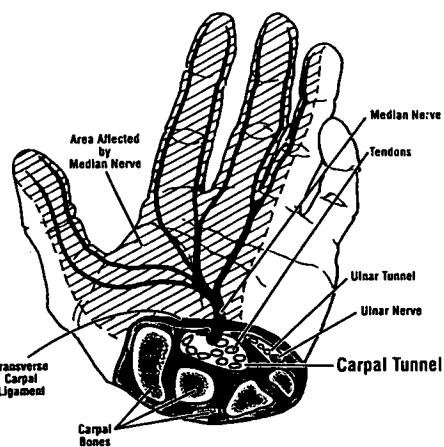




Just the Facts...

Carpal Tunnel Syndrome



Carpal tunnel syndrome (CTS) is a disabling and costly cumulative trauma disorder caused by damage to the median nerve as it runs through the carpal tunnel of the wrist. A single case of unilateral CTS costs between \$22,000 and \$30,000, not including lost work time, workers' compensation, or other indirect costs (e.g., decreased productivity, retraining, diminished morale, etc.).

The carpal tunnel, a channel through the middle of the wrist, is comprised of the carpal bones on the bottom and the thick transverse carpal ligament on the top of the wrist. Nine tendons that control the fingers pass through the carpal tunnel, along with the median nerve. Pressure will build up in this space if the tendons become inflamed or if the wrist is held in an awkward position. Also, pressure will build up in the presence of certain medical conditions (e.g., pregnancy). This increased pressure can interrupt the blood flow to the median nerve. Over time, restricted blood flow damages the nerve. The disorder can affect either hand or both hands, and onset is usually gradual. Initial symptoms are pain, tingling and numbness, often occurring at night. The symptoms usually occur in the first three fingers and the palmar side of the thumb. Loss of sensation, motor weakness, dry skin, loss of coordination, and atrophy are later symptoms.

Occupational Risk Factors

Occupational risk factors for CTS include--

- Safety and Health Professionals
- Risk Factors
- Diagnosis and Treatment

- Highly repetitive work.
- Bent wrist postures.
- Excessive force, especially in conjunction with highly repetitive work and deviated postures.
- Mechanical trauma (contact with sharp edges or other surfaces).
- Working in cold temperatures.
- Exposure to excessive vibration.
- Extended duration of effort.

Personal Risk Factors

Personal risk factors for CTS include--

- Conditions that cause abnormal fluid balance, such as pregnancy, oral contraceptive use, menopause, or myxedema.
- Hobbies that put stress on the wrist, such as needlepoint, racquetball, and computer use.

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- Structural bony alterations of the carpal tunnel, such as old fractures or congenital defects.
- Neuropathic medical conditions such as diabetes, alcoholism, rheumatoid arthritis, and gout.
- Smoking.
- Obesity.
- Wrist size and shape.*

Diagnosis

The gold standard in diagnosing CTS is the nerve conduction test. The conduction rate of an electrical impulse is measured between the forearm and the hand. Nerve damage is indicated if the nerve conduction is slower than normal. A simpler method is the Phalen's test, in which the wrist is flexed for 60 seconds. If a person has CTS, the increased pressure in the carpal tunnel will cause symptoms of pain and tingling in the affected fingers. Another relatively simple method is the Tinel test, which involves percussing (tapping) the median nerve on the underside of the wrist. However, recent literature indicates that the Tinel test has little diagnostic value.

The diagnosis of CTS can be complicated by another condition called thoracic outlet syndrome. In CTS, the median nerve is damaged in the wrist, whereas in thoracic outlet syndrome, the median nerve is damaged in the cervical region. Neck, shoulder and upper arm postures can compress nerves and blood vessels between the neck and shoulder. Symptoms are similar to those of CTS, with numbness of the fingers and the arm feeling as if it is "going to sleep." Both conditions may occur simultaneously, further complicating precise diagnosis and appropriate treatment.

Treatment

The specific treatment will depend on the factors that caused the disease and its stage of development. Effective treatment must include identifying and eliminating the conditions that caused the problem, not just treating the symptoms. Initial treatment may include oral anti-inflammatory medication, steroid injection, and/or splints to hold the wrist in a neutral posture at night. During the day, splint usage may or may not be prescribed. Sometimes wearing a splint during an activity actually causes more problems/inflammation because the person has to fight against the splint to do the activity. The fit of the splint needs to be evaluated to ensure it provides adequate support and does not cause mechanical stress points on the hands or wrist. It is critical that the person with CTS cease to work in positions that irritate the wrist. When conservative treatment is not effective, the person with CTS may require carpal tunnel surgery. This costly procedure involves cutting the transverse ligament on the underside of the wrist to relieve the pressure within the carpal tunnel. The surgery can result in decreased hand strength.

Regardless of the treatment method, if the person does not avoid the activities that initially caused the problem, a relapse will occur.

References

1. Armstrong, T.J. *An ergonomics guide to carpal tunnel syndrome*. American Industrial Hygiene Association (AIHA), 1983. Developed under National Institute for Occupational Safety and Health (NIOSH) Contract PO 81-3000 for the AIHA Ergonomics Guide.
2. Caillet, R. *Hand Pain and Impairment*, 4th ed. Philadelphia: F.A. Davis, 1994.
3. Caillet, R. *Neck and Arm Pain*, 3d ed. Philadelphia: F.A. Davis, 1991.
4. Putz-Anderson, V. *Cumulative Trauma Disorders, A Manual for Musculoskeletal Diseases of the Upper Limbs*. Bristol: Taylor & Francis, 1988.

*Studies using computerized CAT scanners suggest an association between a small carpal tunnel and idiopathic CTS. However, Armstrong and Chaffin studied personal risk factors and were unable to find any association between hand and wrist size and occupational CTS. Therefore, medical preemployment screening based on wrist size does not reliably predict worker predisposition to CTS (reference 1).