

Carpal Tunnel Syndrome

What is Carpal Tunnel Syndrome?

The carpal tunnel is a passageway in the wrist formed by the eight carpal (wrist) bones, which make up the floor and sides of the tunnel, and the transverse carpal ligament, a strong ligament stretching across the roof of the tunnel. (Fig. 1)

Inside the carpal tunnel are nine flexor tendons which flex (bend down) your fingers and thumb. Also running through the carpal tunnel is the **median nerve**, a cord about the size of a pencil containing thousands of nerve fibers supplying sensation (feeling) to your thumb, index and middle fingers, and half of the ring finger. The median nerve lies directly beneath the transverse carpal ligament.

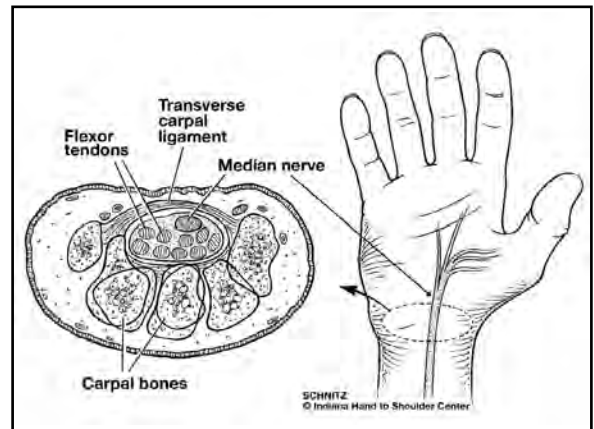


Fig. 1: Cross section of carpal tunnel.

Carpal tunnel syndrome is caused by increased pressure in the carpal tunnel resulting in compression of the median nerve. When the median nerve is pushed up against the ligament, blood flow and the normal physiology to the nerve is restricted, causing a sensation often described

as “pins and needles” to the fingers. In severe or chronic cases, numbness can be constant. (Fig. 2)

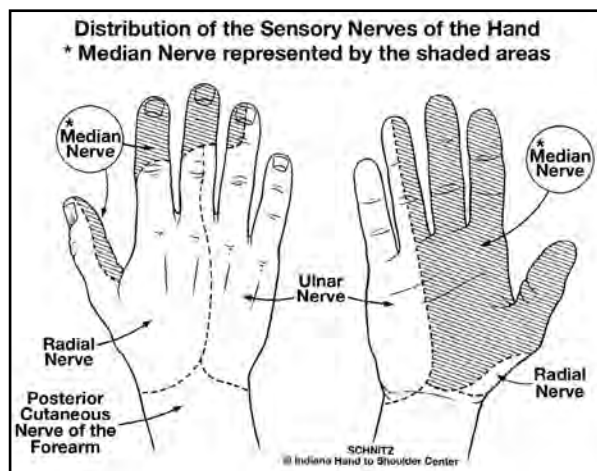


Fig. 2: Areas of median nerve sensation.

What are the causes?

Carpal tunnel syndrome can be caused by a variety of problems. Certain medical conditions that may lead to compression of the median nerve include:

- Inflammation or swelling about the tendons
- Fluid retention
- Wrist fractures and dislocations
- Crushing injuries to the wrist
- Rheumatoid/degenerative arthritis
- Diabetes
- Tumors and tumor-like conditions
- Pregnancy

There is considerable debate as to whether specific work activities may lead to carpal tunnel syndrome. Certain occupational activities which involve high force and high repetition of the fingers or wrist, or prolonged use of vibrating tools may contribute to the development of carpal tunnel syndrome. Despite popular belief keyboard activities have not been

shown to definitively cause carpal tunnel syndrome.

Determining whether or not carpal tunnel syndrome is a work-related condition can be very difficult. Each case must be considered individually and must be based on documentation of specific work as well as recreational activities which may contribute to this condition.

Non-work related activities of daily living and leisure may also provoke symptoms of carpal tunnel syndrome. Lawn mowing, long distance driving, or hobbies such as knitting or wood carving are activities which involve prolonged or repetitive grasping and wrist flexion and may elicit symptoms of carpal tunnel syndrome. Any activity that involves substantial grasp can aggravate symptoms.

What are the signs and symptoms?

Numbness, burning, or tingling of one or more of the fingers (excluding the little finger) is the most common symptom of carpal tunnel syndrome. This numbness can happen at any time; often these symptoms occur at night and may awaken the individual from sleep. Partial relief can sometimes be gained by shaking, massaging, or elevating the hands. At times, the numbness and pain may extend up the arm, into the elbow, and as far up as the shoulder and neck.

A decrease in sensation or feeling may result in clumsiness and weakness of the affected hand. Patients may find themselves dropping objects and less capable of performing tasks requiring gripping or pinching strength.

On the palm side of the hand, just below the thumb, is a bulging pad of muscle called the thenar muscle group. Some of these muscles are controlled by the median nerve. With advanced carpal tunnel syndrome, this muscle group may begin to waste away, giving a flattened appearance to the palm when compared to the other hand. (Fig. 3)

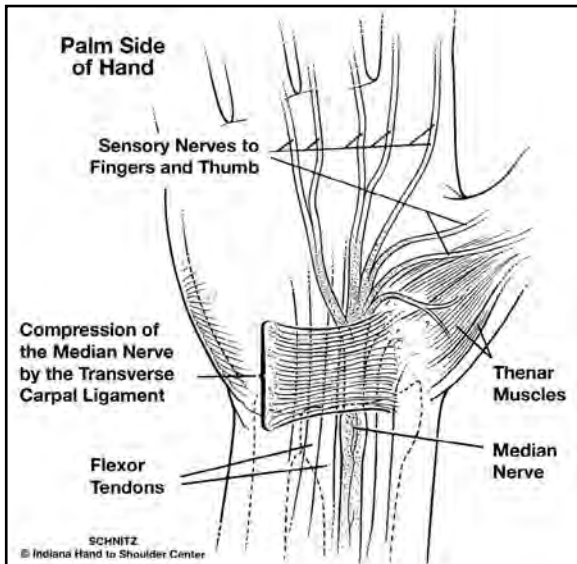


Fig. 3: Thenar muscles.

How is it treated?

Conservative treatment of patients with mild symptoms usually involves modification of activities that may provoke symptoms.

Your physician may prescribe a splint to be worn to restrict movement of the wrist. Depending on the severity of the condition, the splint may be worn during the day and/or night.

The length of time the splint is needed varies, but can be for approximately 4 - 6 weeks.

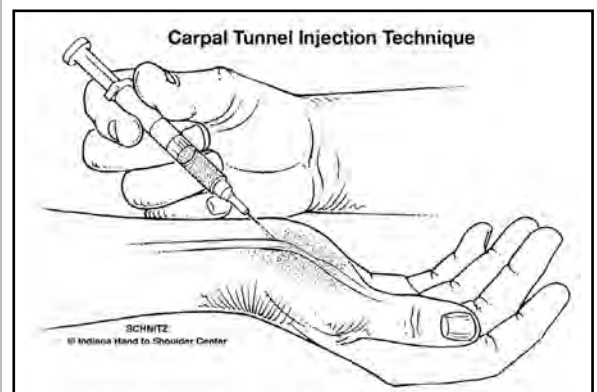


Fig. 4: Cortisone injection to decrease swelling.

In some instances, a cortisone injection may be administered into the carpal tunnel to alleviate symptoms. This may greatly reduce the patient's discomfort. (Fig. 4)

When conservative treatment does not achieve the desired results, or in cases involving more severe symptoms, such as thenar muscle wasting and extensive weakness and numbness, surgery may be recommended.

Surgery is usually performed on an outpatient basis. An incision is made on the palm of the hand, and the surgeon will cut (release) the ligament forming the roof of the tunnel. (Fig. 5) This relieves the pressure on the median nerve.

What about recovery?

With the blood flow to the median nerve restored, the symptoms of burning and tingling are usually relieved soon after surgery. Patients can expect soreness from the incision for 4 - 6 weeks and discomfort from deep pressure for as long as several months. Improvements in

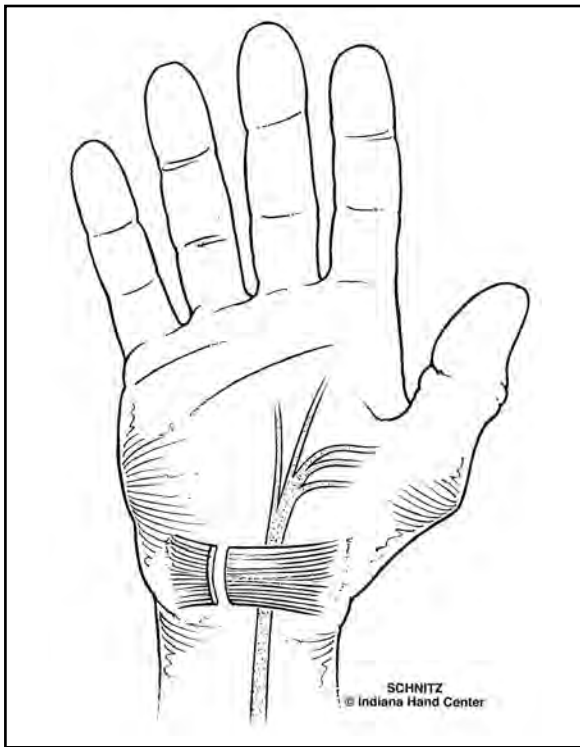


Fig 5: Transverse carpal ligament is divided to decompress the median nerve.

strength and sensation depend on the extent of the nerve damage prior to treatment. Normal grip strength may not return for several months following surgery. The natural healing process and regeneration of nerve fibers will occur throughout the following six months to a year. Some patients with severe nerve damage prior to surgery may never regain normal sensation postoperatively. The degree of nerve damage prior to the surgery is highly variable.

During the recovery period, your physician may recommend a program of hand therapy to regain strength, reduce discomfort, and increase range of motion to the fingers and hand.

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