

Carpal Tunnel Release, Arthritis and Rheumatism, Vol. 44, No. 5, May 2001, 1184-1193.

Electrodiagnostic Tests

Electrodiagnostic tests are routinely used to evaluate CTS. As with any diagnostic test, however, caution must be used in interpreting the results. The test is not infallible and false positive findings do arise. For instance, Colorado's Medical Treatment Guidelines note that electrodiagnostic studies require clinical correlation due to the occurrence of false positive and false test results. Since electrodiagnostic testing may be positive in asymptomatic individuals, CTS remains a clinical diagnosis which may not rest on the test results alone. www.coworkforce.com/DWC/Rule_XVII_Exhibit_B2.asp. Studies in the scientific literature support this warning. For instance, 46 percent of normal subjects in one research study had at least one false positive electrodiagnostic test for CTS. Redmond, et. al., *False Positive Electrodiagnostic Tests in Carpal Tunnel Syndrome*, *Muscle Nerve*, 1988 May; 11(5): 511-18. Another study demonstrated an 18 percent false positive rate on nerve conduction testing. Atroshi et. al. *Diagnostic Properties of Nerve Conduction Test in Population-Based Carpal Tunnel Syndrome*, *BMC Musculoskeletal Disorders* 2003; 4 (1):9.

Provocative Testing

Provocative testing is also not without its limitations. A paper in the *Journal of the American Medical Association* reported that several traditional findings of CTS have little or no clinical value including nocturnal paresthe-

sias, the Phalen's sign and Tinel's sign. *JAMA* 2000 June 21; 283 (23): 3110-7. See also: Kuhlman et al., *Sensitivity and Specificity of Carpal Tunnel Syndrome Geyers*, *Am. J. Physical Medical Rehabilitation* 1997 Nov.-Dec; 76(6):451-7.

CONCLUSION • Carpal tunnel syndrome is a widespread condition affecting the hand that has enormous financial and work-related implications. Much has been written about the correlation between CTS and work. The causal relationship between the two, however, is in dispute. Studies demonstrate that this condition is primarily related to an underlying pathology, genetic issues or risk factors such as smoking, alcohol consumption, and obesity. Symptoms vary from vague discomfort to muscle atrophy. Nevertheless, the one constant is that CTS will be centered on the areas of the hand served by the median nerve. Specific tests assist in the diagnosis of CTS with electrodiagnostic testing being the gold standard. As with any diagnostic modality, caution must be used in analyzing the test results. They cannot be applied in a vacuum since each test has limitations and occurrence of false positive results. Simply put, CTS remains a clinical diagnosis which must be based upon the totality of the circumstances.

Numerous reported decision have discussed CTS in a compensation context and the outcomes have varied from multi-million dollar verdicts to findings for the defense. By knowing the signs and symptoms of this hand condition, the task of presenting or defending a CTS claim will be much easier.

Digital Equipment Corporation, 950 F. Supp. 519 (E.D. N.Y. 1997).

Mild CTS Is Not A "Disability"

In 2002, the Supreme Court ruled that a worker who suffers from CTS is not disabled under the Americans with Disabilities Act. While severe cases of carpal tunnel syndrome are characterized by muscle atrophy and sensory deficits, the Justices noted that mild cases create only intermittent symptoms of numbness and tingling. Given this disparity in problems, CTS diagnosis does not show a disability within the meaning of the ADA. *Toyota Motor Manufacturers v. Williams*, 534 U.S. 184 (2002).

Workers' Compensation

The beginning of 2004 was greeted with more news involving carpal tunnel syndrome when a federal jury in South Dakota awarded a CTS sufferer more than \$12 million dollars because her claim for workers' compensation benefits was denied. The bulk of the award consisted of punitive damages, which according to counsel for the plaintiff, was based on an incentive plan offered by the insurance carrier that provided bonuses to employees who lowered payouts on claims. *Daly, Jury Awards \$12 million to Ailing Worker*, Rapid City Journal, January 21, 2004.

Where Does CTS Fall?

More than 4,000 published decisions have discussed this medical condition in a compensation context. A major issue in these controversies is whether CTS falls within the statutory scheme for compensation. Is this medical problem an occupational disease, an industrial accident, or a condition unrelated to the work environment? The courts have reached varying conclusions. Some jurisdictions have found that CTS is caused by the numerous micro-traumas

of work and is an accidental injury developed over a long period of time. Others have stated that CTS is not compensable as an occupational disease since the condition can be caused by a number of reasons unrelated to work. Zitter, *Worker's Compensation: Recovery for Carpal Tunnel Syndrome*, 14 A.L.R. 5th 1.

Investigating the CTS Claim

In any CTS claim, a number of factors should be explored. A basic investigation of the statutory scheme under which compensation is being sought and the appropriate disability policy should be reviewed. The claimant's medical history should also be researched because of the numerous factors that can cause a compression of the median nerve unrelated to trauma or work-related activities.

"Where Does It Hurt?"

The distribution of hand symptoms is helpful in ascertaining if the problem is truly related to CTS instead of some other medical condition. CTS involves the median nerve so symptoms in the fingers should be limited to the thumb, ring, middle, and part of the index finger. Areas of the hand supplied by the ulnar nerve should not be affected.

Is An Attorney Involved?

A claimant's involvement with an attorney is strongly predictive of more severe symptoms and functional limitations and patients are less likely to improve while legal issues are pending. The association between alcohol and tobacco and the successful outcome of a carpal tunnel release is noteworthy. These exposures may influence results through a direct toxic effect on the median nerve but it is more likely that they are surrogates for unmeasured lifestyle or clinical factors. Katz, et. al., *Predictors of Outcomes of*

- **Two-Point Discrimination**—The physician will touch two different points on the hand or finger at a very close distance apart to see if the patient can differentiate between the touches;
- **X-Ray**—This diagnostic test depicts old hand fractures and the presence of arthritis;
- **Blood Tests**—A blood screening reveals signs of diabetes, rheumatoid arthritis, hypothyroidism, or some other medical condition that can cause CTS;
- **Electrodiagnostic Testing**—Nerve conduction and electromyography measures any decreased signal involving the median nerve;
- **Ultrasound**—Recent research suggests that sound waves used to create images of the hand may help diagnose CTS, and to monitor the effectiveness of treatment.

TREATMENT • Physicians utilize a two-pronged approach in relieving the symptoms of carpal tunnel syndrome:

- The first task is to alleviate or eliminate any underlying pathology that may be causing the problem such as diabetes or arthritis;
- The second step is to treat the hand symptoms.

Addressing The Hand Symptoms

The patient is advised to avoid activities that involve repetitive hand movements, and a wrist splint can be prescribed to restrict mobility. Use of a cold pack may provide temporary relief and anti-inflammatory medication, vitamin B6, and a diuretic will help reduce swelling in the tunnel. If symptoms persist, a corticosteroid injection or local anesthetics will be administered.

Prognosis Factors

Five factors have been identified in determining the likely outcome of non-operative treatment:

- Age over 50 years;

- Constant paresthesias;
- Symptoms lasting more than 10 months;
- Stenosing flexor tenosynovitis; and
- A positive Phalen's sign in less than 30 seconds.

People who received conservative medical treatment when none of these factors are present recover 66 percent of the time but 59 percent continue to have problems when one factor exists. When two factors are present, 83 percent of the patients do not obtain long term improvement and the odds of not getting better increase to 93 percent when three factors exist. Patients with four or more of the criteria fail to obtain permanent relief without surgery. Kaplan et. al., *Predictive Factors in the Non-Surgical Treatment of Carpal Tunnel Syndrome*, J. Hand Surgery, 15-B: 106, 1990. See also, Canale, *Campbell's Operative Orthopaedics*, Vol. 4: 3687 Mosby (1998).

Carpal Tunnel Release

When conservative treatment fails or the muscles at the base of the palm atrophy, a carpal tunnel release is suggested. This outpatient procedure cuts the transverse carpal ligament so as to relieve the pressure on the median nerve. A two-inch incision is made in the wrist exposing the carpal tunnel for repair. Alternatively, the surgery can be done endoscopically with two small incisions in the wrist and palm to accommodate the camera and instruments. Because the endoscopic procedure involves less cutting of the skin, the pain is reduced and recovery is quicker.

LITIGATION TIPS • Carpal tunnel syndrome attained notoriety in 1996 when a federal jury awarded three plaintiffs \$5.3 million dollars for hand problems they sustained while using the defendant's computer equipment. *Geressy v.*

Relation To Underlying Medical Condition

Recent articles conclude that this medical problem is related primarily to an underlying medical condition, genetic issues, or risk factors such as smoking, alcohol consumption, and obesity. When individuals with this profile are exposed to repetitive wrist or work involving their hands, the odds of developing CTS are dramatically increased. Therefore, carpal tunnel syndrome will be linked to the workplace regardless of whether it is actually caused by the work itself. *Carpal Tunnel Syndrome*, Evanston Northwestern Healthcare, www.enh.org/well-connected/articles/000034.asp.

Risk Factors

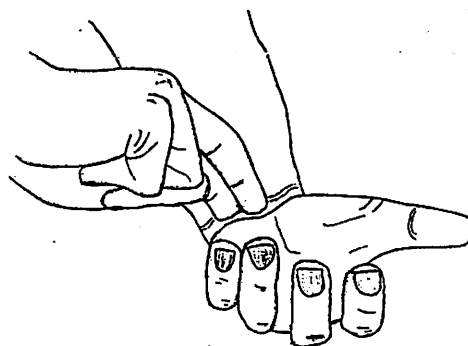
Because the cause of CTS may be unrelated to work, the following conditions, which put people at risk, should be investigated:

- Arthritis, lupus, and gout;
- Poor nutrition;
- Hypothyroidism;
- Diabetes;
- Wrist dislocation, fracture, and cysts;
- Pregnancy;
- Kidney disease;
- Menopause;
- Fluid retention;
- Pre-menstruation;
- Obesity;
- Smoking;
- Medication;
- Hepatitis C;
- High blood pressure;
- Oral contraceptives;
- Family history of CTS;
- Structural abnormalities;
- Obstructive pulmonary disease;
- Alcohol abuse;
- Raynaud disease;
- Paget disease.

DIAGNOSIS • Following a discussion with the patient about the history of symptoms, a physician will examine the patient's hands to see if there are visible signs of swelling, injury, atrophy, or weakness. Several provocative tests assist in the diagnosis of CTS:

- Tinel's Sign—The area containing the median nerve on the palm side of the hand will be tapped to see if percussion produces pain, numbness, tingling, or mild shock. See Figure 4.

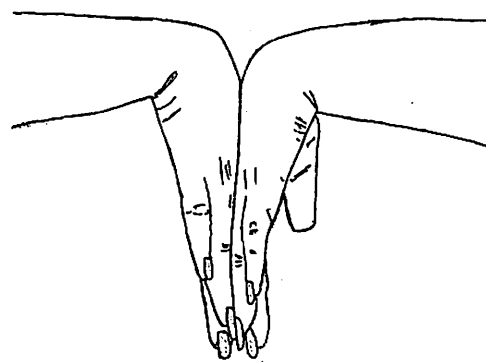
FIGURE 4



TINEL'S SIGN

- Phalen's Sign or Wrist-Flexion Test—The patient is instructed to place both hands back-to-back with the palms on the outside. If symptoms develop within one minute of keeping the hands in this position, CTS is suspected. See Figure 5.

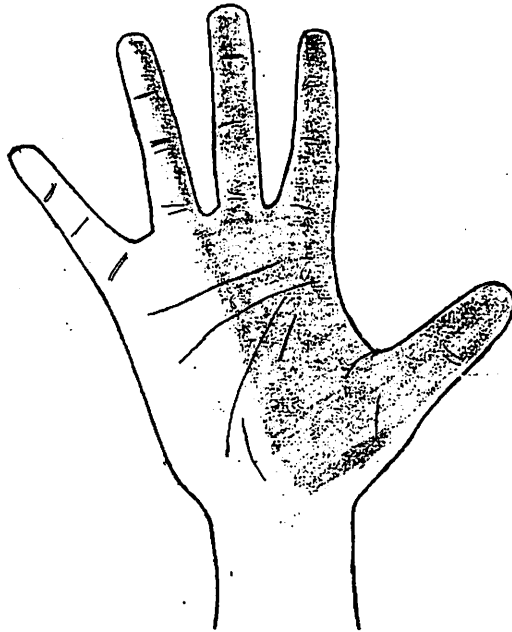
FIGURE 5



PHALEN'S SIGN

median nerve: the thumb, index, middle, and ring fingers. See Figure 3.

FIGURE 3



AREA SERVED BY MEDIAN NERVE

As the pain intensifies, clumsiness of the hand develops, resulting in a weaker grip, dropping of objects, and difficulty in performing simple tasks such as fastening buttons, typing, knitting, and grasping small objects. Fingers feel swollen even though no such problem exists. Differentiating between hot and cold by touch may become difficult and symptoms generally surface in both hands. The dominant hand, however, is the first to encounter problems. In severe or chronic cases, the muscles under the thumb weaken resulting in decreased strength and atrophy. Occasionally, the patient's pain may travel up the arm and into the shoulder.

CAUSES • Carpal tunnel syndrome is an inflammatory process caused by physical injury, an underlying medical condition, or repetitive stress. No test can objectively identify the exact cause of the problem. *Carpal Tunnel Syndrome,*

Evanston Northwestern Healthcare, www.enh.org/wellconnected/articles/000034.asp. Basically, any factor that reduces the space in the tunnel can result in increased pressure on the median nerve.

Distribution Of The Ailment

Women are affected at a much higher rate than men with some researchers suggesting the disparity being as much as five-to-one. Complaints of CTS generally appear in people around the age of 50 although this condition is not limited to that age population.

CTS In The Workplace

Much has been written about carpal tunnel syndrome and the work environment. Tasks that require repetitive hand and wrist movements, the use of tools that vibrate, and stressful wrist posture are frequently cited as triggering events for the development of symptoms. CTS is an increasing source of workers' compensation claims. Assembly line workers, data-entry clerks, cashiers, and secretaries miss the most time from work because of this condition.

Causal Link To Workplace Activity Unclear

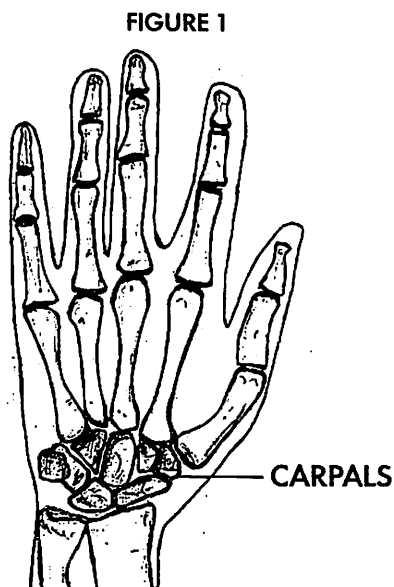
The causal relationship between work and CTS, however, is in dispute. The National Institute of Neurological Disorders and Stroke reports that, "[t]here is little clinical data to prove whether repetitive and forceful movements of the hand and wrist during work or leisure activities can cause carpal tunnel syndrome." www.ninds.nih.gov/health_and_medical/pubs/carpal_tunnel.htm. A Mayo Clinic study concluded that heavy computer use does not increase the risk of carpal tunnel syndrome. See Steven, et al. *The Frequency of Carpal Tunnel Syndrome in Computer Users at a Medical Facility*, *Neurology* 2001; 56: 1568-1570.

passes through the carpal tunnel, a narrow opening at the base of the palm. The result is sensory and motor disturbances.

Prevalence

The magnitude of this problem is demonstrated by several statistical facts. Almost one million people a year develop this condition necessitating medical care and causing temporary disability. *Work-Related Carpal Tunnel Syndrome in Massachusetts*, Commonwealth of Massachusetts, Department of Public Health. In fact, the U. S. Department of Labor has found that repetitive motions, such as typing, scanning groceries, and grasping tools, resulted in the longest absences from work, more than any other injury, with an average of 19 missed days. <http://state.lbs.gov/iif/home.html>. CTS was the chief occupational hazard during the last decade, disabling large numbers of workers and it is the second most common surgery with more than 230,000 operations each year. *National Statistics for Carpal Tunnel Syndrome*, Balance Systems, Inc., www.repetitive-strain.com/national.html.

ANATOMY • The anatomical construction of the wrist explains this medical condition. Eight small bones, known as carpals, are arranged in two U-shaped rows and create the rigid floor of the carpal tunnel. See Figure 1.

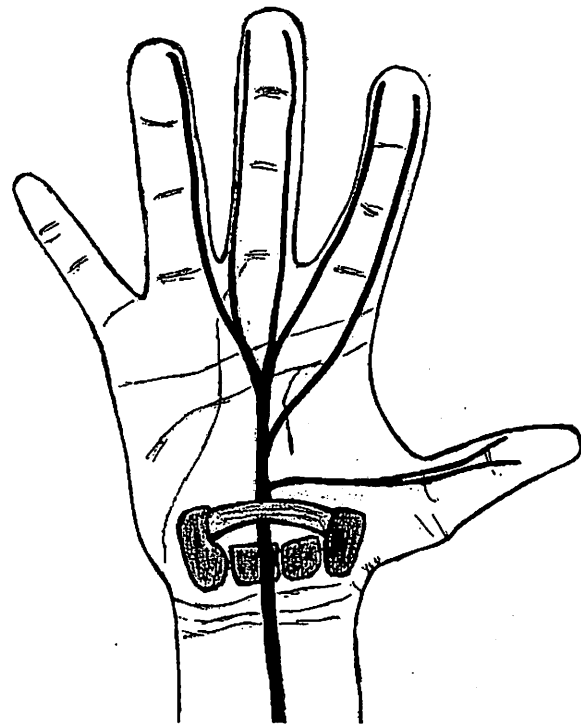


The carpal bones closest to the wrist are the scaphoid, lunate, triquetral, and pisiform. Closest to the fingers are the trapezium, trapezoid, capitate, and hamate. The roof of the tunnel is formed by a thick ligament that stretches across the top of the carpals. This fibrous band is called the transverse carpal ligament or the flexor retinaculum.

Nerve Compression

Through this archway pass the median nerve and nine flexor tendons providing movement and feeling in several fingers. Carpal tunnel syndrome arises when the canal's opening narrows, causing a squeezing of the median nerve. See Figure 2.

FIGURE 2



SYMPTOMS • The symptoms of CTS vary but their onset is usually gradual. Initial problems appear at night and consist of a vague discomfort in the hand causing sleep disturbances.

Progression of symptoms results in numbness and tingling in the fingers served by the

A Litigation Primer On Carpal Tunnel Syndrome

Samuel D. Hodge, Jr.

The number of carpal tunnel claims continues to rise; but the connection between the condition and workplace activity remains unclear.

TECHNOLOGICAL ADVANCEMENTS during the past few decades have dramatically improved the quality of life. Computers have changed the home and workplace environments. The manufacturing process has been streamlined with workers overseeing machines which do much of the work. These advancements, however, are not without a price. New medical problems have surfaced with labels such as "compression neuropathy," "repetitive strain injury" and "cumulative trauma disorder."

This article will discuss one such condition— carpal tunnel syndrome ("CTS").

THE PROBLEM • Carpal tunnel syndrome or "tardy median palsy" is a common disorder of the hands, which results in pain, weakness, and disability. While the cause of the problem is not always known, the anatomical explanation for this condition is simple. Swelling and pressure in the wrist area pinches the median nerve as it
