Anthem

Clinical UM Guideline

Subject: Carpal Tunnel Decompression Surgery
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Description

This document addresses open and endoscopic surgical decompression of the median nerve, as a treatment for carpal tunnel syndrome, which occurs when the median nerve, which runs from the forearm into the palm of the hand, becomes compressed or squeezed at the wrist. The carpal tunnel is a narrow, rigid passageway of ligament and bones at the base of the hand that houses the median nerve and the tendons that bend the fingers. The median nerve provides feeling to the palm side of the thumb and to most of the fingers.

Note: For a related topic, see CG-MED-24 Electromyography and Nerve Conduction Studies

Clinical Indications

Medically Necessary:

Carpal tunnel decompression surgery (open or endoscopic) is considered **medically necessary** when the criteria in Section I (Diagnostic criteria) **and** Section II (Symptom Severity criteria) below are met:

I. Diagnostic Criteria:
Clinical evaluation confirms the diagnosis of carpal tunnel syndrome by a consistent history, physical exam and/or confirmatory electrodiagnostic testing.
and
II. Degree of Clinical Severity Criteria:
The symptoms are severe based on one (1) or more of the following:
   A. There is persistent pain, sensory loss, or paresthesia in the median nerve distribution that is refractory to one (1) or more of the following noninvasive conservative treatments:
      1. 6 weeks of hand/wrist immobilization (brace or splint); **or**
      2. Local steroid injections; **or**
   B. There is progressive pain, sensory loss, or paresthesia in the median nerve distribution with evidence of median nerve denervation or axonal loss confirmed by electrodiagnostic testing.

Not Medically Necessary:

Carpal tunnel decompression surgery (open or endoscopic) is considered **not medically necessary** when the criteria above have not been met.

The following procedures are **all** considered **not medically necessary** when performed with a carpal tunnel release procedure:

A. Skin nerve preservation; **or**
B. Epineurotomy; **or**
C. Flexor retinaculum lengthening; **or**
D. Internal neurolysis; **or**
E. Hydrodissection.

The following surgical techniques are considered **not medically necessary** for treating carpal tunnel syndrome:

A. Thread carpal tunnel release (TCTR); **or**
B. Ultrasound-guided percutaneous needle release (PCTR).

Coding

The following codes for treatments and procedures applicable to this guideline are included below for informational purposes. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement policy. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

When services may be Medically Necessary when criteria are met:

CPT	
29848	Endoscopy, wrist, surgical, with release of transverse carpal ligament
64721	Neuroplasty and/or transposition; median nerve at carpal tunnel

ICD-10 Procedure	
01N50ZZ	Release median nerve, open approach
01N54ZZ	Release median nerve, percutaneous endoscopic approach

ICD-10 Diagnosis	
G56.00-G56.03	Carpal tunnel syndrome

When services are Not Medically Necessary:
For the procedure codes listed above when criteria are not met; for the following procedure codes, or when the code describes a procedure or situation designated in the Clinical Indications section as not medically necessary.

CPT

25999	Unlisted procedure, forearm or wrist [when specified as thread carpal tunnel release or ultrasound-guided percutaneous needle release]
64999	Unlisted procedure, nervous system [when specified as thread carpal tunnel release or ultrasound-guided percutaneous needle release]

ICD-10 Diagnosis

G56.00-G56.03	Carpal tunnel syndrome

Discussion/General Information

According to the National Institute of Neurological Disorders and Stroke (NINDS) information on carpal tunnel syndrome (CTS), the carpal tunnel is a narrow, rigid passageway of ligament and bones at the base of the hand that houses the median nerve and the tendons that bend the fingers. The median nerve provides feeling to the palm side of the thumb and to most of the fingers. CTS occurs when the median nerve is compressed at the wrist resulting in symptoms, such as recurrent numbness or tingling sensations in the hand and wrist, hand weakness, and recurrent pain of the hand and wrist. These symptoms usually begin gradually with increasing intensity over time, which can interfere with ordinary activities of daily living, such as grasping small objects and driving.

The cause of CTS is not always known but contributing factors may include trauma (distal radius fracture) or injury to the wrist that causes swelling, which compresses the median nerve, as well as metabolic disorders such as thyroid disease, rheumatoid arthritis, and fluid retention during pregnancy. Underlying causes, such as diabetes or arthritis, should be treated first but are not contraindications for conservative and/or surgical interventions. CTS usually occurs only in adults with women being three times more likely than men to develop this condition. Additional risk factors for CTS include regular computer work where repetitive awkward positioning and forceful movements of the hands and wrists over prolonged periods are significantly associated with the development of CTS. Assembly line work and work that involves forceful gripping exertion over time are also associated with CTS, as is a past history of wrist fracture in some individuals. Musculoskeletal conditions, such as hand, wrist and elbow tendinopathies, as well as elevated BMI (basal metabolic rate), dialysis, and fibromyalgia have also been noted in some studies as risk factors for CTS.

Initial treatment usually involves wearing a splint at night to keep the wrist in proper alignment. Over-the-counter and prescription drugs, including non-steroidal anti-inflammatory drugs (NSAIDs), can reduce painful swelling and corticosteroid injections have also been used to relieve symptoms. Stretching exercises, taking frequent rest breaks, wearing splints to keep wrists straight, and using correct posture and wrist position can help with the symptoms of CTS. For severe cases, surgical decompression of the median nerve may be recommended. However, some residual numbness or weakness of the involved hand/wrist is common following surgical correction when performed by open approach or endoscopically (NINDS, 2020).

According to the American Academy of Orthopedic Surgeons (AAOS) evidence-based clinical practice guidelines for management of CTS:

> Carpal tunnel syndrome is a symptomatic compression neuropathy of the median nerve at the level of the wrist, which is characterized physiologically by evidence of increased pressure within the carpal tunnel and decreased function of the nerve at that level. Carpal tunnel syndrome can be caused by many different diseases, conditions and events. It is characterized by patients as producing numbness, tingling, hand and arm pain and muscle dysfunction. The disorder is not restricted by age, gender, ethnicity, or occupation and is associated with, or caused by, systemic disease and local mechanical and disease factors.

The AAOS guideline makes the following recommendations regarding diagnosis:

- Strong evidence supports thenar atrophy as strongly associated with ruling-in CTS, but poorly associated with ruling-out CTS.
- Strong evidence supports not using the Phalen Test, Tinel Sign, Flick Sign, or upper limb neurodynamic/nerve tension test (ULNT) criterion A/B as independent physical examination maneuvers to diagnose CTS, because alone, each has a poor or weak association with ruling-in or ruling-out CTS.
- Moderate evidence supports not using the following as independent physical examination maneuvers to diagnose CTS, because alone, each has a poor or weak association with ruling-in or ruling-out CTS:
    - Carpal compression test;
    - Reverse Phalen test;
    - Thenar weakness or thumb abduction weakness or abductor pollicis brevis manual muscle testing;
    - 2-point discrimination;
    - Semmes-Weinstein Monofilament test;
    - CTS-Relief maneuver (CTS-RM);
    - Pin Prick sensory deficit; thumb or index or middle finger;
    - ULNT Criterion C;
    - Tethered median nerve stress test;
    - Vibration perception – tuning fork;
    - Scratch collapse test;
    - Luthy sign;
    - Pinwheel.
- Moderate evidence supports not using the following as independent history interview topics to diagnose CTS, because alone, each has a poor or weak association with ruling-in or ruling-out CTS:
    - Sex/gender;
    - Ethnicity;
    - Bilateral symptoms;
    - Diabetes mellitus;
    - Worsening symptoms at night;
    - Duration of symptoms;
    - Patient localization of symptoms;
    - Hand dominance;
    - Symptomatic limb;
    - Age;
    - BMI.
- Limited evidence supports that patients who do not report frequent numbness or pain might not have CTS.
- Limited evidence supports that a hand-held nerve conduction study (NCS) device might be used for the diagnosis of CTS.
- Moderate evidence supports not routinely using MRI for the diagnosis of CTS.
- Limited evidence supports not routinely using ultrasound for the diagnosis of CTS.

- Moderate evidence supports diagnostic questionnaires and/or electrodiagnostic studies that could be used to aid the diagnosis of CTS.

The AAOS guideline makes the following recommendations regarding surgical repair of CTS:

- Strong evidence supports that surgical release of the transverse carpal ligament should relieve symptoms and improve function (Strength of Recommendation: Strong).
- Limited evidence supports that if surgery is chosen, a practitioner might consider using endoscopic carpal tunnel release based on possible short-term benefits (Strength of Recommendation: Limited Evidence).
- Strong evidence supports that surgical treatment of carpal tunnel syndrome should have a greater treatment benefit at 6 and 12 months as compared to splinting, NSAIDs/therapy, and a single steroid injection (Strength of Recommendation: Strong Evidence).
- Moderate evidence supports that there is no benefit to routine inclusion of the following adjunctive techniques: epineurotomy, neurolysis, flexor tenosynovectomy, and lengthening/reconstruction of the flexor retinaculum (transverse carpal ligament) (Strength of Recommendation: Moderate Evidence).
- Limited evidence supports that simultaneous bilateral or staged endoscopic carpal tunnel release might be performed based on patient and surgeon preference. No evidence meeting the inclusion criteria was found addressing bilateral simultaneous open carpal tunnel release (Strength of Recommendation: Limited Evidence).

Note: The following definitions for strengths of recommendations are provided by the AAOS guideline:

- Strong evidence is derived from two or more “High” quality studies with consistent findings for recommending for or against the intervention;
- Moderate evidence is derived from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention;
- Limited evidence is derived from two or more “Low” quality studies with consistent findings or evidence from a single “Moderate” quality study recommending for or against the intervention or diagnostic or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention (AAOS, 2016).

Regarding risk factors for CTS associated with workplace conditions, the AAOS provides:

> Studies should be conducted to identify objective methods for assessing workplace physical factors, in order to improve the precision of risk estimation and improve confidence in thresholds of injury.
>
> Workplace intervention studies should be conducted to confirm that modifications in work activities may improve symptoms and functional deficits in workers with CTS (AAOS, 2016).

Electrodiagnostic testing (EDT) may include nerve conduction studies (NCS) and electromyography (EMG) testing. According to the AAOS guideline, the published evidence from clinical trials suggests that the most appropriate setting for EDT is where the clinical diagnosis of CTS is uncertain or when atypical features exist.

The following is excerpted from a review article (Wang, 2013) about electrodiagnosis (EDX) of CTS:

> EDX is an extension of the history and physical examination. The key finding for CTS is that of conduction slowing localized to the segment of the median nerve passing through the CT (carpal tunnel).
>
> Clinical impression of the likelihood of CTS from history and physical examination is formed before EDX study, which usually begins with median motor nerve conduction, followed by ulnar motor nerve conduction, and then the three sensory tests that form the Combined Sensory Index (CSI) study.
>
> NCS is more valuable than needle EMG study in general, because of the underlying pathophysiology of focal demyelination in CTS. Both the distal location and relative ease of CTS study contribute to the reliable nature of EDX in the assessment of this disorder.
>
> Though the best EDT for CTS has yet to be determined, many studies for CTS have been designed over the last few years. For instance, using the absolute method, one can assess for CTS by obtaining median sensory latency recordings from the thumb, and the index, long, and ring fingers.
>
> Many factors are important to prevent a misdiagnosis of CTS including meticulous attention to electrode placement, distance measurements, stimulation intensity, skin temperature, and many other factors.
>
> An increasing awareness of variation among normal reference values from laboratory to laboratory has led to the comparison reference value method. This newer method was recommended for use in diagnosing CTS in the 2011 American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM) monograph.
>
> The CSI is an attempt to maximize sensitivity for detecting CTS without reducing specificity by using a single score derived from multiple sensory tests. The CSI, sometimes called the Robinson index, is the sum of comparisons of sensory latencies collected with three established sensory tests for the study of CTS using the following formula: CSI = ringdiff + thumbdiff + palmdiff. In this formula, ringdiff is the peak latency difference of the median and ulnar antidromic sensory nerve conduction to the ring finger stimulating 14 cm proximally; the thumbdiff is the peak latency difference of the median and radial antidromic sensory nerve conduction to the thumb stimulating 10 cm proximally; and the palmdiff is the transpalmar peak latency difference of the median and ulnar orthodromic conduction using a distance of 8 cm.
>
> Although a false negative error may limit early detection and treatment, a false positive error could result in overtreatment, which has the potential to cause harm to the patient.

Notably there are additional or adjunctive surgical procedures that are sometimes performed with carpal tunnel release surgery. The following surgical procedures have no recommendation from the AAOS when performed in conjunction with carpal tunnel release surgery:

- Skin nerve preservation;
- Epineurotomy;
- Flexor retinaculum lengthening;
- Internal neurolysis;
- Tenosynovectomy;
- Ulnar bursa preservation;
- Thread carpal tunnel release (TCTR);

- Ultrasound-guided percutaneous needle release (PCTR);
- Hydrodissection.

Surgical treatment for CTS is proposed when conservative measures have not improved symptoms. Surgical decompression involves release of the median nerve by cutting the transverse carpal ligament. This can be done either with an open approach or endoscopically. Mini-invasive techniques, including endoscopic and mini-open approaches, have been studied and noted to have higher learning curves for the surgeon. Many individuals consider these minimally invasive techniques to be justified by the shorter functional recovery time, compared to classical open surgery, but with identical long-term results. The decision about which surgical technique to use depends on the individual's and surgeon's dual preference. Additional factors that influence the choice of surgical technique include the stage of CTS severity, etiology and availability of materials. Results from use of these minimally invasive techniques have been reported as satisfactory in 90% of cases. Nerve recovery depends on the stage of preoperative severity with full recovery of function reported to take about 2-3 months in most cases. These surgical procedures are reported to have a benign reputation with a 0.2-0.5% neurovascular complication rate (Chammas, 2014).

Carpal tunnel decompression surgery has been studied in multiple clinical trials, including systematic reviews of randomized trials that compared outcomes from open and endoscopic techniques. Results have consistently shown similar clinical outcomes from open and endoscopic approaches in relief of symptoms but with better recovery of function and shorter recovery times seen from endoscopic techniques (Chen, 2014). In 2015, Vasiliadis and colleagues conducted a systematic review and meta-analysis of available studies that compared open to endoscopic surgical decompression for safety and efficacy measures. Safety was assessed by the incidence of major, minor and total number of complications, recurrences, and re-operations. The total time needed before return to work or to normal daily activities was also assessed. The investigators included all randomized or quasi-randomized controlled trials that compared any endoscopic approach with any open technique using MEDLINE (from January 1966 to November 2013), EMBASE (from January 1980 to November 2013), the Cochrane Neuromuscular Disease Group Specialized Register (November 2013) and CENTRAL (2013, issue 11 in The Cochrane Library). The authors concluded that endoscopic repair is associated with less time off from work or daily activities. However, the assessment of major complications, reoperations and recurrence of symptoms did not favor either approach. It was noted that there is an uncertain advantage for the endoscopic approach with respect to total minor complications (more transient paresthesia but fewer skin-related complications). The effect of a learning curve might be responsible for reduced recurrences and reoperations with endoscopic repair in studies that are more recent, although formal statistical analysis failed to provide evidence for such an association (Vasiliadis, 2015).

Additional meta-analysis of randomized controlled trials yielded similar results for safety and efficacy for both endoscopic and conventional open procedures. This analysis included 13 randomized trials which were reported as showing no significant difference in the overall complication rate (RR=1.34, 95% confidence interval [CI] [0.74, 2.43]; p=0.34), subjective satisfaction (RR=1.0, 95% CI [0.93, 1.08]; p=0.92), time to return to work (mean difference = -3.52 [-8.15, 1.10]; p=0.14), hand grip and pinch strength, and operative time (mean difference = -1.89, 95% CI [-5.84, 2.06]) between the endoscopic and open surgical groups (p=0.16, 0.70, and 0.35, respectively). The rate of hand pain (RR=0.73, 95% CI [0.53, 0.93]; p=0.02) in the endoscopic group was significantly lower than that in the open group. Endoscopic treatment seemed to cause more reversible postoperative nerve injuries, as compared with open procedures (RR=2.38, 95% CI [0.98, 5.77]; p=0.05). No statistical difference in the overall complication rate, subjective satisfaction, time to return to work, postoperative grip and pinch strength, and operative time was observed between the two groups (Zuo, 2015).

In 2020, Li and colleagues conducted a comprehensive systematic review and meta-analysis of 28 studies that compared outcomes for endoscopic vs. open surgical repair of CTS. The endoscopic approach was associated with significantly higher satisfaction rates (MD, 3.13; 95% CI, 1.43 to 4.82; p=0.0003), greater key pinch strengths (MD, 0.79 kg; 95% CI, 0.27 to 1.32; p=0.003), earlier return to work times (MD, - 7.25 days; 95% CI, - 14.31 to - 0.19; p=0.04), higher transient nerve injury rates (OR, 4.87; 95% CI, 1.37 to 17.25; p=0.01), and a lower incidence of scar-related complications (OR, 0.20; 95% CI, 0.07 to 0.59; p=0.004). The permanent nerve injury showed no significant differences between the two groups (OR, 1.93; 95% CI, 0.58 to 6.40; p=0.28).

Results of additional randomized studies and retrospective reviews comparing endoscopic and open surgical repair of CTS have consistently shown that both techniques are well tolerated with no significant differences in functional outcomes, symptom severity and functional status, or complication rates. It was noted that individuals generally preferred the endoscopic approach, which was demonstrated by significantly higher overall satisfaction scores related to the less invasive procedures (Kang, 2013; Michelotti, 2014; Soltani, 2013).

Thread carpal tunnel release (TCTR) is a minimally invasive procedure for transecting the transverse carpal ligament (TCL) by sawing the ligament with a piece of thread looped percutaneously under the guidance of ultrasound (US). This procedure has been proposed as an alternative technique for performing carpal tunnel release for the treatment of CTS. To date, the published evidence has been limited by interventional challenges including risk for injuring the superficial palmar arterial arch (SPA) if the needle exits too distally or a risk of incomplete transaction of distal TCL if the needle exits too proximally. Other concerns include injury of the common digital branch or the communicating branch between the ulnar nerve and median nerve, called the Berrettini branch, if the needle control accuracy is not improved. Recent trials using cadaveric wrists have demonstrated a more precise approach to protect the superficial palmar aponeurosis (SupPA), Berrettini branch, and common digital nerves but larger trials better designed to show clinical outcomes are needed to support the safety and efficacy of TCTR (Guo, 2017).

Another minimally invasive surgical technique proposed for the treatment of CTS is US-guided percutaneous needle release (PCTR), which is very similar to TCTR. PCTR uses US guidance to transect the transverse carpal ligament in individuals with CTS. Only small cohort trials have been published, to date, most of which are cadaveric trials, in which the safety and efficacy of PCTR to transect the transverse carpal ligament with minimal adjacent tissue damage has been reported. Larger well-designed trials are needed to validate the impact on clinical outcomes, as compared with traditional carpal tunnel release techniques (Burnham, 2017; Burnham, 2021; Dekimpe, 2019).

Definitions

Endoscopic carpal tunnel decompression: A surgical procedure where the transverse carpal ligament is incised under indirect visualization via endoscopic guidance, in order to decompress the median nerve.

Epineurotomy: An incision into the connective tissue framework and sheath of a nerve, which binds together the nerve bundles, each of which has its own special sheath, or perineurium.

Flexor retinaculum lengthening: Refers to a lengthening procedure of the flexor retinaculum (transverse carpal ligament, or anterior annular ligament), which is a fibrous band on the palmar side of the hand near the wrist. It arches over the carpal bones of the hands, covering them and forming the carpal tunnel.

Hydrodissection: Refers to a surgical technique in which a pressurized fine stream of water (jet) is used to divide the soft tissues associated with CTS.

Median nerve compression test: A test for CTS where pressure is applied with the thumbs over the median nerve within the carpal tunnel, located just distal to the wrist crease. The test is positive if the individual responds with numbness and tingling within 30 seconds.

Neurolysis: Refers to the application of physical or chemical agents to a nerve in order to cause a temporary degeneration of targeted nerve fibers. When the nerve fibers degenerate, this causes an interruption in the transmission of nerve signals, which results in alleviation of pain.

Open carpal tunnel surgical decompression: A surgical procedure where a small incision is made at the wrist, in order to transect or divide the transverse carpal ligament, decompress the median nerve and widen the carpal tunnel.

Phalen test: A test for CTS where the dorsal surface of the hands is pushed together and held for 30 – 60 seconds. Pain, numbness, or tingling caused by this technique is considered a positive test for CTS.

Skin nerve preservation: Refers to a surgical technique aimed at preserving the superficial nerve branches that cross the incision site during open carpal tunnel decompression surgery. This is intended to reduce the postoperative scar pain associated with open carpal tunnel surgery.

Symptom severity:
Moderate symptoms: Refers to sensory loss in the median nerve distribution or symptoms (sensory loss or pain) interfere slightly with hand function but the individual is able to perform all activities of daily living (ADLs); nocturnal symptoms may occasionally but not routinely disturb sleep;

Severe symptoms: Refers to weakness in the median nerve distribution or symptoms disrupt one or more ADLs or nocturnal symptoms routinely disrupt sleep.

Tenosynovectomy: Refers to the surgical excision of a tendon sheath.

Thenar atrophy: A test for CTS that assesses any weakness of the thenar muscles, which are located in the palm of the hand. Subjects place their thumb and small finger together while the physician pushes on the thumb. If the individual develops any weakness in the hand, the sign is considered positive for CTS.

Thread carpal tunnel release: A minimally invasive surgical procedure where a piece of surgical dissecting thread is introduced under ultrasound guidance and used as a dividing element, in order to transect the transverse carpal ligament and decompress the median nerve.

Tinel's sign: A test for CTS where light tapping is applied over the median nerve to see if it generates a tingling sensation, which is considered a positive test.

Ulnar bursa preservation: Refers to the surgical preservation of a layer of gliding tissue, which is the parietal layer of the ulnar bursa between the contents of the carpal tunnel and the soft tissues incised during carpal tunnel surgery. This surgical procedure is intended to reduce scar pain, and improve grip strength and function following open carpal tunnel decompression.

Ultrasound-guided percutaneous needle release (PCTR): Refers to a percutaneous procedure done under sonographic guidance in order to release the median nerve at the area in the carpal tunnel where compression has occurred causing CTS.

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Index

The use of specific product names is illustrative only. It is not intended to be a recommendation of one product over another, and is not intended to represent a complete listing of all products available.

History

Status	Date	Action
Reviewed	11/09/2023	Medical Policy & Technology Assessment Committee (MPTAC) review. Updated References section. Removed Websites for Additional Information section.
Reviewed	11/10/2022	MPTAC review. References were updated.
Revised	11/11/2021	MPTAC review. A minor revision to the language was made for clarification in the Clinical Indications section header from “Symptom Severity Criteria” to “Clinical Severity Criteria.”
New	08/26/2021	MPTAC review. Initial document development.
New	08/12/2021	MPTAC review. Initial document consideration.
