Carpal Tunnel Syndrome

Diagnosis/Condition: Carpal Tunnel Syndrome
Discipline: Integrated
ICD-10 Codes: G56.0
Origination Date: 2000
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Carpal tunnel syndrome (CTS) is the most common peripheral entrapment neuropathy.

Historically, descriptions of occupational hand/wrist diseases (eg, "writer’s cramp," "telegraphist’s cramp," and "tailor’s cramp") appeared in the medical literature of the early 1900s. They included signs and symptoms that we would recognize today as carpal tunnel syndrome. In 1938, the term "carpal tunnel syndrome" was first used by Moersch. However, the pathology of CTS was not well understood until after the influential hand surgeon Dr. George Phalen presented his experience from treating 439 patients at the Cleveland Clinic during the 1950s and 1960s.

Ironically, because most of Phalen’s patients were middle-aged women who were not employed outside the home, Dr. Phalen concluded that CTS was not an occupational disease but was instead "idiopathic." He did observe, however, that repeated, forceful grasping hand movements seemed to aggravate the symptoms. More recently, longitudinal studies have not been performed to directly assess and verify a causal relationship between occupational ergonomic risk factors and the development of CTS. Cross-sectional studies have found divergent results regarding the association between certain occupational ergonomic risk factors and CTS.¹

This condition occurs when the median nerve becomes pressed or squeezed at the wrist through the carpal tunnel (a narrow, rigid passageway of ligament and bones at the base of the hand). Sometimes, thickening from irritated tendons or other swelling narrows the tunnel and causes the median nerve to be compressed. The result may be pain, weakness, or numbness in the hand and wrist, radiating up the arm. Carpal tunnel syndrome is the most common and widely known of the entrapment neuropathies and is often found in persons who use repetitive movements often.²

Review of recent work suggests that CTS is associated with “demyelination of peripheral nerve trunk and spinal nerve root neurons [that] may be responsible for much of the abnormal pathology and, therefore, symptomatology of common peripheral entrapment or compressive neuropathies such as carpal tunnel syndrome.” From this perspective, CTS (and other entrapment neuropathies) is probably due to mechanical irritation, thus providing a rationale for mechanically focused evaluation and treatment.³
Patients with CTS frequently present with concurrent neck and arm pain. The “double crush” hypothesis posits that many CTS cases involve cervical nerve root irritation in addition to compression and irritation at the carpal tunnel, with one potentiating the other by impairment of axonal flow. Experimental studies, case reports and literature reviews fail to provide support for this hypothesis. However evaluation of all anatomical sites for possible nerve involvement may be valuable.4,5

Limited research on acupuncture has been conducted for conditions related to the upper extremity. Of the trials published, the common conditions of lateral epicondylitis (tennis elbow) and carpal tunnel syndrome (CTS) have been studied most prominently. Behavior and workplace modifications, non-invasive procedures, alternative therapies (e.g. yoga, acupuncture), and preventative therapies (e.g. hydrotherapy, hand therapy, and splinting) are all suggested as beneficial.6,7 In 1997 the National Institutes of Health convened a Consensus Conference on Acupuncture and indicated it may be beneficial as an adjunct or alternative therapy for CTS.8

**Subjective Findings and History**
- Pain in the wrist, palm and/or sometimes proximal radiation in the forearm, arm and shoulder
- Paresthesia or hyperalgesia in the median nerve distribution in radial-palmar aspect of the hand
- Classically, worse at night, relieved by dependency
- Sensory deficit in the palmar aspect of the first three digits and radial aspect of the 4th and/or weakness of thumb opposition, volar abduction
- Hand weakness, loss of fine coordination, and/or atrophy9
- Activities history: repetitious wrist movements, sustained wrist/hand contractions such as grasping and pinching, use of vibrating tools, knitting. Can be insidious onset
- Trauma: history of fracture, burns, inflammation, space occupying lesions
- Concurrent systemic illnesses: metabolic/hormonal, vascular, autoimmune, hematologic, congenital abnormalities (e.g. diabetes, rheumatism, myxedema, acromegaly, and some types of medications may precipitate symptoms)
- Higher incidence in pregnancy

**Objective Findings**
- Palpation: Evaluate for spinal and upper extremity joint dysfunction and soft tissue problems to rule in or out neuritis of a referred, radicular or peripheral etiology that mimics or complicates median nerve compression
- Neurologic examination: Tinel and Phalen Sign have good specificity but poor sensitivity; provocative testing with prolonged (15 min) wrist flexion is associated with electrophysiologic evidence of injury;10 Thenar strength loss or atrophy indicates more advanced or chronic cases
- Passive elbow flexion/pronator test
• Positive apprehension test
• Radiographic examination (if other conditions are suspected)
• Wrist and hand configuration may predispose to CTS (wrist ratio for example).
• Electrodiagnostic evaluation may be conclusive; nerve conduction velocity (NCV) studies must be correlated with clinical symptoms and, by themselves, are insufficiently specific to establish a diagnosis of CTS
• Ultrasononographic measurement of the cross-sectional area (CSA) of the median nerve at the carpal tunnel inlet is useful in diagnosing and grading CTS
• Electroneuromyography used to measure median nerve dysfunction at the wrist and confirm the clinical diagnosis of CTS
• A consensus conference was organized that identified a combination of symptoms (numbness, tingling, burning and pain in combination with nocturnal symptoms) plus abnormal median nerve function based upon nerve conduction studies (NCS) as the ‘gold standard’ for the diagnosis of CTS

Assessment
The clinical impression should indicate the specific anatomical structures involved and clinically correlate them with the mechanism of injury, history, subjective complaints, and objective findings. Pre-existing or concurrent medical conditions that are unrelated to work or non-work activity, but are risk factors in themselves for CTS should be considered. It is well established that diabetes, hypothyroidism, gout, autoimmune diseases such as rheumatoid arthritis, systemic lupus erythematosus, and pregnancy/postpartum increase the risk of developing CTS.

When evaluating and treating patients suffering from arm pain and repetitive stress injuries, the acupuncture practitioner may consider all three factors: 1) obstruction of the channels due to a) strain or injury, and / or b) invasion of pathogenic factors (bi syndrome); 2) underlying deficiency, and; 3) blood stasis. Not all factors will necessarily be present in all patients.

Plan
Passive Care:
• Temporary splinting, especially at night (Cock-up wrist splint)
• Manipulation: spinal and/or carpal osseous and soft tissue
• Physical Therapy Modalities, especially ultrasound, mechanical traction, spinal manipulation and low level laser therapy, paraffin bath therapy
• Medication: NSAIDS, corticosteroid injection, oral steroids
• Supplementation: B6 as a part of B complex, omega-3 fatty acids.
• Combination therapy (alpha-lipoic acid, curcumin phytosome, and B-group vitamins)
• Acupuncture
• Electroacupuncture
• Tuina (massage)
• Myofascial release therapy and movement re-education
• Localized relaxation massage combined with multimodal care
• Fascial manipulation® (FM) and Low-Level Laser Therapy (LLLT)\(^ {30} \)
• Surgical nerve decompression (or mini incision)\(^ {31,32} \)

Active Care:
• Postural awareness and training
• Progressive resistance exercises\(^ {33} \) for wrist, stretching exercises for muscles along path of median nerve. Yoga (Overhead arm extension [urdhva hastasana], trunk extension [dandasana], chair twists [bharadvajasana])
• Self-massage, instrument assisted soft tissue massage\(^ {34,35} \)
• Activities/work restrictions: Limit use involving aggravating activities. May need ergonomic job-site/activities evaluation, alternative keyboards, breaks during computer work\(^ {36} \)

Outcomes Assessment Tools (OATS):
• Visual analog pain scale/numeric pain rating scale.
• DASH (disabilities of the arm shoulder and hand)
• Boston (Levine) Questionnaire

Length of Treatment
• Estimated duration of care: may continue up to 8 weeks.

Referral Criteria
• Conservative interventions are appropriate for up to 8 weeks
• Referral for nerve conduction studies/advanced imaging if poor response to conservative care (4-6 weeks)
• Referral for surgical consultation may be appropriate after 4-6 weeks of care with inadequate improvement

Resources for Clinicians


Resources for Patients

The Evidence


Clinical Pathway Feedback

CHP desires to keep our clinical pathways customarily updated. If you wish to provide additional input, please use the e-mail address listed below and identify which clinical pathway you are referencing. Thank you for taking the time to give us your comments.

Clinical Services Department: providers@chpgroup.com

1 Maghsoudipour M, Moghimi S, Dehghaan F, Rahimpanah A. Association of occupational and non-occupational risk factors with the prevalence of work related carpal tunnel syndrome. *Journal Of Occupational Rehabilitation* [serial online]. June 1, 2008;18(2):152.
8 NIH. National Institute of Neurological Diseases and Stroke (NINDS), 2011
17 Meems M, Den oudsten B, Meems BJ, Pop V. Effectiveness of mechanical traction as a non-surgical treatment for carpal tunnel syndrome compared to care as usual: study protocol for a randomized controlled trial. *Trials.* 2014;15:180.
32 Papatheodorou LK, Sotereanos DG. Treatment recommendations for carpal tunnel syndrome and peripheral nerve repair. Instr Course Lect. 2015;64:273-80.