Carpal tunnel syndrome (CTS) is the most common peripheral entrapment neuropathy. Historically, descriptions of occupational hand/wrist diseases (e.g., "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. Currently, 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.

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.

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. The 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.

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. While surgery is considered the definitive treatment for CTS, 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. 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.7

**TCM VIEW OF CTS**

According to Traditional Chinese Medicine (TCM) theory CTS falls within the category of muscle or sinew pain; it corresponds to obstruction in the circulation of qi and blood in the channels and collaterals due to either strain along the muscle channels, or to what is traditionally known as ‘bi syndromes’. Pathogenic factors such as wind, cold, and dampness that penetrate the exterior of the body (ji biao) and lead to pain, numbness, and impairment of movement. In order for external pathogenic factors to invade the tissues, the right or correct qi (zheng qi) of the patient must be weak, relative to the strength of the pathogenic factor. Additionally, a history of chronic and repetitive injuries to the same area may cause the qi to become blocked and the blood to become stagnant, leading to blood stasis. Therefore, 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.

**Subjective Findings and History:**
- Pain in the wrist, palm and/or sometimes proximal radiation in the forearm, arm and shoulder.
- Paresthesia 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.
- 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)
- Pregnancy

**Objective Findings:**
- Palpation: Evaluate for spinal and UE 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. 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. NCV studies must be correlated with clinical symptoms and, by themselves, are insufficiently specific to establish a 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, lupus, and pregnancy/postpartum increase the risk of developing CTS.

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 and low level laser therapy
- Medication: NSAIDS
- Supplementation: B6 as a part of B complex, omega-3 fatty acids

Active Care:
- Postural training
- Progressive resistance exercises for wrist, stretching exercises for muscles along path of median nerve. Yoga (Overhead arm extension [urdhva hastasana], Trunk extension [dandasana], Chair twists [bharadvajasana])
- Carpal bone manipulation
- Massage and self-massage, instrument assisted soft tissue massage
- Activities/work restrictions: Limit use involving aggravating activities. May need ergonomic job-site/activities evaluation, alternative keyboards, breaks during computer work

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

Referral Criteria
- Conservative interventions are appropriate for up to 8 weeks (splinting).
- 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

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

Practitioner Resources

O’Connor D, Marshall S, Massy-Westropp N. Non-surgical treatment (other than steroid injection) for carpal tunnel syndrome. Cochrane Collaboration.
http://www.cochrane.org/reviews/en/ab003219.html (Accessed 4/30/08.)

**Patient Resources:**
National Institute of Neurological Disorders and Stroke. Carpal Tunnel Fact Sheet. The mission of NINDS is to reduce the burden of neurological disease - a burden borne by every age group, by every segment of society, by people all over the world.
http://www.ninds.nih.gov/disorders/carpal_tunnel/detail_carpal_tunnel.htm (Accessed 4/30/08.)


**The Evidence**
Yeomans S. "Carpal Tunnel Syndrome - A Chiropractic Perspective". Aspen Publishing; July, 1993 and included as a chapter (21-6) in the text "Chiropractic Family Practice", Editor Joseph Sweere.


Goodyear-Smith, F.; Arroll, B.; What can family physicians offer patients with carpal tunnel syndrome other than surgery? A systematic review of nonsurgical management. ANNALS OF FAMILY MEDICINE... 2004 MAY-JUN Vol. 2 Pgs. 267-73

Carpal Tunnel Syndrome  JOURNAL OF THE AMERICAN CHIROPRACTIC ASSOCIATION. 2004 OCT Vol. 41 Pgs. 29-30


Field, T.; Diego, M.; Cullen, C.; Hartshorn, K.; Gruskin, A.; Hernandez-Reif, M.; Sunshine, W.; Carpal tunnel syndrome symptoms are lessened following massage therapy JOURNAL OF BODYWORK AND MOVEMENT THERAPIES. 2004 JAN Vol. 8(1). Pgs. 9-14

Rayegani, S.M.; Adybeik, D.; Kia, M.A.; Sensitivity and specificity of two provocative tests (Phalen's test and Hoffmann-Tinel's sign) in the diagnosis of carpal tunnel syndrome JOURNAL OF ORTHOPAEDIC MEDICINE. 2004 Vol. 26(2)

Kao S. Carpal Tunnel Syndrome As an Occupational Disease The Journal of the American Board of Family Practice 16:533-542 (2003). (accessed at http://www.jabfm.org/cgi/content/full/16/6/533 02/16/07)


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.

Chuck Simpson, DC, CHP Medical Director: csimpson@chpgroup.com

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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;8(2):152.
3 Carpal tunnel syndrome and the “double crush” hypothesis: a review and implications for chiropractic. Russell B. Chiropr Osteopat. 2008 Apr 21;6(2).
7 NIH. National Institute of Neurological Diseases and Stroke (NINDS), 2011

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