

NEW YORK NEUROGENIC SLP, P.C.

NTRODUCTION

Multiple Sclerosis (MS) is a progressive disorder of the central nervous system resulting in demyelination of nerve fibers and axonal injury (Bjartmar & Trapp, 2001). It affects the white matter of the central nervous system and is characterized by progressive neurological deficits most often with a remitting/relapsing disease course (Sliwa & Cohen, 1998). The development of scattered lesions and/or plaques within the brain produces varying combinations of motor, sensory, and cognitive-communication impairment.

Dysphagia and MS

Dysphagia, or difficulty swallowing occurs in ~45% of MS patients (ASHA, 2008). Dysphagia may be a result of multiple contributing factors including: • Decreased neural drive to the swallowing musculature.

- Insufficient sensory feedback,
- Myofascial restrictions,
- Disruption of air-flow gradients,
- Anatomical changes to the swallowing musculature, and
- Muscle atrophy as a result of disuse.

Self–reported questionnaires concerning communication & swallowing difficulties associated with MS indicate that:

- 45% of respondents reported changes in speech and/or communication
- 33% of MS patients reported impairments of voice, chewing and swallowing capabilities (Beukelman, Kraft, & Freal, 1985; Hartelius & Svensson, 1994).
- Despite these overwhelming figures, only a small number of MS patients (2%) are appropriately referred for speech, language, voice and/or swallowing treatment (Hartelius & Svensson, 1994).

NMES

Neuromuscular Electrical Stimulation (NMES) is a non-invasive form of muscle rehabilitation. For nearly two decades, Physical Therapists have used NMES to treat patients with a wide range of diagnoses, including MS.

- In 2002, the FDA cleared the use of NMES for the treatment of dysphagia; introducing Speech-Language Pathologists to the modality of e-stim.
- When applied to the exterior neck, NMES can re-educate the pharyngeal muscles to initiate swallowing.
- With nearly 45% of MS patients developing dysphagia & the high incidence of aspiration pneumonia related deaths, utilizing NMES for the treatment of dysphagia may reduce MS mortality.

WHAT IS GUARDIAN® THERAPY?

Guardian® is a form of NMES swallowing therapy. It was designed to serve as an **adjunct** therapeutic modality. Guardian® should be applied while simultaneously providing patients with traditional/conventional swallowing exercises. When used as an adjunct to traditional swallowing therapy, Guardian® has been found to (1) Accelerate the recovery time from a restricted diet, (2) Improve swallowing skills, and (3) Help patients achieve sustained improvement and long term results.

THE ROLE OF NMES IN DYSPHAGIA (SWALLOWING) MANAGEMENT FOR **INDIVIDUALS WITH RR-MS**

1. The Graduate Center of the City University of New York; 2. New York Neurogenic Speech-Language Pathology, P.C.; 3. The Raymond Naftali Center for Rehabilitation, Inc.

How Does Guardian® Work?

A small, carefully calibrated electrical current is delivered to the motor nerves of the patient's throat through specially designed electrodes. The electrical current causes the muscles responsible for swallowing to contract.

• At the same time, a dysphagia specialist guides the patient through as series of active swallowing exercises to reeducate and strengthen swallowing function.

Overtime, Guardian® therapy can lead to the improved quality of muscle contractions thereby, improving swallowing function.

PURPOSE

To assess the impact of NMES in conjunction with traditional swallowing therapy in 8 individuals with oropharyngeal phase dysphagia and RR- MS.

PATIENT POPULATION: DEMOGRAPHICS

Total number of participants = 8 individuals Disease Type: RR-MS

Mean Age: 56 years old (women); 52 years old (men) Gender: 5 Females; 3 Males

Disease history: $\bar{x} = 17.3$ years (range 13-18 years) Ambulation Level: 4 ambulatory participants; 4 nonambulatory participants Location: New York City/Metropolitan Area

METHODS

Eight individuals with RR-MS with a MS history ranging from 13-18 years participated. All patients were referred for a swallowing evaluation by their neurologist due to risk for developing aspiration pneumonia & documented complaints for:

•"coughing/choking 4+ times/meal",

- "shortness of breath during mealtime",
- "fatigue when eating/drinking"; and, • "globus sensation".

These symptoms were chronically present. None of the participants were reported to experience a MS flair three months prior to treatment. All participants received a clinical swallowing evaluation prior to and at the end of treatment. Three participants also underwent a videofluoroscopic swallowing study pre- and post-treatment. All participants received 24 one-hour Guardian® NMES sessions in conjunction with traditional swallowing therapy over a 3-4 month period of time.



Marissa A. Barrera, MS, MPhil, MSCS, CCC-SLP_{1.2.3} Barbara O' Connor Wells, MA, MPhil, PhD, CCC-SLP_{1.2.3}





- Improvement from pre- to post-treatment was observed in oropharyngeal transit time ($\bar{x} = 18 \text{ sec vs } \bar{x} = 10 \text{ sec}$).
- Via palpation of the thyroid cartilage (i.e., Adam's apple), movement of the larynx (hyolaryngeal excursion) was noted to improve.
- 88% of participants reported "coughing/choking 2 times or less during a meal" compared to 100% of participants reporting "coughing/choking 4+ *times/meal"* at baseline.
- Interpretation of videofluoroscopic studies post-treatment revealed reduced saliva polling & improve base of tongue propulsion.
- Upon completion, all participants reported "less fear when eating" and none of the participants developed aspiration pneumonia despite their *"high risk"* status prior to participation.

- Increase in contractile proteins (i.e., proteins found in muscles that elicit a contraction).
- Increase in aerobic enzymes.
- Increase in muscle mitochondrial size and number.
- Increase in capillary density.

WHAT MAKES GUARDIAN® INNOVATIVE?

- Guardian NMES dysphagia therapy elicits brain plasticity which enables the recovery of swallowing function.
- It targets and stimulates CN and muscles that otherwise could not be treated with conventional swallowing treatment.
- NMES facilitates cortical reorganization by inducing repetitive swallows, producing sensory stimulation, providing kinesthetic (movement) feedback, and promoting functional/task-specific use patterns.



 Widespread implementation of NMES swallowing therapy could potentially reduce social stigma associated with dysphagia, costly modified diets & most importantly, reduce harmful and/or deadly respiratory infections.



RESULTS

EFFECT OF NMES ON MUSCLES

NMES + concurrent swallowing exercises has been shown to produce an:



CONCLUSION & DISCUSSION

• The present findings support the use of NMES for the treatment of swallowing difficulties due to RR-MS.

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