

SPONTANEOUS
ELECTRICAL
ACTIVITY



CHRONIC MUSCLE SPASM

LIMITATIONS OF EMG AND NERVE CONDUCTION STUDIES IN CLINICAL PRACTICE

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INTRODUCTION: Chronic pain and weakness are significant factors in the onset of disability. Complete needle EMG and NCSs are often required to identify the state of nerve function as it may relate the presenting symptoms. However, recent studies have shown that acquired chronic muscle spasm, identified with simple needle EMG sampling with the presence of spontaneous electrical activity (SEA), is a common causes of both chronic pain and weakness. Current reporting techniques will typically indicate the presence or absence of SEA without indication of its functional significance.

OBJECTIVE: To expand current reporting techniques for needle EMG and NCSs to include precise location by muscle group of the presence and intensity of SEA.

METHODS: A severity scale of SEA and parameters for reporting is proposed. Several levels of activity are to be discriminated and given point values for any muscle showing or adjacent to muscles demonstrating SEA. Increased insertional activity is included as it has been seen in spasms of intermediate duration. The proposed levels include: (1) No SEA or increased insertional activity, (2) Increased insertional activity whether or not it recurs on repeat insertion, (3) low level SEA, (4) moderate SEA, and (5) high level SEA. Requirements for measurement of SEA require that reciprocal inhibition by contralateral muscle groups cannot be demonstrated and that the muscle should be in a natural state of relaxation based upon body habitus.

RESULTS: Outcome data and correlation with pathophysiology can then be determined.

SUMMARY/CONCLUSION: Proposed addition of SEA reporting should allow for improved assessment of presenting symptoms of chronic pain and weakness.

Post Laminectomy Syndrome
What EMG and Nerve Conduction Studies Miss

20-40% of patients suffer from what is known as "Post Laminectomy Syndrome" following back surgery. Multiple potential causes have been entertained. Post operative MRI scans demonstrated in those patients full relief of the spinal compression of the nerve root. Yet symptoms persist well beyond six months and in many cases never resolve. Recovery of nerves after long periods of compression has been known to take months and this is a likely explanation in cases where the symptoms gradually dissipate following surgery. However, in the majority of cases of Post Laminectomy Syndrome, the radiculopathy symptoms that brought the patient to surgery do not resolve.

When persistent radiculopathy is present, it is expected that abnormalities in the EMG findings and Nerve Conduction Studies will be found. However, little to no attention is paid to the para-spinal and structural muscles of the back as to the functional state of the muscles. Clinical experience with the CMECD® has shown that in cases of Post Laminectomy Syndrome, there is nearly uniformly evidence of chronic muscle spasm of these muscles at the level of the prior laminectomy. Additionally, these muscles treated with the CMECD® procedure gave sustained relief in most cases of the radiculopathy. Not only was pain relieved but sensation returned and often fully normalized.

Taking the clinical experience into account, it may be reasonably assumed that the para-vertebral and structural muscles had a role in nerve root compression that was relieved with relaxation of those muscles. Since current protocols do not include evaluation of those muscles and there had not been, up to this point, a rating scale as to the severity of the muscle spasm, the diagnosis of causes of pain was not achieved.

A single case of post laminectomy syndrome was followed closely starting within the first month after surgery and profound chronic muscle spasm was identified. The muscles identified had been cut during the surgical procedure and were in a slow healing process for well over 6 months. The CMECD® procedure was utilized but did not have the normal duration of action, typically 2-3 months, but lasted only several weeks. It was hypothesized that since the mechanism of action is to block the muscle neuromuscular receptors in a covalent fashion, new receptors were being generated in the process of muscle repair limiting the effectiveness of the phenoxybenzamine.

Simply put, the EMG and Nerve Conduction studies were capable of identifying continued dysfunction of nerves but could not identify the cause. Only taking into account the severity of muscles would it be possible to identify the cause and the degree of muscle dysfunction. This abstract presents a rating scale for the severity of muscle dysfunction based upon the severity of the Spontaneous Electrical Activity that has been previously demonstrated to correlate with the severity of muscle spasm.

Post Laminectomy Syndrome presents a simple model for understanding the role of chronic muscle spasm as it relates to symptoms for which EMG and Nerve Conduction Studies are prescribed. However, numerous other sites of pain and neural dysfunction have also been found to be caused by chronic muscle spasm. Piriformis syndrome is the most notable example but other sites such as when spasm of the extensor digitorum lungus puts pressure on the deep peroneal nerve that can cause weakness in dorsiflexion of the foot.

Many other sites of referred pain are actually pain at a distance from the muscle in chronic spasm. Tennis elbow is commonly caused by chronic spasm of upper or lower arm muscles that lead to tendonitis with the pain identified at the elbow. While not a common pain that required an EMG and Nerve Conduction Study, many other sites of pain are pain at a distance, the source of which can be identified by EMG identification of muscles in chronic spasm and then successfully treated by the CMECD® procedure.

In short, EMG and Nerve Conduction studies that do not take into account the presence of chronic muscle spasm as the possible primry or secondary cause of the presenting symptoms, do not represent complete studies.

Piriformis Syndrome A Muscular Cause Of Radiculopathy



