transverse carpal ligament, predisposes this region to damage from a wide variety of compressive lesions, from local trauma, from hand and wrist overuse, from local constrictions, or from prolonged, improper positioning. CTS may provide the first signs of a more diffuse process such as generalized peripheral neuropathy.

The frequency and significance of CTS led the Quality Standards Subcommittee (QSS) of the American Academy of Neurology (AAN) to develop practice parameters for AAN members to assist them in understanding approaches to the diagnosis of CTS. The subcommittee reviewed the last 10 years of CTS literature and classified it into controlled studies, well-designed studies, and other reports. On the basis of this review and expert opinion, recommendations are presented as standards, guidelines, or options (see Definitions, p 2408). An algorithm is presented in the figure. *The recommendations in this document are options unless otherwise specified.*

Diagnostic criteria.

- I. History. The likelihood of CTS increases with the number of standard symptoms and provocative factors listed below:
 - A. Symptoms (standard)
 1. Dull, aching discomfort in the hand, forearm, or upper arm
 2. Paresthesia in the hand
 3. Weakness or clumsiness of the hand
 4. Dry skin, swelling, or color changes in the hand

5. Occurrence of any of these symptoms in the median distribution
- B. Provocative factors
 1. Sleep
 2. Sustained hand or arm positions
 3. Repetitive actions of the hand or wrist
- C. Mitigating factors
 1. Changes in hand posture
 2. Shaking the hand
- II. Physical examination (standard)
 - A. May be normal
 - B. Symptoms elicited by tapping or direct pressure over the median nerve at the wrist (Tinel's sign) or with forced flexion or extension of the wrist (Phalen's sign)
 - C. Sensory loss in the median nerve distribution
 - D. Weakness or atrophy in the thenar muscles
 - E. Dry skin on thumb, index, and middle fingers
- III. Differential diagnosis
 - A. Cervical radiculopathy (especially C-7)
 - B. Brachial plexopathy (especially upper trunk)
 - C. Proximal median neuropathy (especially at the pronator teres muscle)
 - D. Peripheral neuropathy
 - E. Vascular or neurogenic thoracic outlet syndrome
 - F. Central disorders such as multiple sclerosis and cerebral infarction
- IV. Confirmatory studies (guideline)

If the diagnosis is uncertain with only a few of the clinical features present, confirmatory testing or a therapeutic trial is needed and may include:

 - A. Electromyography (EMG) and nerve conduction studies (NCS), which can confirm a median neuropathy at the wrist but are not able to exclude the diagnosis of CTS.

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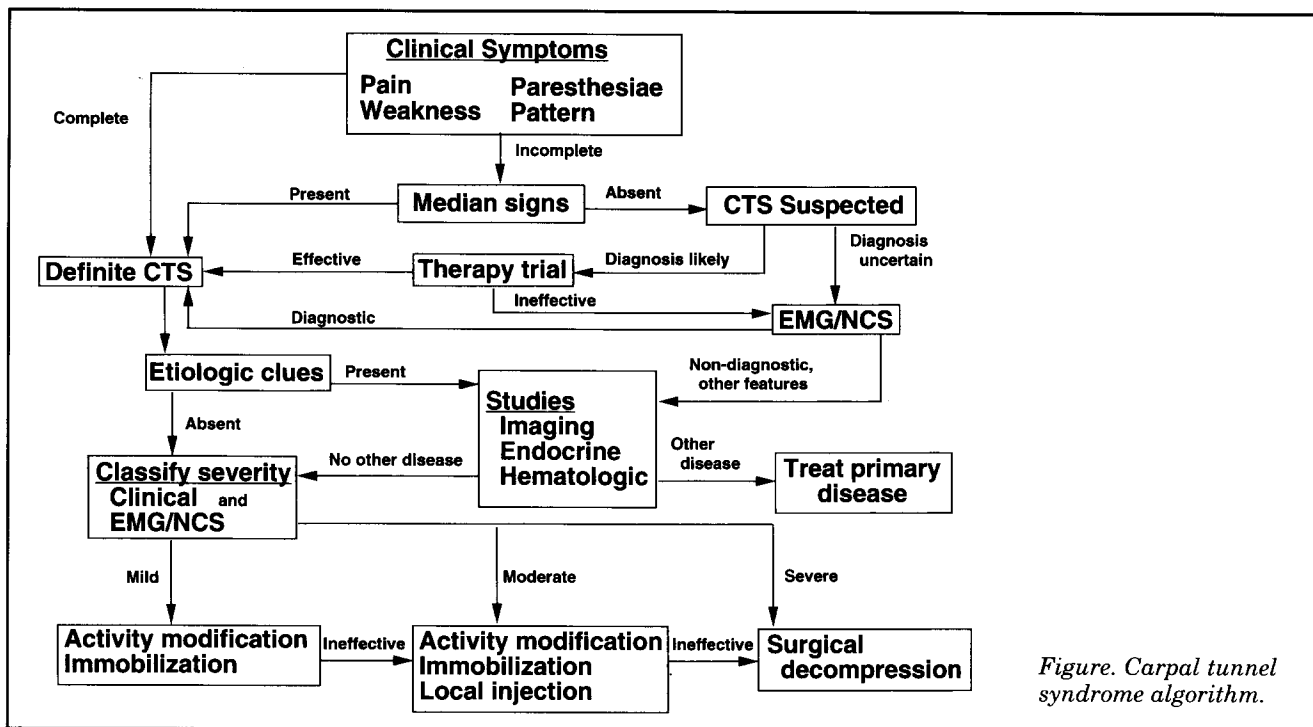


Figure. Carpal tunnel syndrome algorithm.

EMG/NCS can help define the severity of damage.¹

B. Therapeutic trials with one of the noninvasive treatments listed below in the section entitled "Treatment," I.C.1

V. Further diagnostic testing

A. *Indications* (guideline) for further testing include:

1. Exclusion or confirmation of associated disease
2. Exclusion or confirmation of alternative diagnoses

B. *Contraindications*—none

C. *Imaging* (radiographic or magnetic)—local structural disease

1. Wrist—for previous fractures, local deformity, primary bone or joint disease, evidence of local tumor
2. Cervical spine—for cervical radiculopathy
3. Chest—for brachial plexopathy or thoracic outlet syndrome

D. Endocrine, hematologic, or serologic test for pregnancy or systemic disorders, such as diabetes, hypothyroidism, acromegaly, and gout

E. *Neuropathy evaluation*—protein electrophoresis, tissue biopsy for amyloid, spinal fluid examination, assessment for connective tissue disorders

F. *Electrophysiologic testing*—EMG/NCS testing for diffuse disorders

G. The benefits of the following diagnostic techniques have yet to be fully established:

1. Carpal tunnel pressure measurements
2. Sensory quantitation, including vibrometry
3. MRI quantitation of the carpal tunnel
4. Ultrasound of the carpal tunnel
5. Current perception threshold

VI. Document in the medical record (standard)

- A. Positive findings by history or physical examination
- B. Justification for the studies performed
- C. Each treatment given and its justification

Treatment.

I. Classic CTS

A. *Indications* (guideline): treat if the symptoms interfere with the patient's daily life

B. *Contraindications* (guideline): underlying systemic disease requires special considerations

C. *Noninvasive treatment* is tried first unless there is progressing motor or severe sensory deficit or severe electrodiagnostic abnormality

1. Treatment may include:

- a. wrist splints
- b. modification of activities
- c. removal of constrictions
- d. nonsteroidal, anti-inflammatory drugs
- e. diuretics in patients with limb swelling

2. Complications—none

3. Expected duration of care—some improvement in 2 weeks, continuing for 6

- months
4. Anticipated outcome—return to full activity in 90% of patients with mild disease
 5. Recommended setting—outpatient office
 6. Qualifications—physician
- D. *Invasive treatment* is indicated if noninvasive treatments are not effective or if there is progressing motor deficit, severe sensory deficit, or severe electrodiagnostic abnormality
1. Steroid injection can be considered if not tried before and if the findings are not severe
 - a. Technique—local injection into carpal tunnel
 - b. Complications—local infection, tendon rupture, increased median nerve deficit, reflex sympathetic dystrophy
 - c. Expected duration of care—repeat injection up to three times at 3- to 6-week intervals if no or only temporary benefit occurs
 - d. Anticipated outcome—complete relief, depending on severity
 - e. Recommended setting—outpatient office
 - f. Qualifications for performance—physician with training in use of local injections
 2. Surgical therapy (guideline) should be considered if nonsurgical therapy fails to relieve pain or a progressive motor or sensory deficit
 - a. Technique
 - (1) Open division of the transverse carpal ligament and adjacent palmar aponeurosis in conjunction with tenosynovectomy, if there is proliferative synovitis
 - (2) Postoperative elevation of hand and graduated exercise of hand and forearm
 - (3) Wrist splint in neutral or slight extension position for 2 to 3 weeks
 - b. Complications—deep wound infection in 0.5%; reflex sympathetic dystrophy in less than 0.5%
 - c. Duration of care—recovery over 6 months, return visits at 2- to 6-week intervals
 - d. Anticipated outcome—complete relief if symptoms and signs are not severe
 - e. Recommended setting:
 - (1) Ambulatory surgery in an operating room
 - (2) Hospitalization for concurrent medical or surgical problems requiring inpatient treatment

DEFINITIONS

Classification of evidence

Class I. Evidence provided by one or more well-designed randomized controlled clinical trials.

Class II. Evidence provided by one or more well-designed clinical studies such as case control, cohort studies, etc.

Class III. Evidence provided by expert opinion, non-randomized historical controls, or one or more case reports.

Strength of recommendations

Standards. Generally accepted principles for patient management that reflect a high degree of clinical certainty (ie, based on class I evidence or, when circumstances preclude randomized clinical trials, overwhelming evidence from class II studies that directly address the question at hand or from decision analysis that directly addresses all the issues).

Guidelines. Recommendations for patient management that may identify a particular strategy or range of management strategies and that reflect moderate clinical certainty (ie, based on class II evidence that directly addresses the issue, decision analysis that directly addresses the issue, or strong consensus of class III evidence).

Practice options or advisories. Other strategies for patient management for which there is unclear clinical certainty (ie, based on inconclusive or conflicting evidence or opinion).

Practice parameters. Results, in the form of one or more specific recommendations, from a scientifically based analysis of a specific clinical problem.

- f. Qualifications for performance—surgeon trained or experienced in the surgical therapy of CTS
- II. Other forms of CTS
- A. CTS in the presence of systemic disease, large mass lesions at the wrist, major bony deformity, or infection requires treatment of primary disease first (guideline)
 - B. Therapeutic options specifically for the CTS are generally less successful and are associated with greater risk
 - C. *Treatment*—must be carefully selected
 1. Noninvasive therapy has a lower risk of complications
 2. Local injections are not indicated
 3. Surgical release
 - a. Early, if a specific mass or bony compression has been identified
 - b. May result in useful improvement even in the presence of systemic disease
 - D. *Documentation* is required for all therapies (standard)
 - E. *Complications*—additional nerve damage with the treatment is more likely in the presence of a generalized neuropathy
 - F. *Duration of care* (option)—up to 12 months

- G. Anticipated *outcome*—partial relief
- III. Evolving therapies
 - A. Endoscopic release—inadequate experience and no controlled studies
 - B. Concurrent Guyon canal release has not been shown to be of benefit
 - C. Ergonomic modifications in the workplace
- IV. Documentation of the justification for and specifics of any therapy must be provided (standard)

Future research. Each of the individual diagnostic studies and therapies discussed warrants formal review with outcome-based studies.

A more detailed background article by Jasper Daube, MD, with references, will be submitted to **Neurology** for publication.

Mission statement. *The Quality Standards Subcommittee of the American Academy of Neurology is charged with developing practice parameters for neurologists on diagnostic procedures, treatment modalities, and clinical disorders. The selection of topics is based on such factors as prevalence or frequency of use, potential for improving health outcomes, and reduction of variation in practice patterns, economic impact, and adequacy of scientific evidence.*

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Reference

1. American Academy of Neurology, American Association of Electrodiagnostic Medicine, American Academy of Physical Medicine and Rehabilitation. Practice parameter for electrodiagnostic studies in carpal tunnel syndrome (summary statement). *Neurology* 1993;43:2404-2405.

This statement is provided as an educational service of the American Academy of Neurology. It is based on an assessment of current scientific and clinical information. It is not intended to include all possible proper methods of care for a particular neurologic problem or all legitimate criteria for choosing to use a specific procedure. Neither is it intended to exclude any reasonable alternative methodologies. The AAN recognizes that specific patient care decisions are the prerogative of the patient and the physician caring for the patient, based on all of the circumstances involved.