

Carpal Tunnel Syndrome

A stylized, light-colored graphic of a person with arms raised, set against a dark purple background. A white pulse line runs horizontally across the bottom of the image, passing behind the person's legs.

U.S. DEPARTMENT OF HEALTH
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National Institutes of Health



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You're working at your desk, trying to ignore the tingling or numbness you've had for months in your hand and wrist. Suddenly, a sharp, piercing pain shoots through the wrist and up your arm. Just a passing cramp? More likely you have carpal tunnel syndrome, a painful progressive condition caused by compression of a key nerve in the wrist.

What is carpal tunnel syndrome?

Carpal tunnel syndrome occurs when the median nerve, which runs from the forearm into the hand, becomes pressed or squeezed at the wrist. The median nerve controls sensations to the palm side of the thumb and fingers (although not the little finger), as well as impulses to some small muscles in the hand that allow the fingers and thumb to move. The carpal tunnel — a narrow, rigid passageway of ligament and bones at the base of the hand — houses the median nerve and tendons. Sometimes, thickening from irritated tendons or other swelling narrows the tunnel and causes the median nerve to be compressed. The result may be pain, weakness, or numbness in the hand and wrist, radiating up the arm.

Although painful sensations may indicate other conditions, carpal tunnel syndrome is the most common and widely known of the entrapment neuropathies in which the body's peripheral nerves are compressed or traumatized.

What are the symptoms of carpal tunnel syndrome?

Symptoms usually start gradually, with frequent burning, tingling, or itching numbness in the palm of the hand and the fingers, especially the thumb and the index and middle fingers. Some carpal tunnel sufferers say their fingers feel useless and swollen, even though little or no swelling is apparent. The symptoms often first appear in one or both hands during the night, since many people sleep with flexed wrists. A person with carpal tunnel syndrome may wake up feeling the need to “shake out” the hand or wrist. As symptoms worsen, people might feel tingling during the day. Decreased grip strength may make it difficult to form a fist, grasp small objects, or perform other manual tasks. In chronic and/or untreated cases, the muscles at the base of the thumb may waste away. Some people are unable to tell between hot and cold by touch.

What are the causes of carpal tunnel syndrome?

Carpal tunnel syndrome is often the result of a combination of factors that increase pressure on the median nerve and tendons in the carpal tunnel, rather than a problem with the nerve itself. There may be a congenital predisposition — the carpal tunnel is simply smaller in some people than in others. Other contributing factors include trauma or injury to the wrist that causes swelling, such as sprain or fracture; obesity, overactivity of the pituitary gland; hypothyroidism; rheumatoid arthritis; mechanical problems in the wrist joint; work stress; repeated use of vibrating hand tools; fluid retention during pregnancy or menopause; or the development of a cyst or tumor in the canal. In some cases no cause can be identified.

There is little clinical data to prove whether repetitive and forceful movements of the hand and wrist during work or leisure activities can cause carpal tunnel syndrome. Other disorders such as bursitis and tendonitis have been associated with repeated motions performed in the course of normal work or other daily activities. Writer's cramp — a condition in which a lack of fine motor skill coordination and ache and pressure in the fingers, wrist, or forearm — may also be brought on by repetitive activity.

Who is at risk of developing carpal tunnel syndrome?

Women are three times more likely than men to develop carpal tunnel syndrome, perhaps because the carpal tunnel itself may be smaller in some women than in men. The dominant hand is usually affected first and produces the most severe pain. Persons with diabetes or other metabolic disorders that directly affect the body's nerves and make them more susceptible to compression are also at high risk. Carpal tunnel syndrome usually occurs only in adults.

In the workplace, the risk of developing carpal tunnel syndrome is not confined to people in a single industry or job, but is especially common in those performing assembly line work — manufacturing, sewing, finishing, cleaning, and meat, poultry, or fish packing. In fact, carpal tunnel syndrome is three times more common among assemblers than among data-entry personnel.

How is carpal tunnel syndrome diagnosed?

Early diagnosis and treatment are important to avoid permanent damage to the median nerve. A physical examination of the hands, arms, shoulders, and neck can help determine if the individual's complaints are related to daily activities or to an underlying disorder, and can rule out other painful conditions that mimic carpal tunnel syndrome. The wrist is examined for tenderness, swelling, warmth, and discoloration. Each finger should be tested for sensation, and the muscles at

the base of the hand should be examined for strength and signs of atrophy. Routine laboratory tests and X-rays can reveal diabetes, arthritis, and fractures.

Physicians can use specific tests to try to produce the symptoms of carpal tunnel syndrome. In the Tinel test, the doctor taps on or presses on the median nerve in the person's wrist. The test is positive when tingling in the fingers or a resultant shock-like sensation occurs. The Phalen, or wrist-flexion, test involves having the individual hold his or her forearms upright by pointing the fingers down and pressing the backs of the hands together. The presence of carpal tunnel syndrome is suggested if one or more symptoms, such as tingling or increasing numbness, is felt in the fingers within 1 minute. Doctors may also ask individuals to try to make a movement that brings on symptoms.

Often it is necessary to confirm the diagnosis by use of electrodiagnostic tests. In a nerve conduction study, electrodes are placed on the hand and wrist. Small electric shocks are applied and the speed with which nerves transmit impulses is measured. In electromyography, a fine needle is inserted into a muscle; electrical activity viewed on a screen can determine the severity of damage to the median nerve. Ultrasound imaging can show impaired movement of the median nerve. Magnetic resonance imaging (MRI) can show the anatomy of the wrist but to date has not been especially useful in diagnosing carpal tunnel syndrome.

How is carpal tunnel syndrome treated?

Treatments for carpal tunnel syndrome should begin as early as possible, under a doctor's direction. Underlying causes such as diabetes or arthritis should be treated first. Initial treatment generally involves resting the affected hand and wrist for at least 2 weeks, avoiding activities that may worsen symptoms, and immobilizing the wrist in a splint to avoid further damage from twisting or bending. If there is inflammation, applying cool packs can help reduce swelling.

Non-surgical treatments

Drugs — In special circumstances, various drugs can ease the pain and swelling associated with carpal tunnel syndrome. Nonsteroidal anti-inflammatory drugs, such as aspirin, ibuprofen, and other nonprescription pain relievers, may ease symptoms that have been present for a short time or have been caused by strenuous activity. Orally administered diuretics (“water pills”) can decrease swelling. Corticosteroids, injected directly into the wrist, or taken as prednisone by mouth, may reduce the pressure on the median nerve and provide immediate, temporary relief to persons with mild to moderate symptoms. (Caution: persons with diabetes and those who may be predisposed to diabetes should note that prolonged use of corticosteroids can make it difficult to regulate insulin levels. Corticosteroids should not be taken without a doctor's prescription.) Additionally, some studies show that vitamin B6 (pyridoxine) supplements may ease the symptoms of carpal tunnel syndrome.

Exercise — Stretching and strengthening exercises can be helpful in people whose symptoms have decreased or ended. These exercises may be supervised by a physical therapist, who is trained to use exercises to treat physical impairments, or an occupational therapist, who is trained in evaluating people with physical impairments and helping them build skills to improve their health and well-being.

Alternative therapies — Acupuncture and chiropractic care have benefited some individuals but their effectiveness remains unproven. An exception is yoga, which has been shown to reduce pain and improve grip strength among people with carpal tunnel syndrome.

Surgery

Carpal tunnel release is one of the most common surgical procedures in the United States. Generally, surgery is recommended if symptoms last for 6 months or if there is evidence of muscle damage in severe cases of carpal tunnel syndrome. Surgery involves severing the band of tissue around the wrist to reduce pressure on the median nerve. Surgery is done under local anesthesia and does not require an overnight hospital stay. Many individuals require surgery on both hands. The following are types of carpal tunnel release surgery:

Open release surgery, the traditional procedure used to correct carpal tunnel syndrome, consists of making an incision up to 2 inches in the wrist and then cutting the carpal ligament to enlarge the carpal tunnel. The procedure is generally done under local anesthesia on an outpatient basis, unless there are unusual medical considerations.

Endoscopic surgery may allow faster functional recovery and less postoperative discomfort than traditional open release surgery. The surgeon makes two incisions (about ½" each) in the wrist and palm, inserts a camera attached to a tube, observes the tissue on a screen, and cuts the carpal ligament (the tissue that holds joints together). This two-portal endoscopic surgery, generally performed under local anesthesia, is effective and minimizes scarring and scar tenderness, if any. One-portal endoscopic surgery for carpal tunnel syndrome is also available.

Although symptoms may be relieved immediately after surgery, recovery from carpal tunnel surgery can take months. Some individuals may have infection, nerve damage, stiffness, and pain at the scar. Occasionally the wrist loses strength because the carpal ligament is cut. Individuals should undergo physical therapy after surgery to restore wrist strength. Some people may need to adjust job duties or even change jobs after recovery from surgery.

Recurrence of carpal tunnel syndrome following treatment is rare. The majority of people recover completely.

How can carpal tunnel syndrome be prevented?

At the workplace, workers can do on-the-job conditioning, perform stretching exercises, take frequent rest breaks, wear splints to keep wrists straight, and use correct posture and wrist position. Wearing fingerless gloves can help keep hands warm and flexible. Workstations, tools and tool handles, and tasks can be redesigned to enable the worker's wrist to maintain a natural position during work. Jobs can be rotated among workers. Employers can develop programs in ergonomics, the process of adapting workplace conditions and job demands to the capabilities of workers. However, research has not conclusively shown that these workplace changes prevent the occurrence of carpal tunnel syndrome.

What research is being done?

Within the National Institutes of Health (NIH), the National Institute of Neurological Disorders and Stroke (NINDS) is the Federal government's leading supporter of biomedical research on neuropathy. Another NIH component, the National Institute of Arthritis and Musculoskeletal and Skin Disorders (NIAMS), supports research on tissue damage associated with repetitive motion disorders, including carpal tunnel syndrome. Scientists supported by the NINDS are studying the factors that lead to long-lasting neuropathies, and how the affected nerves are related to symptoms of pain, numbness, and functional loss. Researchers also are examining biomechanical stresses

that contribute to the nerve damage responsible for symptoms of carpal tunnel syndrome in order to better understand, treat, and prevent this ailment. By quantifying the distinct biomechanical pressures from fluid and anatomical structures, researchers are finding ways to limit or prevent carpal tunnel syndrome in the workplace and decrease other costly and disabling occupational illnesses.

Scientists funded through the NIH's National Center for Complementary and Alternative Medicine are investigating the effects of acupuncture on pain, loss of median nerve function, and changes in the brain associated with carpal tunnel syndrome. In addition, a randomized clinical trial designed to evaluate the effectiveness of osteopathic manipulative treatment in conjunction with standard medical care is underway. Evaluations of these therapies and other therapies will help to tailor patient treatment programs.

Where can I go for more information?

The National Institute of Neurological Disorders and Stroke conducts and support a wide range of research on neurological disorders, including neuropathy. For information on other neurological disorders contact in the Institute's Brain Resources and Information Network (BRAIN) at:

BRAIN

P.O. Box 5801

Bethesda, MD 20824

301-496-5751

800-352-9424

www.ninds.nih.gov

Additional information is available from the following organizations:

American Academy of Orthopaedic Surgeons

6300 North River Road

Rosemont, IL 60018-4262

847-823-7186

800-346-2267

www.aaos.org

American Chronic Pain Association

P.O. Box 850

Rocklin, CA 95677-0850

916-632-0922

800-533-3231

www.theacpa.org

**National Center for Complementary and
Alternative Medicine Clearinghouse**

National Institutes of Health, DHHS

P.O. Box 7923

Gaithersburg, MD 20898-7923

301-519-3153

888-644-6226

www.nccam.nih.gov/health/clearinghouse

**National Institute of Arthritis and
Musculoskeletal and Skin Diseases**

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Building 31, Room 4C05

Bethesda, MD 20892-2350

301-496-8188

www.niams.nih.gov

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and Health (NIOSH)**

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Prevention, DHHS

1600 Clifton Road

Atlanta, GA 30333

404-639-3311

800-232-4636

www.cdc.gov/niosh

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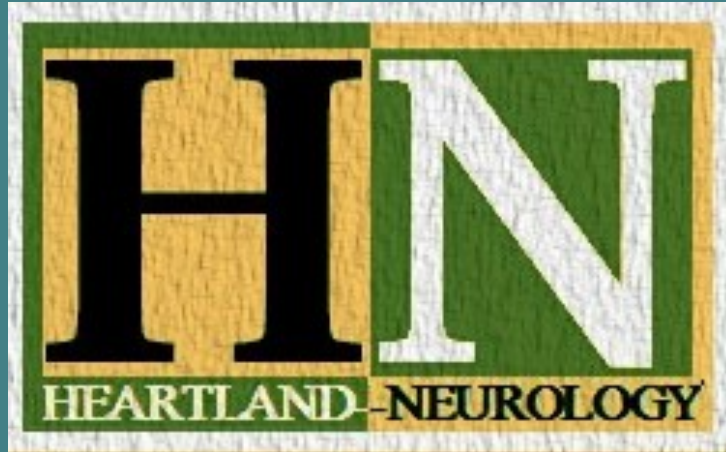




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