OVERVIEW
You have been diagnosed with carpal tunnel syndrome (CTS), which is the terminology used to described compression or entrapment of the median nerve in the carpal tunnel. The carpal tunnel is a passage way for the median nerve and the flexor tendons from the forearm into the palm. If the carpal tunnel gets tight, the median nerve becomes compressed, which can cause pain and tingling in the hand. Narrowing of the carpal tunnel can occur due to aging, repetitive work, or injury to the wrist. Some times the narrowing of the carpal tunnel is reversible and the median nerve will recover. Other times, surgery is needed to release the pressure on the median nerve.

BACKGROUND
The median nerve is one of the three major nerves in the arm. The nerve innervates the muscles on the thumb side of the forearm and then passes through the carpal into the hand. The nerve innervates the thenar muscles at the base of the thumb and provides sensory innervation to the index and long fingers, and parts of the thumb and ring fingers. CTS is 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. Contributing factors include trauma to the wrist that cause swelling, hypothyroidism, rheumatoid arthritis, mechanical problems in the wrist joint, repeated use of vibrating hand tools, fluid retention during pregnancy or menopause, or the development of a cyst or tumor in the carpal tunnel. In some cases no cause can be identified.

Women are three times more likely to develop CTS, perhaps because the carpal tunnel itself may be smaller in women than in men. The dominant hand is usually affected first. 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. The risk of developing carpal tunnel syndrome is especially common in those performing assembly line work - manufacturing, sewing, finishing, cleaning, and meat, poultry, or fish packing.

CLINICAL PRESENTATION AND DIAGNOSIS
Symptoms usually start gradually, with frequent burning, tingling, or itching numbness in the palm of the hand and 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
Decreased grip strength may make it difficult to form a fist, grasp small objects, or perform other manual tasks. In chronic cases, the muscles at the base of the thumb may waste away.

Physical examination is done to determine if the patient’s complaints are related to CTS and to rule out other painful conditions that mimic carpal tunnel syndrome. The wrist is examined for tenderness, swelling, warmth, and discoloration. Sensation is tested in the fingers. Physicians use specific tests to try to produce the symptoms of CTS. In the Tinel test, the doctor taps on or presses on the median nerve in the patient’s wrist. Phalen’s test involves having the patient hold the forearms upright by pointing the fingers down and pressing the backs of the hands together. If needed, laboratory tests and X-rays can reveal diabetes, arthritis, and fractures.

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.

**TREATMENT**

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. Alternative therapies, including acupuncture and chiropractic care have benefited some patients, but their effectiveness remains unproved.

Initial treatment generally involves resting the affected hand for at least 2 weeks, avoiding activities that may worsen symptoms, nonsteroidal anti-inflammatory drugs, such as ibuprofen, to reduce swelling. Wrist splints are used to help rest the hand. The splints should be worn at night and with any activities such as driving and bicycle riding which are well known to aggravate the condition. Many patients get good relief with these measures. Once symptoms have improved, many patients can decrease the brace wear without recurrence of symptoms.

Cortisone injection into the carpal tunnel can also be diagnostic and therapeutic. If the diagnosis of CTS is correct, most patients will get fair to good relief of symptoms within 2-3 days. There are some risks with the injection including infection, hot flashes, change in glucose levels for patients with diabetes, and local skin pigment changes that often corrects with time.
Surgery is the definitive treatment for nerve conduction documented moderate to severe CTS. Nerve conduction should be done before proceeding to surgery. Surgery is indicated when weakness is present and the pain intolerable and cortisone hasn’t been good enough. The surgery is quite safe, done under local, as an outpatient, but the hand must be immobilized for a week and then rested for 4-6 weeks with limited or light duty work to maximize recovery without adhesions or deficits.

Surgical treatment is considered if there is not lasting relief of symptoms with the initial treatment. Carpal tunnel release is one of the most common surgical procedures in the United States. Open release, the traditional procedure for CTS, consists of making an incision up to 2 inches in the palm and then dividing the transverse 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 is done in many specialized hand centers and uses special cameras to visualize and cut the ligament through two small incisions. Results of surgery are very good. Usually pain is relieved immediately after surgery, but full recovery can take months, while the incision heals and the wrist adapts to the altered ligament support.

EXPECTED OUTCOMES
Surgery, if needed, is usually successful in relieving pain. Recovery of sensation and strength can be variable and relates to the severity and duration of median nerve compression. Surgery is not without risks, which include infection, nerve damage, stiffness, and pain at the scar. Occasionally, the wrist loses some wrist strength because the carpal ligament is cut. Some patients may need to adjust job duties or even change jobs after surgery. Recurrence of CTS following surgery is rare.

MORE INFORMATION
Further information can be obtained on the internet. Your local public library can help you explore these sources if you are interested. Two good sites for expert and peer reviewed information are the American Academy of Orthopedic Surgeons at www.aaos.org and www.emedicine.com.

FEEDBACK
If you have questions or comments, please contact the office or submit them to the web site at www.pedorortho.com.