

Carpal Tunnel Syndrome (CTS)

DEFINITION

A syndrome of hand and wrist numbness and/or paresthesias due to entrapment of the median nerve as it passes through the carpal tunnel from the wrist to the hand.

ISSUES

- CTS has an *indistinct, multifactorial etiology* and may arise from both occupational and non-occupational risk factors. Often a single cause cannot be identified.
- Detailed history, careful physical examination, judicious diagnostic testing and appropriate consultation are required for an *accurate diagnosis* of CTS.
- In the vast majority of cases, *electrodiagnostic studies should be performed prior to surgery* to confirm the diagnosis.

WCB-ALBERTA POSITION

I. OCCUPATIONAL RISK FACTORS

Some evidence of occupational risk has been associated with the following:

- Job tasks that require forceful repetitive wrist motion (>1000/hr). High force, high repetition and duration may have a synergistic effect.
- Regular, frequent use of vibrating tools.

Tasks characterized by a high frequency but low force (like computer key pad use) do not appear to be important precipitating factors for CTS.

There is a lack of consistent and valid scientific studies that address the causal role of other putative occupational risk factors.

II. NON-OCCUPATIONAL RISK FACTORS

CTS has an indistinct, multifactorial etiology. Occupational risk factors should rarely be considered as its sole cause. There is evidence that certain individual characteristics and co-existing medical conditions may cause or contribute to CTS. These non-occupational risk factors should be considered when determining the extent of work-relatedness.

Please see *Table of Non-Occupational CTS Risk Factors* on the following page.

Non-Occupational CTS Risk Factors

Individual Characteristics

Genetic predisposition	Body Mass Index (>29)	Psychosocial factors
Gender (female)	Co-morbidities associated with age (>50)	

Coexisting Medical Conditions

Diabetes	Hormonal <ul style="list-style-type: none"> • <i>Pregnancy</i> • <i>Hormonal therapy</i> • <i>Menopause</i> • <i>Oophrectomy</i> 	Anatomic <ul style="list-style-type: none"> • <i>Wrist fractures/dislocations (e.g. Colles fracture)</i> • <i>Osteoarthritis</i> • <i>Acromegaly</i> • <i>Improper immobilization of the wrist</i> • <i>Aberrant muscle bellies</i> • <i>Acute trauma</i> • <i>Neoplasia (including benign tumors and lesions)</i>
Thyroid disorders including myxedema	Renal disease <ul style="list-style-type: none"> • <i>Uremia and hemodialysis</i> • <i>Renal failure</i> 	
Inflammatory arthritis <ul style="list-style-type: none"> • <i>Gout</i> • <i>Rheumatoid arthritis</i> 		

III. DIAGNOSIS OF CARPAL TUNNEL SYNDROME

- There are dozens of CTS diagnostic methods: none is considered definitive. Evidence of diagnostic accuracy exists only for a small subset.
- Combinations of independent tests appear to perform better diagnostically than do single tests.
- Rigorous diagnosis of CTS is essential, as it is the basis of appropriate treatment.
- In the vast majority of cases, electrodiagnostic studies should be performed prior to surgery to confirm the diagnosis.

III.A. DIFFERENTIAL DIAGNOSIS

The following local conditions also cause hand and wrist complaints and must be ruled out before a diagnosis of CTS is made:

- Tendon/ligament strain
- Tendonitis/tenosynovitis (this may be a co-existing condition or possible cause of CTS)
- Hand-arm vibration syndrome
- Nerve or nerve root compression
- Non-specific hand/wrist pain

Numbness predominantly in the fifth finger or extending to the hypothenar eminence or dorsum of the hand should suggest diagnoses other than CTS.

III.B. EXAMINATION-BASED CLINICAL DIAGNOSIS

Paresthesias, hypoesthesia or numbness localized to the palmar aspect of the first to the fourth fingers and the distal palm (the sensory distribution of the median nerve at the wrist) are considered essential to make a clinical diagnosis of CTS, although these symptoms are not specifically diagnostic of CTS: other conditions may cause identical symptoms.

There is insufficient evidence to identify a single "best" physical examination-based test. The reliability and accuracy of the following clinical diagnostic tools appear to support their use as components of an examination-based clinical diagnosis of CTS:

- Phalen Sign
- Carpal Compression Test (CCT or Durkan)
- Hand Symptom Diagram (HSD)
- Tinel Sign

It should be noted that both history and physical examination rely on subjective reporting of symptoms, sensation or pain: with the exception of thenar wasting, there are no objective examination-based clinical tests for median nerve impairment.

III.C. ELECTRODIAGNOSTIC STUDIES

Electrodiagnostic studies (EDS), including Nerve Conduction Studies (NCS) and electromyography (EMG) are the most objective tests available to demonstrate median nerve deficit.

Correlated with the history and physical examination, electrodiagnostic studies increase or decrease the probability of carpal tunnel syndrome as the correct diagnosis (use of electrodiagnostic study findings as the sole diagnostic tool is not recommended).

In the absence of thenar atrophy, bilateral upper limb electrodiagnostic studies are required to confirm a pre-operative diagnosis of CTS.

III.D. SENSORY TESTS

Sensory tests for CTS (such as Semmes-Weinstein) typically involve measurement of a patient's threshold for detection of a sensory stimulus. There is little evidence to support use of sensory tests for diagnosis of CTS.

III.E. IMAGING TESTS

The potential utility of computed tomography, magnetic resonance imaging and ultrasonography in CTS diagnosis is still being determined and they remain primarily research tools.

III.F. LABORATORY AND OTHER TESTS

Where occupational history suggests a work relationship, laboratory tests to assess for non-work related conditions, such as TSH, blood glucose, Rheumatoid factor, ESR, etc., should be done and copies of the results obtained by WCB-Alberta from

health care providers to aid in establishing causation. Height and weight or BMI should also be provided.

IV. RECOMMENDED MANAGEMENT OF CARPAL TUNNEL SYNDROME

Resolution of symptoms and preservation of hand function are goals of CTS treatment, which includes non-surgical (or "conservative") treatment and surgical treatment. A significant number of CTS patients will improve with no treatment which may help explain why many unproven alternative therapies claim success.

IV.A. CONSERVATIVE TREATMENT

The consensus of medical opinion is that, in the majority of cases, a course of appropriate conservative management of CTS should be attempted before advising surgery, except in cases with:

- Obvious thenar wasting
- Severe sensory disturbance
- History of acute or traumatic onset

Under these circumstances, expedited medical and surgical assessment is required in the initial treatment phase due to the risk of progressive and permanent neurological damage.

Treatment of coexisting medical conditions that may cause or contribute to CTS should be attempted and may be effective.

Medication

- Optional medications:

- NSAIDs (unlikely to have further effect after one month and may cause GI complications).
- Local injection of corticosteroids for CTS associated with tenosynovitis or stenosing tenosynovitis (maximum 3 injections at 4-6 week intervals if there is significant improvement after each injection). There are inherent risks of repeated steroid injection.

- Medications that are *not recommended*:

- Oral steroids
- Narcotic analgesics
- Vitamin B-6

Physical Therapies

Wrist splints with palmar reinforcements can sometimes be effective in the treatment of carpal tunnel syndrome, as they maintain the wrist in a neutral position.

Neuromagnetic treatment, ultrasound, nerve and tendon gliding exercises, treatment with low-level laser, iontophoreses, electrical stimulation, and phonophoreses have not been shown to be effective.

IV.B. SURGICAL TREATMENT

Provided that it has been correctly diagnosed, carpal tunnel syndrome may require referral to a plastic surgeon, neurosurgeon, orthopaedic surgeon, or general surgeon with expertise in hand surgery and subsequent surgical intervention if

- There is no resolution of electrodiagnostically confirmed CTS following a 4 week trial of conservative treatment, or
- There is significant muscle wasting.

The standard surgery for CTS is the transection of the transverse carpal ligament ("carpal tunnel release"), either by open incision or endoscopic surgery.

In the vast majority of cases, bilateral electrodiagnostic studies should be performed prior to surgery to confirm the diagnosis.

In cases of surgical failure a second opinion may help determine the need for repeat surgery.

V. FITNESS TO WORK

- With *conservative treatment*, expected duration of absence:
 - With modified duties: 0 – 1 week
 - Without modified duties: 0 - 4 weeks.

Modified duties are generally required if work involves certain types of vibration, repetition and force. Worksite analysis and modifications may be required to help prevent recurrences.

- After *surgery*:
 - most patients can return to light hand use following the removal of sutures, but may not tolerate the use of tools that require a power grip for an average of 6 to 8 weeks.

VI. PERMANENT CLINICAL IMPAIRMENT CRITERIA

Assess, if indicated, 2 years after surgery to allow for adequate nerve regeneration. Impairment assessment is based upon ongoing median nerve dysfunction.