Carpal tunnel syndrome

Carpal tunnel syndrome is a disorder caused by disturbances in nerve function (neuropathy), leading to pain and numbness or tingling (paresthesia) primarily in the wrist and hand. While carpal tunnel syndrome can occur at any age, it most often affects people between the ages of 40 and 60. In more than half of cases, both hands are affected; however, the severity may vary between hands. When only one hand is affected, it is most often the hand used for writing (the dominant hand).

In carpal tunnel syndrome, the pain or paresthesia is usually felt in the wrist, the palm, and the first four fingers of the hand. These signs and symptoms often develop during sleep and are noticeable upon waking. Affected individuals typically shake their hand to get rid of the pain and numbness, a characteristic move known as the flick sign. As the condition advances, the signs and symptoms begin to occur during the day as well. Affected individuals may have difficulty performing manual tasks such as turning doorknobs, fastening buttons, or opening jars. The symptoms of carpal tunnel syndrome may be triggered by certain activities that flex or extend the wrist, such as driving, typing, or holding a telephone.

Over time, people with carpal tunnel syndrome can have muscle and nerve wasting (atrophy) in the affected hand and a reduced ability to detect sensations, which can be mistaken for an improvement of symptoms.

Frequency

Carpal tunnel syndrome is estimated to affect 1 to 5 percent of the adult population.

Causes

Carpal tunnel syndrome occurs when a nerve in the hand and forearm, known as the median nerve, gets pinched (compressed) within a passage called the carpal tunnel. The carpal tunnel is a narrow canal at the wrist through which the median nerve extends from the forearm to the hand and the first four fingers. It is surrounded by the wrist bones and connective tissues, which are tissues that support the body's joints and organs.

Carpal tunnel syndrome is often described as idiopathic because its cause is frequently unknown but can be influenced by lifestyle factors. Little is known about the genetic contributions to this condition. Most of the genes that have been studied provide instructions for making proteins that are components of connective tissues. Other genes associated with the condition play roles in nerve cell function, the immune system, or metabolism. Additionally, the width of the carpal tunnel varies among individuals; people with narrower passages are more likely to have nerve compression than are people with wider passages.

In carpal tunnel syndrome, nerve compression can be caused by many factors including inflammation of connective tissues surrounding the carpal tunnel, accumulation of fluids (edema) in the lower arm, hormonal changes, stress and trauma to the wrist, or obstructions within the carpal tunnel, such as a cyst or tumor. Carpal tunnel syndrome occurs in 20 to 45 percent of pregnant women, likely due to edema or hormonal changes, and often goes away at the end of the pregnancy.

Particular activities, often related to certain occupations, may increase a person's risk of developing carpal tunnel syndrome. Repeated use of tools that vibrate or require forceful movements can put stress on the wrist, causing swelling or inflammation around the carpal tunnel. Whether repeated tensing of the hand and wrist, caused by frequent computer use, increases the risk of carpal tunnel syndrome is unclear; the evidence is conflicting. It is likely that the impact of computer use on the development of carpal tunnel syndrome is minor.

While carpal tunnel syndrome can be a feature of many disorders, including obesity, alcohol use disorder, rheumatoid arthritis, type 1 diabetes, type 2 diabetes, hypothyroidism, kidney (renal) failure, transthyretin amyloidosis, and hereditary neuropathy with liability to pressure palsies, it usually occurs in people with no related health conditions.

Inheritance Pattern

Carpal tunnel syndrome is a complex condition and is usually not inherited. However, having a close relative with carpal tunnel syndrome likely increases a person's risk of developing the condition.

When carpal tunnel syndrome occurs as part of a genetic syndrome, this feature follows the inheritance pattern of the syndrome.

Other Names for This Condition

- amyotrophy, thenar, of carpal origin
- carpal canal
- carpal tunnel
- compression neuropathy, carpal tunnel
- CTS
- distal median nerve compression
- distal median nerve entrapment
- entrapment neuropathy, carpal tunnel
- median neuropathy, carpal tunnel

Diagnosis & Management

Formal Diagnostic Criteria

- American Association of Neuromuscular & Electrodiagnostic Medicine: Evidence-Based Guideline: Neuromuscular Ultrasound for the Diagnosis of Carpal Tunnel Syndrome
  http://www.aanem.org/getmedia/128edcd9-438f-40ce-8d1f-f72a0cca0e47/NMUS-for-DX-of-CTS_Reaffirmed.pdf

Formal Treatment/Management Guidelines

- American Academy of Orthopaedic Surgeons: Management of Carpal Tunnel Syndrome Evidence-Based Clinical Practice Guideline
  https://www.aaos.org/uploadedFiles/PreProduction/Quality/Guidelines_and_Reviews/guidelines/CTS%20CPG_4.13.2017.pdf

Genetic Testing Information

- What is genetic testing?
  /primer/testing/genetictesting
- Genetic Testing Registry: Carpal tunnel syndrome
  https://www.ncbi.nlm.nih.gov/gtr/conditions/C0007286/

Research Studies from ClinicalTrials.gov

- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?cond=%22carpal+tunnel+syndrome%22+OR+%22carpal+tunnel%22

Other Diagnosis and Management Resources

- MedlinePlus Encyclopedia: Carpal Tunnel Release
  https://medlineplus.gov/ency/article/002976.htm
- MedlinePlus Encyclopedia: Carpal Tunnel Repair--Series--Normal anatomy
  https://medlineplus.gov/ency/presentations/100078_1.htm
- University of Washington: Orthopaedics and Sports Medicine
  http://www.orthop.washington.edu/patient-care/articles/arthritis/carpal-tunnel-syndrome.html

Additional Information & Resources

Health Information from MedlinePlus

- Encyclopedia: Carpal Tunnel Release
  https://medlineplus.gov/ency/article/002976.htm
- Encyclopedia: Carpal Tunnel Repair--Series--Normal anatomy
  https://medlineplus.gov/ency/presentations/100078_1.htm

- Encyclopedia: Carpal Tunnel Syndrome
  https://medlineplus.gov/ency/article/000433.htm
- Health Topic: Carpal Tunnel Syndrome
  https://medlineplus.gov/carpaltunnelsyndrome.html

Additional NIH Resources

- National Institute of Neurological Disorders and Stroke: Carpal Tunnel Syndrome Information Page
  https://www.ninds.nih.gov/Disorders/All-Disorders/Carpal-Tunnel-Syndrome-Information-Page

Educational Resources

- American Association of Neuromuscular & Electrodiagnostic Medicine
  http://www.aanem.org/Patients/Disorders/Carpal-Tunnel-Syndrome
- American College of Rheumatology
  https://www.rheumatology.org/I-Am-A/Patient-Caregiver/Diseases-Conditions/Carpal-Tunnel-Syndrome
- American Society for Surgery of the Hand
  http://www.assh.org/handcare/Anatomy/Details-Page/articleId/27950
- American Society of Hand Therapists
  https://www.asht.org/sites/default/files/docs/2018/Carpal%20Tunnel%20Syndrome%202018.pdf
- Canadian Centre for Occupational Health and Safety
  https://www.ccohs.ca/oshanswers/diseases/carpal.html
- MalaCards: carpal tunnel syndrome
  https://www.malacards.org/card/carpal_tunnel_syndrome
- Merck Manual Consumer Version
  https://www.merckmanuals.com/home/bone,-joint,-and-muscle-disorders/hand-disorders/carpal-tunnel-syndrome
- OrthoInfo from the American Academy of Orthopaedic Surgeons
  https://orthoinfo.aaos.org/en/diseases--conditions/carpal-tunnel-syndrome/
- U.S. Department of Health and Human Services: Office on Women's Health
  https://www.womenshealth.gov/a-z-topics/carpal-tunnel-syndrome

Patient Support and Advocacy Resources

- Arthritis Society (Canada)
  https://www.arthritis.ca/
- The Foundation for Peripheral Neuropathy
  https://www.foundationforpn.org/what-is-peripheral-neuropathy/causes/carpal-tunnel-syndrome/

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28Carpal+Tunnel+Syndrome%5BMAJR%5D%29+AND+%28carpal+tunnel+syndrome%5BTI%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+720+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- CARPAL TUNNEL SYNDROME
  http://omim.org/entry/115430
- MONONEUROPATHY OF THE MEDIAN NERVE, MILD
  http://omim.org/entry/613353

Medical Genetics Database from MedGen

- Carpal tunnel syndrome
  https://www.ncbi.nlm.nih.gov/medgen/2856

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