

Ulnar nerve compression neuropathy: what is the role of electromyography?

Abstract

Introduction: Electromyography (EMG) of the ulnar nerve may be normal when tested in patients despite a good history for ulnar nerve compression neuropathy. The aim of this study was to determine if patients with normal electrophysiology who went on to have operative treatment for cubital tunnel syndrome showed improvement at follow up.

Methods: We reviewed all patients referred from one surgeon's clinic for ulnar nerve EMG testing during a five year period (2007-11). All patients who had normal EMG results but subsequently went on to have operative decompression for on-going symptoms of nerve compression and a 'classical' clinical picture were identified. All case notes were reviewed and patients followed up with a telephone questionnaire to determine if there was symptomatic improvement or not despite the normal EMG results.

Results: 207 sets of notes for patients referred for ulnar nerve electromyography were reviewed. 31 patients who had normal electrophysiology subsequently had operative decompression of the nerve. All of these patients except one showed symptomatic improvement post operatively at follow up at 3 and 6 weeks.

Conclusion: Patients who present with a good history and clinical signs of cubital tunnel syndrome do not necessarily have abnormal findings on EMG. They may well go on to have operative decompression of the ulnar nerve and show symptomatic improvement as a result. This may in part be because cubital tunnel syndrome is a dynamic phenomenon with maximal compression when the elbow is fully flexed. Ulnar nerve electromyography is often performed with the elbow in extension or only mild flexion and thus may not show the true extent of any neuropathy. As a result patients with normal EMG may still benefit from cubital tunnel release.

Keywords: cubital tunnel syndrome, decompression, electromyography, ulnar nerve

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Abbreviations: EMG, electromyography; CTS, cubital tunnel syndrome; NCS, nerve conduction studies

Introduction

Electromyography (EMG) of the ulnar nerve frequently forms part of the work up for the diagnosis and management of cubital tunnel syndrome (CTS) but controversy exists as to its necessity in cases where the history and examination are 'classical' for the condition.¹⁻³ The current practice in our unit is to obtain electro physiological confirmation of the diagnosis in all patients presenting with symptoms of CTS, however in a number of cases the nerve conduction studies (NCS) may be normal despite a good clinical picture of ulnar nerve compression neuropathy. In these patients with refractory symptoms we often go on to perform a surgical decompression despite normal neurophysiology. The aim of this study was to look at patients with clinically diagnosed CTS who had gone on to have surgical treatment and to compare the results of those who had positive EMGs and those who had negative EMGs.

Many doctors would assert that routine pre-operative neurophysiology is a necessity for objective confirmation of the diagnosis of the condition and stratification of its severity, this has been extensively studied in the more common condition of carpal tunnel syndrome.^{4,5} It is also felt to be prudent from a litigation point

of view to have a definitive diagnosis of nerve compression to prevent accusations of unnecessary surgery in the event that no symptomatic improvement is gained from decompression be it for ulna or median nerve compression. Indeed the increasing litigation burden lead the American academy of Orthopaedic surgeons to recommend NCS on all patients being considered for carpal tunnel decompression.⁶

It is felt by other clinicians that in many cases a confident diagnosis of ulna nerve compression at the elbow can be made on clinical grounds alone.⁷ In view of the unnecessary cost, delay to surgery and uncomfortable experience for the patient that gaining nerve conduction studies entails we felt it would be worthwhile to ascertain if positive pre operative EMG tests indicated that it was more likely surgery would be successful in terms of symptomatic improvement.

Patients & methods

All patients referred from our clinic for nerve EMG testing during a five year period (2007-11) were identified, those where this was to primarily assess the ulna nerve were found and this data was correlated with our operative database and a cohort who subsequently went on to have surgical ulna nerve decompression at the elbow was isolated. Two groups were identified, those whose pre-operative NCS confirmed the diagnosis of ulna nerve compression and those whose NCS showed no evidence of neuropathy. All case notes were

reviewed for the 2 groups and it was confirmed that all patients had pre operative symptoms classical for CTS (numbness in ring and little fingers and or hand weakness)¹ and positive provocation tests (tinnel's sign and elbow flexion and nerve compression test).² Further evaluation of the case notes was performed to ascertain if at 6 week follow up the patient had satisfactory resolution of their symptoms or not and if this information was absent they were followed up by telephone consultation.

Our outcome measure was simple, did surgical treatment relieve their symptoms. Two surgical procedures were included in our study; simple ulna nerve decompression and decompression combined with transposition; there has been no significant benefit of one of these procedures over the other in the literature.⁸ The pre operative nerve conduction study results had no bearing on which procedure was performed, this decision was made intra-operatively, simple decompression was the preferred procedure but if after this the ulna nerve subluxed during flexion and extension of the elbow a formal transposition was carried out.

Results

207 patients had been referred for nerve conduction studies and had ulnar nerve electromyography results available, of these 36 were for the direct assessment of ulna neuropathy at the elbow with classical symptoms in clinic. 10 patients had studies primarily of the ulna nerve but had unusual clinical findings or symptoms suggestive of a mixed neuropathy and were hence excluded from this study, the majority of the remainder were where ulna nerve testing had been done for comparative purposes in the assessment of the median or radial nerve. 22 of the patients tested had nerve conduction studies confirming compression neuropathy at the elbow and 14 had no evidence of any ulna neuropathy. Of the 36 patients postoperative data was available for all but 1 patient who was subsequently contacted by telephone and questioned ensuring a 100% follow up rate.

From the 22 patients with positive NCS, 5 (22.7%) had ongoing ulna nerve symptoms at the 6 week follow up, these patients were then contacted by phone to see if there had been any further improvement or if any revision surgery had been performed. No patients had had significant improvements in their symptoms, one had undergone a second decompression with transposition with no further improvement. Of the 14 patients with negative NCS, 3 (21.4%) had ongoing symptoms at the 6 week follow up none of these patients had had further symptomatic improvement since or further surgery. There were no surgical or postoperative complications identified in any patient from either group. Our results suggest a similar success rate of surgical treatment in patients with clinically diagnosed ulna nerve compression at the elbow regardless of the results of pre-operative nerve conduction testing showing a 77.3% success rate in those with positive studies and a 78.6% success rate in those with negative studies.

Discussion

Patients with suspected compression neuropathy of the ulnar nerve including Cubital Tunnel Syndrome are commonly referred for electrophysiological testing to confirm conduction deficits. However a number of patients who present with symptoms indicative of ulnar nerve compression have normal EMG test results. Our practice has been to offer these patients a surgical decompression despite in supportive investigation, our results have shown that the success of

surgery is not predicted by nerve conduction test results and in light of the time, cost and morbidity associated with them we therefore question their necessity.

We postulate that ulna nerve compression at the elbow is a dynamic phenomenon worse in higher degrees of elbow flexion due to higher tension in the nerve and a reduction in micro vascular supply. It has been shown that NCS results are dependent on many factors including position of the limb, temperature of the limb and the length of nerve segment tested,⁹ and whilst in the optimum conditions reproducible results may be obtained we feel the lack of standardised testing and variability of results in a standard clinical renders them less useful.

There are many floors to this study; It is a retrospective review and our numbers are relatively small therefore making it susceptible to type 2 error therefore we have not sought to show a statistically significant difference rather to illustrate a point with absolute numbers. It could be said that the NCS are more likely to be positive in more severe neuropathy and therefore that the patients we operated on with negative studies had early and less severe compression meaning they were more likely to become asymptomatic after treatment. We accept this point but feel that this does not detract from our hypothesis that in a district general hospital setting and patients with a classical presentation of ulna nerve compression at the elbow pre operative NCS do not influence the outcomes of surgery and do not help discriminate between those patients who should and shouldn't be offered surgery. Finally we had a very simple and subjective outcome measure. We plan to carry out a prospective study in the future to see if ordering NCS in our patients positively influences our surgical outcomes and intend to carry out pre and post operative objective assessments of our cohorts to further confirm the preliminary findings of this study

Conclusion

Patients who present with a good history and clinical signs of cubital tunnel syndrome do not necessarily have abnormal findings on EMG. They may go on to have operative decompression of the ulnar nerve and show symptomatic improvement as a result.

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None.

Conflict of interest

The author declares no conflict of interest.

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