ORIGINAL ARTICLE

Who presents to our electroneurophysiology laboratory?

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Abstract

Objective: To determine the distribution rate of Electroneuromyography diagnosis and correspondence between the preliminary diagnosis and final outcome.

Methods: The retrospective study was conducted at the Department of Neurology, Harran University, Sanliurfa, Turkey, and comprised record of patients diagnosed with Electroneuromyography during a 24-month period from April 2011 to April 2013. SPSS 11.5 was used for data analysis.

Results: Of the 4,230 cases reviewed, 1,946 (46%) showed normal Electroneuromyography findings despite pathological Electroneuromyography findings in 2,284(54%) cases. The most common diagnosis was carpal tunnel syndrome in 721(17%) patients, followed by polyneuropathy 312(7.4%), peripheral nerve injury 238(5.6%), brachial plexus lesion 180(4.3%), myopathy 114(2.7%), lumbar radiculopathy 108(2.6%), poliomyelitis 62(1.5%) and injection neuropathy 62(1.5%).

Conclusion: Off-label use of Electroneuromyography may be reduced by using electroneurophysiological laboratory rotation as well as adequate and comprehensive clinical evaluation of patients.

Keywords: Electroneuromyography, diagnosis. (JPMA 65: 245; 2015)

Introduction

Electroneuromyography (ENMG) is an essential method for evaluation of the anterior horn cells, peripheral nervous system, neuromuscular junctions and the neurophysiological state of muscles. It is an indispensable tool for diagnosis and prognosis, for determining the course of treatment, and for following up on the effectiveness of current treatments.[1,2] Despite advances in medical techniques, ENMG has retained its value.[3]

Medical history and physical examination findings are necessary for the ENMG team to perform electrodiagnostic tests that are comprehensive and appropriate for each case.[4]

The current study was planned to determine the distribution rate of ENMG diagnoses and correspondence between the preliminary diagnosis and final outcome.

Patients and Methods

The retrospective study was conducted at the Department of Neurology, Harran University, Sanliurfa, Turkey, and comprised record of patients diagnosed with ENMG during a 24-month period from April 2011 to April 2013.

Routine clinical examinations had been performed in all patients. The appropriate ENMG protocols were conducted in the light of preliminary diagnosis and physical examination. The diagnoses determined using ENMG results were categorised. However, since the medical history and examination findings of the patients had not been recorded, only the requested preliminary diagnosis records were considered.

All procedures had been performed using a Nihon Kohden 9200K 4-channel ENMG device. According to the protocols prepared following the preliminary diagnosis and clinical examination of the patients, one or several of the following examinations were performed: nerve transmission studies, needle electromyography (EMG), visual evoked potentials (VEP), sensory evoked potentials (SEP), brainstem auditory evoked potential (BAEP), electroretinograms (ERG, repetitive nerve stimulation, single-fibre EMG studies, sphincter EMG, and sympathetic skin response.

Peripheral nerve trauma that developed in relation to stabbing injuries, firearm injuries, or various accidents (traffic accidents, falling from a height, etc.) were collectively managed under the peripheral nerve damage category. Optic nerve damage that occurred following various accidents or associated with systemic diseases was placed under the other optic nerve damage category. The other results obtained after ENMG and the diagnoses were categorised separately.

Data was analysed using SPSS 11.5.

Results

There were records of 4,230 patients in the study. The

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Table-1: The numbers and percentages of ENMG examinations performed in the patients.

ENMG procedure	Number of Patients	(%)
Nerve transmission studies	2078	49.1
Needle EMG	1798	42.5
Evoked potentials (VEP, SEP, BAEP, ERG)	256	6.1
Repetitive nerve stimulation	53	1.3
Single-fiber EMG	35	0.8
Sphincter EMG	5	0.1
Sympathetic Nerve Responses	2	0.01

ENMG: Electroneuromyography. EMG: Electromyography.
VEP: Visual evoked potentials. ERG: Electroretinograms.
SEP: Sensory evoked potentials.
BAEP: Brainstem auditory evoked potential.

Table-2: The diagnoses of the patients following ENMG and their rates.

Diagnosis	Number of Patients	(%)
Normal	1947	46%
Carpal tunnel syndrome (CTS)	721	17%
Polyneuropathy (PNP)	312	7.4%
Cubital tunnel syndrome	45	1.1%
Myopathy	114	2.7%
Brachial plexus lesions	180	4.3%
Injection neuropathy	62	1.5%
Facial paralyses	57	1.3%
Lumbar Radiculopathy	108	2.6%
Cervical Radiculopathy	40	0.9%
Myasthenia Gravis	14	0.3%
Multiple Sclerosis	53	1.3%
Guillain-Barré Syndrome	50	1.2%
Poliomyelitis	62	1.5%
Spinal muscular atrophy (SMA)	10	0.2%
ALS	6	0.1%
Thoracic outlet syndrome (TOS)	3	0.1%
Myotonia congenita	2	0.01%
Meralgia paresthetica	9	0.2%
Polymyositis	13	0.35
Monomelic amyotrophy (Hirayama)	4	0.1%
Multifocal motor neuropathy	5	0.1%
Hereditary pressure sensitive neuropathy	5	0.1%
Guyon's canal syndrome	2	0.01%
Pronator teres syndrome	2	0.01%
Peroneal nerve entrapment neuropathy	44	1%
Radial nerve entrapment neuropathy	10	0.2%
Other peripheral nerve damages	238	5.6%
Reflex sympathetic dystrophy	1	0.01%
Spinal mass	3	0.1%
Optic neuritis	34	0.8%
Other optic nerve damages	59	1.4%
Lombert Eaton syndrome (LES)	1	0.01%
Meningocoele	10	0.2%
Periodic paralysis	2	0.01%
Tarsal tunnel syndrome (TTS)	2	0.01%

overall mean age was 35.34±19.34 years. There were 1,810(42.8%) male patients with a mean age of 33.42±20.46 years, and 2,420(57.2%) females with a mean age of 36.77±18.34 years. Normal ENMG findings were seen in 1,946(46%) cases, while pathological ENMG findings were observed in 2,284(54%).

Nerve transmission studies alone were performed in 2,078(49.1%) patients, while nerve transmission was combined with needle EMG in 1,798(42.5%). One or more evoked potentials were performed in 256(6.1%) cases. Repetitive nerve stimulation was performed in 53(1.3%) patients, single-fibre EMG in 35(0.8%), sphincter EMG in 5(0.1%) and the sympathetic skin response method in 2(0.01%) (Table-1).

The most common diagnosis was carpal tunnel syndrome (CTS) in 721(17%) patients, followed by polyneuropathy 312(7.4%), peripheral nerve injury 238(5.6%), brachial plexus lesion 180(4.3%), myopathy 114(2.7%), lumbar radiculopathy 108(2.6%), poliomyelitis 62(1.5%), injection neuropathy 62(1.5%) facial paralyses 57(1.3%), multiple sclerosis 53(1.3%), and Guillain-Barré syndrome 50(1.2%) (Table-2).

Discussion

Medical history and physical examinations are essential for patients directed to the electroneurophysiology laboratory and indispensable for the planning of ENMG examinations. As ENMG provides not only a diagnosis but also an indication of the severity of the disease, it serves as a guide for the treatment strategy.[4] In the study by Danner et al., the clinical diagnosis and ENMG diagnosis were found to be the same in 38.6% of cases.[5] In the study by On et al.,[6] 140 of 1,050 ENMG examinations were performed without preliminary diagnosis, and the correspondence rate between the preliminary diagnosis and the ENMG diagnosis was 57.5%. In that same study, the most frequent preliminary diagnosis was focal neuropathy in the upper extremities (28.8%) and the second most was CTS (22.1%). The most frequent ENMG diagnosis was again CTS (20.4%).[6] In Turkey, a 57.5%-42.3% correspondence rate was reported between the preliminary diagnosis and ENMG results.[6,7] In one study, 19.7% patients were directed to the electroneurophysiology laboratory without a preliminary diagnosis, medical history, or physical examination.[7] This situation complicates the proper diagnosis made by ENMG examination. In addition, 43.3% patients showed ENMG results consistent with their preliminary diagnosis, while 38% showed discrepancies between the ENMG and preliminary diagnoses. In the study quoted above, preliminary diagnosis was consistent with the ENMG

diagnosis in 42.3% cases, but the most frequently encountered preliminary diagnoses were CTS (45.1%), polyneuropathy (13.9%), lumbar radiculopathy (13.1%) and cervical radiculopathy (10.8%). In that study, CTS was the most frequent preliminary diagnosis (36.2%) and ENMG diagnosis (27.4%).[7] In another study, the correspondence rate between the preliminary diagnosis and ENMG findings was 46.4%. In the order of their frequencies, the preliminary diagnoses were CTS (40.7%), polyneuropathy (18.8%), radiculopathy (17.8%), non-CTS entrapment neuropathy (7.5%), and peripheral nerve injuries (6.7%). Among the ENMG results, CTS was again the most frequently observed diagnosis (27.5%), followed by polyneuropathy (12.7%), radiculopathy (9%), and peripheral nerve injuries (4.2%).[8]

In yet another study, the clinical and ENMG diagnoses were found to be the same in 38.6% cases.[6] Another study reported that 140 of 1,050 ENMG examinations were performed without preliminary diagnosis, and the correspondence rate between the preliminary and ENMG diagnoses was 57.5%. It also reported that the most frequent preliminary diagnosis was focal neuropathy in the upper extremities (28.8%) and the second most was CTS (22.1%). The most frequent ENMG diagnosis was again CTS (20.4%).[6]

One study showed the correspondence between the two diagnoses to be 56.3%. In 41.5% cases, the ENMG was normal. Preliminary diagnosis and ENMG results were different in 4.9% cases. The most frequent preliminary diagnoses were CTS (59.6%), polyneuropathy (17.1), radiculopathy-plexopathy (13.4%), non-CTS entrapment neuropathy (7.3%), and myopathy (1.3%). Following ENMG, the most frequent diagnosis was again CTS (27.6%), followed by polyneuropathy (12.7%), radiculopathy-plexopathy (11.6%) and other entrapment neuropathies (4.6%).[9]

In our study, following ENMG examination, CTS was identified in 721 (17%) patients and was the most frequently encountered disease. This observation is consistent with the literature findings related to Turkey. After CTS, the next most frequently encountered diseases were polyneuropathies (7.4%) followed by peripheral nerve damage (5.6%), brachial plexus lesions (4.3%), myopathies (2.7%), lumbar radiculopathy (2.6%), and poliomyelitis (1.5%). CTS was the most frequently observed disease in the study. The presence and frequency of brachial plexus lesions and poliomyelitis were also noteworthy. Cases of poliomyelitis demonstrate the necessity to reconsider correspondence with vaccination efforts in the region.

Conclusions

The lack of standard training by rotation in electroneurophysiology laboratories among physicians who request ENMGs and the insufficient focus and orientation on patients are factors that may increase the non-correspondence rate between the preliminary and ENMG diagnoses. The correspondence between the two diagnoses can be worth a lot more, and it is necessary to increase the awareness among physicians requesting ENMG. This may be achieved by performing further prospective studies.

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