Introduction

- Stroke is the third leading cause of disability with approximately 65% of all survivors experiencing ambulatory deficits to some degree. Implementation of effective interventions is critical to successful recovery of motor function.
- Literature review: existing research supports FES as an effective intervention for post-stroke rehabilitation.
- Gap in the literature: most studies are based on subjects less than 2 years post-CVA due to challenges in subject recruitment within the chronic post-stroke phase.
- Case Report Objective: describe the development and application of FES as an adjuvant to P.T. treatment by a practicing clinician for a patient presenting with foot drop two years post-stroke.

Patient History/Systems Review

- 78 y/o female s/p right hemorrhagic stroke and craniotomy.
- HPI: L UE and LE hemiparesis, L foot drop, and LLE extensor tone.
- Received PT in 2012, 2015, 2016, 2018, one treatment period/year, lasting a duration of six to nine weeks.
- Began using Bioness L300 System in 2012
- Concurrent medical tx: L Achilles tendon release, Botox-injection to reduce tone, and intermittent use of AFO.

Examination

- Selection criteria: s/p CVA (hemorrhagic or ischemic), development of foot drop second to CVA, and FES use to correct for foot drop
- Posture: increased trunk flexion, weight shift of the body to right, sacral sitting, mild cervical lordosis, forward head posture
- Strength: L ankle strength grossly 0/5 for DF, PF, eversion and inversion.
- Fall-risk: in 2012, patient unable to perform 30 second chair stand test or Timed-Up and Go.
- Balance: static standing balance via Romberg with feet apart for 30 seconds (eyes open) and 20 seconds (eyes closed)
- Gait: decreased L ankle DF during swing phase of gait

Clinical Impression

- Objective: stimulate left anterior tibialis, peroneus longus and brevis to permit ankle dorsiflexion and eversion.
- FES Parameters:
  - Symmetric biphasic waveform
  - Alternating current
  - Pulse width = 200 microseconds
  - Frequency = 30 hertz
  - Amplitude set to achieve a strong muscular contraction and increased to patient’s maximum level of tolerance.
- Modifications to FES Delivery: medial repositioning of the electrodes to achieve greater ankle eversion, increase in the amplitude to achieve greater ankle dorsiflexion, and adjustment of the amplitude when the patient indicated discomfort.
- Treatment Duration: six to nine weeks, 2x/week, 45 minutes per session.

Clinical Implications

- Successful patient outcomes with FES as therapeutic adjuvant.
- Produce outwardly immediate results for the appropriate patient population
- Confounding variables to consider: prior medical management and surgical intervention, the use of supportive bracing, and/or limited availability to attend treatment.
- Further research needed to:
  - Evaluate the influence of FES on neuroplasticity of the brain
  - Investigate the effect of FES on neuroplastic changes within the brain as it relates to motor function recovery to determine a carryover effect/long-term effects following removal of the device.

Outcomes following Application of Functional Electrical Stimulation as it Relates to Increased Functional Mobility in a Patient Post-Chronic Stroke: A Case Report

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References: See Handout with Reference List