

Review on Carpal Tunnel Syndrome

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Research Article

ABSTRACT

Health ailments due to occupational disease spawn by exposure to a work place health hazard. It might be due to job environment and exposure intensity. Carpal tunnel syndrome (CTS) is a peripheral compression induced neuropathy results due to median nerve intrigue and at the level of the carpal tunnel, delimited by the carpal bones and by the transverse carpal ligament. Carpal tunnel syndrome is known to be effectuated by the compression of median nerve and the various processes associated with while it progress through the carpal tunnel meagre space. Early detection of pathological changes at a stage when they are reversible is the foremost suggestion is to curtail the harmness originated by occupational disease. Carpal tunnel syndrome is a state in which one of two main nerves gets compressed in the wrist. Subsequently it leads to pain in the hand, wrist and sometimes forearm, and numbness and tingling in the thumb, index and long finger. Sometimes weakness of hand and muscle is observed in certain advanced cases. Interestingly, Carpal tunnel syndrome is highly prevalent in women and old age groups. Numerous people prefer surgery to treat this condition, though intermittently various treatments, such as therapeutic ultrasound are recommended. In this review broad spectrum about environmental aspects and the nature of putative exposures and the strategies which might reduce the burden of the carpal tunnel syndrome are discussed.

Keywords: Carpal tunnel syndrome, Occupational disease, Numbness

INTRODUCTION

Carpal tunnel syndrome (CTS) is the prominent reason of nocturnal paraesthesia and is presumed in any patient with this symptom regardless age. CTS results due to increased pressure in the carpal tunnel and the dysfunction of median nerve. The Carpal tunnel is a narrow passage way in the wrist, about an inch wide. The floor and sides of the tunnel are formed by small wrist bones called carpal bones. Carpal tunnel is the compartment encompassed by bones of the carpus and the transverse carpal ligament. It safe guards the median nerve and flexor tendons that bend the fingers and thumb [1]. The tissue pressure in the tunnel of normal wrists is 2-31 mm Hg whereas for carpal tunnel patients is 32-110 mm Hg. Pressure may be elevated by wrist flexion with elongation and flinger flexion. 94 mm Hg pressure exists when the wrist in flexed position and rose to 110 mm Hg while the wrist is extended. Many changes prevail in ligaments and surrounding nerves produce alterations in the connective tissue flexibility nature in altered manner eventually leads to increased pressure [2,3].

RISK FACTORS FOR CARPAL TUNNEL SYNDROME [4-8]

Numerous factors contribute as risk factors for carpal tunnel syndrome even though it was not a direct causative factor but chances of aggravating median nerve damage prevail.

These include:

Anatomic Factors

Due to dislocation or wrist fracture or arthritis deformations of small bones persist. Alteration of space within the carpal tunnel and creates a pressure on the median nerve.

Workplace Factors

Baneful pressure created on median nerve due to handling of vibrating tools which require prolong or repetitive flexing of the wrist which sometimes leads to nerve damage. Frequent exposure of hands to vibration or cold temperature can also cause carpal tunnel syndrome.

Sex/Gender

Women have high risk factors for carpal tunnel syndrome than men. Naturally women have smaller carpal tunnels and risks may increase during pregnancy, breast feeding or menopause due to fluctuations exists in hormones. It is commonly diagnosed between 30-60 years age group women. Pregnancy-induced carpal tunnel syndrome usually resolves after the pregnancy is over.

Lifestyle Factors

A lifestyle factor that may increase the risk of carpal tunnel syndrome including smoking since blood flow to median nerve is affected. Other factors include consumption of high salt, sedentary lifestyle, and a high body mass index (BMI) and obesity.

Nerve-Damaging Conditions

Chronic illnesses like diabetes increase the risk of nerve damage, including damage to median nerve.

Inflammatory Conditions

Illnesses that are characterized by inflammation, such as rheumatoid arthritis has influence in the lining around the tendons in wrist and creates pressure on the median nerve. It is also caused by overactive pituitary gland, hypothyroidism or other neurological disorders.

Age

Normal wear and tear of the tissues in the hand and wrist caused by aging.

Heredity

It has major impact on carpal tunnel syndrome. Normally few people has smaller carpal tunnel and due to anatomic differences that change the amount of space for the nerve and these characteristic can run in families.

Recurrent Hand Use

For prolonged period of time using the same hand and wrist motions or activities lead to aggravate the tendons in the wrist, causes swelling that puts pressure on the nerve.

SYMPTOMS OF CTS [9-12]

The carpal tunnel safeguards the median nerve and flexor tendons that bend the fingers and thumb. Pressure on the median nerve is major cause of carpal tunnel syndrome. The symptoms include:

- Pain, numbness and tingling in the hand and arm. It may radiate up to the forearm towards shoulder.
- Burning pain primarily in the thumb and index, middle and ring fingers.
- Occasional shock like sensations that radiate to the thumb, index, middle and ring fingers.
- Difficult to carry out normal day to day work due to weakness and clumsiness in the hand.
- Loss of proprioception, paraesthesia in the hand.
- Dull, aching discomfort in the hand, forearm or upper arm.
- Dry skin, swelling or colour changes in the hand.
- In morning time finger stiffness is observed.
- Becoming less sensitive to touch (hypoesthesia).

The symptoms of carpal tunnel syndrome emerge gradually without a specific injury. Night-time symptoms are very common since many sleep with their hand and wrist bent there by sleep disturbances observed.

Daytime symptoms include that people unable to hold things for a prolonged period of time with the wrist bent forward or backward like usage of phone, driving or reading a book.

PATHOPHYSIOLOGY OF CTS

CTS are a complex phenomenon and the entrapment neuropathy caused by compression and traction of the median nerve at the level of the carpal tunnel. This leads to intraneural medical factor disorders ^[11,12]. The carpal tunnel is an osteofibrous outlet, which lies between the flexor retinaculum (FR) and the carpal bones. Flexor tendons cause bending the fingers and thumb also travel through carpal tunnel. Since median nerve plays vital role in controlling muscles present in base of thumb while tissues adjacent to flexor tendons gets swelled and excess pressure is exerted on the median nerve. Median nerve gets impaired within rigid confines of carpal tunnel and both sensory, motor fibres are affected. Pressure on the median nerve leads to formation of edema, hindrance in venous outflow and ischemia in nerve injury ^[13]. When the median nerve gets compressed as it pass in depth through transverse carpal ligament (TCL), induce atrophy of the thenar eminence, weakness of the flexor pollicis brevis, opponens pollicis, abductor pollicis brevis and also sensory loss. The superficial sensory branch of the median nerve responsible for sensation to the base of the palm branches proximal to the TCL and moves superficial to it ^[14].

DIAGNOSIS

Doctor's physical examination and nerve conduction studies are used to diagnose carpal tunnel syndrome.

PHYSICAL EXAMINATION

Primarily doctors investigate and collect details about general health and medical history. It was done by examining the wrists for signs of tenderness, swelling and deformities followed by sensation checking on fingers, numbness or tingling. Additionally, checking about the weakness in the muscle around the base of thumb is also made ^[15].

NERVE CONDUCTION STUDIES

This test can monitor the fastness of signals transmitted through the nerves and detect clearly about the nerve conduct capacity. Carpal tunnel syndrome is confirmed when the nerve impulse is relatively slower than normal when the nerve impulse passes in to the hand ^[16,17].

ELECTROMYOGRAM

It measures the electrical activity in muscles and reveals about nerve or muscle damage. EMG test is also used to analyse the severity nature of CTS if surgical decompression is being noted ^[18].

TREATMENT

Carpal tunnel syndrome will get retrogress if not treated in time. Non-surgical treatment may include:

Bracing or Splinting

To get relieved from tingling and numbness a brace or wrist splint may be worn which will protect from bending wrist on sleep. Splint should be worn during night for period of 3-4 weeks ^[19].

NONSTEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDs)

Medications such as ibuprofen and naproxen can help to relieve pain and inflammation for a short-term period ^[20].

CORTICOSTEROIDS

It causes reduction in inflammation and swelling, hence pressure on the median nerve is relieved. Oral corticosteroids will not be effective as corticosteroid injections for treating carpal tunnel syndrome ^[21].

ACTIVITY CHANGES

Changing or modifying the activities of too much work to wrist can help slow or stop progression of the disease. Cycling or any other exercise should be avoided ^[22].

SURGICAL TREATMENT

In case of nerve damage surgical treatment is recommended.

Carpal Tunnel Release

Surgical procedure for carpal tunnel syndrome is called carpal tunnel release.

Open Carpal Tunnel Release

A small incision is made in palm of hand, where a transverse carpal ligament is cut thereby releasing median nerve. In surgery transverse carpal ligament is divided gradually size of tunnel is increased hence pressure on the median nerve gets decreased [23,24].

Endoscopic carpal tunnel release

Small incision is made using a miniature camera called endoscope which enables the doctor to observe wrist structures without opening the whole area by large incision. Endoscopic carpal tunnel syndrome is interconnected with minimal incision hence greater patient satisfaction is achieved [25,26].

PREVENTIVE MEASURES

There is no clear manifest regarding carpal tunnel syndrome prevention; however it can be minimized by the following methods:

Reduce the Force and Relaxation to Grip

For prolonged work like cash counting or keyboard typing sufficient rest should be provided and gentle soft touch to keyboard is enough.

Take Constant Gap between Work

Frequently rotate the wrists and stretch the palms and fingers and give rest. Switch over hands and position may be changed during work.

Sleeping Criteria

Sleeping with folded hands should be avoided and moreover snug and wrist splint should be worn.

Posture Position

Shortening the neck and shoulder muscles may compress the nerves in neck thereby hands, fingers and wrists gets affected.

CONCLUSION

Carpal tunnel syndrome is a disorder which is responsible for work absences and lost productivity. Pharmacists are likely to happenstance patients seeking guidance about carpal tunnel syndrome, especially regarding self-management and the available non-prescription products that may aid extravagance and accomplish the condition, such as analgesics and protective and supportive hand/wrist splints.

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