Correlation between Electrodiagnostics and Functionality after Cubital Tunnel Release

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INTRODUCTION: Electrodiagnostic studies are frequently utilized to diagnose upper extremity neuropathies. However, their connection to postoperative outcomes in patients with cubital tunnel syndrome is unclear. We sought to correlate electrodiagnostic results to short-term outcomes by *Quick*DASH scores following cubital tunnel release.

METHODS: Retrospective review of patients undergoing surgery for cubital tunnel syndrome with preoperative electrodiagnostic studies (EDS). Patients were split into cohorts depending on whether or not they met the minimal clinically important difference (MCID) of 6.8 for the quick disabilities of the arm, shoulder, and hand (qDASH) survey at 3-6 months after surgery. The electronic medical record was reviewed for EDS data, patient demographics and comorbidities, preoperative examination findings, operative procedure (i.e., concomitant carpal tunnel release, ulnar nerve transposition), and postoperative complications. Bivariate analysis, correlation metrics on EDS data to improvement by qDASH, and regression analysis with meeting the MCID as a dependent outcome were performed using R Studio.

RESULTS:

A total of 257 patients underwent cubital tunnel release with preoperative electrodiagnostic studies, consisting of 160 patients who met MCID and 97 who failed to meet MCID. Cohorts were similar in baseline demographics, comorbidities, preoperative exam findings, and operative technique. The MCID group had lower, but not statistically significant, complication (3.75% vs. 7.22%; p=0.248) and repeat surgery (0.62% vs. 4.12%; p=0.069) rates. The group meeting the MCID were found to have significantly lower ulnar nerve sensory onset latency (3.04ms vs. 3.28ms; p=0.020) and peak latency (3.53ms vs. 3.82ms; p=0.007). The sensory amplitude was similar between groups and the motor (above to below elbow) latency, velocity, and amplitude were also similar between groups. Regarding electromyogram data, the group meeting the MCID had fewer patients with decreased insertional activity (0% vs. 5.63%; p=0.037), but the presence of fibrillations, positive sharp waves and motor unit recruitment patterns were similar between the groups. The cubital tunnel severity as determined by the EDS was similar between groups with 14.1% in the MCID group having negative findings compared to 14.3% in the other group (p=0.498). By Spearman's Rho test, none of the nerve conduction study findings were found to have a relationship with delta *Quick*Dash scores (**Table 1**). Multivariate regression (**Table 2**) suggested that higher preoperative *Quick*Dash scores (OR: 1.04; CI: 1.03 – 1.06; p<0.001), patient age (OR: 0.98; CI: 0.95 – 1.00; p=0.038), and duration of symptoms (OR: 0.99; CI: 0.98 – 1.00; p=0.010) were independently associated with meeting the *Quick*Dash MCID at 3-6 months after surgery.

DISCUSSION AND CONCLUSION: The severity of electrodiagnostic findings do not correlate with changes in functional outcomes by *Quick*DASH scores after cubital tunnel release surgery. Electrodiagnostic studies may not be required prior to operative treatment of cubital tunnel syndrome. Younger patients with a high level of preoperative disability and a shorter duration of symptoms may be the most likely to benefit from surgical intervention.

Table 1: Correlation with Nerve Conduction Findings and 3-6 month delta QuickDash for the entire cohort.

Variable	Spearman's Rho	Relationship
Sensory Onset Latency	0.163	No True Relationship
Sensory Peak Latency	0.241	No True Relationship
Sensory Amplitude	-0.145	No True Relationship
Motor Latency	0.072	No True Relationship
Motor Velocity	-0.019	No True Relationship
Motor Amplitude	0.042	No True Relationship

Table 2: Multivariate regression with meeting 3-6 month MCID as the dependent outcome.

		3-6 Month MCID	
Predictor	Odds Ratio	Confidence Interval	p-value
Preoperative *Quick*DASH	1.04	1.03 – 1.06	**<0.001**
Concomitant Carpal Tunnel Release	0.87	0.47 – 1.60	0.659
Age	0.98	0.95 – 1.00	**0.038**
Diabetes	2.10	0.90 – 5.26	0.097
Former Smoking	1.11	0.53 – 2.40	0.778
Current Smoking	0.44	0.17 – 1.17	0.100
Duration of Symptoms (months)	0.99	0.98 – 1.00	0.010

Abbreviations: MCID – minimal clinically important difference; *Quick*DASH - quick disabilities of the arm shoulder, and hand