WALBRIDGE PHYSICAL MEDICINE AND REHABILITATION, P.C.

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April 27, 2009

Dr. Michael Jones
111 Main Street
Philadelphia,

Patient Name: Joseph Smith
Date of Birth: 01/11/50
SS Number: 111-11-1111
Date of Evaluation: 04/25/2009

Dear Dr. Smith:
At your request, the above named underwent a Nerve Conduction Study. These were performed on the patient's upper extremities secondary to complaints of numbness in hands.

Nerve Conduction Study:
Nerve conduction studies were performed on the patient's bilateral upper extremities and there was increased distal latency of the median motor nerves bilaterally. No response to the stimulation of the median sensory nerves. Significant differences were noted when comparing the interossei to the lumbricals motor study bilaterally. There was no response to the median nerve to the fourth finger or the median sensory nerve to the thumb. Significant differences were noted when comparing the median to the ulnar motor nerves bilaterally. Median F-Wave was inconclusive.

Conclusion:
Based on the information provided by the technician who performed this study, and the history provided by the examinee, my conclusion is: **Abnormal study consistent with severe carpal tunnel syndrome.**
Recommendations:

1. **Clinical correlation.**
2. **Consider orthopedic referral.**
3. **Followup study if symptoms persist.**

BRIEF PATIENT HISTORY

Age: 56 Height: 5 feet 9 inches Weight: 158
The examinee stated that the symptoms began six month ago.

Past medical history: Diabetes.
Past surgical history: Status post hernia repair.
Medications: Glucophage.
Allergies: NKDA.
Occupation: Maintenance mechanic.
Social History: Tobacco: No; Alcohol: Does not drink; Chemical exposure: No.

MEDICAL NECESSITY

This patient has been referred for an Electrodiagnostic Study, which consists of Nerve Conduction Study. Pain, which has its origin in muscles, bones and internal organs, is treated differently than pain, which has a radicular origin. Electrodiagnostic testing is the examination of choice when the differential diagnosis includes; radiculopathy, plexopathy, peripheral nerve entrapment, axonotmesis or neuronotmesis. Failure to diagnose may lead to erroneous, unnecessary treatment, extended care or delayed referral.

An Upper Extremity Electrodiagnostic Study was performed, which consists of Nerve Conduction Study.

EXPLANATION OF STUDIES

Nerve conduction studies were performed on the patient's bilateral upper extremities.

Median Sensory Nerve:

The index finger was stimulated antidromically at 14 centimeters using ring electrodes. This nerve is involved in the carpal tunnel. Its evaluation is useful in diagnosing Carpal Tunnel as well as other entrapments and neuropathies.

Ulnar Sensory Nerve:

The fifth finger was stimulated antidromically at 14 centimeters using ring electrodes. This nerve is not involved in the carpal tunnel, but traverses Guyon's Canal. The distal latency of this nerve is compared to the median nerve and the normal parameters are well documented. "Felsenthal G; Median and Ulnar Distal Motor and Sensory Latencies in The Same Normal Subject. Arch Phys Med Rehabil 1977;58:297-302". Its evaluation is useful in diagnosing entrapments and neuropathies.

Median and Ulnar Sensory Nerves to the fourth finger:

Since both of these nerves innervate the fourth finger, their study is useful in the diagnosis of Carpal Tunnel Syndrome. This study is done antidromically at 14 centimeters using ring electrodes. The distal latencies of these nerves are compared and

the normal values are well documented. Felsenthal G; Carpal Tunnel Syndrome Diagnosis. Arch Phys Med Rehabil 1979;60:90."

Median and Radial Sensory Nerves to the Thumb:

Since both of these nerves innervate the thumb, their study is useful in the diagnosis of Carpal Tunnel Syndrome. This study is done antidromically at 10 centimeters using ring electrodes. The distal latencies of these nerves are compared and the normal values are well documented. "Johnson EW, Sipski M, Lammertse T, Median and Radial Sensory Latencies to Digit One: Normal Values and Usefulness in Carpal Tunnel Syndrome. Arch Phys Med Rehab 1987;68;140-141."

Median Sensory Nerve Inching Technique:

This study is used as way to isolate compression of the median nerve as it traverses the carpal tunnel. Ring electrodes are placed on the third finger, and the nerve is stimulated at 1 centimeter intervals. This is an antidromic study.

Mayo Technique, a Mixed Motor / Sensory Study:

This test is performed over the median and ulnar Nerves in the palm using a 3 centimeter bar electrode and recorded over the median and ulnar nerves 14 centimeters proximally. This study is valuable in diagnosing Carpal Tunnel Syndrome. This is an orthodromic study.

Median Motor Study:

This study was performed by placing a 3 centimeter bar electrode over the Abductor Policis Brevis and stimulating at a distance of 8 centimeters proximally and at the elbow. This is an orthodromic study. This study not only gives us the speed of conduction across the carpal tunnel, but the conduction velocity of a long distal segment of the median nerve. Its evaluation is useful in diagnosing Carpal Tunnel and other entrapments as well as neuropathies.

Ulnar Motor Study:

This study was performed by placing a 3 centimeter bar electrode over the Abductor Digiti Quinti and stimulating at a distance of 8 centimeters proximally and at the elbow. This is an orthodromic study. This study not only gives us the speed of conduction across Guyon's Canal, and the conduction velocity of a long distal segment of the ulnar nerve. This nerve usually stimulated above and below the elbow. Its evaluation is useful in diagnosing Carpal Tunnel, by comparing it to the median nerve, as well as diagnosing other entrapments and neuropathies.

Median and Ulnar Motor Nerves to the1st Lumbrical and 2nd DI:

This study is used to evaluate the patient for Carpal Tunnel Syndrome, since the median nerve goes through the carpal tunnel and the ulnar nerve does not This study is done at 8 centimeters proximally using a 3 centimeter bar electrode and is an orthodromic study. The distal latencies of these nerves are compared and the normal values are well

documented. Preston DC, Logigian EL; Lumbrical and Interossei Recordings in Carpal Tunnel Syndrome. Muscle & Nerve 1992; 15: 1253-1257."

Median-Ulnar Mixed Sensory/Motor Palm to the Wrist Study:

Both the median and ulnar nerves in the Mid-palm region are stimulated while the response is recorded 8 centimeters proximally over the main trunk of the median and ulnar nerves. This technique is very sensitive in localizing a lesion to the primarily involved segment, for which normal parameters are well documented. ie: "Jackson DA, Clifford JC: Electrodiagnosis of Mild Carpal Tunnel Syndrome. Arch Phys Med Rehabil 1989;70(3): 199-204"

Mid-Palmar Antidromic Median Sensory to the 3rd Digit:

The sensory fibers of the 3rd digit are often injured before others due to the inherent increased susceptibility of their superficial location in the carpal tunnel with respect to other fibers. The latency obtained by stimulating the median nerve 7 centimeters proximal to the active recording electrode on the 3rd digit is compared to the latency obtained when stimulating 14 centimeters proximal to the active recording electrode. The time across the carpal tunnel should always be less than the time for the distal segment because of the larger diameter of the more proximal nerve fibers, thus this technique allows the practitioner to isolate the potentially injured segment. Normal parameters are well documented ie "Kimura J: A Method for Determining Median Nerve Conduction Velocity Across the Carpal Tunnel. J Neurol Sci 1978;38:1-10

F-Wave, a late response:

The F-Waves were evaluated for both the median and ulnar nerves. Recordings are made over the abductor policis brevis for the median nerve, and the abductor digiti quinti for the ulnar nerve. This study is done by placing a 3 centimeter bar on the muscles named above, and stimulated 8 centimeters proximally. Because the F-Wave evaluates the conduction velocity of the more proximal segments, they supplement the routine motor and sensory nerve conduction studies. This study is preformed antidromically.

Other Nerve Studies:

Other nerves studies including the ulnar dorsal cutaneous nerve, a sensory study, the radial nerve, both motor and sensory as well as others are used in the evaluation of other conditions including entrapment syndromes motor and sensory neuropathies to name just a few. These tests are delineated on the attached nerve conduction form.

The nerves described above are the ones most commonly studied. The nerve conduction report that is attached accurately describes the exact nerves, which were studies on this patient today.

Side to Side Comparisons:

Side to side comparisons of the sensory and motor responses are performed in order to achieve the sensitivity required to interpret a study as positive in the presence of

pathology as well as to correct for the statistical variability that occurs from one patient to the next. This is well documented ie: "Robinson LR, Temkin NR, Fujimoto WY, Stolov W: Effect of Statistical Methodology on Normal Limits in Nerve Conduction Studies. Muscle & Nerve 1991: 14:1084-1090"

Temperature Consideration:

The skin temperature was measured, and the values for extremities where the temperature was below 30 degrees centigrade were adjusted.

Age Consideration:

Above 60 years of age, patients have slower conduction and lower amplitude responses, and this is most evident in the sensory studies. The values for pediatric studies are significantly different. If this is a pediatric study, an addendum is attached.

Thank you for allowing me to participate in the care of this patient. If you should require any additional information, please do not hesitate to contact me.

Sincerely

Eric M. Lipnack, D.O.
Diplomate: American Board of Physical Medicine and Rehabilitation
Diplomate: American Academy of Pain Management
Fellow, American Academy of Disability Evaluating Physicians

Dictated but not read
Signed in Doctor's absence to avoid delay

EML/vid/MS

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