



HEALTH INFORMATION AND PREVENTIVE STEPS FOR WORK-RELATED CARPAL TUNNEL SYNDROME

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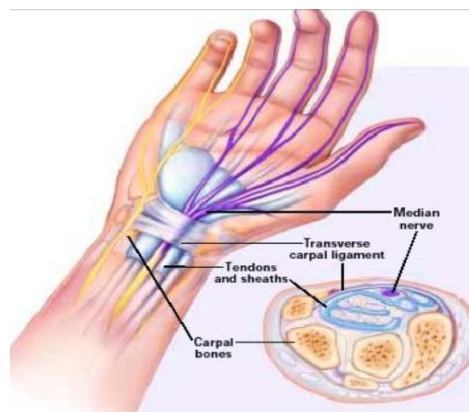
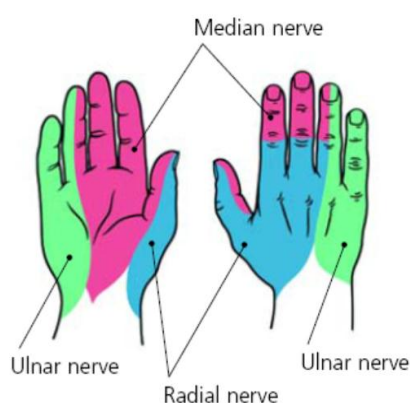
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Carpal tunnel syndrome (CTS)

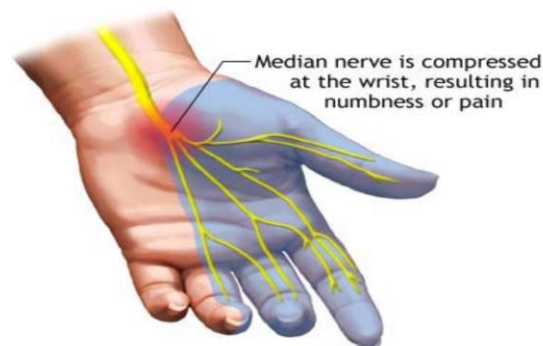
Carpal tunnel syndrome, the most common focal peripheral neuropathy, results from compression of the median nerve at the wrist.

CTS is the name for a group of problems that includes swelling, pain, tingling, and loss of strength in wrist and hand.

The carpal tunnel is a narrow tunnel in the wrist formed by ligament and bone. The median nerve, which carries impulses from the brain into the hand, passes through the carpal tunnel, along with the tendons that enable the hand to close. The median nerve controls the feelings and sensations in the palm side of your thumb and fingers.



Sometimes swelling and irritation of the tendons can put pressure on the wrist nerve causing the symptoms of CTS. When stressed, the tendons swell inside the tunnel and compress the median nerve. Besides stress due to repeated movements, other conditions can lead to compression of the median nerve: arthritis, diabetes, fluid retention, gout and fractures, or chemical imbalances, emotional stress, and sometimes hormonal changes in women.



What are the symptoms of CTS?

Typically, CTS begins slowly with feelings of burning, tingling, and numbness in the wrist and hand. The areas most affected are the thumb, index and middle fingers. If

not treated, the symptoms may escalate into acute, persistent pain.

Patients with CTS often have bilateral symptoms, but one hand seems to be more significantly effected.

At first, symptoms may happen more often at night as many people sleep with their wrist bent, which may cause more pain and symptoms at night. As CTS gets worse, the symptoms may be felt during the daytime too.

Some of the Symptoms of CTS

- Tingling in the fingers
- Numbness in the fingers
- Aching in the thumb, perhaps moving up as far as the neck
- Burning pain from the wrist to the fingers
- Change in touch or temperature sensation
- Clumsiness in hands
- Weakness of grip, ability to pinch and other thumb actions
- Swelling of hand and forearm
- Change in sweat functions of hand

CTS can become so crippling that people can no longer do their work or even perform simple tasks at home. At its most extreme, carpal tunnel syndrome forces people to undergo surgery and miss many days of work, or prevents them from working at all because their hand functions are permanently impaired.

Epidemiology of Carpal Tunnel Syndrome

A total of 10,069 individuals were diagnosed with carpal tunnel syndrome in the study period. The incidence carpal tunnel syndrome was 376 per 100,000 persons per year. The incidence was significantly greater among women vs. men (491 vs. 258 per 100,000 persons per year). Overall the annual rates increased nearly two fold over the study period, from 258 per 100,000 in the earlier period (1981 to 1985) to 424 per 100,000 people in the later period (2000 to 2005.) (Dr. Russell Gelfman et al, Neurology, January 6, 2009).

In a study of the 2466 responders (25-75yrs), 354 reported pain, numbness, and/or tingling in the median nerve distribution in the hands (prevalence, 14.4%). On clinical examination, 94 symptomatic subjects were diagnosed as having clinically certain CTS (prevalence, 3.8%). Nerve conduction testing showed median neuropathy at the carpal tunnel in 120 symptomatic subjects (prevalence, 4.9%). 66 symptomatic subjects had clinically and electrophysiologically confirmed CTS (prevalence, 2.7%). Of 125 control subjects clinically examined, electrophysiological median neuropathy was found in 23 (18.4%).

Prevalence rates of CTS were 21.5% (overall), 32.5% (technicians) and 12% (attenders) and this difference was statistically significant. Prevalence rates increased with

increasing age and increase in years of employment. Thus the important variables in the prevalence of CTS are age, years of employment and work pattern.

Another study on a smaller population of 94, 20 participants were diagnosed with CTS. Out of 20 participants diagnosed with CTS, the most common symptom was hand/wrist pain (90%) followed by numbness (30%), hand weakness (20%), tingling (10%), nocturnal exacerbations (10%), difficulty in holding things (10%) and motor weakness (5%).

These show that symptoms of pain, numbness, and tingling in the hands are common in the general population. Based on the above data, 1 in 5 symptomatic subjects would be expected to have CTS based on clinical examination and electrophysiologic testing.

-- Spinner RJ et al. The many faces of carpal tunnel syndrome. Mayo Clin Proc 64:829-36, 1989

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Who's At Risk?

Carpal tunnel syndrome strikes men and women of all ages. Women are three times more likely to have CTS than men. The risk increases for both men and women as they age. Hormonal changes during menopause and pregnancy can put women at greater risk of getting CTS.

It is often found in workers whose tasks require repeating the same motion in the fingers and hand for long periods of time. CTS has surfaced among meatpackers, assembly line workers, jackhammer operators, and employees who spend hours working at a computer or typewriter. Carpal tunnel syndrome shows up in athletes as well as homemakers.

Causes and Contributing Factors in Carpal Tunnel Syndrome

Aberrant anatomy

Anomalous flexor tendons
Congenitally small carpal canal
Ganglionic cysts
Lipoma
Proximal lumbrical muscle insertion
Thrombosed artery

Infections

Lyme disease
Mycobacterial infection
Septic arthritis

Inflammatory conditions

Connective tissue disease
Gout or pseudogout
Nonspecific flexor tenosynovitis*
Rheumatoid arthritis

Metabolic conditions

Acromegaly
Amyloidosis
Diabetes
Hypothyroidism or hyperthyroidism

Increased canal volume

Congestive heart failure
Edema
Obesity
Pregnancy

People who have diabetes, hypothyroidism, lupus, obesity, and rheumatoid arthritis are more likely to get CTS. In some of these patients, the normal structures in the wrist can become enlarged and lead to CTS. Also, smokers with CTS usually have worse symptoms and

recover more slowly than nonsmokers.

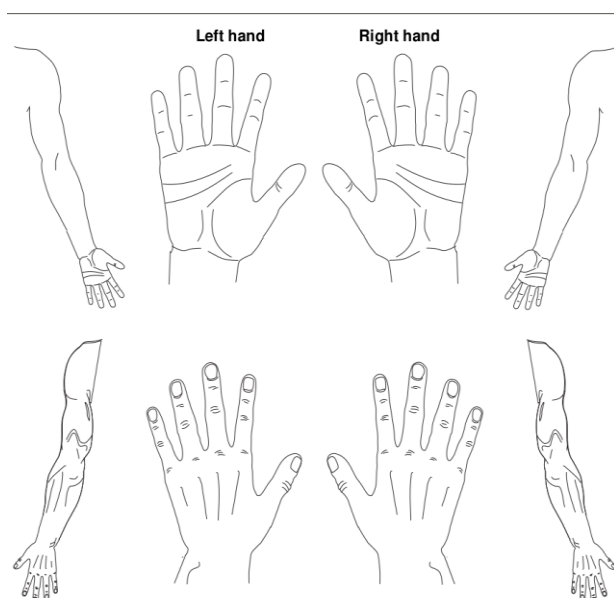
How is CTS Diagnosed?

One or more of the following tests are employed to determine whether the patient has carpal tunnel syndrome.

SYMPTOM DESCRIPTION AND SEVERITY

History of symptoms. The pattern of signs and symptoms may offer clues to their cause. For example, since the median nerve doesn't provide sensation to little finger, symptoms in that finger may indicate a problem other than CTS.

Hand Diagram. A diagram of the hand and wrist, usually divided into six regions, is a very useful diagnostic tool. Patients are asked to indicate where their symptoms are, including pain, numbness, or tingling, by locating the affected areas on the diagram.



A diagnosis is probable if at least two of fingers 1, 2, or 3 have these symptoms, and if there is pain in or near the wrist. CTS is possible if at least one of these fingers has symptoms. It is unlikely if there are no symptoms in these fingers, the palm, or the wrist.

PHYSICAL ASSESSMENT TESTS

Physical exam. Your doctor will want to test the feeling in your fingers and the strength of the muscles in your hand, because these can be affected by carpal tunnel syndrome.

Flick Signal. One important and simple test of carpal tunnel is the "flick" signal:

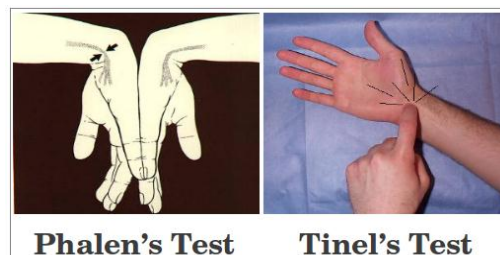
The patient is asked, "What do you do when your symptoms are worse?"

If the patient responds with a motion that resembles shaking a thermometer, the doctor can strongly suspect carpal tunnel.

Testing The Thumb. Whether the thumb is strong and can be risen up from the plane of the palm?

Provocation Tests. Certain tests can produce symptoms: **Phalen's Test.** In this, the patient rests the elbows on a table and lets the wrists dangle with fingers pointing down and the backs of the hands pressed together. If symptoms develop within a minute, CTS is indicated.

This test may be particularly important in determining the severity of CTS and assessing the results of treatment.



Tinel's Sign. In the Tinel's sign test, the doctor taps over the median nerve to produce a tingling or mild shock-sensation.

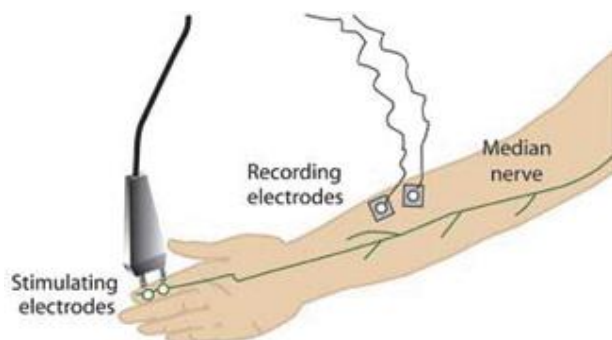
Tourniquet Test. This test employs an inflatable cuff that applies pressure over the median nerve to produce tingling or small shocks.

Hand Elevation Test. The patient raises their hand overhead for 2 minutes to produce symptoms of CTS. The test was recently proven to be accurate and may provide useful information when combined with the Tinel's and Phalen's tests.

ELECTRODIAGNOSTIC TESTS

Electrodiagnostic tests analyze the electric waves of nerves and muscles. These tests can help detect median nerve compression in the carpal tunnel.

Nerve Conduction Studies. To perform nerve conduction studies, surface electrodes are first fastened to the hand and wrist. Small electric shocks are then applied to the nerves in the fingers, wrist, and forearm to measure how fast a signal travels through the nerves that control movement and sensation. Nerve conduction tests are fairly accurate when done on patients with more clear-cut symptoms of carpal tunnel syndrome. They are less accurate in identifying mild CTS.



Electromyography. To perform electromyography, a fine, sterile, wire electrode is inserted briefly into a muscle, and the electrical activity is displayed on a viewing screen. Electromyography can be painful and is less accurate than nerve conduction.

IMAGING TECHNIQUES

Ultrasound and Magnetic resonance imaging (MRI) yield mixed results. In addition, there are no accepted standard diagnostic criteria for carpal tunnel syndrome using ultrasound.

Electrodiagnostic tests remain the preferred method of diagnosis. MRI may be most effective for detecting any internal injuries, tumors, arthritis, or joint damage that

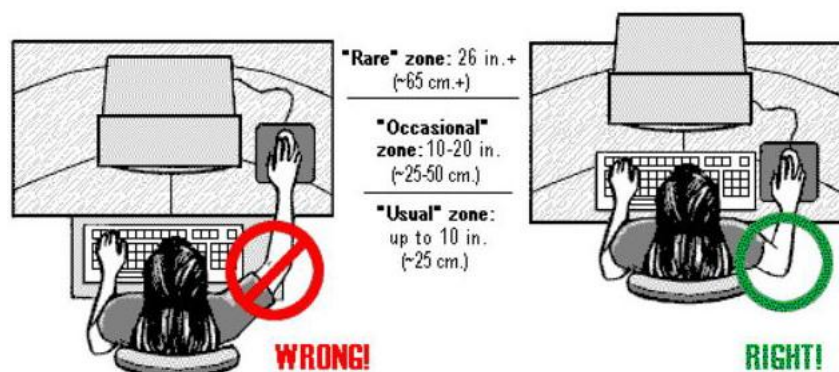
might be causing the problem. It may also be valuable in selecting surgical candidates when electrodiagnostic tests indicate more severe disease than expected.

Treatment of CTS

It is important to be treated by a doctor for CTS in order to avoid permanent damage to the wrist nerve and muscles of the hand and thumb. Left untreated, CTS can cause nerve damage that leads to loss of feeling and less hand strength. Permanent injury occurs in about 1 percent of those with CTS. It is much easier to treat early on.

Limiting Movement. If possible, the patient should avoid activities at work or home that may aggravate the symptoms. The affected hand and wrist should be rested for 2 - 6 weeks. This allows the swollen, inflamed tissues to shrink and relieves pressure on the median nerve.

In Work related symptoms, evaluating the ergonomics (**Ergonomics** is the study and control of the effects of postures, stresses, motions, and other physical forces on the human body engaged in work) of the work environment and employing required modifications may be beneficial.



If these techniques don't offer relief within a few weeks, additional treatment options are to be looked at.

NONSURGICAL THERAPY

If diagnosed early, nonsurgical methods may help improve CTS. Methods may include:

Wrist splinting. A splint that holds your wrist still while you sleep can help relieve nighttime symptoms of tingling and numbness. Nocturnal splinting may be a good option in pregnancy.



NSAIDs. NSAIDs may help relieve pain from carpal tunnel syndrome in the short term. There's no evidence, though, that these drugs can actually improve the carpal tunnel syndrome itself.

Corticosteroids. Injecting carpal tunnel with a corticosteroid, such as cortisone, to relieve your pain.

Corticosteroids decrease inflammation and swelling, which relieves pressure on the median nerve.

Oral corticosteroids aren't considered as effective as local corticosteroid injections into the Carpal Tunnel for treating CTS.



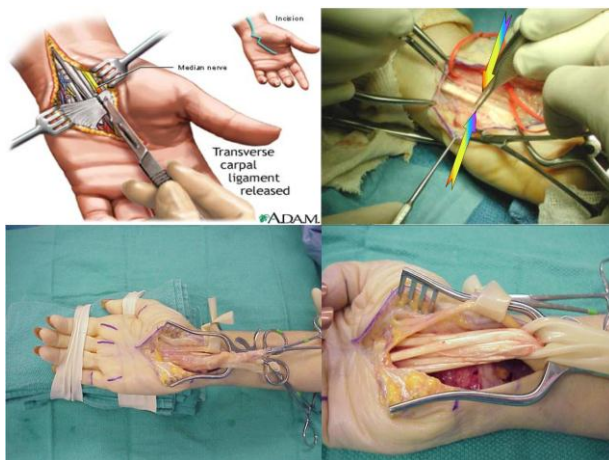
SURGERY

If the symptoms are severe or persist after trying nonsurgical therapy, surgery may be the best option.

The goal of carpal tunnel surgery is to relieve pressure on your median nerve by cutting the ligament pressing on the nerve. During the healing process after the surgery, the ligament tissues gradually grow back together while allowing more room for the nerve than existed before. The surgery may be done a couple of different ways. Either technique has risks and benefits.

Endoscopic surgery. Carpal tunnel surgery can be done using an endoscope, a telescope-like device with a tiny camera attached to it that allows to see inside the carpal tunnel and perform the surgery through small incisions in the hand or wrist.

Open surgery. In other cases, surgery involves making a larger incision in the palm of your hand over the carpal tunnel and cutting through the ligament to free the nerve.



Gradually working your hand back to normal is encouraged while avoiding forceful hand motions or extreme positions of your wrist. Soreness or weakness may take from several weeks to as long as a few months

to resolve after surgery. If the symptoms were very severe before surgery, symptoms may not go away completely after surgery.

Complications of surgery include Recurrence (12.3%), Pain full scar 5 case (5.6%), sympathetic dystrophy (4.4%), palmar coetaneous nerve injury (2.2%), thenar branch nerve injury (1.1%).

YOGA AND ALTERNATIVE PROGRAMS

Yoga. Very limited evidence suggests that yoga practice may provide some benefit for patients with carpal tunnel syndrome.

General Exercise Program. There is no evidence that exercise can directly improve CTS. But, a regular exercise regimen lowers the risk for cumulative trauma disorders and improves overall health and well-being.

Ultrasound. It employs high-frequency sound waves directed toward the inflamed area, which gets converted into heat in the deep tissues of the hand, opening the blood vessels and allowing oxygen to be delivered to the injured tissue. It is not yet known how effective ultrasound treatment is.

Ice and Warmth. Ice may provide benefit for acute pain. Some patients have reported that alternating warm and cold soaks have been beneficial. (If hot applications relieve pain, most likely the problem is not caused by CTS but by another condition producing similar symptoms.)

Acupuncture. A very limited amount of evidence shows that acupuncture may be useful as a supplement to standard treatment.

Chiropractic Therapies. Chiropractic techniques have been useful for some people whose condition is produced by pinched nerves. There is little evidence, however, to support its use for carpal tunnel syndrome.

Magnets. Magnets are a popular but unproven therapy for pain relief.

Prevention of Carpal Tunnel Syndrome

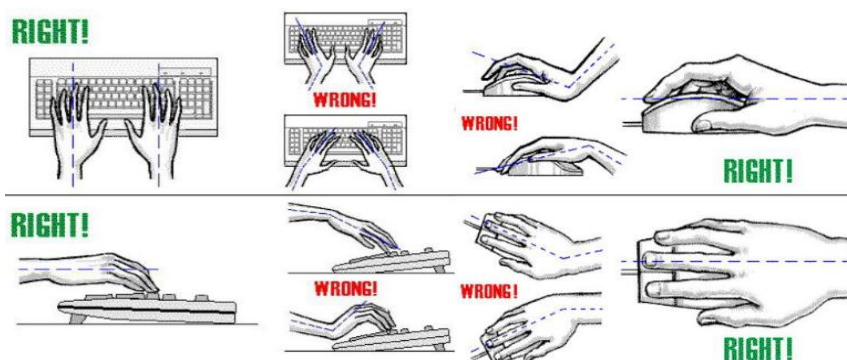
There are no proven strategies to prevent carpal tunnel syndrome, but you can minimize stress on your hands and wrists by taking the following precautions:

Reduce your force and relax your grip. Most people use more force than needed to perform many tasks involving their hands. Hitting the keys softly on the keyboard, use of a big pen with an oversized, soft grip adapter and free-flowing ink may be beneficial.

Take frequent breaks. Give hands and wrists a break by gently stretching and bending them periodically. Alternate tasks when possible. Use of equipment that vibrates or that requires you to exert a great amount of force, taking breaks is even more important.

Watch your form. Avoid bending wrist all the way up or down. A relaxed middle position is best. When using a

keyboard or a mouse, keep it at elbow height or slightly lower.

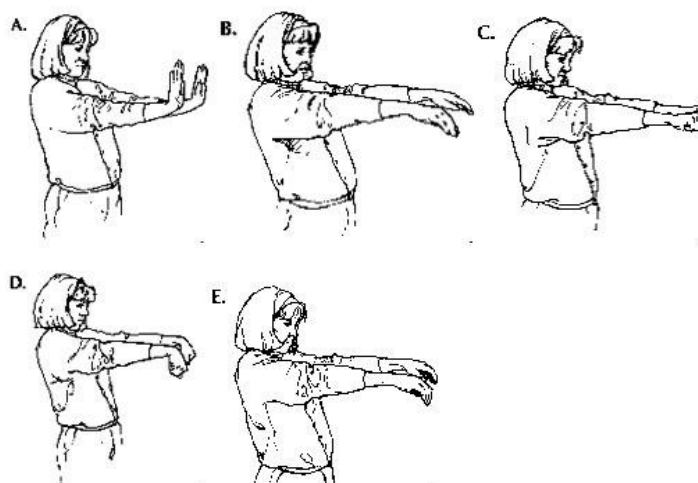


Improve your posture. Incorrect posture can cause shoulders to roll forward. When the shoulders are in this position, the neck and shoulder muscles are shortened, compressing nerves in the neck. This can affect wrists, fingers and hands.

Hand and wrist exercises. It may help reduce the risk of developing carpal tunnel syndrome. Isometric and stretching exercises can strengthen the muscles in the wrists and hands, as well as the neck and shoulders. Performing some simple exercises for 4 - 5 minutes every hour may be helpful.

Keep your hands warm. working in a cold environment is more likely to develop hand pain and stiffness. Keeping the hands and wrists warm may be helpful.

1	Thumb Stretch	A. Grab your thumb in a fist B. Bend wrist down to feel the stretch in the thumb & wrist.		
2	Carpal Stretch	A. Place the palm flat on wall, fingers point down (elbow straight). B. Reach across and pull the thumb back. Feel pull on palm side forearm.		
3	Extensor Stretch	A. Make a fist (elbow straight). B. Reach under and pull back on the fist. Feel the pull on the top forearm.		



CONCLUSION

CTS is the Most common focal peripheral neuropathy, which is in the rise globally. Pain and paresthesias in the distribution of the median nerve are the classic symptoms.

While Tinel's sign and a positive Phalen's maneuver are classic clinical signs of the syndrome, hypalgesia and weak thumb abduction are more predictive of abnormal nerve conduction studies.

Conservative treatment options include splinting the wrist in a neutral position and ultrasound therapy. Orally administered corticosteroids can be effective for short-term management (two to four weeks), but local corticosteroid injections may improve symptoms for a longer period.

If symptoms are refractory to conservative measures or if nerve conduction studies show severe entrapment, open or endoscopic carpal tunnel release may be necessary.

Regular exercise and frequent breaks may be helpful in preventing Carpal Tunnel Syndrome.

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