Carpal Tunnel Syndrome Electrodiagnostic Severity is Not Associated with PROMIS Upper Extremity, PROMIS Pain Interference, and PROMIS Pain Intensity

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INTRODUCTION: The routine preoperative use of confirmatory electrodiagnostic studies (EDS) for carpal tunnel syndrome is associated with delays to surgical treatment and higher costs; emerging evidence demonstrates that EDS is likely over-utilized in routine cases. Patients and surgeons may assume that more severe electrodiagnostic disease is associated with more severe clinical symptoms, which in turn may warrant more invasive treatment; however, this assumption has not been supported by the recent literature. The primary objective of this study was to determine the association between preoperative EDS severity and Patient-Reported Outcomes Measurement Information System (PROMIS) Upper Extremity, PROMIS Pain Interference, and PROMIS Pain Intensity in patients with EDS-confirmed carpal tunnel syndrome. The secondary objectives of this study were to determine the association between sensory and motor conduction latencies and amplitudes and PROMIS scores.

METHODS: A retrospective study of 45 patients with EDS-confirmed carpal tunnel syndrome was conducted. Patients completed the PROMIS Upper Extremity, PROMIS Pain Interference, and PROMIS Pain Intensity. Explanatory variables included EDS disease severity (mild, moderate, severe), sensory peak latency, sensory amplitude, motor latency, motor amplitude, the presence of nonrecordable sensory latency, and the presence of nonrecordable sensory amplitude. Explanatory variables also included patient-related factors such as age, sex, and diabetes mellitus. Associations between variables were assessed using simple linear regression, analysis of variance (ANOVA), and Student's t test.

RESULTS: In our cohort, the EDS severity was mild in 38%, moderate in 42%, and severe in 20% of patients. The median sensory conduction peak latency in the median nerve distribution was 4.9 ms. The mean PROMIS Upper Extremity score was 44.4, the mean PROMIS Pain Interference score was 53.5, and the mean PROMIS Pain Intensity score was 49.9. Bivariate analysis demonstrated no association between EDS severity overall or any EDS parameter individually and PROMIS Upper Extremity, PROMIS Pain Interference, and PROMIS Pain Intensity. Diabetes mellitus was associated with poorer PROMIS Upper Extremity scores.

DISCUSSION AND CONCLUSION: Overall EDS severity and individual EDS parameters are not associated with PROMIS Upper Extremity, PROMIS Pain Interference, and PROMIS Pain Intensity. Diabetes mellitus as a risk factor for worse baseline PROMIS Upper Extremity scores in patients with EDS-confirmed carpal tunnel syndrome. Since carpal tunnel release is commonly indicated for pain and dysfunction, it is important for patients and surgeons to be aware that validated measures of pain and dysfunction do not correlate with EDS severity.

Table 1: Bivariate analysis of EDS parameters and PROMIS scores.

Patient-Related Variable	PROMIS Upper Extremity		PROMIS Pain Interference		PROMIS Pain Intensity	
	Mean (SD)	p-value	Mean (SD)	p-value	Mean (SD)	p-value
EDS severity						
Mild	45.04 (12.20)		51.79 (5.63)		48.34 (4.59)	
Moderate	44.59 (11.09)	0.9	53.86 (7.24)	0.3	50.17 (5.19)	0.2
Severe	42.92 (11.10)		55.92 (4.01)		52.36 (8.01)	
	β regression coefficient (SE)	p-value	β regression coefficient (SE)	p-value	β regression coefficient (SE)	p-value
Sensory peak latency (ms)	-0.58 (1.29)	0.7	0.24 (0.73)	0.7	0.64 (0.56)	0.3
Sensory amplitude (μV)	0.50 (0.26)	0.06	-0.19 (0.15)	0.2	-0.07 (0.12)	0.6
Motor latency (ms)	0.18 (0.76)	0.8	0.46 (0.41)	0.3	0.62 (0.37)	0.1
Motor amplitude (mV)	-0.02 (0.46)	0.9	-0.23 (0.25)	0.4	-0.28 (0.23)	0.2
	Δ Mean (SE)	p-value	Δ Mean (SE)	p-value	Δ Mean (SE)	p-value
Nonrecordable sensory peak latency	-0.79 (11.42)	0.8	0.22 (6.25)	0.9	1.41 (5.73)	0.4
Nonrecordable sensory amplitude	-0.79 (11.42)	0.8	0.22 (6.25)	0.9	1.41 (5.73)	0.4

† Abbreviations: EDS, electrodiagnostic study; PROMIS, Patient-Reported Outcomes Measurement Information System; SD, standard deviation; SE, standard error.

Table 2: Bivariate analysis of patient-related variables and PROMIS scores.

Patient-Related Variable	PROMIS Upper Extremity		PROMIS Pain Interference		PROMIS Pain Intensity	
	β regression coefficient (SE)	p-value	β regression coefficient (SE)	p-value	β regression coefficient (SE)	p-value
Age	-0.07 (0.14)	0.6	-0.05 (0.08)	0.5	0.01 (0.07)	0.9
BMI	-0.21 (0.24)	0.4	0.21 (0.13)	0.1	0.08 (0.12)	0.5
	Δ Mean (SE)	p-value	Δ Mean (SE)	p-value	Δ Mean (SE)	p-value
Female sex	-3.63 (11.27)	0.3	-1.06 (6.23)	0.6	1.41 (5.73)	0.4
Diabetes mellitus	-11.38 (10.56)	<0.05	3.75 (6.10)	0.1	1.83 (5.73)	0.4
Hypothyroidism	-12.49 (10.97)	0.06	4.83 (6.13)	0.2	6.52 (5.53)	0.05
Hypertension	-4.94 (11.14)	0.1	2.81 (6.09)	0.1	2.23 (5.66)	0.2
Depression	-2.20 (11.38)	0.6	1.25 (6.23)	0.6	2.17 (5.69)	0.3
Anxiety	2.40 (11.37)	0.5	-2.87 (6.13)	0.2	-1.61 (5.73)	0.4
Dominant hand	6.05 (10.84)	0.1	-2.03 (5.96)	0.3	0.06 (5.19)	0.9

† Abbreviations: BMI, body mass index; PROMIS, Patient-Reported Outcomes Measurement Information System; SE, standard error.