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 pinches and 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 can include 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).

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.

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.

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

### Healing after surgery

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

Discomfort/pain/swelling
1. For the first 48 hours after surgery: rest and elevate your hand above your heart on a pillow. Use an ice pack on the hand for 15 minutes several times a day.

2. Immediately after surgery, pain is managed with narcotic medication. Because narcotic pain pills are addictive, they are prescribed for 2 weeks or less. Their regular use may cause constipation, so drink lots of water and eat high-fiber foods. Laxatives (e.g., Dulcolax, Senokot, Milk of Magnesia) may be bought without a prescription.

3. Thereafter, pain is managed with acetaminophen (e.g., Tylenol) and nonsteroidal anti-inflammatory drugs (NSAIDs) (e.g., aspirin; ibuprofen, Advil, Motrin, Nuprin; naproxen sodium, Aleve).

Restrictions
4. Do not lift anything heavy with your treated hand for 1 month.

5. Avoid activities that put pressure on the palm of your hand, such as typing, using a computer, or working with tools (e.g., screwdrivers, hammers) until your surgeon gives the okay.

6. There are no dietary restrictions. Eat healthy.

Activity

Bathing/Incision Care
8. You may shower 1 day after surgery unless otherwise instructed.

9. Keep the bandage dry and clean. Replace it as needed.

When to Call Your Doctor
Call your doctor if the incision begins to separate or shows signs of infection, such as redness, swelling, pain, or drainage.

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.

References

Glossary
endoscopic-assisted surgery: carpal tunnel release can be performed using a probe (endoscope) that is fitted with a tiny camera and light; the endoscope is inserted through a small incision in the hand to release the entrapped nerve.