



# Correlation of Ultrasound and Electrodiagnostic Testing with Severity of Carpal Tunnel Syndrome



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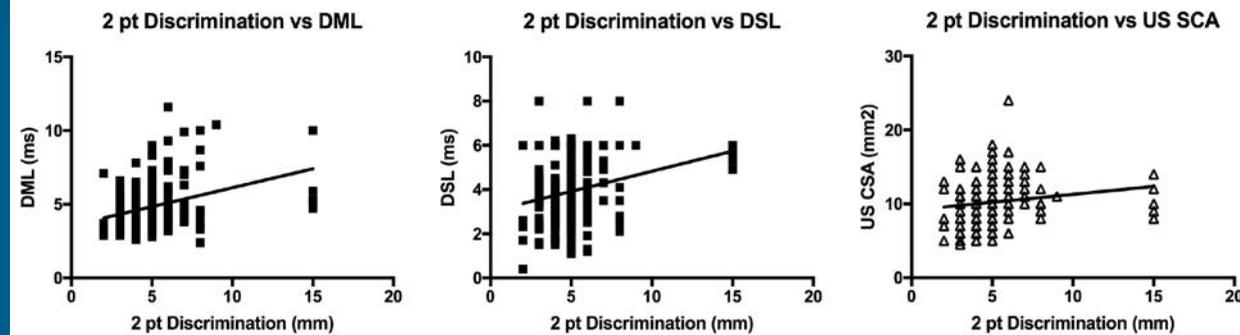
## Purpose

The association of electro-physiological and sonographic findings with symptom severity and functional status in carpal tunnel syndrome (CTS) has been poorly investigated. The purpose of this study was to identify whether electro-diagnostic testing or ultrasound demonstrated a stronger correlation with two-point discrimination and consequently constituted a better predictor of carpal tunnel severity.

## Materials & Methods

A retrospective review of 215 consecutive patients with carpal tunnel symptoms referred to an upper extremity practice was conducted in the current study. All patients were evaluated with static two-point discrimination (2-PD) of the thumb, index and middle finger of the affected hand. A 2-PD  $\geq 6$  mm was considered a positive finding. All patients underwent ultrasound testing to calculate the median nerve cross-sectional area (CSA), as well as electrodiagnostic testing. A median cross-sectional area of  $\geq 10$  mm<sup>2</sup>, a distal motor latency (DML) of  $\geq 4.2$  ms and a distal sensory latency (DSL) of  $\geq 3.2$  ms were considered to be positive findings. Correlations between 2-PD and either DML, DSL or median CSA were calculated. Sensitivities, specificities and predictive values of abnormal DML and DSL (either alone or combined), as well as median CSA were also measured, using abnormal 2-PD as the standard reference.

## Correlation of 2PD with measures parameters



**Table 1: Correlation of 2PD with US CSA, DML & DSL**

2PD Correlation	US CSA	DML	DSL
Number of hands	215	215	215
Pearson coefficient (r)	0.15	0.33	0.26
P value	0.2	<0.0001	0.0002

2PD: 2-point discrimination; US: ultrasound; CSA: cross-sectional area; DML: distal motor latency; DSL: distal sensory latency.

**Table 2: Sensitivity & specificity of NCS & US for abnormal 2PD**

Test	Sensitivity	Specificity	PPV (%)	NPV (%)
NCS	85% (75-95)	32% (18-46)	33%	84%
DML alone	74% (60-88)	44% (32-56)	34%	81%
DSL alone	74% (60-88)	40% (28-52)	33%	79%
CSA	79% (67-91)	44% (32-56)	36%	84%

NCS: nerve conduction studies; US: ultrasound; 2PD: 2-point discrimination; PPV: positive predictive value; NPV: negative predictive value; DML: distal motor latency; DSL: distal sensory latency; CSA: cross-sectional area.

## Results

Analysis failed to prove a statistically significant correlation between 2-PD and median CSA ( $r=0.15$ ,  $p=0.2$ ). A weak correlation was detected between 2-PD and EDX parameters, slightly stronger for DML ( $r=.33$ ,  $p<0.0001$ ), as compared to DSL ( $r=.26$ ,  $p=0.0002$ ) [figure & table 1]. When 2-PD was used as a reference standard, EDX parameters combined had the greatest sensitivity (85%), followed by ultrasound (79%). Ultrasound had a greater sensitivity than DML (74%) and DSL (74%), used alone. All parameters demonstrated a very low specificity [table 2].

## Conclusions

EDX is the only test to demonstrate a weak correlation with abnormal 2-PD, and as such is a better even though weak predictor of disease severity. However, ultrasound remains a promising evolving field.