

# InfoSheet – Carpal Tunnel Syndrome

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## WHAT DO YOU FEEL?

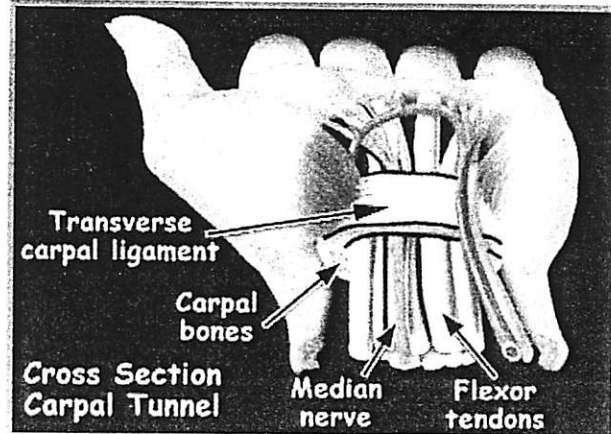
Most people with carpal tunnel syndrome (CTS) have numbness, tingling, or “pins and needles” feeling in their fingers, primarily the thumb, index, middle, and part of the ring finger. Careful scrutiny usually shows that the little finger is unaffected. This can be an essential piece of information to make the diagnosis. If you awaken with your hand asleep, pinch your little finger to see if it is numb also, and be sure to tell your doctor if it is or isn't.

The symptoms are usually intermittent, but as the problem worsens, they can become constant. Common activities that aggravate the symptoms included driving, reading, and talking on the telephone. Additionally, waking in the middle of the night with pain and a feeling that the whole hand is asleep, weakening of the hand's grip, and dropping of objects also develop. Cramping can carry from the palm and wrist to the forearm, and even across the elbow. When very severe, the muscles at the base of the thumb can waste away (thenar atrophy).

## WHAT CAUSES THE PROBLEM?

Carpal tunnel condition is caused by compression of the median nerve at the wrist, causing numbness, tingling, weakness, and discomfort in the wrist and hand. The "carpal tunnel" is a tunnel in your wrist. The floor and walls of the tunnel are formed by a group of wrist bones (called carpals). The roof is made of a strong ligament called the transverse carpal ligament (on the inside of your wrist), which spans like a bridge over the group of bones creating a tunnel at the junction of your hand and wrist. The

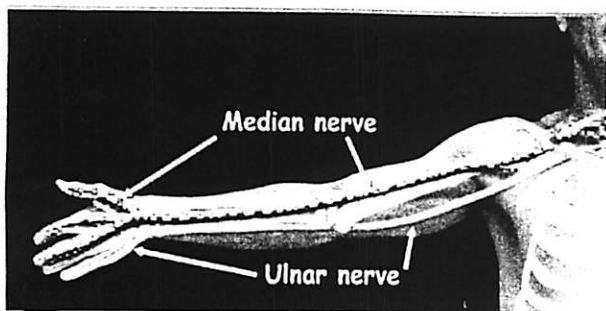
median nerve and tendons that move your fingers and thumb pass through this tunnel in order to get from hand to forearm.



*Figure: Anatomy of the carpal tunnel*

The flexor tendons are important because they allow us to move the fingers and the hand, such as when we grasp objects. The tendons are covered by a material called tenosynovium. The tenosynovium is very slippery, and allows the tendons to glide against each other as the hand is used to grasp objects. Any condition which causes irritation or inflammation of the tendons can result in swelling and thickening of the tenosynovium. As the tenosynovium covering all of the tendons begin to swell and thicken, the pressure begins to increase in the carpal tunnel (because the bones and ligaments that make up the tunnel are not able to stretch in response to the swelling). This compresses the median nerve.

Nerves are somewhat like wires. Some carry electrical information from the brain to the muscles, while others carry sensation from the skin to the brain. The nerves are also like garden hoses, such that any compression and ensuing narrowing will cause reduction of the flow of information within them.



*Figure: The Median nerve*

The median nerve travels down your arm, through the carpal tunnel, and into your hand. It carries sensory impulses (feeling) from the thumb and four fingers on the palm (except for the little finger and half of the ring finger), and carries motor impulses to the muscles of the thumb, the thenar muscles. These muscles are very important in moving the thumb so that you can touch each of the other fingers. This motion is called *opposition*.

Increased pressure in the carpal tunnel begins to squeeze the median nerve against the transverse carpal ligament - because the nerve is the softest structure in the carpal tunnel. Eventually, the pressure reaches a point when the nerve can no longer function normally. When this nerve is compressed, numbing, tingling, and aching in the palm of the hand begins followed by a weakening of the thenar muscles.

### **WHO GETS CARPAL TUNNEL SYNDROME?**

Carpal tunnel syndrome can start by the age of twenty, on through and until after the age of 80. Sometimes CTS may follow a change in work habits or physical activity involving the repetitive use of the hand(s). Other causes can be fluid retention often associated with pregnancy, diseases such as diabetes and rheumatoid arthritis, tumors of the wrist, fractures of the wrist, and thyroid imbalance. Additionally, it is also relatively

common yet temporary during pregnancy, thought to be occurring secondary to swelling and/or hormonal changes. Although it seems to occur more commonly in people who work with computer keyboards or who participate in assembly-line work, these activities in of themselves do not generally cause CTS, but may bring it out sooner in people who are prone to the condition. Other injuries or surgeries, such as wrist fractures or shoulder problems, can also cause CTS. Diabetes, rheumatoid arthritis, thyroid disease, and gout can also cause CTS. In the vast majority of people, however (greater than 95%), we cannot find any specific cause for the onset of CTS.

### **WHAT ARE "ELECTRICAL" OR "NERVE STUDIES" FOR TESTING MY CARPAL TUNNEL?**

You may have had or have been asked to have electrical studies in order to measure the severity of your carpal tunnel syndrome. Since nerves carry electrical impulses, the best way to test a nerve is to start an electrical impulse at one position and then measure how fast it is conducted, and how much of the impulse gets past the point of possible compression. This is called a "nerve conduction study". The second kind of testing involves assessing how well the nerves "talk" to the muscles. This is accomplished by placing a thin pin into the muscle itself. This particular test is termed an "EMG", or electromyography. Together, the two types of tests can tell how severe the CTS is, ensure that no other nerve-related problems are contributing to the patient's symptoms, and give the surgeon a relatively good idea of how complete of a recovery there will be after the surgery is performed.

## HOW IS CARPAL TUNNEL SYNDROME TREATED?

The first step is activity and workplace/homeplace modification, as well as part-time splinting. Frequent breaks in repetitive tasks are also helpful.

Wearing a removable wrist splint at night, as well as wearing it as needed during the day, will often provide some symptom relief. These braces simply keep the wrist in a neutral position (not bent back too far nor bent down too far, as commonly happens while people sleep). When the wrist is in this neutral position, the carpal tunnel is as big as it can be - so the nerve has as much room as possible. By preventing such extremes of motion of the wrist at night, many people will also feel fewer symptoms during the day. If you have symptoms during the day as well, the brace may help reduce those symptoms as well.

Anti-inflammatory medications taken by mouth may tend to decrease a patient's symptoms. Cortisone injections into the carpal tunnel used to be more widely used to reduce symptoms, but it is generally recognized that the effects are only temporary, typically lasting only 1-2 months. Physical therapy and massage is sometimes of benefit in the treatment of CTS.

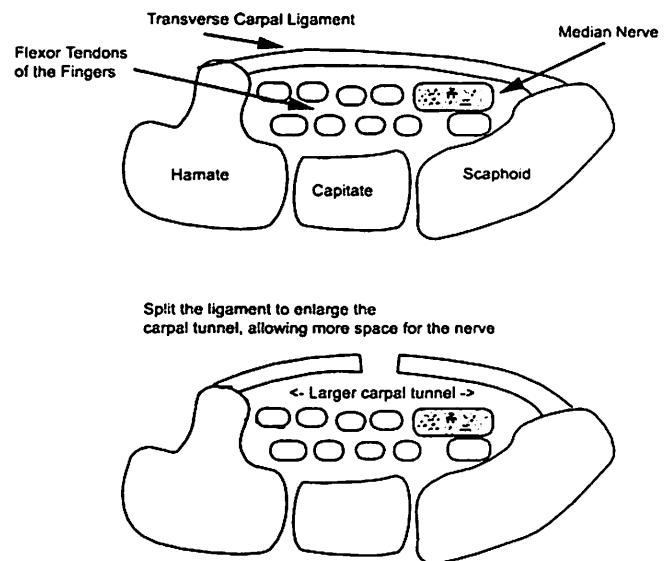
For those people that respond poorly to conservative treatment of CTS, operative treatment results in good outcomes in more than 95% of patients. The operation is done as an outpatient, and the type of skin incision may vary. Underneath, the goal is the same: the release of the transverse carpal ligament (see diagram). This allows the carpal tunnel to enlarge in volume, releasing the pressure on the median nerve. The ligament then re-heals in the expanded position.

### **Basic Steps in Open Carpal Tunnel Release:**

A small incision, usually less than 2 inches, is made in the palm of the hand. In some cases, the incision needs to be extended into the forearm.

Next, a structure called the palmar fascia is divided, so that the constricting element, the transverse carpal ligament, can be seen.

The transverse carpal ligament is then released with either a scalpel or scissors, while making sure that the median nerve is out of the way and protected. This relieves the pressure on the median nerve.



*Figure: Opening the canal...*

At the end of the procedure, only the skin incision is repaired. The transverse carpal ligament remains open and the gap is slowly filled by scar tissue.

### **WHAT HAPPENS AFTER THE SURGERY?**

Since no splint is applied, you can move your fingers and use your hand as soon as the anesthesia wears off. It's important to fully open and close your fist as much as possible, as it will help keep the swelling down in the fingers. You are allowed to use your hand immediately for daily activities, and you can use your hand for driving and light duty work starting the next day. Some activities may cause you pain, but they will not injure the hand or median nerve.

The sutures come out in ten days to two weeks, and most people get back to doing most of their activities in 2-4 weeks.

The improvement from the operation commonly comes in stages. The tingling and night pain often resolves within just a few days. Sensation improves in about 3 months, and strength improves in about 6 months. The six month mark usually represents the final result that will be achieved, as further improvement will then be small.

About one-half of the patients undergoing carpal tunnel release experience "pillar pain". This typically feels like a dull ache at the base of the palm on both sides of the incision. This pain will slowly get better over the 4-6 months after the surgery.

### **IS IT EVER "TOO LATE" TO HAVE THE SURGERY PERFORMED?**

Some patients say that other doctors/friends/family members, etc., have told them that, as "bad" as their carpal tunnel syndrome is, it's "too late" to have the surgery.

*This is not true.*

The main reason to have a carpal tunnel release is to prevent the symptoms from worsening. This goal is achievable in *almost everyone*. The next reason to have the surgery would be to improve the symptoms, such as eliminating any existing night pain. This goal is also achievable in *most people*, although the degree of improvement varies with the severity of the disease. The last reason to have the surgery is the goal of achieving a symptom-free, "normal" hand. While the worsening of the disease can be stopped and the symptoms can be made better, some "numbness" and weakness of grip may *always* remain, despite having surgery. This may reflect *permanent changes* within the nerve that occur secondary to not doing surgery early enough.