

A14 Neuromuscular Electrostimulation vs Traditional Therapy in the Stroke Patient with Oropharyngeal Dysphagia: Effects on Quality of Life - Randomized Study

Carla Gouveia¹, Pedro Sá-Couto², Maria Assunção Matos³

¹Tondela Viseu Hospital Center, Physical Medicine and Rehabilitation Service, Speech Therapy Sector, 3504-509 Viseu, Portugal.

²Center for Research and Development in Mathematics and Applications (CIDMA), Department of Mathematics (DMAT), University of Aveiro, 3810193 Aveiro, Portugal

³Center for Health Technology and Services Research (CINTESIS.UA), School of Health Sciences (ESSUA), University of Aveiro, 3810-193 Aveiro, Portugal.

Introduction

Oropharyngeal dysphagia (OD) is common after stroke. Its presence submits the patient to clinical instability, which can cause complications such as aspiration pneumonia, dehydration, malnutrition and death.[1,2] One of the most recent approaches suggested for the rehabilitation of OD, neuromuscular electrostimulation (NMES), is considered a non-invasive technique, applied through electrodes placed transcutaneous.[3,4] Several studies have shown that this approach can improve swallowing function in post-stroke patients. In Portugal, there is no evidence of studies on this subject. The objective is to compare effectiveness of traditional therapy (TT) with associated NMES versus traditional therapy in the rehabilitation of patients with OD after stroke and the effects on their quality of life (QOL).[5-7]

Methods

Twelve patients referred to the Rehabilitation Service, with suspected OD, were subjected to a screening of the OD through the Volume -Viscosity Swallow Test (V-VST), submitted to a video endoscopy of swallowing to confirm the diagnosis, filling in the Eating Assessment Tool (EAT-10) to assess the limitations caused by the OD in the patients social and emotional life and the Functional Oral Intake Scale (FOIS) to characterize the severity of the presented OD. The Lisbon Aphasia Assessment Battery (Bateria de Avaliação de Afasia de Lisboa - BAAL)[8] was applied to ensure good comprehension skills. The number of spontaneous swallows triggered in 10 minutes and the measurement of maximum tongue protrusion (cm) were also evaluated. This assessment was carried out by a Speech Therapist, blind to the intervention to be carried out afterwards. The patients were randomly divided, through coin flipping method, into two groups: Experimental group (EG; n=7) (patients received TT and application of NMES); Control group (CG; n=5) (patients only receiving TT). After 4 weeks of intervention, 3 sessions/ week, with about 30 minutes, results were compared.[9-12] FOIS was completed at the end of each intervention week and at the end of the 4 weeks of intervention, V-VST and EAT-10 were applied again.

The results are presented in Mean \pm Standard Deviation. The analysis of the association between two qualitative variables was performed using a contingency table and Fisher's exact statistical test was applied. To compare two groups, the t-test of independent samples was used, after calculating the difference between the end and the beginning of the treatment. The assumptions of normality were not always verified, but the results of the Mann-Whitney U test confirmed the t-test results. All the results were produced using IBM SPSS Statistics V25.0 (Armonk, NY), and considered significant if p value <0.05 .

Results

Twelve patients with OD after stroke, in acute phase, of both sexes participated in this study (see table 1 for further details). The difference of EAT-10 between the beginning and the end of the intervention for CG was -19.8 ± 3.7 and for EG was -22.9 ± 7.1 ($p=0.404$), suggesting that there was superior improving of QOL for EG. For the FOIS scale, the difference was of 1.6 ± 0.5 for the CG and 2.9 ± 1.9 ($p = 0.179$) for the EG, suggesting superior improvement in the FOIS scale for the EG (see figure 1). Concerning the weekly evolution of this scale, it was also observed faster recovery for the EG. Significant differences were also found in the means obtained in the number of spontaneous swallows and in the maximum protrusion of the tongue between the beginning and the end of the treatments: CG: 2.6 ± 0.5 ; EG: 4.0 ± 0.6 ($p = 0.002$) and CG: 2.0 ± 0.0 ; EG: 3.1 ± 0.4 ($p < 0.001$), respectively.

Keywords:
Dysphagia, Traditional Therapy,
Neuromuscular
Electrostimulation, Quality of Life

Corresponding author:
Carla Gouveia
cslgouveia@gmail.com

Conflict of interest:
The authors declare no conflict
of interests

First published: 22JUN2021



© 2020 The Authors. This is an open access article distributed under CC BY license, which license allows reusers to distribute, remix, adapt, and build upon the material in any medium or format, so long as attribution is given to the creator. The license allows for commercial use (<https://creativecommons.org/licenses/by/4.0/>).



Table 1 – Sample characterization.

	Total	Control Group (N=5)	Experimental group (N=7)	Statistical result
	N (%)	N (%)	N (%)	
Sex				
Female	5(41.7)	1(20.0)	4(80.0)	Fisher=1.656 p=0.293
Male	7(58.3)	4(57.1)	3(42.9)	
Education				
≤ 1st cycle	7(58.3)	4(57.1)	3(42.9)	Fisher=1.656 p=0.293
> 1st cycle	5(41.7)	1(20.0)	4(80.0)	
Time after stroke				
≤1 month	5(41.7)	1(20.0)	4(80.0)	Fisher=1.656 p=0.293
> 1 month	7(58.3)	4(57.1)	3(42.9)	
BAAL				
Normal	12(100)	5(41.7)	7(58.3)	n.a.
Altered	0(0)	0(0.0)	0(0.0)	
V-VST (at the start)				
Absent	0(0)	0(0.0)	0(0.0)	n.a.
Present	12(100)	5(41.7)	7(58.3)	
V-VST (at the end)				
Absent	12(100)	5(41.7)	7(58.3)	n.a.
Present	0(0)	0(0.0)	0(0.0)	
	M±SD	M±SD	M±SD	
Age	75.0±5.6	77.4±5.2	73.3±5.6	t(10)=1.3 p=0.226

Control group: Traditional Therapy; Experimental group: Traditional Therapy + NMES n.a.: Not applicable M=mean; SD=standard deviation; V-VST= Volume -Viscosity Swallow Test; BAAL= Lisbon Aphasia Assessment Battery *p≤0.05; **p≤0.01.

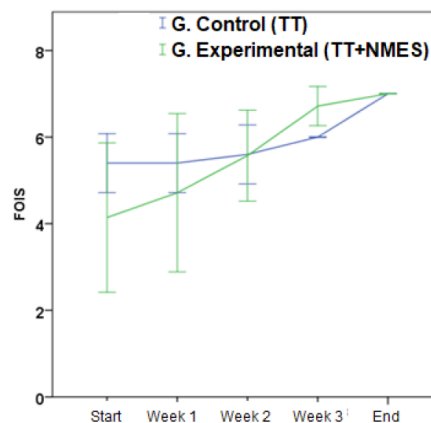


Figure 1 - Results of the FOIS scale assessed weekly between the beginning and the end of the intervention. The values shown are the average and the respective 95% confidence interval

Discussion

In the EG, there is a trend towards a faster recovery of OD, reaching the level 7 of the FOIS scale about a week before the CG. Regarding QOL, it was possible to observe that the patients of both groups, when recovering from DO improved their QOL and that the EG tends to present better results. The experimental group was able to substantially increase the number of spontaneous swallows, as well as the maximum protrusion of the tongue.

Ethics committee and informed consent

The current research was approved by the Ethics Committee for Health at the Hospital Center Tondela Viseu, an independent ethics committee, and subjects gave their informed consent before they were enrolled in the study.

References

- Speyer R, Cordier R, Kertscher B, Heijnen BJ. Psychometric properties of questionnaires on functional health status in oropharyngeal dysphagia: A systematic literature review. *Biomed Res Int.* 2014;2014. <https://doi.org/10.1155/2014/458678>
- Speyer R. Behavioral Treatment of Oropharyngeal Dysphagia. 2017. <https://doi.org/10.1007/174>
- (NICE) NI for H and CE. Transcutaneous neuromuscular electrical stimulation for oropharyngeal dysphagia in adults. 2020;(December 2018):1-5. www.nice.org.uk/guidance/ipg634.
- Ortega O, Rofes L, Martin A, Arreola V, López I, Clavé P. A Comparative Study Between Two Sensory Stimulation Strategies After Two Weeks Treatment on Older Patients with Oropharyngeal Dysphagia. *Dysphagia.* 2016;31(5):706-716. <https://doi.org/10.1007/s00455-016-9736-4>

5. Sproson L, Pownall S, Enderby P, Freeman J. Combined electrical stimulation and exercise for swallow rehabilitation post-stroke: a pilot randomized control trial. *Int J Lang Commun Disord*. 2018;53(2):405-417. <https://doi.org/10.1111/1460-6984.12359>
6. Speyer R. Oropharyngeal dysphagia: Screening and assessment. *Otolaryngol Clin North Am*. 2013;46(6):989-1008. <https://doi.org/10.1016/j.otc.2013.08.004>
7. Freitas NB, Finard SA, Olchik MR. A percepção da qualidade de vida de pacientes disfágicos neurogênicos pós-intervenção fonoaudiológica. 2013;41. <http://hdl.handle.net/10183/152829>
8. Castro, Caldas A, 1979;, Damásio A, 1973; Ferro J, 1986. BAAL Bateria de Avaliação de Afasias de Lisboa.
9. Sun SF, Hsu CW, Lin HS, et al. Combined neuromuscular electrical stimulation (NMES) with fiberoptic endoscopic evaluation of swallowing (FEES) and traditional swallowing rehabilitation in the treatment of stroke-related dysphagia. *Dysphagia*. 2013;28(4):557-566. <https://doi.org/10.1007/s00455-013-9466-9>
10. Soares TMC, Conceição TMA, Cardoso F, Beresford H. Avaliação da estimulação elétrica no tratamento da disfagia secundário Assessment of electrical stimulation in the treatment of the dysphagia. 2009.
11. Lee KW, Kim SB, Lee JH. The Effect of Early Neuromuscular Electrical Stimulation Therapy in Acute / Subacute Ischemic Stroke Patients With Dysphagia. 2014;38(2):153-159.
12. Lobo MB, De Luccia N, Nogueira AC, Silvério CC. O efeito da eletroestimulação neuromuscular na contração da musculatura supra-hióidea durante a deglutição de indivíduos com disfagia. *Rev CEFAC*. 2016;18(5):1179-1188. <https://doi.org/10.1590/1982-0216201618524715>