



Electrodiagnostic Findings in 108 Consecutive Patients Referred to a Post-Polio Clinic

The Value of Routine Electrodiagnostic Studies

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Many patients with a history of polio develop new symptoms including weakness, pain, fatigue, and changes in function, or post-polio syndrome (PPS).^[1] Before a diagnosis of PPS is made, other diagnoses must first be ruled out. Assessment must be done in a comprehensive and coordinated manner.^[2] Therefore, as part of our routine evaluation, we do an electromyogram/nerve conduction study (EMG/NCS) on every patient. During examinations on our clinic patients we began to notice (1) electrodiagnostic evidence of polio in limbs not previously felt to be involved; (2) a normal EMG, or evidence of another disease; and (3) EMG evidence consistent with additional neurological lesions, including compression neuropathies, peripheral neuropathies, and radiculopathies. A prospective study using a routine, standardized four-extremity electrodiagnostic protocol was done to quantify the frequency of these occurrences.

METHODS

We studied 108 consecutive patients referred to our post-polio clinic. We performed a comprehensive history and physical examination, and then did an EMG/NCS on all patients, using bilateral median and ulnar sensory nerve conduction studies; four-extremity needle EMG of three muscles on each extremity; appropriate paraspinal and additional limb muscles; and other appropriate nerve conduction studies.

RESULTS

Of the 108 patients, we found only 100 actually had had polio (92%). Of these, 49 patients had subclinical polio. The frequency and distribution with which it occurred is demonstrated in [TABLE 1](#). [TABLE 2](#) summarizes the additional abnormal neurological findings. Forty-nine percent of the patients had an abnormal peripheral nerve study. Carpal tunnel syndrome (CTS), either alone or in conjunction with an ulnar nerve neuropathy, was the most frequent finding, in a total of 38% of all patients.

TABLE 1. Frequency of Subclinical Polio in 100 Consecutive Post-Polio Patients

Number of Limbs involved per Patient	Patients (N)	Total Number of Limbs
1	23	23
2	20	40
3	4	12
4	2	8
Total	49	83

TABLE 2. Additional Electrodiagnostic Findings in 100 Consecutive Post-Polio Patients

Finding	Patients (N)	Percent
Carpal tunnel syndrome (CTS)	35	35
Ulnar neuropathy at the wrist	2	2
CTS and ulnar neuropathy	3	3
Peripheral neuropathy	3	3
Brachial plexopathy	1	1
Tibial neuropathy	1	1
Radiculopathy	4	4
Total	49	49

DISCUSSION

Bromberg and Waring performed electrodiagnostic studies in a group of patients seen in their clinic, and found that 9% had normal EMGs, or borderline normal EMGs.^[3] Other authors have found EMG evidence of old anterior horn cell disease in extremities thought to be uninvolved.^[4-6] The reason for this high prevalence of subclinical polio is related to the ability of the neuromuscular system to function and reinnervate even when many anterior horn cells are lost. The long-term effect of this, however, is that progressive and unexpected weakness may develop in those "nonaffected" extremities. Additional electrodiagnostic findings including CTS and ulnar nerve neuropathy have been reported to be prevalent in post-polio patients.^[7,8] Werner et al.^[7] demonstrated that assistive device use is a major risk factor, and we also found that duration of use and severity of polio were additional considerations.^[8]

CONCLUSION

Our findings strongly support the value of a standardized four-extremity EMG/NCS as an adjuvant to a comprehensive history and physical examination. It helps to differentiate between old polio and other neurological diagnoses. There is a high prevalence of subclinical polio, which is important to know about in order to give proper recommendations regarding rest and activity. Given the frequency of risk factors for development of potentially treatable neurological lesions like CTS, early detection is valuable. We believe routine electrodiagnostic testing is essential for proper evaluation and management of the post-polio patient.

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Antibiotic-associated diarrhea (AAD) results from a microbial imbalance that leads to a decrease in the endogenous flora that is usually responsible for colonization resistance and to a decrease in the fermentation capacity of the colon. *Clostridium difficile* and *Klebsiella oxytoca* contribute to the occurrence of AAD in some cases and play a role in the pathogenesis of colonic lesions. Several attempts have been made to determine whether the administration of probiotics would prevent antibiotic-associated. Several reports related to patients experiencing a recurrence of *C. difficile* infections. This serious clinical problem occurred in ~20% of the subjects treated for a first episode of infection with this microorganism and in > 40% of subjects who experienced several episodes. A total of 50 patients referred to a tertiary referral EMG laboratory for testing of predominantly unilateral leg symptoms (weakness, sensory complaints, and/or pain) were included in the investigation; 25 normal "control" subjects were later recruited to calculate the specificity of the automated protocol. The American Association of Neuromuscular & Electrodiagnostic Medicine (AANEM) states that nerve conduction studies performed independent of needle EMG may only provide a portion of the information needed to diagnose muscle, nerve root and most nerve disorders. When NCS is used on its own without integrating needle EMG findings or when an individual relies solely on a review of NCS data, the results can be misleading and important diagnoses may be missed. Patients referred to Uppsala University Hospital because of clinical and radiologic symptoms of NPH were evaluated prospectively before surgery and at follow-up 12 months postoperatively by a multidisciplinary team specialized in hydrocephalus. A neurologist performed a clinical and neurologic evaluation, including a medical history covering intracranial hemorrhage, meningitis, or trauma or other causes of secondary hydrocephalus. All patients were assessed according to a prospective, standardized protocol developed to follow symptoms with time and to measure the outcome after shunt surgery. Post-polio syndrome is a clinical diagnosis, supported by electrophysiological findings and possible mimics need to be reassuringly ruled out. An extensive work-up including laboratory tests, imaging studies, cerebrospinal fluid sampling, detailed electrophysiological evaluation, and muscle biopsies may be required to exclude alternative diagnoses. Electrophysiological findings in patients with post-polio syndrome. *Electromyogr Clin Neurophysiol.* (1990) 30:451-8. Post-polio syndrome (PPS) is a condition that affects polio survivors years after recovery from an initial acute attack of the poliomyelitis virus. Post-polio syndrome is mainly characterized by new weakening in muscles that were previously affected by the polio infection and in muscles that seemingly were unaffected. Researchers who discovered inflammation around motor neurons or muscles are trying to find out if this is due to an immunological response. Other investigators have discovered that fragments of the poliovirus, or mutated versions of it, are in the spinal fluid of some survivors. The significance of this finding is not known and more research is being done.