

## **The Role of Electrodiagnosis in Carpal Tunnel Syndrome Diagnosis**

### **Introduction**

Electrodiagnostic (EDX) studies, comprising nerve conduction studies (NCS) and electromyography (EMG), serve as an objective tool in the assessment of carpal tunnel syndrome (CTS). This position statement outlines the appropriate application of electrodiagnosis in the evaluation and diagnosis of CTS.

### **Clinical Indications and the Value of EDX Testing**

Although clinical diagnostic tools for Carpal Tunnel Syndrome like the CTS- 6 are regarded as reliable, their validation is primarily derived from a limited body of evidence characterized by methodological limitations, small sample sizes, and patient populations that may not be representative.<sup>1</sup> EDX testing remains the most validated diagnostic method, offering high sensitivity, specificity, and prognostic value.<sup>2</sup>

EDX testing is appropriate when the patient's history and physical examination suggest the need for further evaluation, particularly if symptoms are impacting their quality of life.

### **EDX Testing Protocol for CTS**

Testing protocol varies based on the electromyographer's skills, training, and experience. The EDX study to diagnose CTS should include:

- Median sensory or mixed nerve conduction across the carpal tunnel with comparison to other sensory nerve conduction in the same limb.
- Median motor nerve conduction across the carpal tunnel with comparison to other motor nerve conduction in the same limb.
- Needle EMG of appropriate muscles is recommended when further evaluation is needed to confirm CTS or to investigate alternative diagnoses.

For detailed clinical guidelines, refer to the AANEM Guideline [\*Practice Parameter for EDX Studies in CTS: Summary Statement \(including literature review\)\*](#).

### **Clinical Integration**

EDX testing remains the most validated diagnostic method, offering high sensitivity, specificity, and prognostic value.<sup>2</sup>

EDX testing is an extension of the clinician's history and physical examination and is an important tool that must be interpreted within the clinical context.<sup>3,4</sup> The results of the patient's history and

physical examination are used to formulate a list of differential diagnoses which is needed to appropriately design the EDX study. Using the clinical findings to guide the EDX study maximizes the accuracy and reliability of the study in evaluating CTS. This approach can guide treatment planning and surgical decision making.

### **Quality Standards**

To provide best practice care, EDX testing must be performed by appropriately trained and qualified practitioners (reference AANEM's position statement [\*Who is Qualified to Practice Electrodiagnostic Medicine?\*](#)), established standards and utilizing appropriate EDX equipment. EDX testing should include appropriate documentation, including tabulated NCS and EMG results, hand temperature, clearly identified abnormalities and a list of confirmed diagnoses. Inclusion of NCS waveforms in the report is recommended for possible later review.<sup>2</sup>

### **Role of Ultrasound in Diagnosing CTS**

Neuromuscular ultrasound (NMUS) is a powerful tool for diagnosing CTS, complementing traditional EDX studies.<sup>4,5</sup>

- Studies show that measuring the median nerve cross-sectional area at the wrist using ultrasound achieves diagnostic accuracy between 79% and 97%, making it a reliable option.<sup>4</sup>
- NMUS identifies structural abnormalities including but not limited to bifid median nerves, persistent median arteries and ganglion cysts, which EDX studies alone cannot detect.
- Clinical Impact: It is particularly useful for atypical CTS cases, such as unilateral symptoms or sudden onset, and can guide therapeutic decisions.<sup>4</sup>

### **Recommendations**

- EDX should be performed when the patient's history or physical examination suggests a diagnosis of CTS.
- EDX testing should be performed by practitioners with appropriate training and credentials.
- EDX testing should follow standardized protocols.
- EDX should be done using appropriate equipment
- EDX testing results should be interpreted in conjunction with clinical findings.
- Repeat EDX studies in select patients may be indicated for monitoring disease progression or treatment response.
- The use of ultrasound enhances diagnostic precision of carpal tunnel syndrome and improve patient outcomes.

### References

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