

AANEM PRACTICE TOPIC



American Association of Neuromuscular & Electrodiagnostic Medicine

421 First Avenue S.W., Suite 300 East, Rochester, MN 55902 (507/288-0100)

ABSTRACT: An evidence-based review of electrodiagnostic (EDX) techniques in the evaluation of peroneal neuropathy was conducted to determine whether these techniques are useful for diagnosis and prognostication in this disorder. A Medline search and a review of relevant sources were performed in 1999 and updated through July 2003 to identify articles describing the use of EDX in patients suspected to have peroneal neuropathy. From the 499 articles identified, 112 articles describing motor and sensory nerve conduction studies and needle electromyography in peroneal neuropathy were reviewed in detail; 11 articles met the predetermined literature inclusion criteria for the adequacy of EDX techniques employed. Six articles provided Class III evidence in support of a role for nerve conduction studies in making the diagnosis of peroneal neuropathy; five articles provided Class IV evidence. Implicit in making the diagnosis were normal EDX findings outside the distribution of the peroneal nerve. The current literature supports the use of EDX in patients with suspected peroneal neuropathy (Level C recommendation).

Muscle Nerve 31: 520–527, 2005

PRACTICE PARAMETER: UTILITY OF ELECTRODIAGNOSTIC TECHNIQUES IN EVALUATING PATIENTS WITH SUSPECTED PERONEAL NEUROPATHY: AN EVIDENCE-BASED REVIEW

CHRISTINA MARCINIAK, MD, CARMEL ARMON, MD, MHS, JOHN WILSON, MD, and ROBERT MILLER, MD

Authors had nothing to disclose.

American Association of Neuromuscular & Electrodiagnostic Medicine, 421 First Avenue SW, Suite 300E, Rochester, MN 55902, USA

CLINICAL BACKGROUND

Common peroneal neuropathy is one of the more frequent focal mononeuropathies in the lower ex-

trémities occurring in both adults and children. Peroneal palsy with foot drop is rarely seen in the neonate.^{2,4} Foot drop due to weakness of ankle dorsiflexion is the most common presentation of a peroneal neuropathy. It may also result from other causes involving the upper or lower motor neuron. Disorders that must be distinguished from peroneal neuropathy include sciatic mononeuropathy, lumbosacral plexopathy, motor neuron disease, polyneuropathy, and an L5 radiculopathy. In addition to establishing a diagnosis, electrodiagnostic (EDX) studies have been used by some authors to localize the level of the abnormality and to establish prognosis.^{5,12} The most common site of injury is the fibular head (FH), but focal neuropathies have also been reported at the level of the calf, ankle, and foot.⁸

This review addressed the following clinical questions:

1. In patients with suspected peroneal neuropathy:
 - a. are EDX studies useful to confirm the diagnosis,

This article was prepared and reviewed by the AANEM and did not undergo the separate review process of *Muscle & Nerve*.

This summary is an educational effort of the American Association of Neuromuscular & Electrodiagnostic Medicine (AANEM), formerly the American Association of Electrodiagnostic Medicine. It is based on a systematic review of the published scientific literature and assesses the usefulness of electrodiagnostic (EDX) techniques in the diagnosis of patients with peroneal neuropathy. The Peroneal Neuropathy Task Force of the AANEM was charged by the AANEM Board to perform a literature review in order to provide recommendations on the use of EDX studies in peroneal neuropathy.

Abbreviations: AT, anterior tibial; CMAP, compound muscle action potential; EDB, extensor digitorum brevis; EDX, electrodiagnostic; EMG, electromyography; FH, fibular head; NCSs, nerve conduction studies

Key words: compression neuropathies; deep peroneal neuropathy; electrodiagnostic; entrapment neuropathies; foot drop; mononeuritis; peroneal neuropathy; superficial peroneal neuropathy

Correspondence to: American Association of Neuromuscular & Electrodiagnostic Medicine, 421 First Avenue SW, Suite 300E, Rochester, MN 55902, USA; e-mail: aanem@aanem.org

© 2005 American Association of Neuromuscular & Electrodiagnostic Medicine. Published by Wiley Periodicals, Inc.
Published online in Wiley InterScience (www.interscience.wiley.com).
DOI 10.1002/mus.20308

- b. what is the range of EDX findings, and
 - c. in particular, how often can EDX provide localizing information to the region of the fibular head?
2. Can EDX techniques be used to assess prognosis in patients with peroneal neuropathy?

A systematic review and analysis of the literature regarding the use of EDX techniques in the evaluation of patients with suspected peroneal neuropathy was performed using evidence-based medicine methods.

METHODOLOGIC BACKGROUND

Three methodological factors impacted the evaluation of the literature reporting on or evaluating the role of EDX testing in suspected peroneal neuropathy, during the development of this article. The first factor is the duality of roles that exists with electrodiagnostic testing, either as an extension of the physical examination and as an objective diagnostic test. The second was the recent expansion of the sources of normal values that are acceptable to consider a study of high quality. The third factor was the decision of the Quality Standards Subcommittee and Technology and Therapeutics Assessment Subcommittee of the American Academy of Neurology that nerve conduction studies (NCSs), when performed appropriately, provide reliable results that are not influenced by the examiner.

Electrodiagnostic testing encompasses two roles in the evaluation and management of patients with neuromuscular disease. Most frequently, EDX testing is used as an extension of, on an equivalent footing with, the neurological examination. Like any of the other building blocks of the medical and neurological history and examination sequence, EDX testing can assist in making a diagnosis while excluding alternatives, assist in patient education, provide prognostic information, and can guide and monitor treatment. When viewed in this way, EDX results may be incorporated into the case definition of various neuromuscular conditions, following the usual process of diagnostic reasoning about the localization of the lesion, with consensus or general agreement. This process is a permissible method for assigning utility of a diagnostic test. Taking the example of peroneal neuropathy, agreement might be reached to define it based on (1) findings on clinical examination alone (i.e., weakness in peroneal-innervated muscles, clinical sensory deficit in the distribution of the peroneal nerve, with the rest of the examination normal); (2) the results of electrodiag-

nostic tests alone (i.e., abnormal peroneal motor and sensory NCSs, all other NCSs normal, with or without findings of denervation in peroneal-innervated muscles, but not others); or (3) using a combination of clinical and EDX criteria.

However, EDX testing may also be considered as a test, with a different status than that of the clinical examination. Viewed in this way, validation of its utility in making a diagnosis requires using a reference standard ("gold standard") case definition that is derived independently of the results of the EDX test themselves.

This is a relatively recent distinction. Most of the electrodiagnostic literature was developed before this distinction was made. The literature therefore typically utilizes EDX testing as an extension of the neurological examination. The reference standard is implicit; it is the standard of what is normal, clinically or electrodiagnostically. Findings that are not normal (clinically or electrodiagnostically) in the distribution of the peroneal nerve, and no other distribution, lead to the diagnosis of peroneal neuropathy. There are limitations to the evaluation of existing literature using criteria that (1) were not articulated when that literature was developed and (2) may not completely capture the way that the technique under consideration is being used.

Second, the range of options for sources of normal values that will permit a report of an abnormal result to be considered reliable has been expanded, so that they currently include: (1) values obtained in a normal group (according to the reference standard) enrolled specifically for the article; (2) normal values established in normal control subjects tested in the same laboratory; and (3) normal values established in normal control subjects using the same EDX techniques, even if obtained in another laboratory.

Finally, as a result of the recognition of the reliability of NCSs, when performed appropriately, the results of NCSs may be used to generate Level III evidence, within the evidence-based medicine frame of reference, even if the examiner performing the test is not masked to the clinical findings. Level III evidence is the lowest level from which tentative conclusions may be drawn.

METHODS

Identification of the Literature. A Medline search was conducted in November 1999, and subsequently updated through July 2003, for articles in English using the following MeSH terms: compression neuropathies (limited to the peroneal nerve), deep per-

oneal neuropathy, entrapment neuropathies, foot drop, mononeuritis, peroneal neuropathy, and superficial peroneal neuropathy. This database included articles from 1966 to 2003. The abstracts of the articles identified were reviewed and the articles that described EDX techniques in patients with peroneal neuropathy were obtained for further review. Case series that included less than five subjects were excluded. The bibliographies of these articles were screened for further research articles, including those prior to 1966, as were relevant textbooks and recent EDX journals.

Inclusion Criteria. The following criteria (modified, by the AANEM Peroneal Neuropathy Task Force and the Practice Issues Review Panel, from those used by the AAEM Carpal Tunnel Task Force 1993) were used to determine whether a paper was included in this article:

1. Patient inclusion criteria:
 - a. For papers demonstrating the use of EDX in making the diagnosis of peroneal neuropathy in patients in whom the diagnosis was (or was not) suspected—the pretest diagnosis was based on clinical criteria that were independent of the EDX procedure under evaluation.
 - b. For papers reporting on the spectrum of EDX abnormalities in patients with peroneal neuropathy or on the role of EDX in prognosis, the diagnosis could be made relying on clinical criteria alone in some, on EDX criteria alone in others, or on a combination of clinical and EDX criteria.
2. The EDX procedure was described in sufficient detail or reference was provided to a published technique to allow duplication of the procedure.
3. Reference values or criteria for interpreting the results of EDX were obtained through concomitant studies of a reference population (enrolled for the purpose of the study); from results of a reference population studied previously in the same laboratory; or based on accepted values or criteria established elsewhere, where similar techniques were used.
4. Criteria for determining the abnormality of results of the EDX procedures were clearly stated and defined in statistically computed terms from data derived from a reference population.
5. Prospective study design. See discussion in “Classification System for Strength of Evidence.”
6. Papers that monitored and reported limb temperature were preferred but this was not a mandatory requirement for inclusion.

Classification System for Strength of Evidence. Articles were rated using the criteria for assessment of the utility of a diagnostic test. Articles evaluating the utility of EDX in making the diagnosis, in which a pre-EDX diagnosis of peroneal neuropathy was made on clinical grounds alone were classified at best as Class III evidence for the NCS findings and as Class IV for the findings on needle examination; if the diagnosis of peroneal neuropathy was made utilizing EDX data, articles were classified as Class IV. This method understates the utility of EDX, relative to its uses in clinical practice, resulting in a conservative assessment. Regardless of how peroneal neuropathy was defined, the use of EDX studies in providing localizing information (to the FH) and in prognosis were classified at best as Class III evidence with regards to the NCS findings and as Class IV with regards to the needle examination findings. Studies in which limb temperature was not reported were included because this omission would not be expected to result in artifactual emergence of the chief findings used to support a diagnosis of peroneal neuropathy: conduction block at the FH, or absence or reduced sensory nerve action potential amplitudes. However, where absolute conduction velocity values were used to determine normalcy, in the absence of documented limb temperature, the information was designated as Class IV evidence, and no conclusions were drawn from those data. Similarly, where criteria 3 and 4 were met partly but not adequately, the study results were designated as Class IV evidence. The chief methodological characteristics abstracted from each article are included in Evidence Table 1, available electronically (<http://www.aanem.org/practiceissues/practiceparameters/peronealevidencetable.pdf>).

RESULTS

Literature Reviewed. The initial Medline search identified a total of 173 articles. Following examination of the abstracts, 43 articles that discussed EDX techniques evaluating the peroneal nerve or its branches were obtained for further review. The second and third Medline search in September 2001 and July 2003 resulted in a total of 499 citations; 11 additional articles were selected upon review of the abstracts. An additional 26 articles were identified by screening the bibliographies of the original articles, 27 articles were obtained from the review of bibliographies of relevant textbooks, and 5 articles were obtained by screening recent EDX journals. Thus, a total of 112 articles were reviewed in detail for the development of this practice parameter.

Reference Standard (Gold Standard) Case Definition.

An explicit description of a universally accepted reference ("gold") standard definition of peroneal neuropathy was not found. However, the criteria utilized by all authors followed the usual diagnostic method, whereby abnormalities in the distribution of the peroneal nerve, in the absence of abnormalities elsewhere, resulted in a diagnosis of peroneal neuropathy.

Articles Included. Eleven articles met the inclusion criteria. Eight articles described the use of motor NCSs, five described the use of sensory NCS, and five the use of needle electromyography (EMG). No articles were identified in which somatosensory evoked potentials were applied to the evaluation of peroneal neuropathy. There were no studies in which the physician performing and interpreting the EDX tests was reported to be masked to the clinical diagnosis. The abstracted methodological characteristics of these studies are summarized in Evidence Table 1.

Study Cohorts Summary. Several methods were utilized for assembly of the study cohort. Four studies were prospective in design and included patients with suspected peroneal neuropathy on the basis of clinical findings.^{5,7,8,13} In one study, subjects with history and clinical findings believed to be suggestive or definitely related to a lesion at the FH were compared with subjects with other lower-extremity neurological abnormalities, including peroneal neuropathy at other locations.¹¹ Three studies described the findings in subjects diagnosed with peroneal neuropathy on the basis of EDX studies.^{6,8,12} Cruz-Martinez et al. included subjects with findings of peroneal neuropathy after weight loss.³ Only subjects with unilateral findings were included in the article by Sourkes and Stewart.¹³ Two articles reported NCS findings in patients diagnosed by needle EMG evaluation of lower-extremity muscles.^{9,10} Additionally, the studies by Katirji and Wilbourn, and Singh et al., included subjects referred to the EDX laboratory, potentially introducing a selection bias.^{6,11} Cohort assembly characteristics could not be determined for the other articles reviewed. No population-based studies were identified.

The number of subjects with suspected peroneal neuropathy ranged from 7 to 103 and their mean ages ranged from 28 to 83 years. Five studies reported a preponderance of male subjects.^{5,6,8,12,13} The information regarding these demographic characteristics was incomplete in the remaining studies.^{7,9,10,11}

The spectrum of physical examination findings was varied. The studies by Singh et al., as well as Smith and Trojaborg, included patients with abnor-

malities in motor and/or sensory findings in the distribution of the common peroneal nerve or one or more of its branches.^{11,12} All subjects in three studies indicated weakness in an appropriate distribution.^{1,3,13} Oh et al. included only patients with sensory changes in the distribution of one or more branches of the peroneal sensory nerve in the foot.⁸ In other studies, these clinical features were not described.^{5,7,9,10} Clinical information was not provided for 22% of the subjects in the study by Katirji and Wilbourn.⁶

SPECIFIC FINDINGS**Utility of Electrodiagnostic Studies in Patients with Suspected Peroneal Neuropathy. Motor Nerve Conduction Studies.**

These studies are summarized in Table 2 available electronically (<http://www.aanem.org/practiceissues/practiceparameters/peronealmethodtable.pdf>). All authors reported on motor NCSs to the extensor digitorum brevis (EDB), whereas five studies also evaluated conduction to the anterior tibialis (AT).^{1,6,10,11,13} In addition, Sourkes and Stewart studied conduction to the peroneus brevis, and Singh et al. to the peroneus longus.^{11,13} Both needle stimulation and recording electrodes were utilized by Singh et al., whereas Redford utilized either needle or surface recordings.^{10,11} Other studies utilized surface recording electrodes and stimulation.^{1,3,5,6,9,13}

Motor conduction velocities across the FH were reported in five studies^{3,9,10,11,13} utilizing segments ranging from 7–10 cm. Slowing of conduction across the FH was 100% sensitive in the studies by Sourkes and Stewart ($n = 22$) and Cruz-Martinez et al. ($n = 27$).^{3,13} Singh et al. noted slowing in 33% of subjects ($n = 30$) in whom responses could be recorded at the EDB muscle; 36% of the 47 patients in this study had absent responses and thus this finding could not be evaluated. Although peroneal motor conduction slowing was noted in subjects with other neurological diagnoses, the presence of focal slowing across the FH segment was 100% specific for those diagnosed clinically with peroneal neuropathy.¹¹ Ninety percent of subjects ($n = 9$) in Redford's group had slowing of conduction to the AT muscle.¹⁰ Conduction to the EDB was normal in three of seven patients in which this response could be recorded, with stimulation applied at the popliteal fossa.¹⁰

Six studies assessed subjects for conduction block at or across the FH. There was not a consistent definition among these authors as to the criteria for block.^{1,3,5,6,9,11} This likely accounts for the variability noted in the sensitivity of this technique. Pickett

noted that a decreased compound muscle action potential (CMAP) of greater than 20% comparing stimulation at the fibular neck to the popliteal fossa was 61% sensitive ($n = 33$). Additionally, compared to subjects with clinical findings of a polyneuropathy, this degree of amplitude drop across the knee segment was 100% specific ($n = 33$) for peroneal nerve lesions at the FH.⁹ Katirji and Wilbourn reported that an amplitude drop of 50% in motor nerve conduction recording to the EDB or to the AT had a sensitivity of 45% ($n = 116$).⁶ Kanakamedala and Hong compared the sensitivity stimulating at 2-cm segments as compared to a 10-cm segment across the FH; 78% of subjects had a significant drop in amplitude with 2-cm segments compared to 39% using the 10-cm segment ($n = 18$).⁵ Singh et al. found that a 75% reduction in the amplitude of the response, when stimulating at the popliteal fossa as compared to distally at the FH, was present in 19% of the 47 subjects.¹¹ Brown and Watson noted 91% of 11 subjects had a reduction in negative peak area comparing proximal to distal stimulation (percent decrease range 17.3% to 47.4%,) compared to control subjects in which no significance difference was found between stimulation sites.¹

Sensory Nerve Conduction Studies. These studies are summarized in Table 2. Levin et al. found that superficial peroneal sensory NCSs, with stimulation applied at the anterior leg, were 63% sensitive ($n = 11$) using orthodromic sensory NCSs recording at the FH and 36% when recording antidromically at the ankle.⁷ All cases with abnormal superficial peroneal sensory NCSs also had an abnormal peroneal motor NCS.⁷ Singh et al., using near nerve recordings, demonstrated that an abnormality in sensory conduction across the FH had a sensitivity of 81% ($n = 47$).¹¹ Brown and Watson found that 83% of his subjects ($n = 6$) had a reduction in the amplitude of the sensory nerve action potential or an absent response, when stimulating the superficial peroneal nerve at the ankle and 8–10 cm proximally while recording on the dorsal foot.¹ In one study, the sensitivity could not be determined because the inclusion criteria were unclear.⁸

Needle Electromyography. The sensitivity of needle EMG abnormalities in the AT muscle ranged from 79% to 100% ($n = 11$ to 44), in the EDB from 77% to 91%, and in the peroneus longus from 60% to 82%.^{1,11,13} Sourkes and Stewart also described abnormalities of the peroneus brevis in 75% ($n = 22$) of his subjects.¹³ Both Cruz-Martinez et al. and Katirji and Wilbourn reported 100% of subjects

($n = 30$ and 113, respectively) had abnormalities in at least one peroneal-innervated muscle, however the specific muscles involved were not described. The short head of the biceps femoris was normal in all subjects in the two studies in which this muscle was included.^{3,13} No authors compared the specificity of a defined set of muscles to a control population of patients with competing neurologic diagnoses.

Using Electrodiagnostic Techniques to Assess Patients with Suspected Peroneal Neuropathy.

Smith and Trojaborg reported clinical and electrophysiologic follow-up studies in 14 patients diagnosed with peroneal neuropathy on the basis of their initial EDX study.¹² The timing of the first assessment varied widely: from 1 month to 1 year after symptom onset.¹² At follow-up (5 months to 3 years), less than half of the subjects (6 of 14) demonstrated complete recovery. The recovery was defined as the absence of weakness in the peroneal longus, AT, and EDB muscles, and by normal sensory findings. Of subjects with full clinical recovery, 100% had normal sensory conduction velocities distal to the FH at the time of the initial study, along with slowing of motor conduction velocities across the FH. Of these six subjects, five showed conduction block during the initial study, which had resolved at follow-up. Normal motor conduction distal to the FH was found in 83% of subjects with full clinical recovery. Subjects with incomplete recovery ($n = 8$) more often had abnormal motor NCSs distal to the site as defined by either a decrease in amplitude (25%), absent response (37%), or mild slowing distally (25%). No subject with an absent response to the EDB ($n = 3$) with proximal stimulation had a full clinical recovery. On electromyographic testing, fibrillation potentials and positive sharp waves were more often present in those with incomplete recovery (86% vs. 50%) (Class IV evidence).

Cruz-Martinez et al. described findings in 20 of 30 patients, 3 weeks to 7 months after the onset of symptoms. The presence of conduction block, as determined by a significant amplitude reduction in the CMAP of the EDB muscle with above knee compared to ankle stimulation, correlated with delayed recovery of function ($P < 0.02$)³ (Class III evidence).

DISCUSSION

There were consistent correlations found between clinical findings of peroneal neuropathy and the following: (1) abnormal motor NCSs measuring

amplitude and change in conduction velocity across the FH; (2) superficial sensory nerve conduction; and (3) needle EMG evaluation of peroneal-innervated muscles. Studies that evaluated motor conduction across the FH segment appear to be of particular utility in distinguishing patients with peroneal neuropathy at this level compared to patients with other lower extremity neurologic disorders (Class III and Class IV evidence). Two studies noted correlation between EDX findings (motor NCSs abnormalities distal to the FH or significant conduction block across the FH) and delayed recovery of peroneal function (Class III and Class IV evidence).

Limitations. Due to the widespread utilization of EDX testing in the evaluation of patients with suspected peroneal neuropathy (suggesting that clinicians have found EDX testing to be useful in this setting) most studies were published prior to the development of more rigorous standards for study design and assessment of the literature. Consequently, available studies only provided Class III and IV evidence, resulting in a conservative assessment of their utility. In particular, classifying of needle EMG data as Class IV evidence because the examiner is not masked to clinical data results in understatement of its utility. The sensitivity and specificity numbers should be interpreted cautiously, and may not be generalizable. No reference was found to a consensus-based standard case definition. Finally, no studies evaluated the impact of EDX testing on treatment in patients with peroneal neuropathies.

Conclusions.

1. In patients with suspected peroneal neuropathy, the following EDX studies are possibly useful, to make or confirm the diagnosis:
 - a. Motor NCSs of the peroneal nerve recording from the AT and EDB muscles, including an assessment of peroneal conduction through the leg and across the FH (Level C recommendation, Class III evidence);
 - b. Orthodromic and antidromic superficial peroneal sensory NCS (Level C recommendation, Class III evidence);
 - c. At least one additional normal motor and sensory NCS in the same limb, to assure that the peroneal neuropathy is isolated, and not part of a more widespread local or systemic neuropathy. This requirement is implicit in clinical practice, including the cited literature; it can-

not be assigned a level of recommendation under the present classification system. (Expert opinion, for the purpose of this paper, is defined as: "implicit in all the papers that were cited, made explicit by the authors, and not disputed by any of the experts who reviewed the manuscript").

2. Data are insufficient to determine the role of needle EMG in making the diagnosis of peroneal neuropathy (Level U recommendation, Class IV evidence, reflecting the current classification system). However, abnormalities on needle examination outside of the distribution of the peroneal nerve should suggest alternative or additional diagnoses (Expert opinion).
3. In patients with confirmed peroneal neuropathy, EDX studies are possibly useful in providing prognostic information, with regards to recovery of function (Level C recommendation, Class III and IV evidence).

RECOMMENDATION FOR FUTURE RESEARCH

It is important that future research evaluating the usefulness of EDX studies in suspected peroneal neuropathy take into account the classification of evidence system. The following steps are recommended:

1. A consensus-based, reference standard for the clinical diagnosis should be developed first. Standardized, consensus-based criteria for degrees of clinical severity should be determined.
2. A prospective study design should be utilized.
3. Studies should include subjects with competing diagnoses, also determined on clinical grounds alone, in order to allow an assessment of whether EDX techniques can be used to distinguish disorders with similar clinical features.
4. If standardization of clinical severity has been achieved, studies should include subjects with varying degrees of severity to allow assessment of the utility of EDX studies across the range of clinical severity.
5. The person performing and interpreting the EDX study under investigation should be blinded to the clinical diagnosis of all subjects being studied.
6. EDX methodology:
 - a. The EDX technique should be described in sufficient detail in order to allow for the duplication of the procedure;
 - b. The limb temperature should be continuously monitored during the EDX study;

- c. Normal values for the procedure should be obtained through concomitant study of a reference population, or through previous study of a reference population in the same laboratory, or in a laboratory utilizing the same techniques;
 - d. The criteria for EDX abnormality should be defined in statistical terms, relative to the data obtained from the normal population.
7. Studies should test procedures that are widely available and useful in a clinical practice setting.
 8. Further studies may be undertaken to evaluate techniques which examine segmental conduction across the FH region (velocity reduction, conduction block, inching).
 9. Studies may be performed to assess the impact of NCSs and needle EMG on the costs, treatment, and the outcomes of patients with suspected peroneal neuropathy.

Definitions for Strength of Evidence. *Class I.* Evidence provided by a prospective study in a broad spectrum of persons with the suspected condition, using a gold standard for case definition, where test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy.

Class II. Evidence provided by a prospective study of a narrow spectrum of persons with the suspected condition, or a well-designed retrospective study of a broad spectrum of persons with an established condition (by gold standard) compared to a broad spectrum of controls, where test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy.

Class III. Evidence provided by a retrospective study where either persons with the established condition or controls are of a narrow spectrum, and where the test is applied in a blinded evaluation, or where the results of the test cannot be influenced by an unblinded examiner.

Class IV. Any design where test is not applied in blinded evaluation or evidence provided by expert opinion alone or in descriptive case series (without control subjects).

Rating System for Strength of Recommendations.

Level A. Established as effective, ineffective, or harmful (or established as useful/predictive or not useful/predictive) for the given condition in the specified population.

Level B. Probably effective, ineffective, or harmful (or probably useful/predictive or not useful/

predictive) for the given condition in the specified population.

Level C. Possibly effective, ineffective, or harmful (or possibly useful/predictive or not useful/predictive) for the given condition in the specified population.

Level U. Data inadequate or conflicting. Given current knowledge, treatment (test, predictor) is unproven.

DISCLAIMER

This report is provided as an educational service of the AANEM. It is based on an assessment of the current scientific and clinical information. It is not intended to include all possible methods of care for a particular clinical problem, or all legitimate criteria for choosing to use a specific procedure. Neither is it intended to exclude any reasonable alternative methodologies. This statement is not intended to address all possible uses of, or issues regarding, the evaluation of peroneal neuropathy, and in no way reflects upon the usefulness of electrodiagnostic studies in those areas not addressed. The AANEM recognizes that specific patient care decisions are the prerogative of the patient and his/her physician and are based on all of the circumstances involved. These guidelines are not a substitute for the experience and judgment of a physician. This review was not written with the intent that it be used as a basis for reimbursement decisions.

The authors are grateful for the assistance of Milind J. Kothari, DO, for his efforts on this document. The AANEM also thanks the members of the Practice Issues Review Panel, Richard Dubinsky, MD, chair; Michael T. Andary, MD, MS; William W. Campbell, MD; Joseph V. Campellone, Jr., MD; Earl J. Craig, MD; Kenneth James Gaines, MD; James F. Howard, Jr., MD; Atul Patel, MD; Yuen T. So, MD, PhD; and Robert A. Werner, MD, MS, for their review and feedback concerning this document.

REFERENCES

1. Brown WF, Watson BV. Quantitation of axon loss and conduction block in peroneal nerve palsies. *Muscle Nerve* 1991; 14:237-244.
2. Crumrine PK, Koenigsberger MR, Chutorian AM. Footdrop in the neonate with neurologic and electrophysiologic data. *J Pediatr* 1975;86:779-780.
3. Cruz-Martinez A, Arpa J, Palau F. Peroneal neuropathy after weight loss. *J Periph Nerv Syst* 2000;5:101-105.
4. Godley DR. Neonatal peroneal neurapraxia: a report of two cases and review of the literature. *Am J Orthop* 1998;27:803-804.
5. Kanakamedala RV, Hong CZ. Peroneal nerve entrapment at the knee localized by short segment stimulation. *Am J Phys Med Rehabil* 1989;68:116-122.

6. Katirji MB, Wilbourn AJ. Common peroneal mononeuropathy: a clinical and electrophysiologic study of 116 lesions. *Neurology* 1988;38:1723–1728.
7. Levin KH, Stevens JC, Daube JR. Superficial peroneal nerve conduction studies for electromyographic diagnosis. *Muscle Nerve* 1986;9:322–326.
8. Oh SJ, Demirci M, Dajani B, Melo AC, Claussen GC. Distal sensory nerve conduction of the superficial peroneal nerve: new method and its clinical application. *Muscle Nerve* 2001; 24:689–694.
9. Pickett JB. Localizing peroneal nerve lesions to the knee by motor conduction studies. *Arch Neurol* 1984;41:192–195.
10. Redford JB. Nerve conduction in motor fibers to the anterior tibial muscle in peroneal palsy. *Arch Phys Med Rehabil* 1964; 45:500–504.
11. Singh N, Behse F, Buchthal F. Electrophysical study of peroneal palsy. *J Neurol Neurosurg Psychiatry* 1974;37: 1202–1213.
12. Smith T, Trojaborg W. Clinical and electrophysiological recovery from peroneal palsy. *Acta Neurol Scand* 1986;74:328–335.
13. Sourkes M, Stewart JD. Common peroneal neuropathy: a study of selective motor and sensory involvement. *Neurology* 1991;41:1029–1033.

This guideline is greater than 5 years old. Every five years, an interim literature search is performed and the guideline is reviewed. While new studies have been published since this guideline was last reviewed, the Practice Issue Review Panel Committee of the AANEM has determined that these studies are not sufficient to mandate a revision of this guideline at the present time. The information contained in this guideline and the recommendations offered are still relevant to current practice.

Reaffirmed by the Practice Issue Review Panel: May, 2015.