



Carpal Tunnel Syndrome

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Carpal tunnel syndrome is a term that is well known. Unfortunately, given this widespread familiarity, people often attribute any discomfort or pain in the hand or wrist to carpal tunnel syndrome. Carpal tunnel syndrome is quite common, affecting 4-10 million Americans, and usually very treatable. However, there are many other conditions which can cause similar complaints. It is important to know the difference.

Fast Facts

- The main symptom of carpal tunnel syndrome is numbness of the fingers.
- Carpal tunnel syndrome may interfere with hand strength and sensation, and cause a decrease in hand function.
- Carpal tunnel syndrome can be treated effectively with medications, splinting, steroid injections in the wrist and/or surgery.

What is carpal tunnel syndrome?

Carpal tunnel syndrome is possibly the most common nerve disorder experienced today. The carpal tunnel is located at the wrist on the palm side of the hand just beneath the skin surface (palmar surface). Eight small wrist bones form three sides of the tunnel, giving rise to the name carpal tunnel. The remaining side of the tunnel, the palmar surface, is composed of soft tissues, consisting mainly of a ligament called the transverse carpal ligament. This ligament stretches over the top of the tunnel.

The median nerve and nine flexor tendons to the fingers pass through the carpal tunnel. [Flexor tendons help flex or bend the fingers.] When the median nerve in the wrist is compressed (squeezed by swollen tissues, for example), it slows or blocks nerve impulses from travelling through the nerve. Because the median nerve provides muscle function and feeling in the hand, damaging the nerve results in symptoms ranging from mild occasional numbness to hand weakness, loss of feeling and loss of hand function.

Usually carpal tunnel syndrome affects only one hand, but can affect both at the same time, causing symptoms in the thumb and the index, middle and adjacent half of the ring finger. In addition to numbness, those with the syndrome may experience tingling, pins and needle sensation or burning of the hand occasionally extending up to the forearm.

Frequently, symptoms surface in the morning upon awakening, or may cause waking during the night. Symptoms can occur with certain activities such as driving, holding a book or other repetitive activity with the hands, especially those requiring prolonged grasping or flexing (bending) of the wrist. Hand functional activities, such as buttoning, may become difficult, and sufferers may drop things more easily.

Individuals often shake their hands trying to obtain relief and may experience the sensation of swelling when, in fact, no swelling is present.

Because numbness and tingling may be mild and occur only periodically, many do not seek medical help. However, the disease can progress to more persistent numbness and burning. In some severe and chronic cases of carpal tunnel syndrome, loss of muscle mass occurs at the base of the thumb on the palm side of the hand. In these instances, especially in untreated cases, some weakness or impaired use of the hand as well as loss of sensation can occur with permanent nerve and muscle damage.

What causes carpal tunnel syndrome?

Carpal tunnel syndrome may occur in patients who are pregnant, overweight or have various medical conditions, including thyroid disease, diabetes or arthritis, or injuries such as wrist fractures. Whether repetitive work activities cause carpal tunnel syndrome is still debated, but it is thought that some repetitive hand activities, especially those involving vibratory motion, can worsen the symptoms. Just as frequently, the syndrome occurs on its own.

However, many other conditions also can be responsible for the symptoms of pain, swelling, numbness or weakness in the hands, including diseases of the nerves located anywhere from the neck to the wrist. The pain and swelling in the hand joints and wrists caused by arthritis also can be responsible. For instance, pain at the base of the thumb commonly is caused by osteoarthritis. Tendonitis, an inflammation of the tendons that connect muscles to bones, can cause pain, swelling, and impaired use of the hand or wrist. Raynaud's phenomena can cause numbness and burning of the fingers as a result of cold exposure and sometimes due to autoimmune diseases. Raynaud's also causes fingers to have a whitish, bluish, or reddish color at various times; color changes are not seen in carpal tunnel syndrome.

Health care professionals should exclude these and other diseases before diagnosing carpal tunnel syndrome.

Who gets carpal tunnel syndrome?

Middle-aged to older individuals are more likely to develop the syndrome than younger persons, and females three times more frequently than males.

How is carpal tunnel syndrome diagnosed?

The diagnosis of carpal tunnel syndrome often is made by the physician based on an accurate description of the symptoms. During physical examination, testing may identify weakness of the muscles supplied by the median nerve in the hand, including some thumb muscles affected by the syndrome. There may be decreased sensation in the hand to pin prick or light touch. Bending the wrist to 90 degrees for one minute may cause symptoms to appear in the hand (Phalen test) or tapping on the wrist with a reflex hammer may cause an electric shock-like sensation (Tinel Sign). Late in the disease, there may be thinning of the muscles or muscle atrophy at the base of the thumb.

Health care professionals can confirm the diagnosis of carpal tunnel syndrome and determine its severity with a two-part electrical test:

- The nerve conduction test is the strongest evidence for carpal tunnel syndrome. A small electrode is placed on the skin on the elbow side of the tunnel, generating a mild electrical current. The current stimulates the nerve. The impulse travels in the nerve through the tunnel to the hand where the impulse is measured. If there is damage to median nerve, the impulse will take longer than expected to get to the hand. The longer the delay in the nerve impulse, the worse the nerve damage will be.
- The second part of the test, electromyography, measures the degree of abnormal function of the muscles. A small needle is placed in various muscles supplied by the median nerve, and the electrical impulse of the muscle is measured at rest and upon contraction (tightening with use) of the muscle. If the nerve is severely compressed, these muscles can be affected and will not perform normally on the electrical test.

In recent years, diagnostic ultrasonography and MRI have been used to help diagnose carpal tunnel syndrome and exclude other causes of hand and wrist symptoms. These technologies can identify swelling of the median nerve and abnormalities of the tunnel wall, its contents and surrounding area. This can include the source of median nerve compression including inflammation of structures in the tunnel such as inflamed tendons, which can occur in rheumatoid arthritis. Other tendon abnormalities, including a ganglion, or excessive fat in the tunnel, also can be seen using MRI.



How is carpal tunnel syndrome treated?

Medication such as acetaminophen and nonsteroidal anti-inflammatory drugs can be used for symptom relief. Splinting the wrist, especially at night, helps keep the wrist straight during the night and thus decreases the pressure on the median nerve. These splints, which are available in most drug stores, may relieve symptoms, especially in milder cases.

A cortisone injection into the carpal tunnel area often is helpful in relieving symptoms for weeks to months and can be repeated. If there is an underlying disease, such as hypothyroidism (underactive thyroid) or rheumatoid arthritis, causing the carpal tunnel syndrome, then treatment of the specific disease also may relieve symptoms.

When the above measures fail to relieve symptoms, surgical opening of the tunnel to relieve the pressure on the median nerve, known as a carpal tunnel release, is appropriate. In severe cases, physicians may consider early surgery. The surgery may be an open surgical procedure or an endoscopic procedure, and often can be done on an outpatient basis.

Points to remember

- Other conditions, such as arthritis, tendonitis and other nerve involvement, need to be ruled out before diagnosing carpal tunnel syndrome.
- Physicians can diagnose carpal tunnel syndrome by history of the symptoms, physical examination and electrical testing, and in some cases by use of ultrasound or MRI.
- The syndrome is treated with analgesics (pain medicines), anti-inflammatory medications, splinting and cortisone injections. However, any underlying disease causing or contributing to the carpal tunnel syndrome, if present, also should be treated.

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The Rheumatology Research Foundation

www.rheumatology.org/Foundation

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Updated September 2013. Written by Joseph J. Biundo, MD and Perry J. Rush, MD, and reviewed by the American College of Rheumatology Communications and Marketing Committee.

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