ELECTROMYOGRAPHY AND NERVE CONDUCTION TESTING:

WHEN TO ORDER;
HOW TO INTERPRET

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EMG/NCS Testing is a component of a complete neurodiagnostic consultation including history and a focused neurological examination.
Performing EMG and nerve conduction testing requires five simultaneous activities:

- Machine Operation
- Data Acquisition
- Data scoring for internal consistency and clinical context
Interaction with patient to obtain relaxation and cooperation

Development of differential diagnoses and adjustment of testing in response to emerging data
EMG and nerve conduction testing is dynamic, like an arteriogram, without a predetermined protocol.

Emerging findings determine the direction the examination will take.
EMG and nerve conduction testing is not uniformly respected in the medical community because the quality of data and interpretation is extremely operator dependent.
The minimum qualifications for performing EMG/NCS testing are extremely low.

A physical therapist or technician with a few weeks’ experience and little knowledge of anatomy or physiology can gather and report data.
For this reason, approximately 40% of the EMG/NCS testing I perform is to provide a second neurodiagnostic opinion.

Second opinion EMG/NCS testing is a particularly viable alternative in view of the over 60% decrease in reimbursement on January 1, 2013.
When to Order EMG/Nerve Conduction Testing:

To determine the location and severity of entrapment neuropathy

To localize the source of sensory symptoms
To identify denervation associated with radicular symptoms reflecting the location and age of the lesion

To detect evidence of reinnervation, which precedes an increase in strength
To evaluate persistent symptomatology following surgical release procedures

To distinguish weakness related to a peripheral nerve or nerve root versus non-organic or the central nervous system
Sources of Erroneous Nerve Conduction Interpretation:

A cold, unwarmed extremity slows nerve conduction.

An estimated or inaccurate limb measurement renders an incorrect nerve conduction velocity.
An unidentified polyneuropathy slows nerve conduction and diminishes action potential amplitude.

Patient obesity, perspiration, and body lotions degrade recording of potentials.
Patient lack of tolerance for electrical stimulation limits replication of pivotal sensory and motor action potentials.

Radiculopathies appear more significant distally, potentially obscuring diagnosis.
Needle examination of cervical or lumbar paraspinous musculature is normal in more than 99% of cases.

Distal denervation as a result of polyneuropathy may be erroneously diagnosed as bilateral radiculopathy.
Approaches to Increase EMG/NCS Sensitivity and Specificity:

Accurate diagnosis requires examiner training, experience, and motivation as well as quality instrumentation.
“Special carpal tunnel studies” involving comparison of median sensory and motor nerves to the patient’s own ulnar and radial nerves corrects for diminished limb temperature, polyneuropathy, and other patient-specific sources of error.
Testing radial sensory and motor nerves, which are rarely entrapped, provides early indication of polyneuropathy which will otherwise contribute to erroneous diagnosis.

Bilateral comparison of the arms and particularly the legs increases diagnostic accuracy.
In general, the more complete the EMG and NCS battery of testing is, the more certain the diagnoses will be.
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