

Carpal Tunnel Syndrome Surgery

Overview

Carpal tunnel syndrome causes tingling, numbness, or pain in the hand. The wrist bones and ligament form a tunnel, a passage for the median nerve and finger tendons. Repetitive strain may cause swelling that traps the nerve within the tunnel. Prompt treatment increases the chances that symptoms will stop and long-term nerve damage will be prevented. Self-care includes modifying activities, stretching, and icing. Conservative treatments include physical therapy, a wrist brace, or medications. Surgery that re-opens the space and frees the nerve may be an option.

What is carpal tunnel syndrome?

The carpal tunnel is a narrow passage inside the wrist formed by bone on the bottom and a carpal ligament on top. The median nerve and adjacent tendons run from the forearm into the palm to control the thumb and first three fingers. Carpal tunnel syndrome (median nerve entrapment) occurs when the median nerve is squeezed or compressed at the wrist. Swelling and inflammation develop, compressing the nerve and causing carpal tunnel symptoms. Carpal tunnel syndrome is the most common type of nerve entrapment.

What are the symptoms?

Numbness, pins-and-needle tingling, or pain occurs along the path of the median nerve. Symptoms begin slowly at first; pain comes and goes in the thumb and first three fingers. Some people “shake out” their hands to try to ease the discomfort.

Other common symptoms are waking at night with pain, a shooting pain in the wrist or forearm, or a weakened grip. People complain of dropping things, having difficulty buttoning clothes, having fingers that feel swollen (even when they’re not), and having trouble making a fist. If long-standing nerve damage and a loss of muscle mass occur, this may cause the palm area under the thumb to look smaller. As the condition worsens, you may feel sharp, shooting hand pain that persists during the day. The pain may extend up to the elbow.

Not all hand pain is related to carpal tunnel. Therefore, a diagnosis is needed to rule out other problems, such as ulnar nerve entrapment at the elbow or a pinched nerve in the neck (cervical radiculopathy).

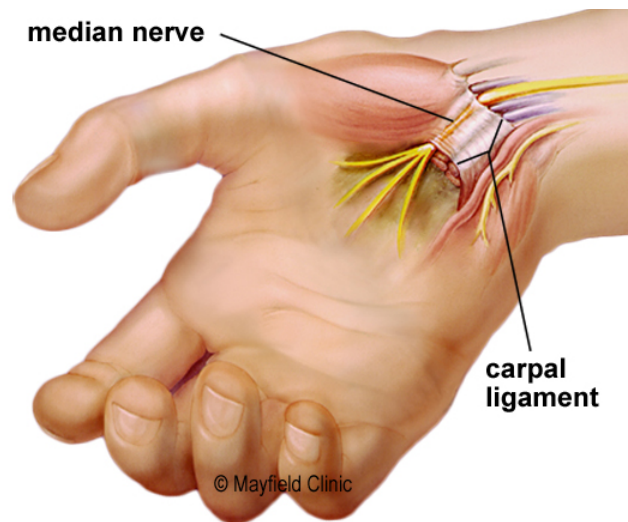


Figure 1. The median nerve and tendons pass through the carpal tunnel, a rigid passageway made of bone and ligaments. The nerve runs from the forearm into the palm of the hand, controlling the thumb and first three fingers.

What are the causes?

Carpal tunnel pain occurs when the tendon presses on the median nerve. With inflammation, the space within the carpal tunnel shrinks, adding to the compression of the nerve.

Some people, often women, have a smaller tunnel and are more at risk of developing carpal tunnel syndrome.

Repetitive movements with the wrist in an unnatural position or overuse are seen among office workers, computer/smart phone users, carpenters, assembly line workers, musicians, and some athletes. Carpal tunnel syndrome can also develop with illness (e.g., rheumatoid arthritis, diabetes, hypothyroidism), obesity, smoking, or pregnancy. It can result from trauma, an injury to the upper arm, a dislocated wrist, or a fracture.

How is a diagnosis made?

Shooting pain in the hand signals carpal tunnel syndrome. An accurate diagnosis rules out other joint or muscle problems that can mimic this syndrome. Your doctor will check the feeling, strength, and appearance of your neck, shoulders, arms, wrists, and hands. Your doctor will ask about your hand pain, including possible causes, and will perform two tests that pinpoint median nerve compression.

Tapping test: Tap the inside of your wrist. Does this cause pain or shock-like tingling?

Wrist flexion (Phalen test): Put the back of your hands together, shoulders relaxed, with fingers pointing down for 1 minute. Does this cause your symptoms?

Inform your doctor about any health problems (e.g., diabetes), strains or recent injuries to your wrist, arm, or neck. Any one of these could affect the median nerve. Describe your daily routine or anything that could have strained or hurt your wrist. Your doctor might order blood tests, which can help detect a health problem that is causing your symptoms. If there are signs or symptoms of a nerve or muscle disorder, your doctor may order an electromyography with nerve conduction testing.

EMG (electromyography): a needle inserted into a muscle of your hand records the electrical activity of that muscle (Fig. 2). Testing also includes a nerve conduction study; electrodes are taped to the skin to deliver several quick, split-second electrical pulses. In carpal tunnel syndrome, the speed of the median nerve impulses is slower than normal. The test is uncomfortable: as the current is applied, a split-second tingle, burning, or shock sensation is felt.

Results will confirm whether your pain is related to the median nerve and not something else. If nerve entrapment is involved, your physician will discuss possible treatments with you.

What treatments are available?

The severity of your symptoms will guide treatment. For mild to moderate symptoms, a number of nonsurgical strategies may help your wrist and hand feel better. Ask your doctor which is right for you.

Nonsurgical therapy

- **Stop and rest:** Stop or reduce repetitive activities that cause stress, numbness, and pain. Rest your wrist longer between activities. Have good posture, especially in the neck and shoulder area.
- **Stretch and strengthen:** Certain yoga stretches and exercises may be therapeutic. Improving wrist and forearm mobility and strengthening may help.

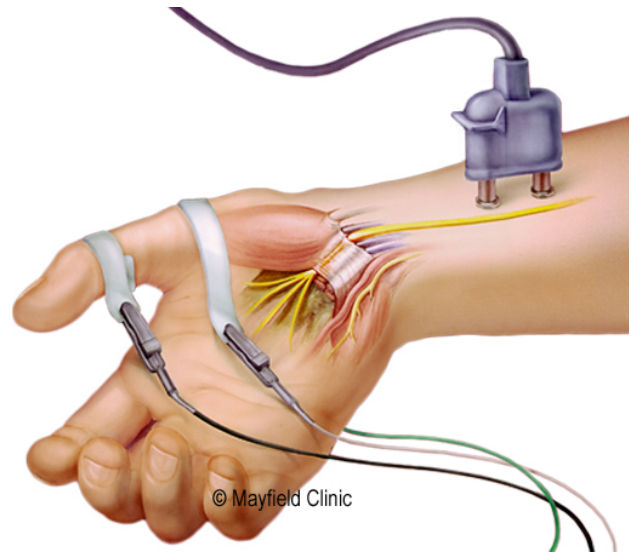


Figure 2. During an EMG, a needle is inserted into your hand records the muscle's electrical activity. During the nerve conduction study, electrodes are taped to the skin to deliver several quick--split second--electrical pulses that will determine the speed of the nerve's signal.

- **Reduce swelling:** Ice your wrist for 10 to 15 minutes 1 or 2 times every hour. Although nonsteroidal anti-inflammatory drugs (NSAIDs) may relieve pain and reduce swelling, use these medications with caution.
- **Balance musculature:** Chiropractic adjustments in the spine and extremities may reduce wrist pain, restore joint motion, and balance musculature. Massage or physiotherapy may address painful trigger points.
- **Keep wrist in a neutral position:** Keep your wrist straight by wearing a wrist splint at night.
- **Be anti-inflammatory:** Try an anti-inflammatory diet and add B6 and B12 supplements if approved by your doctor.
- **Steroid injections:** An injection of cortisone, a synthetic steroid solution, into the carpal tunnel area may help to reduce the inflammatory cascade of carpal tunnel pain and swelling. Pain relief after the injection is immediate for some patients or delayed for others; some have no relief at all. Your doctor will discuss the special precautions and potential complications of these injections.

Surgery

Sometimes carpal tunnel pain persists. Even in patients who have carefully followed nonsurgical therapy, symptoms can become debilitating and make daily activities more difficult. If nerve damage is a concern or the muscles appear weak or atrophied, treatment becomes more pressing to avoid further damage.

Surgery to cut and release the ligament may be an option if testing confirms the median nerve is

entrapped or if pain, weakness, and numbness persist. After surgery the ligament heals back together, but with enough space for the nerve.

What happens during surgery?

Surgery can be performed either as an open or endoscopic technique. Both are performed as outpatient surgery, require small incisions, and take only 10 minutes. Both procedures involve cutting the carpal ligament to relieve pressure on the median nerve. Recovery varies, depending on the incision size and the patient's overall health.

OPEN SURGERY

Step 1: prepare the patient

No food or drink is permitted past midnight the night before surgery. Patients remain awake for the entire process. A sedative can lessen anxiety and help you relax. A local anesthesia, or nerve block, numbs the hand before the incision is made.

Step 2: make an incision

A 1- to 2-inch incision is made from the base of the wrist to the middle of the palm (Fig. 3).

Step 3: open the carpal tunnel

The skin edges are opened to reveal the carpal ligament. The undersurface of the ligament is separated to protect the nerve and tendons below. A cut is made in the ligament to open the tunnel and release the median nerve (Fig. 3).

Step 4: close the incision

The skin incision is closed with a few stitches made in a crease in the palm. Sometimes long-acting numbing medicine is injected around the site to lessen pain. The wound is covered with a bandage.

ENDOSCOPIC SURGERY

Another technique is to use an endoscope. After two small incisions are made in the wrist and palm, an endoscope equipped with a small camera is inserted. Viewing the carpal tunnel through the endoscope, the surgeon cuts the ligament from underneath to release the median nerve. If needed, the procedure can be switched to an open surgery.

What happens after surgery?

Pain after surgery is minimized with oral or intravenous analgesics. Elevation and an ice pack for the bandaged hand can help reduce bleeding and swelling. You will be monitored for a short time. When the doctor believes you are stable, you can leave the surgery center. Be sure to bring someone to drive you home. If you have any complications, you may be required to stay longer.

Mild pain, discomfort, and swelling are common after surgery. Your doctor may recommend icing, elevation of the hand, over-the-counter pain medications or a splint to be worn at night or during various activities. Your doctor also may limit the amount of weight you can lift.

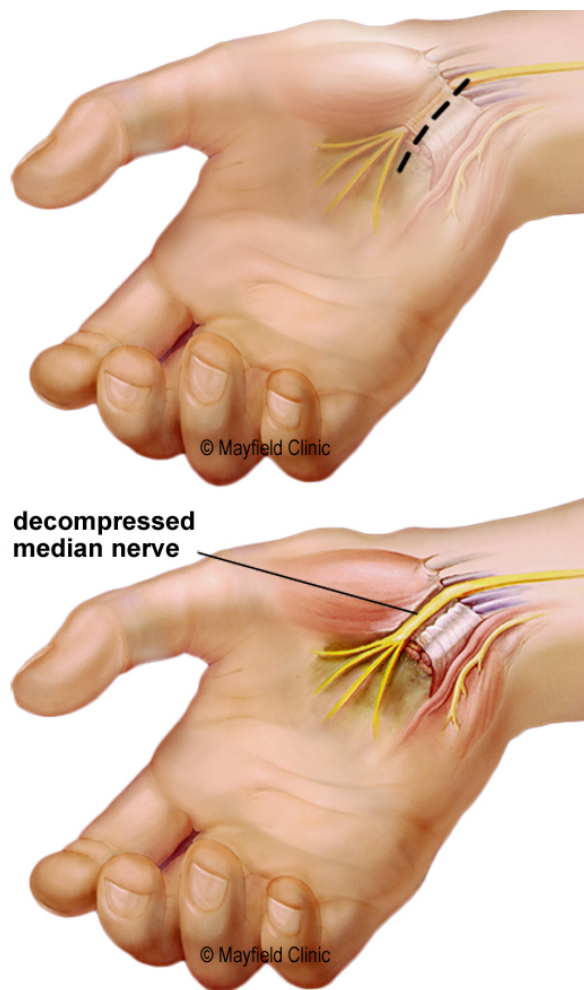


Figure 3. A 1-inch incision is made in the wrist. The transverse carpal ligament is cut to free the median nerve.

Healing after surgery

Time	What to expect	Activity
48 hours	Mild pain and swelling	Rest, ice, and elevate your hand.
7-10 days after surgery	Stitches removed	Slow and easy movement. Gentle exercise and stretches for fingers and hand. Massage area to reduce scarring.
4-6 weeks after surgery	Carefully resume your normal activities during next few months	Add flexibility / strengthening exercises. Problems, like grip loss, may benefit from physical or occupational therapy.
1 year	Recovery	Full or partial.

Stitches are removed 7–10 days after surgery in the doctor's office.

Follow the surgeon's home care instructions for 2 weeks after surgery or until your follow-up appointment. In general, you can expect:

Restrictions

- Keep the arm elevated above your heart for 48 hours.
- Avoid pushing down on your palm (for example when getting out of a chair). Don't lift anything heavier than 5 pounds on the involved arm for one month after surgery.
- No strenuous activity including yard work, housework, and sex.
- You may drive 2 days after surgery if the pain and swelling in your arm is controlled.
- Don't drink alcohol. It thins the blood and increases the risk of bleeding. Also, don't mix alcohol with pain medicines.

Incision Care

- You may shower the day after surgery. Keep any dressing in place and wrap in plastic wrap or plastic bags while you shower.
- Any dressing over the staples or stitches can be removed 2-3 days after surgery. Once the dressing is removed, wash the area gently with soap and water. Pat dry. Inspect and wash the incision daily.
- If there is drainage, cover the incision with a dry gauze dressing. If drainage soaks through two or more dressings in a day, call the office.
- Don't soak the incision in a bath or pool.
- Don't apply lotion/ointment on the incision.
- Dress in clean clothes after each shower. Sleep with clean bed linens. No pets in the bed until your incision heals.
- Staples, steri-strips, and stitches will be removed at your follow-up appointment.

Medications

- Take pain medicines as directed by your surgeon. Reduce the amount and frequency as your pain subsides. If you don't need the pain medicine, don't take it.
- Narcotics can cause constipation. Drink lots of water and eat high-fiber foods. Stool softeners and laxatives can help move the bowels. Colace, Senokot, Dulcolax and Miralax are over-the-counter options.

Activity

- Ice your incision 3-4 times per day for 15-20 minutes to reduce pain and swelling.

- If you were given a brace, wear it at all times even when sleeping. Only remove to shower or to ice the incision.

When to Call Your Doctor

- Fever over 101.5° (unrelieved by Tylenol).
- Some drainage from the incision is normal. A large amount of drainage, foul smelling drainage, or drainage that is yellow or green should be reported to your surgeon's office.

Recovery

After surgery on your dominant hand, 6 to 12 weeks is typical before you can return to full activities. If surgery was on your other hand, 1 or 2 days is common. Ask your surgeon about when you can return to work and resume other activities.

What are the risks?

No surgery is without risks. General complications of any surgery include bleeding, infection, blood clots, and reactions to anesthesia. Specific complications related to carpal tunnel surgery may include nerve injury and scarring.

What are the results?

During the healing process, the ligament gradually grows back together while allowing more room for the nerve than there was before. Some patients feel tenderness around the scar.

Most patients are helped by surgery and are able to return to their jobs. If there was nerve damage before surgery, a full recovery to a "normal hand" may not be possible. Loss of wrist strength affects 10 to 30% of patients. Residual numbness, loss of grip, or pain may be helped by physical therapy. Persistent symptoms are higher in those with diabetes.

The risk of recurrence is small. The most common reason for repeat surgery is incomplete cutting of the ligament during the first surgery or scarring.

Sources & links

If you have more questions, please contact Mayfield Brain & Spine at 800-325-7787 or 513-221-1100.

Sources

1. Vasiliadis HS, et al. Endoscopic vs. open carpal tunnel release. *Arthroscopy* 26(1):26-33, 2010
2. Mintalucci DJ, Leinberry CF Jr. Open versus endoscopic carpal tunnel release. *Orthopedic Clinics NA* 43:431-437, 2012.



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