

# Diagnosis of Cubital Tunnel Syndrome Using Ultrasound &dash; A Retrospective Comparison to Electrophysiologic Studies

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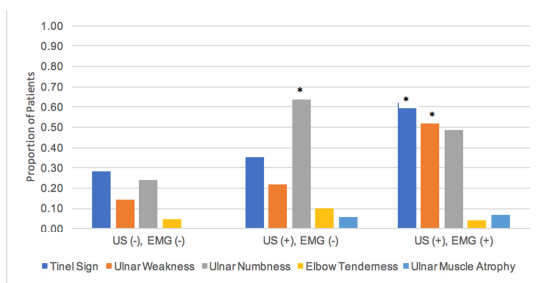
**INTRODUCTION:** The purpose of our study is to determine the utility of ultrasound (US) in the diagnosis of cubital tunnel syndrome (CuTS) as characterized by increased cross-sectional area (CSA) of the ulnar nerve around the elbow. We hypothesize that  $CSA \geq 10 \text{ mm}^2$  will be highly sensitive and specific for diagnosing CuTS, while also detecting some patients with early clinical symptoms CuTS with negative electrodiagnostic studies (EDX) results.

**METHODS:** This is a retrospective study of patients presented to a large academic institution that were clinically diagnosed with CuTS and underwent both EDX and US testing. Clinical exam findings, age, gender, and duration of symptoms were recorded, as well as EDX data and CSA measurements stratified by anatomic site around the elbow. Statistical analysis of the EDX and CSA data was conducted using unpaired T-test, Chi-square, and one-way ANOVA testing.

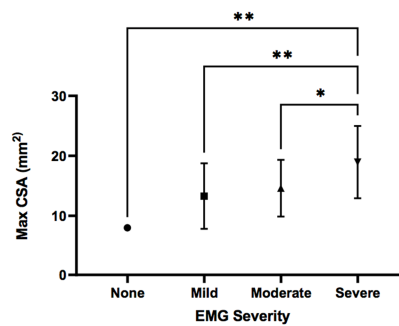
## RESULTS:

A total of 89 patients and 115 nerves were included. In this cohort, 57% of patients were female and 43% male with mean age of  $58.8 \pm 14.1$ . Mean duration of symptoms was  $25.9 \pm 51.4$  months. Average CSA at the medial epicondyle was  $14.36 \pm 1.01 \text{ mm}^2$ , proximal to the elbow was  $9.39 \pm 0.71 \text{ mm}^2$  and distal to the elbow was  $8.96 \pm 0.84 \text{ mm}^2$ . Maximal CSA was highly correlated with disease severity as determined by EDX: mild ( $12.92 \pm 2.1 \text{ mm}^2$ ), moderate ( $14.78 \pm 3.4 \text{ mm}^2$ ), and severe ( $18.03 \pm 2.9 \text{ mm}^2$ ),  $p < 0.001$ . Using a cutoff of  $CSA \geq 10 \text{ mm}^2$  (US+) demonstrated a sensitivity of 0.97 and specificity of 0.83 in predicting decreased motor velocity ( $< 50 \text{ m/s}$ ). Compared to EDX+/US+, patients with EMG-/US+ showed proportionally higher rates of ulnar sensory loss ( $p < 0.04$ ) with similar rate of positive Tinel, elbow tenderness, atrophy, and ulnar motor weakness. EMG+/US+ patients showed proportionally higher rates of positive Tinel sign and ulnar weakness.

**DISCUSSION AND CONCLUSION:** US is a highly sensitive test used in the diagnosis of cubital tunnel syndrome that may be able to better identify patients with early stages of CuTS with negative EDX. Increased ulnar nerve CSA correlates with increased motor conduction velocity of  $< 50 \text{ m/s}$ , and it is most commonly the largest at the medial epicondyle. Maximum CSA is highly correlated with EMG severity score. Patients with US +/- EDX -, have proportionally higher rates of ulnar sensory loss. EMG+/US+ patients showed proportionally higher rates of positive Tinel sign and ulnar weakness.



Percentage of Positive Physical Exam Findings by EMG/US Testing Results (\* statistically significant at  $\alpha = 0.05$ )



Maximum CSA by EMG Severity Score (\* Significant at  $\alpha = 0.05$ , \*\* Significant at  $\alpha = 0.01$ )