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The Effect of NMMS on The Recovery of Dysphagia in subacute stroke patients

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Objective

The purpose of this study was to compare the effects of neuromuscular magnetic stimulation (NMMS) and neuromuscular electrical stimulation (NMES) in subacute stroke patients with dysphagia.

Study design and method

We planned to prospectively enroll 20 subacute stroke patients with dysphagia who were admitted to our rehabilitation facility. Participants were randomly assigned to either the NMMS (Experimental group, EG) (n = 3) or the NMES (Control group, CG) (n = 1) so far. In EG, NMMS was applied to the suprahyoid muscles (Figure 1), at strength set at 90% of the minimal intensity that elicited pain. One train of stimuli comprised 30 Hz for 2 sec followed by 28-sec rest. A single session included delivery of repetitive 20 trains of stimuli over 10 min. In CG, NMES was delivered using a dual-channel, with pulse rate of 80 Hz and duration of 700 ms. The electrodes of channel 1 was attached to the submandibular area at the midpoint between the mandibular angle and chin, the channel 2 was attached to the midpoint between the chin and the edge of the hyoid bone. The amplitude of the electrical current was based upon subjects' verbal feedback. When a grabbing sensation was reported, the amplitude was kept at that level for the remainder of the 30 min session. All participants received 30 min conventional therapy, 5 days per week for 2 weeks. Outcome measurement was American Speech-language-Hearing Association National Outcome Measurement system Swallowing level scale (ASHA-NOMS), Functional Dysphagia Scale (FDS), Penetration-Aspiration Scale (PAS), Mylohyoid Motor Evoked Potential (MH-MEP), and the Korean Swallowing-Quality of Life Questionnaire (K-SWAL-QOL). The assessments were performed at the beginning (T0) and at the end of the treatment (T1).

Result

Four patients (EG = 3, CG = 1) were enrolled in this study, and the demographic and clinical characteristics are presented in Table 1. The intervention was completed by all participants without any adverse reactions. In all cases, NMMS and NMES induced improvements in ASHA-NOMS, PAS, FDS, and K-SWAL-QOL, but no visible changes were observed in MH-MEP (Table 2).

Conclusion

The NMMS seems to be safe and effective intervention modality for subacute stroke patients with dysphagia. Further larger studies are needed to confirm its efficacy.

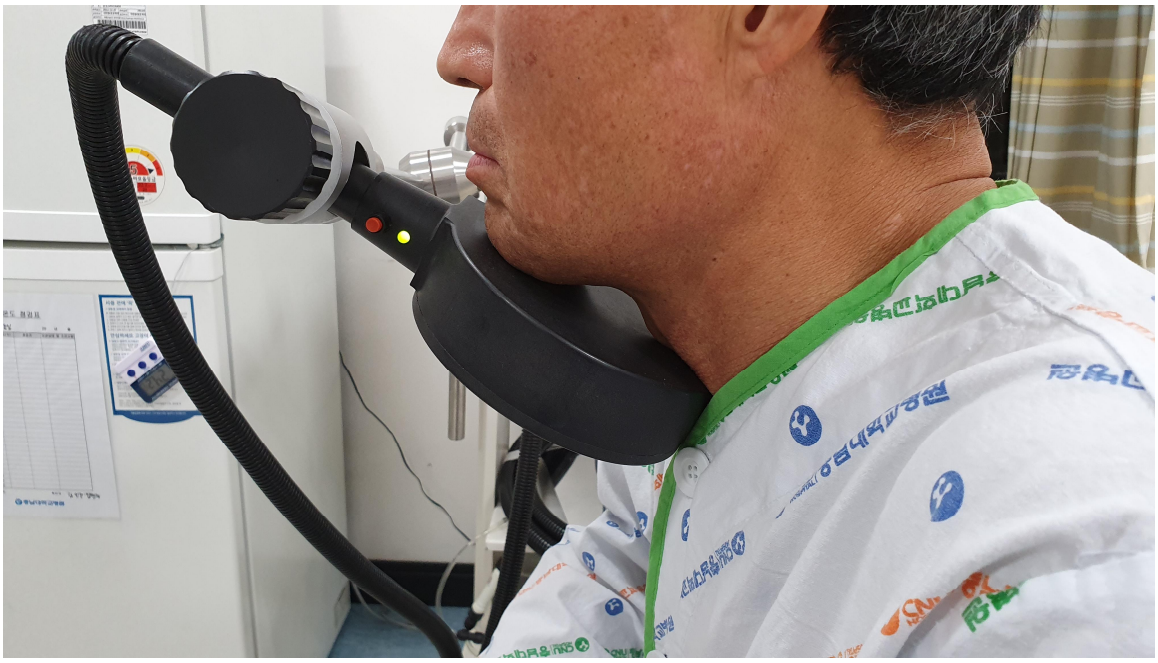

Figure. 1 Participant testing NMMS

Table 1. Demographics and clinical characteristics

Patient no.	Group	Sex	Age	Stroke type	Lesion site	Days from onset	NIHSS	MRS	FAC
1	EG	F	59	ICH	Both pons	40	13	4	0
2	EG	M	73	Infarction	Lt. Basal ganglia	38	4	4	2
3	EG	F	85	Infarction	Rt. MCA)	11	2	5	0
4	CG	M	82	Infarction	Rt. lat. medulla	12	1	4	1

NIHSS, national institutes of health stroke scale; MRS, Modified Rankin Scale; FAC, Functional Ambulation Category; EG, Experimental group; CG, Control group

Table 2. Changes between pre- (T0) and post- (T1) treatment

Patient no.	Group	ASHA NOMS		PAS		FDS		MH-MEP Amplitude (120%)		MH-MEP Amplitude (150%)		K-SWAL-QOL		NIHSS		FIM		FMA	
		T0	TI	T0	TI	T0	TI	T0	TI	T0	TI	T0	TI	T0	TI	T0	TI	T0	TI
1	EG	1	1	8	8	58	58	0.21	0.23	0.69	1.01	111	136	13	11	38	40	20	25
2	EG	5	6	6	1	48	20	0.12	0.14	0.22	0.16	149	152	4	4	40	40	36	36
3	EG	5	5	3	1	44	31	0.31	0.16	0.67	0.36	136	172	2	2	43	43	94	94
4	CG	2	3	6	5	53	49	0.047	0.069	0.071	0.073	165	165	1	1	85	85	100	100

ASHA-NOMS, American Speech-language-Hearing Association National Outcome Measurement system Swallowing level scale; PAS, Penetration-Aspiration Scale; FDS, Functional Dysphagia Scale; MH-MEP, Mylohyoid Motor Evoked Potential; K-SWAL-QOL, Koeran Swallowing-Quality of Life Questionnaire; NIHSS, national institutes of health stroke scale; FIM, Functional Independence Measure; FMA, Fugl-Meyer Assessment; EG, Experimental group; CG, Control group