AANEM
Position Statement
American Association of Neuromuscular & Electrodiagnostic Medicine

AANEM Policy Statement on Electrodiagnosis for Distal Symmetric Polyneuropathy

Introduction

Distal symmetric polyneuropathy (DSP) is one of the most common problems leading to referral for electrodiagnostic testing. The most common etiology in developed countries is diabetes mellitus, comprising 30-80% of all cases.[1-4] While there are over 200 documented causes, some are uncommon.[5] Despite its prevalence, DSP remained incompletely defined until 2005, when the definition and diagnostic criteria were established by systematic analysis of literature and expert consensus.[6] Testing for DSP can be divided into three parts: (1) identifying the presence of the condition, (2) determining whether axon or myelin involvement is predominant and (3) identifying the etiology.

The accuracy of the history and physical examination for determining both the presence and etiology of DSP is limited. A carefully structured examination of a group of diabetic patients with and without diabetic neuropathy, by a team of international expert neurologists and diabetologists showed limited validity and reproducibility of the clinical diagnosis of polyneuropathy.[7] It is likely that less experienced physicians are even less accurate.

Electrodiagnostic testing (EDX), comprised of nerve conduction studies (NCS) and needle electromyography (EMG), is frequently used to evaluate DSP, and is one of the more common reasons for EDX referral.[8-9] An authoritative multispecialty task force concluded, "The combination of neuropathic symptoms, signs, and electrodiagnostic findings provides the most accurate diagnosis of distal symmetric polyneuropathy."[6] However, EDX testing may not be needed for every case of possible DSP. NCS/EMG should not be the only test ordered. Review of family history and screening tests for diabetes, B12 deficiency and monoclonal gammopathy should be assessed in almost every case.[10-11]

There are several reasons to perform EDX testing in cases of suspected or proven DSP, including but not limited to:

1. Determining primary and alternative diagnoses.
2. Determining severity, duration and prognosis of disease
3. Evaluating risk of associated problems
4. Determining the effect of medications
5. Evaluating the effect of toxic exposures

1. Determining Primary and Alternative Diagnoses

EDX testing is often crucial in establishing the cause of DSP, as well as uncovering other (often unsuspected) neuromuscular conditions. Symptoms alone are inadequate to diagnose DSP. In a review of patients referred for EDX testing at an academic neurology department, NCS/EMG resulted in alternative diagnoses in 43% of suspected cases, most often lumbar radiculopathy (18%).[12] Unsuspected diagnoses were found even in many cases with "typical" signs and symptoms of DSP. In another study, 19% of patients referred for polyneuropathy had normal studies, and 24% had another diagnosis.[13] Correct diagnosis of DSP can assure that patients receive appropriate care for many conditions, including genetic neuropathies, lumbar radiculopathy and chronic inflammatory demyelinating polyradiculopathy (CIDP) and avoid inappropriate treatments.

2. Determining Severity, Duration and Prognosis of DSP

Diagnosing the presence or absence of peripheral neuropathy on physical examination is important, but often not enough. The duration and severity of the neuropathy is also important. Knowing this provides clinicians and patients with prognostic information. In a study of 86 patients with Type 2 DM, including patients with and without clinical evidence of DSP, lower extremity NCS were worse with increasing clinical severity and duration of symptoms.[14] Another study showed that NCS correlated well with diabetes duration, fasting blood glucose, and glycated hemoglobin level.[15] Several clinical exams were fairly good at detecting the presence of diabetic neuropathy, but only NCS could determine severity.[16] The Toronto Diabetic Neuropathy Expert Group emphasized the need to determine not just the presence, but the severity of diabetic distal neuropathy using nerve conduction studies.[17] In critical illness neuropathy, greater abnormalities on NCS, particularly reduced motor amplitude, are correlated with disease severity and prognosis.[18] Determining the severity and duration of the neuropathy can be important for life planning in patients even when no treatment is available.

3. Evaluating Risk for Associated Problems

Electrodiagnosis can also be helpful in assessing the risk of complications associated with diseases that can cause DSP. Many clinicians feel that EDX testing is not helpful in patients with a clinical phenotype of DSP and known diabetes. This conclusion is not well supported. There is evidence that abnormal nerve conduction studies correlate with the development of non-neurologic pathology. In a study of 137 patients with diabetes age 60-80 years, the degree of impairment on NCS correlated directly with balance disorders.[19] Balance disorders frequently lead to falls, one of the most common and rapidly growing causes of major injury in the US, with huge costs. Total medical costs in the U.S. in 2015 for falls in the 65+ age group alone were $50 billion.[20] Similarly, the presence of diabetic retinal degeneration was directly correlated with peripheral nerve conduction velocity.[21] Slowed NCV also correlated with subclinical left ventricular dysfunction and was an independent determinative value for left ventricular global longitudinal strain in asymptomatic diabetics.[22]

4. **Determining the Effect of Medications**

EDX testing can aid in identifying the therapeutic or toxic effects of medications on the peripheral nervous system, guiding future treatments. Among therapeutic effects that may be monitoried by EDX are those related to the use of intravenous immunoglobulin (IVIG) for acquired demyelinating polyneuropathies. Medications used to treat a variety of diseases, including cancer, heart disease, hypertension, infections, autoimmune disease, depression and seizures can all cause DSP. In these situations, EDX testing can determine the presence and severity of the problem, and can be crucial in deciding whether treatment should be continued. For example, taxanes are frequently used in the treatment of a variety of cancers, including breast cancer.[23] NCS are abnormal in 67% of patients on taxanes with symptoms of neuropathy, and the results help to guide choices about further treatment. Lithium can be crucial in treating mood disorders including bipolar disorder, but frequently causes peripheral neuropathy.[24] Abnormal EDX studies may signal a need for a change in therapy.

5. **Evaluating Toxic Exposures**

A wide variety of industrial and environmental chemicals, as well as substance misuse can cause peripheral neuropathy. EDX testing, combined with appropriate blood tests, can provide information on the presence, type, and severity of the pathology. For example, evidence of DSP in a patient with a specific occupational toxic exposure can indicate a possible cause and the need for further testing.

Cost

Cost and patient comfort are important considerations in deciding whether to perform EDX for patients with suspected DSP. The cost-effectiveness of EDX is often substantiated through the loss mitigation and benefits that accrue with the clarification of diagnoses, including information on disease severity, duration, risk of complications, and evaluation of treatment response. This is not a high price for a test that frequently changes diagnoses and provides information on severity, duration, assesses risk of complications, and evaluates the effect of treatments.

Guidelines

When should EDX testing be performed on patients with suspected DSP? What suggests it is likely to be low yield? EDX testing should be seriously considered when any of the following criteria are met:

1. The patient's history, physical and standard neuropathy blood tests (diabetes, vitamin B12 deficiency and monoclonal gammopathy testing) do not indicate a likely etiology.
2. Symptoms and/or physical findings are moderate to severe.
3. An atypical presentation, such as predominantly motor symptoms or findings, proximal deficits, or asymmetry.
4. Rapid progression of symptoms or signs.
5. Presence of symptoms or signs indicating another disorder, such as lumbar radiculopathy.

6. Unknown duration or severity of the underlying cause.
7. Family history suggesting hereditary neuropathy.
8. Exposure to substances known to cause neuropathy, including medications.
9. Discrepancy between symptoms and signs.

EDX testing is likely to be of low yield when:

1. Symptoms and physical findings are mild;
2. Findings are symmetric, distal, predominantly sensory;
3. There is a known cause (e.g.: diabetes mellitus); and
4. There is little suspicion of a coexisting nerve disorder.

Summary

DSP is one of the most common reasons for referral to EDX laboratories, and has a wide variety of causes. While EDX testing is important for the diagnosis and management of many DSP patients, it is not needed in all cases. EDX is an extension of the clinical exam, and decisions about testing must be individualized. The most important information in deciding whether or not to recommend or perform EDX testing is a thorough clinical history and physical examination.

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