Electrodiagnostic studies in ulnar neuropathy at the elbow

The clinical spectrum of ulnar neuropathy at the elbow (UNE) ranges from intermittent paresthesias in the fourth and fifth digits to complete sensory loss in the area of the ulnar nerve with atrophy and weakness of the ulnar muscles. Electrodiagnostic studies are usually applied to confirm the diagnosis. In 1999 the American Association of Electrodiagnostic Medicine (AAEM) made several recommendations to optimize the electrodiagnostic protocol for UNE.[1]

The authors obtained normal values of the motor ulnar nerve conduction velocity (NCV) recording from the first dorsal interosseus (FDI) and the abductor digiti minimi (ADM) muscle. The study was performed in 50 healthy controls. The normal values of the motor NCVs differed between the recordings from the ADM and FDI. Mainly the NCVs of the right ulnar nerve recording from the FDI showed lower normal values in comparison to the other measurements. The authors concluded that by taking the normal values of ADM while recording from the FDI could lead to false-positive diagnosis.[2] It emphasizes that it is important to have adequate normal values of each separate test.

There is much debate over which muscle to record from the evaluation of UNE.[2]

Two recent studies indicate that the sensitivity for detecting the motor conduction block or slowing across the elbow in patients with UNE was similar for ADM and FDI recording, but recording from both muscles may increase yield.[2,3]

However, applying two motor studies may artificially increase the diagnostic yield on statistical grounds when only one of the tests needs to be abnormal to make the diagnosis. A disproportional slower motor NCV across the elbow in comparison to the velocity of an adjacent nerve segment has probably only little or no additional value.[2,3]

The diagnosis of UNE is straightforward when motor NC studies show a conduction block across the elbow. However, in many patients the only localizing electrodiagnostic abnormality is motor NCV slowing across the elbow. Unfortunately, the 95% confidence interval of the mean motor NCV across the elbow may vary considerably due to accumulation of distance and latency measurement errors[4] and therefore, isolated
Ulnar motor conduction studies with FDI CMAP recording for the electrodiagnosis of ulnar neuropathy at elbow

Measurement of ulnar nerve (UN) motor conduction velocity (MCV) across the elbow (AE) is a mainstay in EDX evaluation of suspected UNE, especially in milder cases. It is still debated whether its assessment recording from FDI muscle is more sensitive than from ADM. Indeed, the AAEM recommendations state that this procedure may be of benefit if ADM recordings are inconclusive.

The reliability of UN MCV in the AE segment is notoriously affected by several methodological variables, as also demonstrated by studies on changes due to experimental error. Some variables apply to both FDI and ADM recordings, such as joint position, segment length measurement, elbow skin temperature and jitter of subsequent motor responses. The FDI CMAP recordings have some peculiarities. First, this muscle is very often supplied by fibers from a Martin-Gruber anastomosis; in this case, not exactly the same axons are stimulated at the wrist and in around-the-elbow region; this may slightly affect MCV measurement in the wrist-elbow segment to be compared to AE. Second, a probably under-recognized point is the morphology of the FDI CMAP itself. In fact, if the reference electrode is placed on the dorsum of Digit 1 the CMAP has a sharp negative takeoff similar to the ADM CMAP; by contrast, if the reference electrode is placed on the dorsum of Digit 2, as performed in most labs, the main negative component is preceded by a small, less sharp but evident positive wave. In my experience this initial positive deflection tends to be smoothed much more than the subsequent negative one with stimulations at further more proximal sites. This may raise additional accuracy problems in positioning latency markers, especially if waveforms are inspected and markers set with a low sensitivity gain.

In this paper the authors report their findings in normal subjects with simultaneous ADM and FDI recordings. Mean AE MVCs resulted slower of about 2 m/sec when recording from FDI than from ADM. Although statistically significant, such small mean segmental velocity differences are unlikely to be helpful in a practical clinical setting. More interestingly, they also report a much wider range of differences in the considered parameters for individual nerves. Thus, they are the first to emphasize that these two subgroups of motor fibers may have different maximal MCVs even in healthy subjects and this should be considered to avoid false-positive results with FDI recordings. Further studies are needed to compare ADM and FDI recordings in UNE cases of different severity and in the follow-up of surgically verified cases. Techniques exploring MCV of not only the fastest conducting fibers might also give interesting contributions to this issue.

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