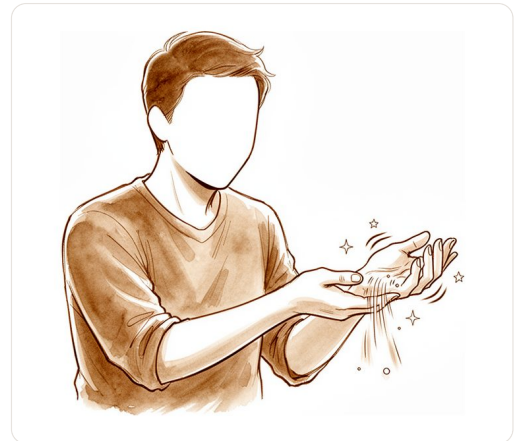


Carpal Tunnel Syndrome

The median nerve passes through the carpal tunnel at the front of the wrist, alongside nine flexor tendons.

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What you're feeling

Carpal tunnel syndrome happens when the nerve running from your forearm into your hand gets squeezed at the wrist. The tingling and numbness usually show up in your thumb, index and middle fingers. Many people notice it first at night. The tingling can wake you up, and you may shake or rub your hand to settle it. Symptoms often flare on waking too, or after using your hands a lot during the day.

As the condition gets worse, the numbness can become constant and the muscles at the base of your thumb can waste away. That makes pinching and gripping harder. You might struggle to hold a coffee mug, turn a door handle, button a shirt, or hold your phone for long. Some people also feel aching in the hand or wrist that does not line up neatly with those three fingers. That is still common, and these symptoms often settle after treatment as well.

A few things raise the chance of developing carpal tunnel syndrome. Carrying extra body weight and doing highly repetitive hand work are both linked to it. It is also more common in women, and it becomes more frequent through middle age. Sometimes it appears alongside other nerve compression, such as at the elbow. Occasionally it can be a sign of a wider health problem, which is why your surgeon takes a full history rather than only looking at your wrist.

The symptoms can improve without surgery, especially when they are mild to moderate. If they keep going or get worse, it is worth getting them checked. Numbness that comes on quickly and worsens over hours needs urgent attention, and pain that is severe or constant should be assessed promptly too.

What's actually happening

Inside your wrist there is a narrow tunnel formed by the small carpal bones on one side and a tough band of tissue, called the transverse carpal ligament, across the other. Through this tunnel run the tendons that bend

your fingers, and the median nerve, which gives feeling to your thumb, index and middle fingers. The tunnel has very little spare room. Anything that takes up extra space inside it, or makes it smaller, squeezes the nerve.

That squeezing is the whole problem. Swelling of the tendon linings, fluid changes during pregnancy or with thyroid and kidney problems, a wrist fracture that has healed with extra bone, or simple thickening of the tunnel's roof can all crowd the nerve. Pressure inside the tunnel rises. The nerve reacts by producing the tingling, numbness and night symptoms you read about above. When the pressure stays high over months and years, the nerve itself becomes damaged, which is why numbness can turn constant and thumb muscles can waste.

Doctors describe two patterns. Acute carpal tunnel syndrome is rare: pressure shoots up suddenly, often after an injury, and the hand needs urgent attention. Far more common is the chronic type, where pressure creeps up slowly. At first it may only rise now and then, for example when you hold your wrist bent for a while, such as during sleep. Over time the pressure stays raised all the time and symptoms become constant.

Treatment follows from this picture. Splints and other nonsurgical methods can settle mild to moderate symptoms by easing the pressure. When they do not, an operation called carpal tunnel release cuts the ligament forming the roof of the tunnel. This opens the tunnel up and takes the pressure off the nerve. Most people who have it get complete or partial relief, with 97% of patients experiencing complete or partial relief. The nerve then recovers at its own pace, and feeling can keep improving for longer than was once thought.

What we can do about it

Dr Kieran Hirpara, an upper-limb surgeon at Mater Private Hospital Rockhampton, starts with the least invasive options that suit your condition. Patients are generally referred to our clinic by their GP; if a physiotherapist has suggested you see us, you will still need a referral from your GP in order to be eligible for the Medicare rebate. At the clinic visit we take a history, examine your hand and arrange imaging if it is needed. For carpal tunnel syndrome we usually begin with non-operative care and consider surgery if that has not given enough improvement.

The first step is often a wrist splint. It holds your wrist straight, which lowers the pressure inside the tunnel and improves blood flow and nerve function. You would wear it for at least 4 weeks, and improvement usually shows up within the first 2 weeks. Wearing it full time may work better than wearing it only at night. A splint that keeps the wrist straight relieves symptoms better than one that bends it back. Hand therapy and stretches can sit alongside this, and some people find lymphatic drainage techniques help with pain. Used early and consistently, these measures can settle mild to moderate symptoms and may avoid surgery altogether.

If a splint alone is not enough, we may offer a cortisone (steroid) injection into the tunnel. This reduces swelling around the nerve. Combining the injection with splinting gives a modestly greater reduction in symptoms, better functional recovery and better nerve function at 12 weeks than the injection alone. We do not use steroid tablets for this condition, because even a short course carries long-term risks that are not fully known.

If these steps have not settled your symptoms, surgery may be the next option. Carpal tunnel release cuts the ligament forming the roof of the tunnel, which takes the pressure off the nerve. Surgery relieves symptoms

better than splinting. It is a shared decision: we will talk through what you have tried, how bad your symptoms are and what matters to you, and decide together whether surgery is right for you.

What to expect

Carpal tunnel syndrome does not usually stay the same. Mild symptoms can settle on their own or with simple treatment such as a splint. Some people get long-term relief from a cortisone injection, especially when it works well at first. But when symptoms are severe or have been present a long time, they rarely go away without treatment. Left alone, the numbness tends to become constant and the hand can weaken.

With the right treatment, most people improve. The great majority of people who have surgery get complete or partial relief. Feeling and hand function usually keep getting better over the first 12 weeks, and improvement can continue well beyond a year. Nerve recovery is slow, so be patient with your hand.

How quickly you improve depends partly on how severe things were to begin with. If your numbness and tingling were mild or moderate, they tend to settle sooner than when the nerve has been squeezed hard for a long time. If your symptoms were severe, recovery can take longer and may not be complete even a year later, particularly the numbness. Even then, most people still feel a real reduction in their symptoms.

A few things are worth knowing. Some people notice extra tingling for a while after the nerve is released. Symptoms outside the three main fingers also tend to settle, with more than 85% of these resolving. If you have diabetes, surgery helps about as much as it does for people without diabetes.

Sometimes symptoms do not fully settle, or they come back after a period of relief. This is uncommon, and it can usually be worked out why. A small number of people need a further operation, and that is more likely in the first year than later. If you are one of them, a second release can still bring meaningful improvement in hand function and quality of life.

Your surgeon will talk with you about where your own symptoms sit on this spectrum, so you know what a realistic recovery looks like for you.

When to see someone

See your GP if tingling or numbness in your thumb, index or middle fingers keeps coming back, wakes you at night, or stops settling after a few weeks of a splint. Ask for a specialist review if the numbness becomes constant, your grip weakens, or the muscles at the base of your thumb look flatter than they used to. Severe or constant pain also deserves a prompt assessment rather than waiting it out.

Go to an emergency department if numbness comes on suddenly and worsens over hours, especially after a wrist injury. That pattern needs same-day assessment, because pressure inside the tunnel can rise fast and the nerve needs relieving quickly.

A few warning signs call for urgent investigation rather than routine review. Pain that is severe and constant, numbness that arrives without any obvious trigger, or symptoms that do not match the usual three-finger

pattern can all point to something less common going on. Tell your GP about them clearly, because they change how quickly you should be seen.

If you have already had a release and symptoms return or never fully settled, go back to your surgeon. Imaging or nerve tests can usually show why, and a second operation helps many people in that situation.

In more depth

This section goes further than you need for your own treatment decisions. Carpal tunnel syndrome is worth the extra reading because it is the most reliably successful operation in hand surgery, which makes the three situations where it behaves differently the ones actually worth understanding.

DIABETES CHANGES LESS THAN YOU WOULD EXPECT

Patients with diabetes are frequently told their result will be worse, and it is a reasonable thing to assume: diabetes damages nerves, and this is a nerve operation.

The evidence does not support it. Pooling **2,869** patients, there was **no significant difference** in improvement across essentially all outcomes after carpal tunnel release between diabetic and non-diabetic patients, the single exception being sensory conduction velocity, an electrical measurement rather than something you would notice [1].

The honest framing is that diabetes may affect the nerve's baseline, but it does not appear to stop decompression from working. The authors' own conclusion is that better diabetic neuropathy care is what deserves attention, not withholding an operation that helps.

THREE WAYS TO DO IT, AND WHY THIS PRACTICE DOES THE OLDEST ONE

The carpal tunnel can be released through an open incision, endoscopically through one or two small portals, or percutaneously with a needle-sized blade guided by ultrasound. All three cut the same structure, the transverse carpal ligament, and the argument between them is about the first few weeks, not about whether the numbness resolves.

Open versus endoscopic has been compared repeatedly. Pooling randomised trials across **1,596** patients, the two were **similar in relief of symptoms**, but endoscopic release produced better recovery of function and **earlier return to work**, and was safer across the measured complications [2].

Ultrasound-guided release is the newer arrival, and it is the one you are most likely to meet in advertising, usually described as "incisionless" and offered in rooms under local anaesthetic rather than in an operating theatre. Two things are worth knowing before that framing does your thinking for you. It is not literally incisionless, there is still a small puncture, and the published trials measure it as a *shorter* incision, not the absence of one. And the evidence, while genuinely encouraging, is thinner than the confidence of the marketing suggests. The pooled analysis of randomised trials rests on **three studies and 221 patients**: function scores favoured ultrasound guidance, and patients returned to normal activities **20.8 days earlier** than after open release [4]. Two large 2026 comparisons matched on patient characteristics: 356 patients against open release [5] and 372 against endoscopic [6] – found it safe and effective, needing less anaesthetic, using fewer opioids

afterwards and leaving patients happier with the wound, though it took **longer to perform** than either alternative. Improvements have held out to **six years** [7].

The honest counterweight rarely appears in the advertising, and it is mostly about **who is holding the probe**.

A 2025 Innsbruck series described patients who needed a second, open operation after an ultrasound-guided release, for incomplete division of the ligament, nerve injuries and arterial injuries [8]. The detail that matters is the operator. Of the fourteen, the original procedure had been done by radiologists in eleven, by a general surgeon in one, and by experienced hand surgeons in two. What happened next differed accordingly. In one of the two hand-surgeon cases, an artery was caught during the release; the bleeding was recognised immediately, the surgeons converted to an open operation on the spot, stopped it, finished the release, and the patient had no further trouble. In the general-surgeon case, the woman had numbness from the moment she woke up, was given two cortisone injections that did nothing, and came back nine months later needing the median nerve rebuilt with **three sural nerve grafts**. That is the argument for experience in one comparison: not that complications never happen to skilled operators, but that a skilled operator recognises one and can rescue it in the same sitting.

Be careful how much weight you put on that series, though, because it has been publicly contested and partly corrected. A high-volume interventional radiology group replied that its central recommendation was “not supported by the data provided”, the series reported no denominator, no total number of procedures and no comparison rate, so it cannot be turned into a risk. That group has performed **more than 2,000** of these releases under a standardised protocol, and pointed out that even if all eleven radiologist cases had needed revision, that would be a revision rate below **5 per 1,000** [10]. The original authors then conceded that three of those cases had been misclassified and were not examples of incomplete release at all, describing it as “a critical error in both the data and its interpretation” [10].

Where the two sides agree is the useful part, and it is worth stating plainly: this operation should be done by someone with real expertise in nerve ultrasound working to a standardised technique, with hand-surgical help immediately available if something has to be converted to an open procedure partway through. The learning curve is roughly **30 procedures** before operating time settles [9]. If you are considering it, those are the fair questions to ask, how many the operator has done, to what protocol, and what happens if it has to become an open operation today rather than in nine months.

On the safety comparison the marketing leans on hardest, the pooled complication rate was 7.1% for ultrasound guidance against 5.6% for open release, a difference whose confidence interval ran from 0.04 to 15.10 [4]. That interval is so wide it tells you almost nothing. “No difference in complications” here means “nobody has yet measured this well enough to say”.

Dr Hirpara performs open carpal tunnel release. The reason is the thing open surgery uniquely offers: the ligament and the nerve are seen directly, the release can be confirmed complete under vision, and any anatomical variation, an extra muscle belly, an unusual branch of the nerve, is dealt with as it is found rather than worked around. It needs no special equipment, and it remains the technique of choice for revision surgery and for unusual anatomy whichever approach a surgeon normally favours.

The trade is real and you should hear it stated plainly: the evidence above suggests you would probably get back to work sooner after an endoscopic or ultrasound-guided release. What the evidence does not suggest is that

you would end up in a different place. If a faster return matters more to you than direct vision of the nerve, that is a legitimate preference, and it is worth raising at your appointment rather than deciding from a website.

THE NERVE THAT STILL HURTS AFTERWARDS MAY NOT BE THE ONE THAT WAS RELEASED

This is the finding most worth carrying away. In a cohort of **7,867** patients undergoing surgery for nerve compression, approximately **3%** underwent decompression of a **different** nerve in the same arm within a year [3].

Three percent is small in absolute terms and large in what it implies. Nerve compression is frequently not a single-site problem: the same person can have median nerve compression at the wrist and ulnar nerve compression at the elbow, and the symptoms overlap enough that one can mask the other. When the hand is still not right after a technically successful release, the question is not always “did the operation fail”, sometimes it is “was there a second site all along”. The authors specifically note that patients with both carpal and cubital tunnel syndrome may benefit from simultaneous decompression [3].

WHY THE OPERATION WORKS SO WELL

The mechanics are unusually simple, which is much of the explanation. The carpal tunnel is a closed space with a rigid floor of carpal bones and a tough transverse carpal ligament as its roof. Pressure inside it rises, the median nerve is the softest structure present, and it suffers. Dividing the ligament converts a closed compartment into an open one and the pressure falls immediately.

That is why relief of night pain is often nearly instant while numbness takes months: the compression stops the day of surgery, but the nerve then has to repair itself, and nerve recovers slowly and from the top down. Persistent numbness at six weeks is usually a nerve healing on schedule rather than an operation that did not work.

REFERENCES

1. Moradi A, Sadr A, Ebrahimzadeh MH, Hassankhani GG, Mehrad-Majd H. Does diabetes mellitus change the carpal tunnel release outcomes? Evidence from a systematic review and meta-analysis. *J Hand Ther.* 2020;33(3):394-401.
2. Chen L, Duan X, Huang X, Lv J, Peng K, Xiang Z. Effectiveness and safety of endoscopic versus open carpal tunnel decompression: a meta-analysis of randomized controlled trials. *Arch Orthop Trauma Surg.* 2014;134(4):585-93.
3. Mendelaar NH, Hundepool CA, Hoogendam L, Duraku LS, Zöphel OT, Selles RW, et al. Multiple compression syndromes of the same upper extremity: prevalence, risk factors, and outcomes. *J Hand Surg Am.* 2023;48(5):479-88.
4. Ekhtiari S, Phillips M, Dhillon D, Shahabinezhad A, McMains C, Dzwierzynski B, Bhandari M. Carpal Tunnel Release with Ultrasound Guidance Versus Open and Mini-Open Carpal Tunnel Release: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *J Hand Surg Glob Online.* 2025;7(2):121-126.
5. Marwin VM, Lincoski CJ, Nelson JT, Watt JF, Moeller AT, Perry PE, et al. Propensity Score-Matched Comparison of Ultrasound-Guided Versus Open Carpal Tunnel Release: Three-Month Outcomes From the MISSION Registry. *J Hand Surg Glob Online.* 2026;8(2):100931.
6. Marwin VM, Nelson JT, Watt JF, Verheyden JR, Perry PE, Warhold LG, et al. Prospective Multicenter Propensity Score-matched Comparison of Ultrasound-guided Versus Endoscopic Carpal Tunnel Release. *J Hand Surg Glob Online.* 2026;8(3):100974.
7. Cano LC, Leiby BM, Shum LC, Ward MG, Joseph AE. Clinical Results of Carpal Tunnel Release Using Ultrasound Guidance in Over 100 Patients at Two to Six Years. *J Hand Surg Glob Online.* 2024;6(3):354-359.
8. Köhl M, Seeher U, Kaiser P, Schmidle G, Zimmermann R, Sigl S. Complications after ultrasound-guided carpal tunnel release: a case series. *J Hand Surg Eur Vol.* 2025;50(8):1050-1053.

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9. Castro-Menéndez M, Balvís-Balvís P, Denisiuk M, Vázquez-Cancela O. Assessing the learning curve for percutaneous ultrasound-guided release in carpal tunnel syndrome. *J Hand Surg Eur Vol.* 2025;50(10):1365-1370.
10. Gruber H, Honold S, Skalla-Oberherber E, Loizides A. RE: Köhl M, Seeher U, Kaiser P, Schmidle G, Zimmermann R, Sigl S. Complications after ultrasound-guided carpal tunnel release: a case series. *J Hand Surg Eur Vol.* 2026;51(3):384-385.