PRIOR SUPPORTING STUDIES

NEEDLE ELECTROMYOGRAPHIC IDENTIFICATION OF CHRONIC MUSCLE SPASM

Introduction: Multiple treatments for muscle spasm are utilized without regard to the physiology of the muscle. No systematic differentiation exists to distinguish between temporary and chronic muscle spasm. Muscles in chronic spasm can persist for decades and require specialized treatment.

Methods: Patient selection required a pain syndrome of greater than one month. Physical examination of reported sites of muscular pain were evaluated by compression to identify sites of non-compressibility and discomfort. EMG evaluation consisted in identification of Spontaneous Electrical Activity (SEA) also know as "End Plate Noise". Treatment of only those sites with significant SEA was performed with onabotulinumtoxinA or phenoxybenzamine/lidocaine until no residual SEA was present.

Results: More than 100 patients were evaluated and treated. Selective chemodenervation based upon EMG identified SEA activity resulted in long term relief regardless of the duration of the prior pain syndrome with a single treatment. Muscle spasms that did not exhibit SEA were treated with conventional therapies with reported good outcomes.

Conclusion: SEA represents the EMG physiologic identifier and likely etiology of chronic muscle spasm.

Clinical Relevance: EMG of muscle in apparent spasm provides the ability to differentiate and treat selectively muscle that will return to normal function with conventional treatment and muscle that is in a state of chronic spasm requiring selective interventions.

EMG GUIDED CHEMODENERVATION TREATMENT OF SCIATICA

Introduction: Sciatica represents a clinical syndrome for which current treatments have been of limited benefit. Utilization of EMG guided chemodenervation was explored in an attempt to achieve better and more consistent outcomes.

Objectives: To develop a successful methodology for treatment of sciatica not caused by disc protrusion or spinal stenosis.

Methods: Chemodenervation agents including Botox and phenoxybenzamine were utilized in clinical practice for patients presenting with sciatica. EMG identification of spontaneous electrical activity (SEA) was sought in resting muscles including erector spinae and psoas muscles with injection of chemodenervation agents to suppress the SEA in the lumbar-sacral region. Initially Botox was used but lack of insurance coverage led to seeking a less expensive agent. Currently, 0.5% phenoxybenzamine combined with 2% Lidocaine is used and generally requires 10cc injected under EMG guidance in 1/4 cc aliquots to multiple adjacent sites until all SEA is abolished.

Results: Over the last year, approximately 20 patients presented with chronic sciatica and were treated with EMG guided chemodenervation. In patients with ongoing disc issues treatment often improved but did not resolve sciatica. In non disc patients with SEA, treatment resolved sciatica in nearly all patients. Piriformis injections were needed in the remaining few patients. Rare recurrences after several months occurred only in patients who did not adjust their activity to prevent repeat overuse injury.

Conclusion: EMG guided chemodenervation of SEA in the erector spinae and psoas muscles using phenoxybenzamine/Lidocaine resulted in a high degree of success with long term relief of sciatica in selected patients.

NOVEL INJECTION TECHNIQUE FOR CHEMODENERVATION OF SYMPTOMATIC CHRONIC MUSCLE SPASM

Introduction: Treatment of chronic muscle spasm with trigger point injections has typically sought to identify a focal trigger point for that muscle. Spontaneous Electrical Activity (SEA) often referred to as end plate noise has been found to be present at trigger points.

Objective: Develop an effective injection technique for symptomatic chronic muscle spasm using EMG guided chemodenervation agents.

Method: EMG guided interrogation was performed of symptomatic chronically spastic muscle. Chemodenervation was performed with dilute OnabotulinumtoxinA 100u/20ml or Phenoxybenzamine 0.25%/Lidocaine 1%. Injection only at the most active sites was found not to provide acute symptomatic relief. Patients were asked to perform movements that caused discomfort at various stages of the injection technique until symptomatic relief was obtained. Injection extending outward from the most active site until all adjacent muscle tissue demonstrating SEA was eliminated provided acute relief and was associated with prolonged relief. For relatively small segments of spastic muscle, redirection of the original needle puncture to cover 360 degree and at various depths and angles was adequate. However, additional skin punctures following the tract of the SEA were commonly required.

Results: Only complete resolution of SEA by EMG guided chemodenervation with various agents provided adequate acute and subsequent prolonged relief of symptomatic chronic muscle spasm.

Conclusion: Novel trigger point injection technique utilizing EMG guided chemodenervation was found to be superior to focal trigger point injection at the site of maximum SEA.

SAFETY OF PHENOXYBENZAMINE CHEMODENERVATION WITH REPEATED INJECTIONS

INTRODUCTION: Chemodenervation with botulinum toxin A is known to cause weakness and atrophy with repeated injections. Alternative medications with a similar duration of action without this side effect would clearly be preferable. Phenoxybenzamine has been shown to be a chemodenervation agent useful in the treatment of chronic muscle spasm. The issue of its safety with repeated use has not been reported. Several hundred patients have been treated without evidence of weakness or atrophy when 1 or 2 injections were delivered to a given muscular region. However, no reports of the outcome of multiple injections have been published.

OBJECTIVE: To document the outcome regarding weakness and atrophy of a single known case of multiple injections to establish parameters of safety for this medication

METHODS: A single patient following a two-level lumbar laminectomy developed severe post-laminectomy syndrome. An MRI at 3 months following surgery was interpreted as worse than pre-surgery. Needle EMG-guided chemodenervation was performed at approximately 2-week intervals with a total of greater than 10 injections for post-laminectomy syndrome to resolve.

RESULTS: A final MRI at 7 months post-surgery showed resolution of neural impingement and resolution of radiculopathy symptoms. No evidence of weakness of atrophy was observed on musculoskeletal physical examination.

SUMMARY/CONCLUSION: Initial results of multiple injections with phenoxybenzamine during needle EMG-guided chemodenervation suggest it may be safely used for repeated interventions. The known mechanism of action indicates this drug should not be toxic to muscle or nerve. Further investigation is needed to determine if the specific dose utilized played a significant role in this outcome.

DEBUNKING THE MYTH: DENERVATED MUSCLE IS THE SOLITARY CAUSE OF MUSCLE SPONTANEOUS ELECTRICAL ACTIVITY

INTRODUCTION: Treatment of chronic muscle spasm is confounded by the belief that spontaneous electrical activity (SEA) is only found in denervated muscle. SEA referred to herein is continuous chaotic electrical activity and without evidence of reciprocal inhibition, to be distinguished from the variety of presentations of transient increased insertional activity. Prior reports have shown that needle EMG evidence of SEA is present in acquired chronic muscle spasm which was successfully treated with needle EMG-guided chemodenervation utilizing phenoxybenzamine.

OBJECTIVE: To correct needle EMG misinterpretation of nerve function and muscle pathology. METHODS: We present a survey of clinical outcomes of 93 patients with SEA treated with needle EMG-guided chemodenervation.

RESULTS: A steady state of pain relief was achieved within 1 week of the injection procedure; 76% of patients reported having had years of prior pain, 50% of patients reported complete relief of pain. Regarding the impact on overall health, wellbeing, or ability to function, 55% of patients reported a major impact and 71.4% of patients reported pain relief that lasted over 3 months.

SUMMARY/CONCLUSION: Rapid resolution of pain and disability with a high degree of sustained pain relief is inconsistent with interpretation of SEA in these patients as the result of denervated muscle. Incorrect interpretation of muscle denervation as solitary cause of SEA needs to be abandoned. The clinical impact of this finding will promote further research and treatment of the pathological state of acquired chronic muscle spasm and resultant chronic pain.

SUCCESSFUL TREATMENT OF LONGSTANDING CHRONIC MUSCLE SPASM WITH EMG GUIDED CHEMODENERVATION

INTRODUCTION: Chronic muscle spasm represents a significant cause for chronic pain. Treatment of chronic pain with opioid medications has led to opioid addiction, and overdose deaths are currently recognized as a national crisis. Treatment modalities are needed to treat truly chronic pain when associated with chronic muscle spasm. Novel treatment modalities utilizing needle EMG-guided chemodenervation have been previously described. Preliminary assessment of the success of such treatments for longstanding chronic muscle spasm can be provided by patient surveys of such treatment.

OBJECTIVE: To identify success rates of needle EMG-guided chemodenervation with phenoxybenzamine in patients with pain duration of greater than 1 year.

METHODS: Ninety-three sequential patients treated with this technique were surveyed by mail. Forty-two responded.

RESULTS: Of the respondents, 31 (74%) reported years of pain duration Of those, 50% reported complete relief of pain (81% of which reported relief of pain for greater than 3 months) and 27.4% reported moderate relief of pain (44% of which reported pain relief for greater than 3 months). The average duration of pain when specified was 5 years and the longest was 15 years. A single treated patient, not in this survey, reported near complete pain relief and return of function after 35 years.

SUMMARY/CONCLUSION: Truly longstanding chronic muscle spasm and pain can be successfully treated in a significant portion of patients with stable outcomes utilizing the previously described technique of needle EMG-guided chemodenervation with phenoxybenzamine. In this unselected patient population with longstanding chronic pain, results support further clinical research to establish the utility of this treatment modality.