

## Health Sciences Research Day at University of Missouri, 2019

The 2019 Health Sciences Research Day was held on Thursday, November 21, 2019. Organized and sponsored by the MU School of Medicine Research Council, Health Sciences Research Day also partners with the MU School of Medicine, MU Sinclair School of Nursing and MU School of Health Professions. This is an annual event where medical students, residents and other learners present the research they have done under the direction of a faculty mentor.

Some of these projects resulted in published papers already (Govindarajan R et al. *RRNMF Neuromuscular Journal*, 1(2), 3-6; Mehta T et al. *RRNMF Neuromuscular Journal*, 1(1); Digala LP, *Clin Neurophysiol Pract.* 2020;5:35-37) and one is under consideration for publication and manuscript is being written.

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### Efficacy of botulinum toxin for treating cramp related pain in peripheral neuropathy

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Richard Sommer, Department of Neurology  
Raghav Govindarajan, MD, Department of Neurology

**INTRODUCTION:** Muscle cramps in peripheral neuropathy are the cause of constant distress and disability. Although several drugs have been used in its management, drug tolerability and inefficacy of these medications is a common concern. Botulinum toxin has been used to manage cramp induced pain in cases of diabetic neuropathy with significant improvement.

**METHODS:** This retrospective chart review included a total of ten patients with established diagnosis of polyneuropathy suffering from lower limb cramps. Comparison of pain score due to cramps before the administration, at 3-month,

6 month and 9 months follow up using the Wilcoxon test was done to assess the efficacy of botulinum toxin.

**RESULTS:** All patients enrolled in the study showed improvement of pain due to cramps assessed by visual pain analog scale with no adverse events. The improvement of pain score from before and at 3 months, 6 months and 9 months follow up was 1.6 ( $p < 0.05$ ), 2.7 ( $p < 0.05$ ) and 3.50 ( $p = 0.05$ ).

**CONCLUSION:** Local BTX-A infiltration is likely efficacious and safe procedure for improving pain associated with cramps in patients with peripheral neuropathy of various etiologies.

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### Botulinum toxin for the treatment of lower limb cramp pain in patients with ALS

Tejas Mehta, MBBS, Observer, Department of Neurology  
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Raghav Govindarajan, MD, Department of Neurology

**INTRODUCTION:** Muscle cramps and pain associated with them can be seen in patients with amyotrophic lateral sclerosis (ALS) and are known to reduce the quality of life. Pharmacological treatment may not benefit all patients in treating these cramps. We assess the efficacy of Onabotulinum toxin A (BTX-A) in the treatment of lower limb cramps in patients with ALS.

**METHODS:** This retrospective chart review included a total of ten patients with ALS who suffered from pain due to lower limb cramps and were managed with BTX-A. Data including patient demographics, visual analog pain scale at different intervals during follow up, ALS functional rating scale and site of onset of ALS symptoms were documented. The pain score at baseline (before administration), at 3 month and at 6 months follow up were compared using Wilcoxon test to assess BTX-A's efficacy.

**RESULTS:** A significant improvement in average pain score due to cramps from baseline to the 6-month interval with a change of  $3.1 \pm 0.7$  ( $p < 0.05$ , 95%CI) was seen on the pain scale. No adverse events were noted during or after administration of BTX-A.

CONCLUSION: Local BTX-A administration is an efficacious and safe procedure for improving pain associated with cramps in ALS.

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### Thickening Fraction as a Measure of Ultrasonographic Diaphragm Dysfunction in Amyotrophic Lateral Sclerosis

Presenter: Lakshmi P, Digala, Medical Graduate.

Lakshmi P. Digala, MBBS

Raghav Govindarajan, MD, Department of Neurology.

INTRODUCTION: Respiratory failure is the most common cause of death in ALS patients secondary to diaphragmatic dysfunction. In this case series of 3 ALS patients, we sought to determine the diaphragm dysfunction by measuring the diaphragm thickening fraction (DTf) and compared with the compound muscle action potential of diaphragm measured by phrenic nerve conduction studies.

METHODS: High-resolution linear US probe of 10 MHz (Philips Healthcare EPIQ 7 Ultrasound System Inc.) was used to measure the diaphragm thickness (DT) using B mode at the Zone of Apposition.

RESULTS: Diaphragm thickening fraction (DTf) is used to measure the extent of diaphragm dysfunction and as a predictive tool for extubation in patients on mechanical ventilation. In our patients, DTf (%) of <20% was predictive of diaphragm dysfunction as measured by the phrenic nerve conduction studies.

CONCLUSION: Critical illness polyneuropathy and myopathy are the cause of diaphragm dysfunction in mechanically ventilated patients. Similar mechanism of the secondary nerve (phrenic) and muscles (diaphragm) dysfunction due to death of anterior horn cell is seen in ALS patients. DTf (%) might serve as a useful surrogate marker to determine the diaphragm dysfunction even in the ALS patients.

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### Clinical Experience of Edaravone in Amyotrophic Lateral Sclerosis

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INTRODUCTION: Amyotrophic lateral sclerosis (ALS) is a devastating neurodegenerative disorder affecting upper and lower motor neurons, resulting in progressive paralysis and death in 3-5 years. In May 2017, edaravone became the second FDA-approved medication for ALS. The therapy regimen is strenuous, requiring intravenous infusion daily for 14 days, followed by a 14-day treatment break. This cycle is repeated indefinitely until the patient chooses to discontinue the medication or dies as a result of his or her neurodegenerative disease.

METHODS: The current study investigated characteristics in a group of patients (n=7) with ALS who began and subsequently discontinued edaravone, compared to a group of patients (n=24) who have continued edaravone treatment for the duration of their disease. In addition, the study evaluated ALSFRS-R scores and FEV1/FVC ratio at different intervals during treatment.

RESULTS: The average patient age was 62.1 years, with a distribution of 18 males to 13 females. 18 patients had limb onset, 12 bulbar onset, and 1 diaphragmatic onset. 7 of the 31 patients discontinued treatment. The average age of patients who discontinued edaravone was 65.7 years, of whom which 3 had limb onset, 3 bulbar onset, and 1 diaphragmatic onset. Port complications were documented for 71.4 percent of patients who discontinued therapy. The remaining patients who discontinued reported no perceived benefit. Within the discontinuation cohort, there was a greater decline in ALSFRS-R scores and FEV1/FVC, compared to the continuation group.

CONCLUSION: When considering edaravone treatment physicians should balance the therapeutic effect, experience of adverse events, and patient perspective of benefit.

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## Factors Influencing the Diagnosis of Chronic Inflammatory Demyelinating Polyneuropathy

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**INTRODUCTION:** Chronic Inflammatory Demyelinating Polyneuropathy (CIDP) is a neurological disorder that leads to demyelination of peripheral nerves where the presentation for this disorder varies patient to patient. CIDP symptoms include loss of sensation, loss of reflexes, tingling and pain, and weakness. Criteria has been developed by the European Federation Neurological Society (EFNS) for guidelines in the diagnosis of this disorder. The objective of this study was to look at the relationship between the EFNS diagnostic criteria and whether patients that have the diagnosis of CIDP meet this criteria.

**METHODS:** We first completed data collection on the patient's diagnosed with CIDP and then the patients that were diagnosed but did not meet the criteria were analyzed to see what common outliers exist for this misdiagnosis.

**RESULTS:** This study looked at the relationship between the EFNS diagnostic criteria and symptoms present in the patients diagnosed with CIDP. The diagnostic criteria for the classic form of CIDP consists of progression for at least 2 months, weakness more than sensory symptoms, hyporeflexia, increased CSF protein, and nerve conduction evidence of a demyelinating neuropathy. There is evidence that has shown the over-diagnosis of a third to half of patients diagnosed with CIDP.

**CONCLUSION:** CIDP is a neurological disorder that varies in presentation making it difficult for accurate diagnosis. Criteria has been developed by the EFNS for guidelines in the diagnosis of this disorder. Overall this study investigated the factors that are involved in the false positive diagnosis of CIDP. Our data indicates the symptoms that increase the rate of misdiagnosis.