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# CONCEPTUAL STUDY OF CARPAL TUNNEL SYNDROME AND ITS MANAGEMENT

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**ABSTRACT**

Chronic pain results from a wide range of patho-physiologies and is especially associated with many neurological disorders. A few neurological conditions associated with pain include Diabetic Neuropathy, Multiple Sclerosis, Carpal Tunnel Syndrome, Migraine, Guillain- Barre Syndrome etc. **Carpal Tunnel Syndrome** (CTS) otherwise called Median Neuropathy is a disease commonly seen these days as a cause of work disability. In Ayurveda, CTS is considered as a *vata vyadhi* with its *sthana samsraya* at *Manibandha Sandhi* which also happens to be a *marma sthana* (Vital part), hence the importance of its management. The aim of this study is to provide an updated review on CTS which will be beneficial in clinical practice as well as in pursuing research studies.

**KEYWORDS:** *kandara, manibandha marma,* Median nerve, *Sandhigata vata,* sports injury.

## INTRODUCTION

Carpals are the bones of the wrist region and Carpal Tunnel is a narrow passageway made up of carpal bones and the connective tissue near the wrist and the palm. Median nerve, (root value: C5-T1) arises from the lateral and medial cords of Brachial plexus extending from lower part of the neck and is the main nerve passing through this tunnel. It controls the movements and sensations of the arm, forearm and the hand. Carpal Tunnel Syndrome is a nerve entrapment syndrome of upper extremity caused by the compression of Median nerve along its course in the carpal tunnel.

Presenting features include burning pain, pins and needles sensation, tingling and numbness along the distribution of the median nerve. In later stages, it may be associated with the atrophy of the Thenar muscles.

Management of CTS involves anti-inflammatory and pain-relieving medicines. The simultaneous use of some therapies like *Panchkarma* and *Marma Chikitsa* can prove to be useful. Life style changes regarding causative factors are also useful to avoid progression of this condition and to gain fast relief from symptoms.

With increasing number of cases, it is the need of the hour to look upon the Ayurvedic perspective which aims to address the vitiated *doshas* through internal medications, therapies and lifestyle recommendations.

## DISCUSSION

### Modern Perspective

Carpals, 8 in number, are the wrist bones which are arranged in 2 rows (distal and proximal) in a way that the palmar surface is deeply concave. This concavity is converted to a tunnel by Flexor Retinaculum; a band of fascia attaching itself to Pisiform bone and hook of Hamate-medially and to the tubercles of both Scaphoid and Trapezium bones-laterally.[1] The tunnel is occupied by the Flexor tendons of forearm and synovial sheath; Median nerve being the main content. Any pathology that cause swelling in these structures or decrease the tunnel size results in compression of the nerve against the transverse carpal ligament (Flexor Retinaculum) bounding the roof of the tunnel. When the pressure increases in the tunnel, there is also a restricted flow of blood to the nerve. All these, ultimately result in Carpal Tunnel Syndrome.

Carpal Tunnel Syndrome is categorized under Cumulative Trauma Disorders caused by repetitive, sustained forceful motions over time, compromising the integrity or functioning of soft tissues and producing inflammation of tendons or compression of nerve.[2] It presents with neurological deficits of median nerve involving paraesthesia, numbness and weakness of muscles innervated by the nerve.[3] The main complaint is difficulty in flexing fingers with burning pain, pins and needle sensation.

a) Cause - Any swelling that causes thickening of synovial sheath likely results in compression and

ischaemia of median nerve in the Tunnel. Common causes of the syndrome include Diabetes Mellitus, (the most common Diabetic neuropathy is of the median nerve at the wrist), Infiltrative Disorders like Amyloidosis especially in AB2M type in which it is presented as 1st symptom, in about 1/2of Acromegaly patients where compression of nerve occurs by excess Connective Tissue in the carpal tunnel, Systemic Sclerosis, as a complication of Colle's fracture or in Dislocation of Lunate bone, Rheumatoid Arthritis, Osteo Arthritis, 3rd trimester of pregnancy, Myxoedema, Obesity, Hypothyroidism, Neck pain, Idiopathic(which outnumbers other conditions).

b) Prevalence - It is seen over 2.1% of general population. It mostly occurs bilaterally but is increasedly seen on the active side where repetitive activities involve wrist flexion. Both genders are affected but mostly females between age group 40-60 yrs are the victims.[4]

c) Symptoms - The patient presents with (i) Numbness and paraesthesia variably in 1st 2nd 3rd & radial ½ of 4th digits; sometimes of entire hand extending to forearm and upper arm or isolated to one or two fingers (ii) Pain- burning type, worst at night, is a common symptom occurring in arm- forearm and is usually relieved with shaking hands. (iii) Associated atrophy of the thenar muscles (Ape-like Thumb deformity) may be seen.

d) Signs - Mostly include decreased or altered sensation in the radial 3 ½ digits and weakness of Abductor Pollicis Brevis muscle which leads to clumsiness in fine movements.

i. Tinel's Sign: Thumping volar aspect with the help of a percussion hammer reproduces the tingling sensation.
ii. Phalen's sign: Pressing extensor surface of both flexed wrists against each other for30-60 seconds leads to exacerbations of symptoms which disappear with straightening of wrist.
iii. Froment's Sign: Patient unable to hold a book.[5]

e) Outcome Measures – Certain questionnaires available to determine the severity of symptoms and functional status in patients with CTS. These include

i. Boston Carpal Tunnel Questionnaire(BCTQ)
ii. Brigham and woman's Carpal Tunnel Questionnaire
iii. Disability of Hand and Shoulder (DASH) Questionnaire

f) Radiology - Symptoms of nerve damage are ambiguous in the initial period of development of neuropathy, hence diagnosis seems difficult in this stage. USG is useful, especially, in fully developed cases presenting a triad of (i) Palmar bowing of FR(>2mm beyond a line connecting pisiform and scaphoid) (ii) Enlargement of nerve proximal to FR (iii) Distal flattening of nerve.[6]

Sensitivity and specificity of MRI is low. Both Tinsel sign and Phalen's sign induce or increase paraesthesia along the median nerve distribution. Both these tests have low sensitivity and moderate specificity. Nerve conduction velocity test is required to confirm suspected diagnosis. Electro-diagnosis is extremely sensitive and shows slowing of median potentials (more of sensory and to lesser extent motor), along the wrist.

g) Differential Diagnosis - Carpal Tunnel Syndrome is often confused with.[7]

i. Thoracic Outlet syndrome
ii. Other Median Nerve Entrapment Syndromes-

- Pronator teres Syndrome.
- Anterior Interosseous Nerve Syndrome.

h) Treatment - Begins after controlling systemic conditions and involves use of NSAIDs, injection of Glucocorticoids or anaesthetics in carpal tunnel, Wrist splinting in extension (especially at night) and Surgical Decompression of carpal tunnel.[8]

Surgical intervention is made when: (i) Response to conservational treatment is poor (ii) There is evident atrophy of Thenar muscles (iii) Presence of significant denervation potentials in EMG.

**CTS in Children**

CTS is a rare phenomenon in children. Previous studies in children attributed the causes as congenital malformation, Brachial Plexopathy or trauma. The main cause in majority of the studies, though was found to be lysosomal storage disorders like Mucopolysaccharidoses and Mucolipidoses. The symptoms are vaguely presented by children unlike adults. Usually, it comes to notice only when children complain of wrist pain at night or pain in writing. But it is easily recognized when associated with trauma or malformations. In case of evident Thenar atrophy, one has to differentiate it from congenital thenar atrophy. There may be masking of CTS symptoms by joint stiffness or skeletal dysplasia. In these cases, early clinical and electrophysiological screening is said to be beneficial.

**CTS –An Occupational Disease**

CTS, is the most common occupational disease caused by Repetitive Strain Injuries.[9] Persons employed in occupations of dental hygiene, assembling, packaging, shoe manufacturing, sewing, machine operating, fish processing, carpet layering, quarry and rock drilling and those working in slaughterhouses, musicians are amongst the most exposed. There are clear associations of CTS and workplace activities especially in those with regular prolonged use of hand- held powered vibratory tools. Studies in these groups reveal that there have been recurrences of symptoms even after a period of occupational break. With the advent of technology, the usage of computer for long hours seemed to pose a threat

but studies proved it otherwise. Instead, repetitious activities involving flexion and extension of wrist or rotator movements of the hand, especially allied with forceful grip posed a risk. Although complications arising from carpal tunnel sugery like post operative wound infections or median nerve lacerations are rare but if they occur can be emotionally and physically devastating to the patient. Hence alternative medicines are being researched for a permanent solution.

**CTS from Sports Injury**

Any sport that involves prolonged use of hand and wrist, especially, grasping and twisting movements pose a higher risk of developing CTS. Most of the racquet sport activities like tennis, golf etc. rowing, cycling, skiing, archery, can cause trauma of the wrist or injury to the median nerve with the precipitation of symptoms of CTS. Intense sports practice has also been known to be a non-genetic cause of CTS in children. Timely evaluation, diagnosis and intervention by the sports medicine physician with proper management will relieve the athlete of the symptoms. This is necessitated because any damage to the nerve can prolong the recovery or in extreme cases become a threat to the athlete's career.

**Ayurvedic Perspective**

**a. Pathogenesis**

In Ayurveda, the *samprapti* of CTS can be viewed from 3 perspectives and can be explained thus:

i. As a *Sandhigata vata vyadhi*: *Sandhigata vata* (vata afflicting joints) causes pain associated with difficulty in movements.[10] Food and activities aggravating *kapha dosa* results in *Kapha prakopa* .*Vata* vitiation is said to be either due to *dhatu kshaya* or *āvarana*. *Vyana vata* which is associated with the movements of the body is obstructed especially at *manibandha* (wrist) due to *kapha dosha āvarana*. The symptoms of *kaphāvrita vyana vata* will be presented as pain in joints, difficulty in movements and *gati sanga* (obstruction of impulse movement).[11] In later stage, *vyana vata* is further vitiated from *nidana* (cause) like *vishama cheshta*(abnormal repeated activities-typing on laptop etc.), *kreeda* (excessive indulgence in activities like lifting weights, typing etc.) leading to continued *gati sanga*, overpowering *kapha.* At this stage, *Vata prakopa* leads to *Sosha* (wasting) as evidenced by Atrophy.

ii. As *Sandhi marma āghāta* (*Manibandha Marma- vital point on wrist*) -Susruta Acharya opines *bala cheshta kshaya* (decreased sensation and weakness) and *sosha* (atrophy) as the *lakshana (symptoms)* of *Sandhi marma āghāta*.[12] Acharya further opines that the *abhighāta* (injury) to *Manibandha marma* leads to *Kuntata*[13] (deformity) as evidenced from Ape thumb deformity.

iii. As *Srotodushti* (vitiation of channels) of *kandara* (tendon and similar structures) - *Kha vaigunya* (obstruction in channels) of *kandara* manifests as *sankocha* (compression), *supti* (numbness) and *khalli* as cited in *Sroto dushti lakshana* of *kandara*.[14]

**b. Treatment**

i. *Nidana parivarjana*[15] (Avoidance of precipitating factors)

ii. *Hetu vyadhi vipareeta Chikitsa*: Treatment mainly is to control *Vata* vitiation especially *āvrita vata*. In *vyana vyadhi*, *urdhwabhagahara*, *shamana* and *anulomana* treatments can be adopted.[16]

- So, initially when *Kapha* symptoms are predominant, *Dhāra* with *dhanyamla*, *Choorna pinda sweda* and *Abhyanga* with *Snigdhoshna KaphaVata hara dravya* like *Ksheerabala Taila*, *Mahanarayana Taila*, *Mahamasha Taila* can be given.[17]
- In *Vata* dominant conditions, *Sneha Dhara* with *Bala Ashwagandhadi* or *Ksheera bala Taila* and *Snigdha sweda* may be adopted in aggravated symptoms of *vata*. *Shashtika shali pinda sweda* or *Patra pinda sweda* have also proven to be beneficial. All these improve the motor and sensory innervations. *Saalvana Upanaha* seems to be most useful in *Vata* conditions. *Brahmana nasya* aid *Vata samana*.
- *Shamana Snehapana* may be given targeting *madhyama roga marga* and to pacify *Vata.*
- Anti-inflammatory & Analgesic *Lepana* like paste of *Shallaki* + *Ardraka* aids in symptomatic relief of pain.
- *Shali-shashtika lepam* which is *mamsa-asthi dhatu vardhana* is useful during the wasting period.
- Rasnerandadi, Maharasnadi, Ashtavargam, Punarnavadi kashaya; Dhanwantararishtam, Dasamoolarishtam, Punarnavasavam,; Yogaraja Guggulu, Kaishora Guggulu, Trayodashanga Guggulu, Chandraprabha vati – these help reduce symptoms.[17,18]
- Vishatinduka Vati which has *Vedana sthapaka*, *Soola prasamana*, *Sotha hara*, *Uttejaka* and *Nadi balya* properties is quite useful.[19]

iii. Considering *manibandha* as *marma*, stimulating the *marma* at its location three times a day for about 15 seconds each, also gives an added benefit in subsiding of the symptoms.

iv. Flexor Retinaculum, if considered as *kandara* and *kandara* being *upadhatu* of *Rakta*; any medicine acting on *Rakta* will have effect on *Kandara*. So, *Jalouka Avacharana* (leech Tharapy) by placing *2 Jalouka* simutaneously, proximal to Carpal Tunnel and later *Pinda taila Avagaha* can be adopted.

**c.** Inclusion of certain changes in life style shall prove to be beneficial. These include:

- Follow *Vatahara* lifestyle
- Oil massage gently and regularly

- Keep hands warm especially in cold
- Avoid sleeping on hands
- Reduce force while working
- Frequent breaks during typing
- Exercises of hands like stretching and bending them gently.

## CONCLUSION

The number of patients of carpal tunnel syndrome encountered on a daily basis is seen significantly rising. The conventional methods of treatment like Ayurveda *panchakarma* or *marma chikitsa* over surgery are opted by most of them. CTS is best understood as a *sandhigata vata vyadhi*. The *vyana vata* and *kapha dosha* are the main factors involved in the pathogenesis during which the symptoms progress in different stages. So, it becomes necessary for the physician to assess the exact stage, the *dosha* involved and then proceed to the stage-wise treatment. Judicious application of *panchakarma* resolves the symptoms involved and also happens to be the permanent solution. *Marma therapy* brings in an immediate effect, so can be included in the treatment protocol. There have not been many studies regarding carpal tunnel syndrome as a *marmaja vyadhi* and researches involving its management through *marma* therapy will prove to be a break through. For this, a better knowledge of marma, its location and its stimulation techniques is also a pre-requisite. Be it the judicious use of panchakarma, leech therapy or the marma therapy, a thorough understanding of the disease and its management is essential.

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