

Sample Topic

Carpal Tunnel Syndrome



The Medical Disability Advisor: Workplace Guidelines for Disability Duration

Fifth Edition

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Editor-in-Chief

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Carpal Tunnel Syndrome

Related Terms

- Compression Neuropathy
- CTS
- Median Nerve Compression
- Median Nerve Mononeuropathy

Medical Codes

- ICD-9-CM: 354, 354.0
- ICD-10: G56, G56.0, G56.1

Definition

Carpal tunnel syndrome (CTS) is a condition in which tendons or ligaments in the wrist become enlarged. The main (median) nerve of the hand and its branches enter the hand through a narrow passageway (carpal tunnel) formed by the wrist bones (carpal bones) and the tough membrane that holds the bones together (transverse carpal ligament). The median nerve supplies sensation to the thumb, index finger, middle finger, and in most people to part of the ring finger. Because this passageway is rigid, inflammation, swelling, or increased fluid retention may compress the nerve (nerve entrapment), causing pain and numbness in the fingers (particularly the index, middle, and thumb) and eventually serious hand weakness. Pain may eventually extend to the arm, shoulder, or neck.

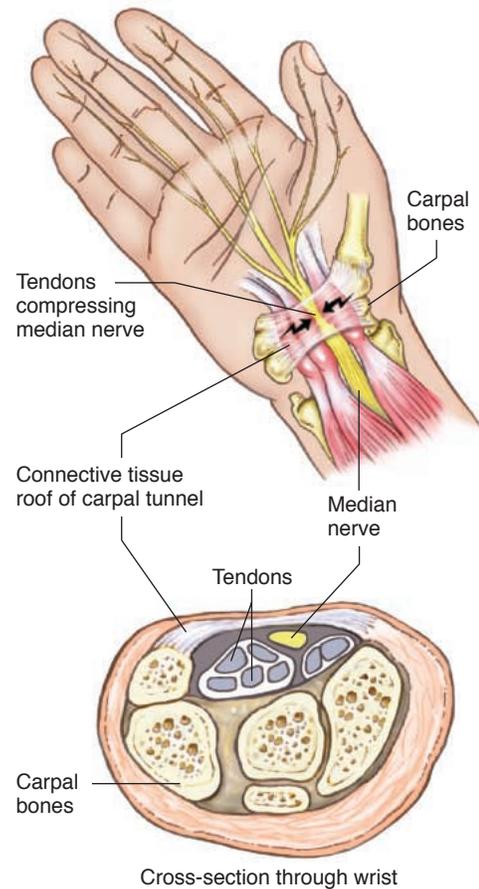
Risk: Causation of carpal tunnel syndrome is controversial. At least 60 conditions have been associated with the condition in the medical literature. Carpal tunnel syndrome is accepted as potentially caused by work activity in 49 of the 50 US states, and some Canadian provinces, but not by most other developed nations. No single ergonomic risk factor is sufficient to explain the low level statistical associations between certain work activities and this condition. Probably multiple simultaneous ergonomic risk factors must be present for work or recreational activity to contribute to the causation of carpal tunnel syndrome. Proposed ergonomic risk factors include any type of activity that involves highly repetitive wrist motion, holding the wrist in awkward positions for sustained periods of time, forceful pinching or gripping, and work-task stresses. Examples might include working for long periods of time with vibrating power tools or heavy assembly line work. Excessive typing or computer work had been suspected by clinicians to have contributed to the risk of CTS; however, scientific evidence has failed to verify or falsify this theory. Other conditions that may help cause or contribute to CTS include rheumatoid arthritis, renal failure, diabetes mellitus, acromegaly, multiple myeloma, amyloidosis, obesity, recent tuberculosis, and bacterial or fungal infection spread into the carpal tunnel.

Individuals who have suffered trauma or injury such as a wrist fracture that decreases the size of the carpal tunnel or swelling of

the synovial lining membranes surrounding the tendons in the carpal tunnel (tenosynovitis) are at higher risk of CTS. It may also occur in some individuals with degenerative neck conditions (cervical spondylosis). There is an increased frequency of CTS in alcoholics, and smokers may experience worse symptoms and a longer recovery time from CTS than nonsmokers.

Women are 3 times more likely to develop the syndrome than men. The risk is higher with advancing age. For women, the peak time for developing CTS is between ages 45-54. Women who are pregnant, taking oral contraceptives, or going through menopause are more prone to developing the condition, possibly due to fluid retention (“Carpal Tunnel Syndrome”).

Incidence and Prevalence: An estimated 5% of the US population is affected by carpal tunnel syndrome (Fuller).



Diagnosis

History: Individuals may describe pain, tingling, numbness, or feeling of weakness in the wrist, hand, or fingers. In mild cases, the symptoms are intermittent and often worsen at night or when the individual first arises in the morning. The individual may complain of dropping items more frequently than usual because of partial loss of sensory input to the brain from the hand. The fingers may at times feel “locked”, and there may be problems pinching or grasping objects. On occasion, pain may radiate into the forearm, shoulder, neck, or chest. The hands or lower arms may feel weak in the morning. Individuals with CTS may have problems performing detailed tasks such as writing or tying shoes. Symptoms may occur at particular times, such

as while holding a phone or a newspaper, gripping a steering wheel, or sleeping.

Physical exam: The physical exam many times is completely normal in CTS. Subjectively altered sensation may be noted in the distribution of the median nerve in the thumb and the first three fingers. Sensation in the palm is not affected because the branch of the median nerve to the palm does not go through the carpal tunnel. While patients frequently complain of “swelling,” there is no observable soft tissue swelling in CTS. In chronic or severe cases, the palm may appear to be wasting away near the thumb (thenar eminence atrophy). In severe cases, weakness of thumb opposition and decreased sensation in the distal phalanges of the thumb and first three fingers (2 point discrimination and/or monofilament testing) may be noted. The individual may be shown a diagram of the hand and wrist to indicate where pain or other sensations are present. An unaffected little finger may indicate CTS.

Tapping on the volar aspect of the wrist over the course of the median nerve near the front of the wrist typically reproduces the tingling feeling in the hand or forearm (positive Tinel’s sign). Positioning the wrist in a fully flexed posture for 60 seconds may reproduce the pain and tingling (positive Phalen’s sign). These methods have a high rate of both false positive and false negative findings. Hand grip strength test may show weakness.

Tests: Nerve conduction studies are performed to evaluate the nerve function (nerve conduction velocity, electromyography) and they are the only objective tests that confirm the diagnosis. The specifics of this testing are important. In mild cases, median nerve sensory distal latency prolongation and slowing of sensory conduction velocity in the carpal tunnel is the most sensitive test for CTS (the test most likely to be abnormal). More severe cases may have motor latency prolongation and conduction slowing in the carpal tunnel. The most severe cases have reduced amplitudes (voltages), which suggest axonal involvement for more severe nerve injury. Many times, nerve conduction testing is incomplete or potentially inaccurate. This testing should conform to consensus criteria for testing technique. Blood tests (serology) for detection of rheumatoid arthritis, diabetes, and thyroid disease are frequently performed. Plain film x-rays of the wrist are used to rule out bony abnormalities, but are almost always normal. MRI and ultrasound are currently considered to be experimental methods of evaluating for the presence of CTS. If a tumor in the carpal tunnel is a rare but possible explanation for an individual’s carpal tunnel syndrome, MRI may be used.

Treatment

Conservative treatment may include eliminating or greatly reducing movements or tasks that seem to cause or exacerbate the symptoms, such as repetitive motion of the wrist and fingers or wrist-bending extremes (flexion and extension). Other treatment may include taking anti-inflammatory medication, wearing protective splints while at work and/or sleeping, stretching exercises, diuretics if appropriate, and possible corticosteroid injections into the carpal tunnel. An electrical current may be used to move medication (usually corticosteroid) through the skin into the area requiring treatment (iontophoresis).

In chronic or severe cases not related to pregnancy, surgery may be required. The procedure (open carpal tunnel release) involves cutting the transverse carpal ligament (roof of the carpal tunnel) to relieve the pressure on the nerve. This is generally done on an outpatient basis with local anesthesia. In some cases, surgery can be performed by inserting a fiberoptic scope through a small incision (endoscopic carpal tunnel release) to observe the inside of wrist structures while incising the carpal ligament.

Prognosis

Symptoms may resolve with conservative management, including reducing or abstaining from the activities that increase symptoms. If pain and tingling increase or if weakness persists, surgery may be necessary. Although the majority of individuals experience permanent relief of symptoms after carpal tunnel release surgery, some residual numbness, pain, weakness, or stiffness may persist.

Differential Diagnoses

- Brachial plexopathy
- Cervical disc disorder
- Diabetic neuropathy
- Ganglion cyst of the wrist
- Neuropathy due to hypothyroidism or hyperthyroidism
- Polyneuropathy
- Rheumatoid arthritis
- Tendinitis of the wrist
- Tenosynovitis of the thumb, (De Quervain’s syndrome)
- Thoracic outlet syndrome
- Toxic neuropathy
- Tumor

Specialists

- Ergonomist
- Hand Surgeon
- Neurologist
- Neurosurgeon
- Occupational Therapist
- Orthopedic Surgeon
- Physiatrist
- Physical Therapist

Rehabilitation†

Conservative management remains effective in most cases of carpal tunnel syndrome. Generally, therapy should occur up to 3 times a week for up to 8 weeks in order to educate the individual in symptom control and management. After a diagnosis of CTS, reduction of the symptoms and the identification of activities that increase the symptoms, both at home and at work, are the first goals. Individuals should receive therapy from an occupational therapist, a physical therapist, or a hand therapist (Gerritsen, “Conservative Treatment Options”).

The first objective of therapy is to reduce pain and swelling, using modalities such as heat and cold (Braddom). The hand and wrist are elevated to reduce swelling and may be positioned in a static resting hand splint to decrease movement in the painful region and to provide proper alignment (Gerritsen, “Splinting vs Surgery”; Muller; O’Connor). After pain is consistently reduced, activities to increase muscle flexibility, range of motion, strength, and body posture are a second objective. During this stage the therapist also monitors sensory status and, if deficits are noted, provides sensory re-education (Muller). Patient

† Researched and authored by the OIOC of New York University Medical Center. To understand the underlying methodology, please refer to “The Rehabilitation Guidelines” at the beginning of this volume.

education also addresses awareness of body posture during task performance. An ergonomic evaluation may also be beneficial (Wilson).

Clinicians and therapists must work with the individual to devise plans that reduce activities that increase the symptoms in the course of daily activities to increase overall comfort and function. In the workplace, modified work is important until symptoms resolve. This needs to be specifically addressed with company representatives if possible. Some have programs with alternative work options, and others do not.

Additional information may provide insight into the rehabilitation needs of these individuals (Evans).

FREQUENCY OF REHABILITATION VISITS	
Nonsurgical	
Specialist	Guidelines
Physical, Occupational or Hand Therapist	Up to 20 visits within 8 weeks
Surgical	
Specialist	Guidelines
Physical, Occupational or Hand Therapist	Up to 15 visits within 6 weeks

The table above represents a range of the usual acceptable number of visits for uncomplicated cases. It provides a framework based on the duration of tissue healing time and standard clinical practice.

Comorbid Conditions

- Diabetes mellitus
- Obesity
- Thyroid illness
- Toxic exposures

Complications

In half of the cases in which CTS occurs in one wrist, the other wrist eventually becomes involved. Pain, numbness, and weak-

ness may become constant in advanced cases. If surgery has been performed, there is a chance that some numbness, pain, stiffness, or weakness may persist.

Factors Influencing Duration

The ability (or lack thereof) to stop activities that increase the symptoms, the response to conservative treatment, and the ability to perform tasks while wearing adaptive splints may influence disability time. The endoscopic form of carpal tunnel release surgery, which involves smaller incisions, has a shorter recovery period but a higher complication rate.

Length of Disability

In a small percentage of cases, individuals may experience chronic problems because of nerve damage that may result from carpal tunnel syndrome.

Medical treatment, carpal tunnel syndrome.

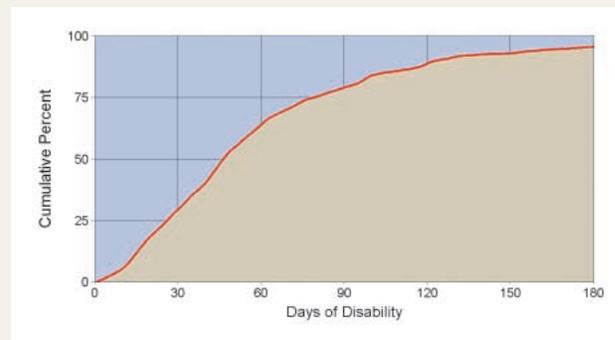
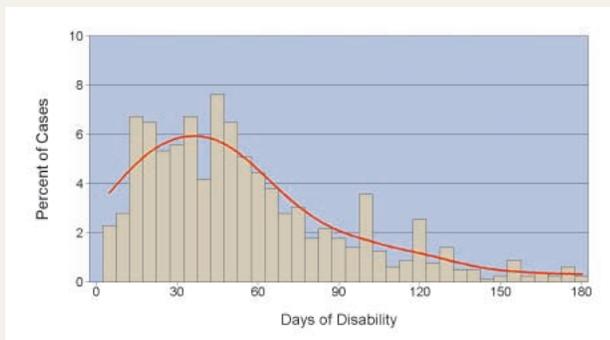
DURATION IN DAYS			
Job Classification	Minimum	Optimum	Maximum
Sedentary	0	7	21
Light	0	7	21
Medium	0	14	28
Heavy	0	21	42
Very Heavy	0	28	63

Surgical treatment, open or endoscopic carpal tunnel release.

DURATION IN DAYS			
Job Classification	Minimum	Optimum	Maximum
Sedentary	1	14	42
Light	3	28	42
Medium	14	42	56
Heavy	28	42	84
Very Heavy	28	56	84

Reference Data

DURATION TRENDS - ICD-9-CM: 354											
Cases	Mean	Min	Max	No Lost Time	Over 6 Months	Percentile:	5th	25th	Median	75th	95th
788	60	1	255	0%	4.6%	Days:	10	27	47	80	172



Return to Work

The individual may need to decrease tasks requiring repetitive wrist motion and extremes of wrist bending (flexion, extension) until the condition is resolved. Additionally, protective wrist splints may be used during work and sleep to maintain neutral wrist positions. Accommodation may be required at workstations, such as ergonomically designed computer keyboards to provide support for the individual's hand and wrist. If the individual has had surgery, if the operated hand must be used for heavy activity, time off from work may be needed for several weeks for recovery. The individual may be required to avoid heavy lifting and repetitive motion for up to 2 months after surgery.

Failure to Recover

Regarding diagnosis:

- Does individual have pain, tingling, numbness, or feeling of weakness in the wrist, hand, or fingers?
- Is pain intermittent, often worsening at night or when individual first gets up in the morning?
- Does individual complain of dropping items more frequently than usual?
- Do fingers feel "locked" at times?
- Does individual have problems pinching or grasping objects?
- Does physical exam reveal changes in sensation along the median nerve in the thumb and first three fingers?
- Does palm appear to be wasting away near the thumb (thenar eminence atrophy)?
- Does individual have a positive Tinel's or Phalen's sign?
- Were nerve conduction studies performed to evaluate the nerve function (distal latency, nerve conduction velocity, electromyography needle testing)?
- Was diagnosis of carpal tunnel syndrome confirmed?
- Were conditions with similar symptoms ruled out?

Regarding treatment:

- If conservative methods have failed to relieve symptoms, is individual a candidate for carpal tunnel release?
- If the case is atypical, did an injection of steroids reduce pain prior to an attempt at surgery?
- Did individual undergo open or endoscopic carpal tunnel release?
- Did individual experience any complications from the surgical procedure itself?
- Does individual continue to experience symptoms even after surgical intervention?
- What further treatment options are being considered?

Regarding prognosis:

- Does pain persist even after 2 months have passed since treatment?
- Does individual perform repetitive tasks such as gripping a tool for prolonged periods of time?

- Can individual refrain from activities that may increase the symptoms for as long as pain or other symptoms persist?
- Until symptoms resolve, should individual be transferred temporarily to a position that does not require repetitive motion?
- Is individual's computer keyboard ergonomically designed to provide support for the hand and wrist?
- Was individual given a splint to provide support for the wrist and hand?
- If so, is it being used as instructed?
- Does individual have a coexisting condition such as diabetes or pregnancy that may affect recovery?

Cited References

- Atroshi, I., et al. "Prevalence of Carpal Tunnel Syndrome in a General Population." *JAMA* 282 (1999): 153-158.
- Braddom, Randolph L. *Physical Medicine and Rehabilitation*. 2nd ed. Philadelphia: W.B. Saunders, 2000.
- "Carpal Tunnel Syndrome." *MayoClinic.com*. Mayo Foundation for Medical Education and Research. 4 Oct. 2004 <<http://www.mayoclinic.com/>>.
- Fuller, David A. "Carpal Tunnel Syndrome." *eMedicine.com*. Eds. Kristine M. Lohr, et al. 13 Jul. 2004. *eMedicine.com, Inc.* 4 Oct. 2004 <<http://www.emedicinehealth.com/articles/5013-1.asp>>.
- Gerritsen, A. A. "Conservative Treatment Options for Carpal Tunnel Syndrome: A Systematic Review of Randomised Controlled Trials." *Journal of Neurology, Neurosurgery & Psychiatry* 249 3 (2002): 272-280. *National Center for Biotechnology Information*. National Library of Medicine. 3 Dec. 2004 <PMID: 11993525>.
- Gerritsen, A. A., et al. "Splinting vs Surgery in the Treatment of Carpal Tunnel Syndrome: A Randomized Controlled Trial." *JAMA* 288 10 (2002): 1245-1251. *National Center for Biotechnology Information*. National Library of Medicine. 3 Dec. 2004 <PMID: 12215131>.
- Mackin, E. J., et al., eds. "The Therapist's Management of Carpal Tunnel Syndrome." *Hunter - Mackin - Callahan Rehabilitation of the Hand and Upper Extremity*. 5th ed. Philadelphia: Mosby, Inc., 2002. 660-671.
- Muller, M., et al. "Effectiveness of Hand Therapy Interventions in Primary Management of Carpal Tunnel Syndrome: A Systematic Review." *Journal of Hand Therapy* 17 2 (2004): 210-228. *National Center for Biotechnology Information*. National Library of Medicine. 3 Dec. 2004 <PMID: 15162107>.
- O'Connor, D., S. Marshall, and N. Massy-Westropp. "Non-Surgical Treatment (Other than Steroid Injection) for Carpal Tunnel Syndrome." *Cochrane Database System Review* 1 (2003): CD003219. *National Center for Biotechnology Information*. National Library of Medicine. 3 Dec. 2004 <PMID: 12535461>.
- Wilson, J. K., and T. L. Sevier. "A Review of Treatment for Carpal Tunnel Syndrome." *Disability Rehabilitation* 25 3 (2003): 113-119. *National Center for Biotechnology Information*. National Library of Medicine. 3 Dec. 2004 <PMID: 12648000>.