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A Prospective Study of Clinical Profile & Risk Factor Assessment of Carpal Tunnel Syndrome

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Abstract
Background: *Carpal Tunnel syndrome (CTS) is the most common entrapment neuropathy in the general population. This study was conducted to find the common clinical presenting feature in electro physiologically diagnosed CTS & to correlate with the socioepidemiologic, associated comorbidities & electrophysiological feature.*
Material & Methods: *520 cases both male and females within age group of 18-65 were included in this study. Electro physiologically diagnosed cases of CTS were included in this study. Cases with polyneuropathy were not included in this study. Socioepidemiologic, clinical, laboratory and electrophysiological evaluation done & correlated.*
Result: *Total number of patients included in the study was 520 out of which female 340 & male 180 with a mean age of presentation was 51.6 year. Most common associated comorbidites were diabetes followed by hypothyroidism. Most common symptoms were pain & paresthesia in hands worsened at night. Bilateral affection were common. Clinical severity correlated with electrophysiological findings.*
Conclusion: *Carpal tunnel syndrome more commonly found in females. Bilateral affection is common. Common symptom is pain & paresthesia in hands. Diabetes & hypo thyroidism are common comorbid condition.*
Keywords: *Carpal tunnel syndrome,nerve conduction studies.*

Introduction

Carpal Tunnel syndrome (CTS) is the most common entrapment neuropathy in the general population.[1] CTS occurs due to compression of the median nerve in the wrist when it passess through the Carpal tunnel. It is either due to a congenitally narrow canal or due to acquired causes. Injury to the median nerve within the Carpal tunnel is due to chronic intermittent mechanical compression & ischaemic damage leading to demyelination & axonal loss.

Common predisposing factors are diabetes mellitus, hypothyroidism, rheumatoid arthritis, obesity, pregnancy, postpartum state & occupations involving stress on wrist joint & carpal tunnel. It most often occurs in females & involves the right hand[2,3] Common clinical symptoms are gradual onset of numbness &

tingling in the median nrve distribution spreading to whole hand at times often disturbing night sleep. Progressive weakness & clumsiness in the affected hand occurs in course of time. The nerve conduction study is a reliable & definitive diagnostic test for CTS We undertook this study to find out the presenting clinical feature of patients from this part of Odisha having a definite neurophysiological diagnosis of CTS.

Material and Methods

Between the period from December 2014 to December 2017 we prospectively studied the patients attending the Neurology OPD, Pain clinic OPD of VIMSAR Burla & patients referred to neurophysiology laboratory from other department with a clinical diagnosis of CTS. The number of patients are 520.Both males & females within age group of 18 to 65 were included in this study. Patients with polyneuropathy diagnosed clinically or electro physiologically were excluded from the study.

Socio epidemiologic & occupational data were obtained from every patient. Patients were given a drawing of the upper limb, in which they were asked to draw the territories in which paresthesia and pain were felt. A detailed systemic & neurological examination was done in every patient with directed examination of upper limbs. Patients were tested for the presence of Tinel's, Phalen's sign, reversed Phalen's (wrist extended 90◦) sign and atrophy of thenar muscle. Patients were asked for worsening of symptoms at night.

Patients were classified in to four groups, according to the diagram described by Katz et al.[4] (a) classic pattern, with symptoms in at least two of the first three fingers, without compromise of the palm or dorsum of the hand;(b) probable pattern, with finger involvement as in the classic pattern, but with symptoms in the palm or dorsum of the hand; (c)possible pattern, with complaints in only one of the first three fingers; (d)unlikely pattern, with symptoms in the hand, but without involvement of the first three fingers. (e) asymptomatic pattern- absence of pain or paresthesia on the hand or wrist.

Diagnosis of CTS was based on the American Academy of Neurology clinical diagnosis criteria summarised as paresthesia, swelling, pain, weakness or clumsiness of the hand provoked or worsened by sleep, sustained hand or arm position, repetitive action of the hand or wrist that is reduced by changing posture or shaking the hand, sensory deficit in the median nerve distribution or atrophy of median innervated thenar muscles.[5]

Neurophysiological studies were done using Medicaid Neuro perfect machine. Motor & sensory nerve conduction of median, radial & ulnar nerves done using standard protocol. Neurophysiological grades were defined as (a) mild CTS-prolonged distal sensory peak latency with or without decreased sensory amplitude (b)moderate CTS-abnormal median sensory peak latency with prolongation of distal motor latency with prolongation of distal motor latency (c)severe CTS-prolonged motor & sensory distal peak latency either with a low or absent sensory nerve action potential(SNAP) or compound motor action potential(CMAP).(d)very severe CTS-absent thenar motor or sensory response either with a present or absent lumbrical response.[6]

Haematological investigations like CBC, ESR, FBS, Lipid profile, Thyroid profile & RA factor done to assess the associated co morbid condition.

Result

Total number of patients included in the study was 520 out of which female 340 & male 180 with a mean age of presentation was 51.6 year

Table -1 Demographic data

Sex	**No. Of patients**	**%**
Female	340	65
Male	180	35
Age Group		
25<35	55	11
35<45	85	16
45<55	240	46
55<65	140	27

Table-2 Coexisting diseases

Coexisting disease	No. Of patients	%
Diabetes mellitus	230	44
Hypothyroidism	170	32
Obesity	104	20
Postpartum	17	3
Rheumatoid arthritis	6	1
Occupational	20	4

Table-3 Distribution of symptoms according to gender of the patient

Symptom	Female(340)	Male(180)
Paresthesia (hand)	286(84%)	130(72%)
Pain(hand)	230(68%)	90(50%)
Worsening of symptom at night	278(82%)	66(36%)
Tinel's sign	110(32%)	61(34%)
Phalen's sign	156(46%)	84(47%)
Pain in forearm & arm	140(41%)	59(33%)
Thenar atrophy	89(26%)	42(23%)
No symptom	22(6%)	5(3%)

Table-4 Categorization according to NCS findings

	Female(340)	Male(180)
Mild	36(11%)	29(16%)
Moderate	164(48%)	120(67%)
Severe	102(30%)	19(11%)
Very severe	38(11%)	12(6%)
Total	340(100%)	180(100%)

Table-5 Gender distribution according to hand involvement, unilateral or bilateral

	Unilateral	Bilateral
Female -340	138(41%)	202(59%)
Male -180	46(26%)	134(74%)
Total -520	184(35%)	336(65%)

Discussion

Carpal tunnel syndrome is a very common entrapment neuropathy encountered in our clinical practice. Although the classical presenting symptom & sign help to diagnose the case clinically there are some abnormal presentation which put the physician in dilemma.

In the present study the demographic data obtained in our study tally with other studies. There is female preponderance in our series which corroborates with findings of other workers.[2,3] Maximum number of cases were found in the age group of 45-55. Some studies show a lower age range.[7]

A metaanalysis show a positive association between hypothyroidism & CTS. Our series had 170(32%) cases having hypothyroidism.[8]

Diabetes mellitus was found in 230(44%) of cases. All of them were of type -2 diabetes. Literature review show a strong association with both type 1 & type 2 diabetes as a risk factor for CTS.[9]

Overweight increases the risk of CTS by 1.5 times & obesity increases the risk by two times. Definite mechanism for this is not known. Obesity was present in 104 (20%) cases in our series.[10]

Occupational CTS is a very important issue.[11] In this series 20(4%) cases (12 cases of Carpenter & 8 cases of Plumber) had CTS. Over use of hand & use of vibrator machine is the cause.CTS is also found in Computer worker with over use.

In the present series we found paresthesia in the hand in median nerve distribution in 286 (84%) cases in female & 130(72%) cases in male. Pain in the same distribution was found in 230(68%) & 90(50%) cases in female & males respectively. In 140 (41%) cases pain was felt in proximal area like forearm & arm in females & 59(33%) cases in male. In 53(10%) cases pain & tingling was also felt in the whole palm & dorsum of hand. Review of literature show that in severe cases of CTS pain can spread proximally to the forearm & sometimes shoulder. In the palm the pain & sensory symptoms are not limited to first three digits but rather includes the entire palmar surface. It might secondary to a peripheral or central mechanism (simultaneous ulnar involvement or central sensitisation respectively) or both.[12]

An interesting observation by Stevens et al show that the symptoms limited to the first three digits might indicate more severe median nerve involvement (distribution of symptoms in the area innervated by the median nerve is associated with more severe changes in nerve conduction velocity).[2]

Tinel's, were present in 110(32%) female & 61(34%) males, and Phalen's sign in 156(46%) female & 84(47%) males cases in our series respectively .Tay et al found positivity of Tinel & Phalen sign in 33.6% & 23.9% patient

respectively.[13] In the literature the sensitivity ranges from 42% to 85% for Phalen's manoeuvre & 38% to 100% for Tinel's test. Specificity ranges from 54% to 98% & from 55% to 100% respectively.[14]

Weakness of thenar muscle with atrophy seen in 89(26%) female and 42(23%) male cases. It was seen in advanced cases. Strength of the Abductor pollicis brevis muscle can provide useful information about functional impairment but assessment by clinical examination alone is not quantifiable & hand dynamometry is a better option.[15]

Electrophysiological study is a very sensitive method of assessing median nerve dysfunction in CTS. The degree of demyelination & axonal loss can be measured.[16] We categorised our cases as mild, moderate, severe & very severe as discussed earlier. Findings are shown in table-4.The degree of electrophysiological abnormality correlated with the clinical severity. In some cases clinical signs were present but no electrophysiological abnormalities were detected suggesting functionally mild involvement. Level of disability correlated with both clinical & electrophysiological findings.

Conclusion

CTS diagnosed electro physiologically may have varied clinical manifestation. Patient may remain asymptomatic. The clinical variability depends on several factors like demographic factors, associated co morbid condition, individual subjective experience of pain & seriousness in seeking medical help. Patients who report to physicians early in the course of disease & have early medical intervention likely to have a better out come.

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