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Carpal Tunnel Syndrome.

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ABSTRACT

Carpal tunnel syndrome (CTS) is a median entrapment neuropathy that causes paresthesia, pain, numbness, and other symptoms in the distribution of the median nerve due to its compression at the wrist in the carpal tunnel. The mechanism is not completely understood but can be considered compression of the median nerve traveling through the carpal tunnel. It appears to be caused by a combination of genetic and environmental factors. Some of the predisposing factors include: diabetes, obesity, pregnancy, hypothyroidism, and heavy manual work or work with vibrating tools. There is, however, little clinical data to prove that lighter, repetitive tasks can cause carpal tunnel syndrome. Other disorders such as bursitis and tendinitis have been associated with repeated motions performed in the course of normal work or other activities. 30 years women came to my clinic for infertility evaluation.Her husband semen analysis is normal.After detailed investigation in chennai government hospital she diagnosed as carpal tunnel syndrome.We are discussing the details of this syndrome in this article.

Keywords: carpal tunnel, neuropathy, median nerve.

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INTRODUCTION

Carpal tunnel syndrome (CTS) is a median entrapment neuropathy. The main symptom of CTS is intermittent numbness of the thumb, index, long and radial half of the ring finger. The numbness often occurs at night, with the hypothesis that the wrists are held flexed during sleep. Recent literature suggests that sleep positioning, such as sleeping on one's side, might be an associated factor. It can be relieved by wearing a wrist splint that prevents flexion. Long-standing CTS leads to permanent nerve damage with constant numbness, atrophy of some of the muscles of the thenar eminence, and weakness of palmar abduction [1-7].

Pain in carpal tunnel syndrome is primarily numbness that is so intense that it wakes one from sleep. Pain in electrophysiologically verified CTS is associated with misinterpretation of nociception and depression [8].

Conservative treatments include use of night splints and corticosteroid injection. The only scientifically established disease modifying treatment is surgery to cut the transverse carpal ligament [9].

Case Report

30 year women came to my clinic for infertility evaluation.Her husband semen analysis is normal.After detailed investigation in chennai government hospital, she is diagnosed as carpal tunnel syndrome [figure-1].

Figure 1: Carpal tunnel syndrome.

DISCUSSION

People with CTS experience numbness, tingling, or burning sensations in the thumb and fingers, in particular the index, middle fingers, and radial half of the ring fingers, which are innervated by the median nerve. Less-specific symptoms may include pain in the wrists or hands and loss of grip strength [10] (both of which are more characteristic of painful conditions such as arthritis).

Some suggest that median nerve symptoms can arise from compression at the level of the thoracic outlet or the area where the median nerve passes between the two heads of the pronator teres in the forearm [11], but this is debatable. This line of thinking is an attempt to explain pain and other symptoms not characteristic of carpal tunnel syndrome [12].

Numbness and paresthesias in the median nerve distribution are the hallmark neuropathic symptoms (NS) of carpal tunnel entrapment syndrome. Weakness and atrophy of the thenar muscles may occur if the condition remains untreated [13].

Most cases of CTS are of unknown causes, or idiopathic [14]. Carpal Tunnel Syndrome can be associated with any condition that causes pressure on the median nerve at the wrist. Some common conditions that can lead to CTS include obesity, oral contraceptives, hypothyroidism, arthritis, diabetes, prediabetes (impaired glucose tolerance), and trauma [15]. Carpal tunnel is also a feature of a form of Charcot-Marie-Tooth syndrome type 1 called hereditary neuropathy with liability to pressure palsies. Other causes of this condition include intrinsic factors that exert pressure within the tunnel, and extrinsic factors (pressure exerted from outside the tunnel), which include benign tumors such as lipomas, ganglion, and vascular malformation. Carpal tunnel syndrome often is a symptom of transthyretin amyloidosis-associated

polyneuropathy and prior carpal tunnel syndrome surgery is very common in individuals who later present with transthyretin amyloid-associated cardiomyopathy, suggesting that transthyretin amyloid deposition may cause carpal tunnel syndrome. The median nerve can usually move up to 9.6 mm to allow the wrist to flex, and to a lesser extent during extension. Long-term compression of the median nerve can inhibit nerve gliding, which may lead to injury and scarring. When scarring occurs, the nerve will adhere to the tissue around it and become locked into a fixed position, so that less movement is apparent.Normal pressure of the carpal tunnel has been defined as a range of 2–10 mm, and wrist flexion increases this pressure 8-fold, while extension increases it 10-fold. Repetitive flexion and extension in the wrist significantly increase the fluid pressure in the tunnel through thickening of the synovial tissue that lines the tendons within the carpal tunnel.The international debate regarding the relationship between CTS and repetitive motion in work is ongoing. The Occupational Safety and Health Administration (OSHA) has adopted rules and regulations regarding cumulative trauma disorders. Occupational risk factors of repetitive tasks, force, posture, and vibration have been cited. Electrodiagnostic testing (electromyography and nerve conduction velocity) can objectively verify the median nerve dysfunction. If these tests are normal, carpal tunnel syndrome is either absent or very, very mild.Clinical assessment by history taking and physical examination can support a diagnosis of CTS.

As a note, a patient with true carpal tunnel syndrome (entrapment of the median nerve within the carpal tunnel) will not have any sensory loss over the thenar eminence (bulge of muscles in the palm of hand and at the base of the thumb). This is because the palmar branch of the median nerve, which innervates that area of the palm, branches off of the median nerve and passes over the carpal tunnel. This feature of the median nerve can help separate carpal tunnel syndrome from thoracic outlet syndrome, or pronator teres syndrome.Other conditions may also be misdiagnosed as carpal tunnel syndrome. Thus, if history and physical examination suggest CTS, patients will sometimes be tested electrodiagnostically with nerve conduction studies and electromyography. The goal of electrodiagnostic testing is to compare the speed of conduction in the median nerve with conduction in other nerves supplying the hand. When the median nerve is compressed, as in CTS, it will conduct more slowly than normal and more slowly than other nerves. There are many electrodiagnostic tests used to make a diagnosis of CTS, but the most sensitive, specific, and reliable test is the Combined Sensory Index (also known as Robinson index). Electrodiagnosis rests upon demonstrating impaired median nerve conduction across the carpal tunnel in context of normal conduction elsewhere. Compression results in damage to the myelin sheath and manifests as delayed latencies and slowed conduction velocities [1] However, normal electrodiagnostic studies do not preclude the presence of carpal tunnel syndrome, as a threshold of nerve injury must be reached before study results become abnormal and cut-off values for abnormality are variable. Carpal tunnel syndrome with normal electrodiagnostic tests is very, very mild at worst. The role of MRI or ultrasound imaging in the diagnosis of carpal tunnel syndrome is unclear.

There are some who believe that carpal tunnel syndrome is simply a universal label applied to anyone suffering from pain, numbness, swelling, and/or burning in the radial side of the hands and/or wrists. When pain is the primary symptom, carpal tunnel syndrome is unlikely to be the source of the symptoms. As a whole, the medical community is not currently embracing or accepting trigger point theories due to lack of scientific evidence supporting their effectiveness. The carpal tunnel is an anatomical compartment located at the base of the palm. Nine flexor tendons and the median nerve pass through the carpal tunnel that is surrounded on three sides by the carpal bones that form an arch. The median nerve provides feeling or sensation to the thumb, index finger, long finger, and half of the ring finger. At the level of the wrist, the median nerve supplies the muscles at the base of the thumb that allow it to abduct, or move away from the fingers, out of the plane of the palm. The carpal tunnel is located at the middle third of the base of the palm, bounded by the bony prominence of the scaphoid tubercle and trapezium at the base of the thumb, and the hamate hook that can be palpated along the axis of the ring finger. The proximal boundary is the distal wrist skin crease, and the distal boundary is approximated by a line known as Kaplan's cardinal line. This line uses surface landmarks, and is drawn between the apex of the skin fold between the thumb and index finger to the palpated hamate hook. The median nerve can be compressed by a decrease in the size of the canal, an increase in the size of the contents (such as the swelling of lubrication tissue around the flexor tendons), or both. Simply flexing the wrist to 90 degrees will decrease the size of the canal. Compression of the median nerve as it runs deep to the transverse carpal ligament (TCL) causes atrophy of the the nar eminence, weakness of the flexor pollicis brevis, opponens pollicis, abductor pollicis brevis, as well as sensory loss in the digits supplied by the median nerve. The superficial sensory branch of the median nerve, which provides sensation to the base of the palm, branches proximal to the TCL and travels superficial to it. Thus, this branch spared in carpal tunnel syndrome, and there is no loss of palmar sensation. Suggested healthy habits such as avoiding repetitive stress, work

modification through use of ergonomic equipment (wrist rest, mouse pad), taking proper breaks, using keyboard alternatives (digital pen, voice recognition, and dictation), and employing early treatments such as taking turmeric (anti-inflammatory), omega-3 fatty acids, and B vitamins have been proposed as methods to help prevent carpal tunnel syndrome. The potential role of B-vitamins in preventing or treating carpal tunnel syndrome has not been proven. There is little or no data to support the concept that activity adjustment prevents carpal tunnel syndrome.Stretches and isometric exercises will aid in prevention for persons at risk. Stretching before the activity and during breaks will aid in alleviating tension at the wrist. Place the hand firmly on a flat surface and gently pressing for a few seconds to stretch the wrist and fingers. An example for an isometric exercise of the wrist is done by clinching the fist tightly, releasing and fanning out fingers. None of these stretches or exercises should cause pain or discomfort.

Biological factors such as genetic predisposition and anthropometrics had significantly stronger causal association with carpal tunnel syndrome than occupational/environmental factors such as repetitive hand use and stressful manual work. This suggests that carpal tunnel syndrome might not be preventable simply by avoiding certain activities or types of work/activities.

The importance of wrist braces and splints in the carpal tunnel syndrome therapy is known, but many people are unwilling to use braces. In 1993, The American Academy of Neurology recommend a non-invasive treatment for the CTS at the beginning (except for sensitive or motor deficit or grave report at EMG/ENG): a therapy using splints was indicated for light and moderate pathology.Current recommendations generally don't suggest immobilizing braces, but instead activity modification and non-steroidal anti-inflammatory drugs as initial therapy, followed by more aggressive options or specialist referral if symptoms do not improve. Many health professionals suggest that, for the best results, one should wear braces at night and, if possible, during the activity primarily causing stress on the wrists.Corticosteroid injections can be effective for temporary relief from symptoms while a person develops a long-term strategy that fits their lifestyle. This treatment is not appropriate for extended periods, however. In general, local steroid injections are only used until other treatment options can be identified. For most surgery is the only option that will provide permanent relief. Release of the transverse carpal ligament is known as "carpal tunnel release" surgery. It is recommended when there is static (constant, not just intermittent) numbness, muscle weakness, or atrophy, and when night-splinting no longer controls intermittent symptoms.In general, milder cases can be controlled for months to years, but severe cases are unrelenting symptomatically and are likely to result in surgical treatment.

REFERENCES

[1] Durkan JA. The J Bone Joint Surg 1991;73(4): 535–8.
[2] Robinson L. Phys Med Rehabilit Clin North America 2007;18(4): 733–46.
[3] Armstrong T, Chaffin D. J Occupat Med 1979;21(7).
[4] Walker, Jennie A. Nursing Standard 2010;24(19): 44–8
[5] Schuind F, Ventura M, & Pasteels J. The J Hand Surg 1990;15(3).
[6] Werner Robert A. J Occupat Rehabilit 2006;16(2): 201.
[7] Lozanocalderon S, Paiva A, Ring D. The J Hand Surg 2008;33(3): 303–307.
[8] Stevens JC, Beard CM, O'Fallon WM, Kurland LT. Mayo Clin Proc 1992;67 (6): 541–548.
[9] Werner Robert A, Albers James W, Franzblau Alfred, Armstrong Thomas J. Muscle & Nerve 1994;17 (6): 632–6.
[10] Wilbourn AJ, Gilliatt RW. Neurol 1997;49 (1): 21–27.
[11] Graham B, Regehr G, Naglie G, Wright JG. The J Hand Surg 2006;31A (6): 919–924.
[12] Cush JJ, Lipsky PE. 2004. "Approach to articular and musculoskeletal disorders". Harrison's Principles of Internal Medicine (16th ed.). McGraw-Hill Professional. p. 2035.
[13] Katz, Jeffrey N.; Simmons, Barry P. New England J Med 2000;346(23):1807–12.
[14] Sternbach G. J Emerg Med 1999;17(3): 519–23..
[15] Lazaro R. Surg Neurol 1997;47 (2): 115–7.