Unexpected inching finding in a patient with an ulnar nerve anatomical variant

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BACKGROUND

Ulnar neuropathy at the elbow (UNE) is the commonest upper-limb entrapment neuropathy after carpal tunnel syndrome and its diagnosis is usually straightforward. The inching technique may help document the site of ulnar nerve entrapment and help deciding the site of surgical release.

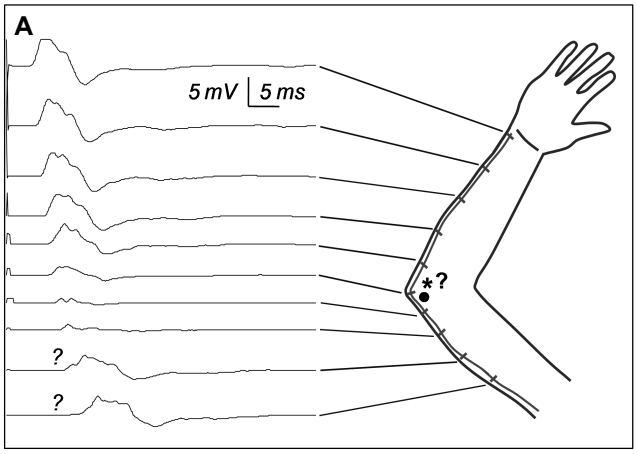
AIM OF THE STUDY

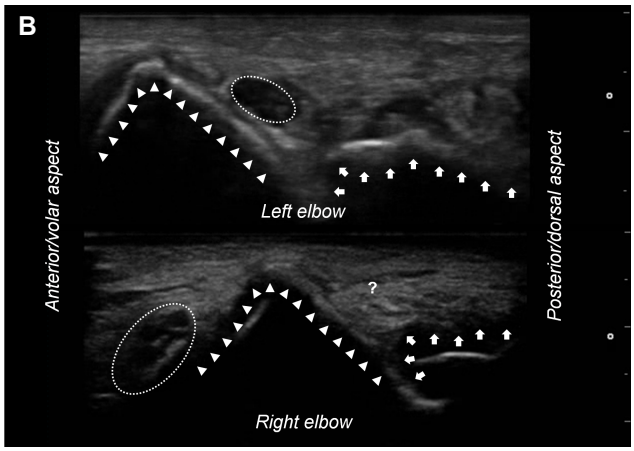
To report a case of suspected UNE where inching yielded unexpected findings and nerve ultrasound allowed to explain it with an ulnar nerve anatomical variant.

CASE REPORT

A 69-year-old man, who complained of paresthesia involving the fourth and fifth finger and clumsiness of the right hand, was sent for suspected ulnar neuropathy. Examination showed mild hypoesthesia in the fourth and fifth finger and slight weakness of the ulnar-innervated intrinsinc hand muscles on the right side. His previous clinical history was unremarkable except mild hypertension. Ulnar nerve electrodiagnostic study (EDX), which was performed according to current guidelines, documented reduced sensory nerve action potential (SNAP) amplitude, reduced motor nerve conduction velocity (MNCV) from above elbow (AE) to below elbow (BE) (AE-BE: 37.5 m/s; BE-wrist: 52 m/s), and a 40% decrease in compound muscle action potential (CMAP) amplitude from BE to AE. An ulnar nerve inching study documented 49% reduction and further 54% decrease in CMAP amplitude across the distal and proximal segments of the cubital tunnel (CT), respectively (Fig. 1A). A surprising 241% increase in ulnar CMAP amplitude in comparison to the AE value was found in the distal arm (Fig. 1A). The presence of Martin–Gruber anastomosis or other anomalous median–ulnar communications were ruled-out. The patient underwent ultrasound (US) imaging, which showed that when the elbow was extended the right ulnar nerve, instead of coursing in the CT betweeen the olecranon and the medial epicondyle (ME), was located anterior to the ME and its cross sectional area (CSA) was increased (29.4 mm^2, normal values: 8.0 ± 3.2 mm^2; Fig. 1B; supplemental video clip). No changes in the ulnar nerve position were found with the elbow flexed. On the opposite side, US showed a normal course of the left ulnar nerve, with a CSA (12.8 mm^2) in the normal range. The inching study was repeated taking into account the abnormal course of the right ulnar nerve, and a nerve entrapment was found in the area corresponding to the site of ulnar nerve enlargement (Fig. 1C). The left upper-limb was asymptomatic and the left ulnar nerve EDX yielded normal values.

The patient gave signed informed consent for the present case report.





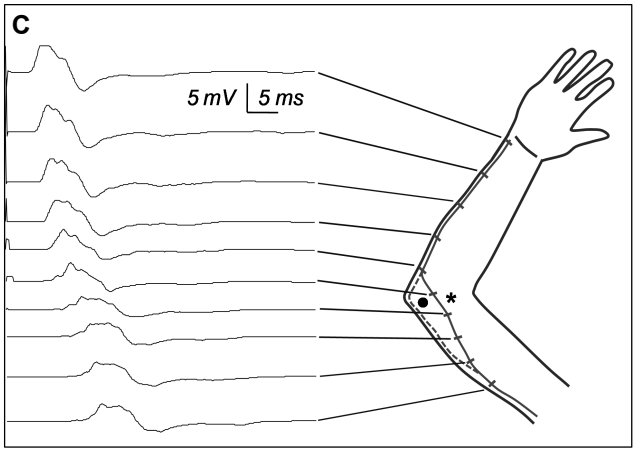


Figure 1. (A) The inching study showed 49% and 54% decrease in compound muscle action potential (CMAP) amplitude across the distal and proximal segments of the cubital tunnel (CT), respectively, suggesting right ulnar nerve (UN) entrapment in the CT (marked by *). A surprising 241% ulnar CMAP amplitude increase in comparison to the abowe elbow value was found in the distal arm.
(B) Ultrasound (US) imaging showed normal course of the left ulnar in the CT between the olecranon (OL) and the medial epicondyle (ME) and normal cross sectional area (CSA). Note that the UN is normally hypoechoic in the CT. The right UN could not be found in the CT, because it coursed anterior to the ME when the elbow was extended, and its CSA (29.4 mm^2) was significantly enlarged. US imaging with the elbow flexed did not show any change in the UN course. Arrowheads and arrows indicate the hyperechoic profiles of the ME and the OL, respectively, with their posterior hypoechoic acoustic shadowing. ? marks the position where the right UN was expected to be located. Dashed ellipses indicate the right and left UN.
(C) The inching study was repeated taking into account the abnormal course of the right UN, and it demonstrated an entrapment in the area that corresponded to the site of the UN enlargement in US imaging. ● marks the ME in A and C.

COMMENT

In the present case, the abnormal course of the right ulnar nerve resulted in submaximal stimulation at the AE sites at the time of first inching study and caused the apparently surprising finding in the inching study. We may be quite confident that the present case shows an anatomical variant and not ulnar nerve instability because the nerve was anterior to the ME in the extended elbow position and its course did not change with the elbow flexed. To the best of our knowledge, reports of ulnar nerve located anterior to the ME are very rare. It has been suggested that ulnar nerve subluxation and/or previous fracture might be a predisposing factor for this abnormal nerve location, but this seemed not the case in our patient, because of neither previous traumas of the elbow, nor nerve subluxation on the opposite side. Anterior transposition of the ulnar nerve into the antecubital fossa is a surgical treatment of ulnar neuropathy at the elbow. Based on the finding of enlarged ulnar nerve in patients who had failed anterior transposition, we may speculate that the position adjacent to the ME might predispose the nerve to recurrent trauma. Alternatively, the sharp bending of the ulnar nerve when it reached its normal course after the elbow might represent a predisposing factor for stretch nerve damage. Anatomical ulnar nerve variations might make the diagnosis of UNE difficult, and result in inappropriate surgical nerve exploration in the wrong spot. The use of US, which is becoming more popular in the field of electrodiagnostic medicine, might help avoiding such pitfalls.