



PROVACATIVE POSITION WHILE NERVE CONDUCTION VELOCITY STUDY FOR DIAGNOSIS OF CARPAL TUNNEL SYNDROME

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ABSTRACT

Research findings indicate that carpal tunnel syndrome (CTS) was a prevailing form of compressive neuropathy, resulting from the compression of the median nerve as it traverses the wrist within the CT. It constitutes 90% of all cases of entrapment neuropathies. In the majority of instances, both parties involved are impacted. The process of formulating a diagnosis is a cumulative one, relying on the evaluation of signs, symptoms, and specific physical tests. Confirmation of a suspected diagnosis may be achieved through the use of electrodiagnostic tests (EDT), specifically the Nerve Conduction Velocity Test (NCVT). Therefore, the objective of our study was to assess the relevance of the Provocative Position (PP) in conjunction with the NCVT for the diagnosis of CTS. We have conducted NCVT on a sample of 25 patients in our study. Additionally, the data was divided by the impulse latency in order to calculate the conduction velocity. Therefore, these steps were also replicated in the PP, and the resulting findings were subsequently compared. In our study, it was observed that bilateral tests exhibited the highest number of patients, with 10 individuals accounting for 40% of the sample. Additionally, 8 patients (32%) displayed left-side test results, while 7 patients (28%) exhibited right-side test results. The findings of this research indicate that there is a notable advantage in utilizing EDT investigations to promptly confirm suspected cases of CTS. This enables early intervention and alleviation of symptoms.

Keywords: CTS, NCVT, EDT, PP, neuropathies.

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INTRODUCTION

Studies had revealed that , “CTS was a prevalent medical condition , which can be characterized by the presence of pain, numbness and tingling sensations in the hand and arm of the affected individual”. According to researchers in this condition “compression or squeezing of the median nerve occur as it passes through the wrist”. Furthermore, researchers have also proven that , it involve various risk factors like obesity, engaging in repetitive and monotonous wrist activity, being pregnant, having a genetic predisposition and experiencing rheumatoid inflammation. In addition, studies have also concluded that it exhibits variation in symptoms.¹ According to past studies, it affects approximately 4% to 5% of the global population and primarily targeting individuals are elderly group with around 40 to 60 years and that too more in women then men.^{1,2} Researchers have come to the conclusion that “NCS was made after it was discovered in 1956 that people with CTS have slowed median nerve conduction times across their wrists”.³ Hence, researchers also concluded that, “in order to establish a diagnosis of CTS, it is necessary to observe prolonged motor and sensory latencies of the median nerve, as well as reduced conduction velocities”.⁴ Nevertheless, certain authors have asserted that there remains a level of uncertainty surrounding the selection of the most optimal diagnostic criteria.⁵

Hence, studies showed that , “NCS was widely recognized as the preferred diagnostic method for CTS patients due to their objective nature and capacity to evaluate the physiological state of the median nerve within the CT”.⁶ Furthermore, it is also advisable by many researchers that, a “comparative analysis of the median nerve's response with another nerve segment that does not traverse the CT”. Furthermore, various factors according to studies can “influence the amplitude and latency of an individual nerve, potentially resulting in inaccurate positive or negative outcomes such as age, gender, finger diameter, concurrent systemic disease, obesity, and temperature”.^{7,8}

Henceforth, in our controlled prospective study, we have included a total of 25 consecutive surgical patients with clinically diagnosed CTS, and negative and less severe findings on NCVT would be reexamined with a protocol incorporating a specific PP of the wrist, where the PP was that particular position in which the patient experiences maximum symptoms.

AIM

To assess and evaluate the relevance of the PP while NCVT for diagnosis of CTS.

INCLUSION CRITERIA

1. Patients with non traumatic pain, tingling & numbness .
2. Patient who do not respond to NSAIDS.
3. Patient with normal NCV but clinically showing signs of CTS.
4. Patients with both male & female sex.
5. Adult patients are involved from 21 to 60 years of age.

EXCLUSION CRITERIA

1. Pregnant ladies
2. Any other disease
3. Children

MATERIAL & METHOD

We have conducted our study in the department of physiology at KIMS, Karad, after obtaining written informed consent from the patient for NCV testing.

Diagnostic criteria for CTS

- a. Distal median motor latency >4.4ms.
- b. Difference between distal motor latency of median & ulnar nerve >1.1 ms
- c. Difference between distal sensory latency of median & ulnar nerve > 0.2 ms.

TECHNIQUE

In our study, for NCVT analysis, we initially done attachment of two electrodes to the patient's skin, specifically positioned over the nerve under investigation. Here, electrical impulses were transmitted through a separate electrode in order to induce nerve stimulation. The impulse generated by nerve stimulation was detected and recorded by the second electrode. Latency was determined by measuring the time interval between the initiation of stimulation on the first electrode and the detection of the signal by the second electrode. The nerve conduction latencies generally range in the order of milliseconds. We then calculated the NCV by calculating the distance between stimulating & receiving electrodes. Further, it was divided by impulse latency to get conduction velocity. Thus, all these steps are repeated in PP as well & findings were compared.

RESULT

Age Group	No. Of Patients	Percentage
21-25	1	4%
26-30	3	12%
31-35	4	16%
36-40	2	8%
41-45	5	20%
46-50	6	24%
51-55	3	12%
56-60	1	4%

TABLE 1: AGE-WISE DISTRIBUTION

In our study, we found that the maximum number of patients were in the 46–50 year old age group with 6 patients (24%), and the minimum were in the 21–25 year old and 56–60 year old age groups with 1 patient (4%), respectively.

SEX	INCIDENCE	NO. OF PATIENTS	PERCENTAGE
MALE		6	24%
FEMALE		19	76%

TABLE 2: SEX DISTRIBUTION

In our study we found that, maximum number of patients were females with 19 (76%) and male with 6 (24%) respectively.

OCCUPATION	NO OF PATIENTS	PERCENTAGE
STUDENT	1	4
STAFF	1	4
FARMER	1	4
BARBER	1	4

SHOPKEEPER	1	4
HOUSEWIFE	20	80

TABLE 3: PATIENT OCCUPATION

In our study we found that, maximum number of patients were housewife upto 20 (80%) whereas, student,staff,farmer,barber and shopkeeper were 1 patient (4%).

SIDE	NO OF PATIENTS	PERCENTAGE
RIGHT	5	20
LEFT	5	20
BILATERAL	15	60

TABLE 4: SIDE-WISE DISTRIBUTION

In our study we found that, bilateral side was with 15 patients (60%) whereas right and left 5 patients (20%).

	Patients	Percentage
Right	07	28%
Left	07	28%
both	09	36%
	23	92%

TABLE 5: TINNEL-SIGN EXAMINATION

In our study we found that , maximum patients should both right and left side tinnel-sign examination upto 9 (36%) whereas, right and left side tinnel-sign showed by 7 patients (28%) respectively.

	Patients	Percentage
Right	07	28 %
Left	08	32%
bilateral	10	40%

TABLE 6: PHALEN TEST EXAMINATION

In our study we found that, bilateral test were showing maximum number of patients 10 (40%) whereas 8 patients showed left side test (32%) and right side test with 7 patients (28%) respectively.

DISCUSSION

According to studies, “EDS were considered the gold standard for confirming the diagnosis of CTS because of their objectivity, but still, some patients with clinical symptoms remain

undiagnosed by routine EDT”. This showed the necessity of the search for new tests to confirm the early ED of CTS. In our study, we evaluated the effect of PP subjective to each patient during EDT of CTS. The electrophysiological testing revealed a significant difference between distal median motor latency and distal sensory latency in the proactive position when compared to the neutral position.

	MEAN		STANDARD DEVIATION		P VALUE
	NEUTRAL	PROVOCATIVE	NEUTRAL	PROVOCATIVE	
DISTAL MEDIAN MOTOR LATENCY	3.44 mS	4.20 mS	0.87 mS	1.24 mS	0.021 (significant)
DISTAL MEDIAN SENSORY LATENCY	2.59 mS	3.41 mS	1.18 mS	1.65 mS	0.009 (significant)

In our present study, on comparing the two variables by NCVT, we have also found that sensory nerve fibers seem to be more sensitive to compression neuropathy than motor fibers and also typically demonstrate changes in nerve conduction earlier than motor fibers. A similar study was done on CTS on sensory & motor nerve conduction in 2002.[147] Furthermore, we also found that ,documentation of neurophysiologic abnormalities in the median nerve was helpful to establish a diagnosis for CTS. In addition to this, sensory and motor nerve conduction studies of the median nerve across the wrist are measured and compared with another nerve segment that does not go through the CT (ulnar), which is the most sensitive and accurate. Furthermore, in our study, the pressure was elevated to 99 mm Hg during wrist flexion at a 90-degree angle (PP). Similarly, the pressure increased to 110 mm Hg when the wrist was extended to a 90-degree angle (also in PP). The pressure measurements in the control group were recorded as follows: 25 mm Hg with the wrist in a neutral position, 31 mm Hg with the wrist in flexion, and 30 mm Hg with the wrist in extension.

CONCLUSION

Patients who have CTS and whose EDT have previously given negative findings may benefit from a simple modification of traditional NT procedures by including positional variation. This will improve the number of patients who have positive test results. Further, in our study when we compared to the neutral position, the values of distal median motor latency and distal median sensory latency were significantly different in the PP then compared to when they were measured in the neutral position during the comparative study of NCVT between the neutral and PP. This research concluded that, the significant benefit of applying EDT investigations to swiftly verify suspected instances of CTS, thereby allowing early treatment and the relief of symptoms. This advantage might be attributed to the rapidity with which the suspected cases are confirmed.

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