



Original Article

Effect of the combination of Mendelsohn maneuver and effortful swallowing on aspiration in patients with dysphagia after stroke

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Abstract. [Purpose] This study investigated the effect of a combined method incorporating the Mendelsohn maneuver and effortful swallowing on aspiration in patients with dysphagia after stroke. [Subjects and Methods] Three patients with dysphagia were recruited. All patients were treated with a combined method consisting of the Mendelsohn maneuver and effortful swallowing. The intervention period was total 20 sessions. Evaluation was based on videofluoroscopic swallowing study and the degree of aspiration was assessed using penetration-aspiration scale. [Results] Before and after intervention, all participants showed a decrease in aspiration with liquid type and semisolid type food. [Conclusion] This study confirms that the combined method of the Mendelsohn maneuver and effortful swallowing has a positive effect on aspiration in patients with dysphagia after stroke.

Key words: Mendelsohn maneuver, Effortful swallowing, Dysphagia

(This article was submitted Jul. 3, 2017, and was accepted Aug. 13, 2017)

INTRODUCTION

Dysphagia is a complication that occurs about 37–78% of stroke patients. Complications of dysphagia include dehydration and malnutrition, and aspiration pneumonia which can lead to death¹⁾. Therefore, proper treatment after early diagnosis is critical. Many treatments such as Mendelsohn maneuver, effortful swallowing, supraglottic swallowing have been reported to improve swallowing in patients with dysphagia²⁾. However, with these methods of treatment, it is difficult to deal with the recovery of swallowing function effectively. It is therefore important to combine and apply a variety of exercises for more effective training.

The Mendelsohn maneuver is effective for the activation of swallowing muscles and the opening of the upper esophageal sphincter using remedial treatment for swallowing. In particular, it has the advantage of extending the opening of the upper esophageal sphincter by inducing muscle activation for a prolonged time^{3, 4)}.

Effortful swallowing is used as a compensatory and remedial approach. It is a training method that involves instructing the patient to forcefully swallow with the muscles of tongue and pharyngeal muscles. As a result, clearance of vallecular residues and it strongly activates swallowing muscles but has a short duration^{4, 5)}. This study was carried out to investigate the effect of an intervention combining the Mendelsohn maneuver and effortful swallowing on aspiration in patients with dysphagia.

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Table 1. General characteristics of subjects

Subjects	Gender	Age (years)	Lesion site	Type of stroke	Paretic side	Onset time (month)	MMSE-K
1	Male	60	MCA	Infarction	Right	2 month	28
2	Male	62	MCA	Infarction	Right	2 month	26
3	Female	59	MCA	Hemorrhage	Left	5 month	28
4	Female	48	MCA	Infarction	Left	4 month	29

SUBJECTS AND METHODS

In this study, four patients with dysphagia after stroke were recruited. The criteria for participation were as follows: 1) diagnosed with dysphagia, 2) able to undergo the Mendelsohn maneuver, 3) no difficulty in communication, 4) history of stroke within 6 months, and 5) aspiration in VFSS. The purpose of the study was explained to the participants before enrollment, and informed consent for participation was obtained in accordance with the principles of the Declaration of Helsinki.

All participants underwent the Mendelsohn maneuver and effortful swallowing at the same time. The Mendelsohn maneuver holds the larynx for 3–5 seconds after swallowing, when the larynx is raised upward. Patients were asked to hold the larynx after swallowing. Effortful swallowing reported a remedial strategy for the treatment of oropharyngeal dysphagia. It involves pushing the tongue firmly against the hard palate while swallowing as forcefully as possible. Patients were asked to push the tongue firmly onto the palate, while squeezing the neck muscles, and swallow as forcefully as possible. Therefore, this study instructed patients to perform effortful swallowing when performing the Mendelshon maneuver as a combination of these two methods. The intervention was conducted a total of 20 sessions. All of the patients were assessed by videofluoroscopic swallowing study (VFSS) before and after the start of the study. The VFSS was performed according to a modified Logemann protocol⁶. We used the penetration-aspiration scale (PAS) based on VFSS to evaluate outcome. PAS score has a maximum of 8 points, where higher score indications a greater degree of aspiration⁷. PAS scores were interpreted by one rehabilitation physician.

RESULTS

Based on PAS assessment, participant 1 showed decreased aspiration from 6 points to 4 points with liquid type food and from 3 points to 2 points with semi-solid type food. Participant 2 showed decreased aspiration from 6 points to 4 points with liquid type food and from 3 points to 2 points with semi-solid type food. Participant 3 showed decreased aspiration from 5 points to 4 points with liquid type food and from 3 points to 1 point with semi-solid type food. Participant 4 showed decreased aspiration from 7 points to 5 points with liquid type food and from 5 points to 4 point with semi-solid type food (Table 1).

DISCUSSION

This study investigated the effect of the combined use of the Mendelshon maneuver and effortful swallowing on aspiration in patients with dysphagia after stroke. As a result, all three participants showed a decrease in aspiration for both liquid and semi-fluid types of food. The Mendelsohn maneuver is a method of intentionally holding the larynx when the larynx is elevated, so that activation of the suprahyoid muscles is induced⁴. In this study, the Mendelsohn maneuver was performed for approximately 5 seconds, and the suprahyoid muscles would have been activated within this time. Effortful swallowing is known to be effective for increasing movement of the hyoid bone as well as inducing strong activation of the hyoid bone over a relatively short time^{4, 5}. Strong activation of the suprahyoid muscles implies a large recruitment of muscle fibers⁸. It can therefore have a potentially positive impact on muscle strength. Training of the suprahyoid muscles directly reduces aspiration. This is associated with the mechanism of normal swallowing. Contraction of the suprahyoid muscles is caused by pulling the hyoid bone in an anterior-superior direction, which in turn affects the airway protection mechanism⁹. In this study, the combination of the Mendelsohn maneuver with effortful swallowing seems to have had a positive influence on the reduction in aspiration. There are some limitations of this study. First, the number of patients is low. Second, there was no control group, so we cannot compare the effects of this treatment with other interventions. Third, the long-term effect is unknown because follow-up was not performed. In conclusion, this study confirms that the Mendelsohn maneuver combined with effortful swallowing is helpful in decreasing aspiration in patients with dysphagia after stroke.

REFERENCES

- 1) Martino R, Foley N, Bhogal S, et al.: Dysphagia after stroke: incidence, diagnosis, and pulmonary complications. *Stroke*, 2005, 36: 2756–2763. [Medline] [CrossRef]
- 2) López-Liria R, Fernández-Alonso M, Vega-Ramírez FA, et al.: [Treatment and rehabilitation of dysphagia following cerebrovascular disease]. *Rev Neurol*,

2014, 58: 259–267 (in Spanish). [[Medline](#)]

- 3) McCullough GH, Kim Y: Effects of the Mendelsohn maneuver on extent of hyoid movement and UES opening post-stroke. *Dysphagia*, 2013, 28: 511–519. [[Medline](#)] [[CrossRef](#)]
- 4) Wheeler-Hegland KM, Rosenbek JC, Sapienza CM: Submental sEMG and hyoid movement during Mendelsohn maneuver, effortful swallow, and expiratory muscle strength training. *J Speech Lang Hear Res*, 2008, 51: 1072–1087. [[Medline](#)] [[CrossRef](#)]
- 5) Jang HJ, Leigh JH, Seo HG, et al.: Effortful swallow enhances vertical hyolaryngeal movement and prolongs duration after maximal excursion. *J Oral Rehabil*, 2015, 42: 765–773. [[Medline](#)] [[CrossRef](#)]
- 6) Logemann JA: *Evaluation and treatment of swallowing disorders*, 2nd ed. Austin: Pro-Ed. 1998.
- 7) Rosenbek JC, Robbins JA, Roecker EB, et al.: A penetration-aspiration scale. *Dysphagia*, 1996, 11: 93–98. [[Medline](#)] [[CrossRef](#)]
- 8) Park JS, Oh DH, Chang MY, et al.: Effects of expiratory muscle strength training on oropharyngeal dysphagia in subacute stroke patients: a randomised controlled trial. *J Oral Rehabil*, 2016, 43: 364–372. [[Medline](#)] [[CrossRef](#)]
- 9) Pearson WG Jr, Hindson DF, Langmore SE, et al.: Evaluating swallowing muscles essential for hyolaryngeal elevation by using muscle functional magnetic resonance imaging. *Int J Radiat Oncol Biol Phys*, 2013, 85: 735–740. [[Medline](#)] [[CrossRef](#)]