

Utility of Ultrasound and Electro-diagnostic Studies in the diagnosis of Carpal Tunnel Syndrome: A Comparative Hospital Based Study.

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Aim: The objective of our study is to compare the Sensitivity and Specificity between Ultrasound and Electro-diagnostic Studies in the diagnosis of Carpal Tunnel Syndrome with reference to a validated clinical diagnostic tool.

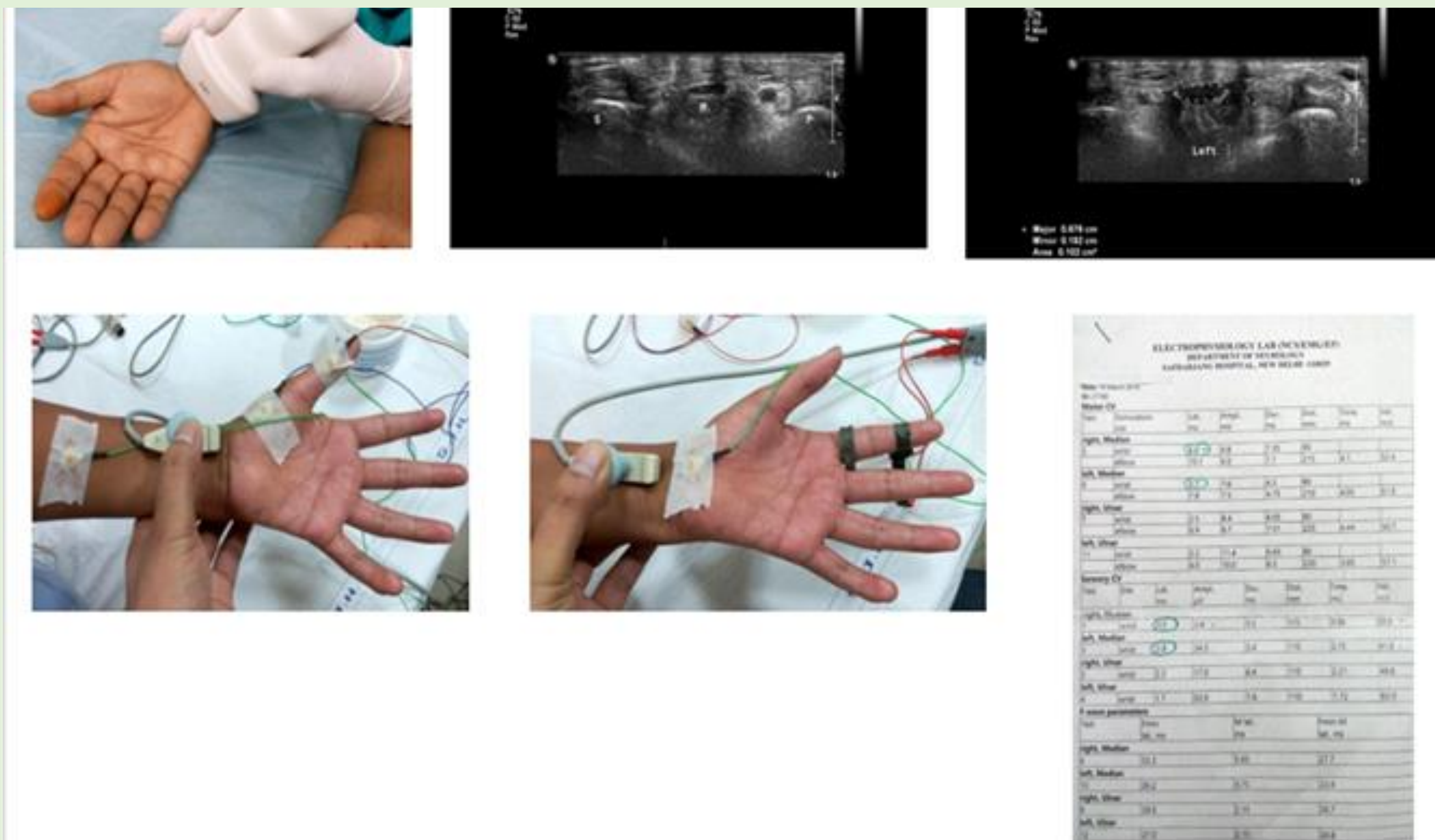
Introduction: Carpal tunnel syndrome is the most commonly diagnosed compression neuropathy of the upper limb. Traditionally electro-diagnostic studies have been used to confirm diagnosis of CTS. However, ultrasound is emerging as an alternative confirmatory test for CTS; however its potential role is limited by lack of adequate data for sensitivity and specificity relative to electro-diagnostic studies.

CTS-6 (Reference standard clinical tool)

The corresponding point values for all positive findings are added together to obtain a total score. A score ≥ 12 was defined as positive for carpal tunnel syndrome.

Numbness predominantly or exclusively in median nerve distribution	3.5
Nocturnal symptoms	4
Thenar atrophy or weakness	5
Positive Phalen test	5
Loss of 2-point discrimination (>5 mm)	4.5
Positive Tinel sign	4

Methods: 40 patients attending OPD of a tertiary hospital with neurological complaints in upper limbs were assessed using CTS-6 clinical tool as standard reference tool. Those patients with CTS-6 score ≥ 12.5 were considered as Cases and those with CTS-6 Score < 12.5 were considered as Controls. Both the cases and controls were subjected to both Ultrasonography of wrist to assess the median nerve cross sectional area at the level of pisiform and Electro-diagnostic Studies/NCS. The sensitivity and specificity of both USG and NCS are analyzed and compared with reference to CTS-6 clinical tool as the standard reference.



Results: Out of the 40 patients, 21 patients had positive findings for USG (i.e median nerve CSA $> 10\text{mm}^2$) which consisted of 18 cases and 3 controls. 21 patients had positive findings on NCS (consisting of 17 cases and 4 controls). Using CTS-6 clinical tool as standard reference, USG was observed to have a sensitivity of 95%, specificity of 90%. EDS/NCS was observed to have a sensitivity of 85% and specificity of 80%, with significant p value (< 0.05)

		CTS Score		Total	P value
		negative	Positive		
NCV	Negative	16 (84.21%)	3 (15.79%)	19 (100.00%)	$< .0005$
	Positive	4 (19.05%)	17 (80.95%)	21 (100.00%)	
Total		20 (50.00%)	20 (50.00%)	40 (100.00%)	

		CTS Score		Total	P value
		negative	Positive		
USG	Negative	17(89.47%)	2(10.5%)	19 (100.00%)	$< .0005$
	positive	3(14.28%)	18(85.57%)	21 (100.00%)	
Total		20 (50.00%)	20 (50.00%)	40 (100.00%)	

DISCUSSION:

There is no universally accepted gold standard for diagnosis of CTS. NCS have been used widely for the diagnosis of CTS, but it has substantial rate of false negatives in clinically defined CTS, as well as high rate of false positive in normal asymptomatic patients.

USG has shown promising results as an alternative method for diagnosing CTS. In addition to its non-invasiveness and shorter examination time, USG has been shown to have a sensitivity as high as 94% and a specificity as high as 98% in the diagnosis of CTS. However, most studies have failed to determine the diagnostic value of USG because they used NCS results as the reference standard.

we used CTS-6 clinical tool as the standard reference to compare USG and NCS.

USG has the following advantages:

1. USG can show directly the morphological changes in the median nerve.
2. It excludes anatomic variants like bifid median nerve, space occupying lesions within the carpal tunnel such as ganglia, neural tumors, vascular anomalies, and tenosynovitis which causes compression of the median nerve.

Non -invasiveness, cheaper as compared to NCS, comfortable for patients.

Shorter duration of examination as compared to NCS

USG can also detect other conditions like medial and lateral epicondylitis in the same sitting. At the same time it can be used in USG guided intervention and treatment.

Conclusion: Based on the findings in our study, we conclude that the sensitivity and specificity is marginally higher than that of EDS/NCS when CTS-6 clinical tool is used as the standard reference tool. However due to small sample size of our study, we recommend a study with larger sample size and well matched cases and controls, to determine the true value of USG in diagnosis of CTS, and also its cost effectiveness.