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Relationship between Swallowing Dysfunction and Decreased Respiratory Function in Dementia Patients

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Abstract. [Purpose] This study aimed to clarify whether respiratory function differed between dementia patients using and not using thickening fluids and texture-modifying foods for swallowing dysfunction management. [Subjects] Sixty-five inpatients in the dementia treatment ward in a psychiatric facility were enrolled. [Methods] The patients underwent respiratory function testing twice with an 80-cm party horn. Moreover, information about the patients' characteristics and use of thickening fluids and texture-modifying foods was obtained from their medical records. [Results] There was a significant difference in being able to blow the party horn to its full length between patients using and not using thickening liquids. [Conclusion] This result suggests that decreased respiratory function may reflect swallowing dysfunction in dementia patients.
Key words: Dementia, Swallowing function, Examination of respiratory function

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INTRODUCTION

A wave of aging is inundating the world[1)]. In Japan, aging has been proceeding at an unparalleled speed. Furthermore, dementia has shown a notable corresponding increase. Among dementia patients, respiratory diseases have been reported as causes of death in 55.5% of Alzheimer disease patients and 33.1% of patients with vascular dementia[2)]. In addition, among nursing home residents with dementia, the probability of at least one episode of a respiratory disease, such as pneumonia or bronchitis, is nearly 50%, and that of an eating problem is 85.8%[3)]. Thus, a change in respiratory function may reflect the presence of swallowing dysfunction. However, the relationship between changes in respiratory function and the prevalence of swallowing dysfunction has not been thoroughly investigated. Regarding the management of swallowing dysfunction, previous studies have reported that the use of thickening fluids and texture-modifying foods is an effective intervention strategy for preventing accidental inhalation of liquid and food into the lungs[4)]. Therefore, the use of this clinical strategy is pervasive.

This study aimed to clarify whether respiratory function differs between dementia patients using thickening fluids and those using texture-modifying foods for swallowing dysfunction management.

SUBJECTS AND METHODS

Subjects

The participants were 65 inpatients (23 men and 42 women, aged 80.20 ± 9.43 years, with a Mini-Mental State Examination score[5)] of 7.48 ± 6.85) in the dementia ward of a psychiatric facility. All subjects and their families were informed in advance of the purpose of the study and of the procedures involved, and their informed consent was obtained. This study was approved by the Institutional Ethics Committee of Nagasaki University.

Methods

Older persons and children find standard pulmonary function testing is difficult to understand and execute[6)]. In this study, the ability to blow air out of the lungs was assessed using a party horn as an index of respiratory function. The party horn (Party Horn Entertainment Village, Hyogo, Japan) was 80 cm long. The paper tube end was marked in order to make sure that it had unrolled completely. At the beginning of the test, patients practiced three times with a 10-cm-long party horn. After sufficient rest, patients performed a respiratory function test twice by blowing an 80-cm-long party horn. Information about the patients' characteristics and use of thickening fluids and texture-modifying foods (mousse food and paste food) was obtained from the medical records.

Subjects were divided into two groups: a group that could blow the party horn to its full length and a group that could not. The χ^2 test or Fisher's exact test was used to compare the groups with respect to various factors and categorical variables. Age and height were compared between the groups using the unpaired t-test, with a significance level of 5%.

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Table 1. Characteristics of the two groups based on their ability to blow the party horn to its complete length

	Complete length (n=37)	Partial length (n=28)	p-value
Age (years)	80.1 ± 7.3	80.3 ± 12.8	
Height (cm)	150.3 ± 9.1	149.1 ± 9.6	
Medical condition (number)			
Thickener users	3	11	**
Texture-modifying food users	0	15	**
Motor paralysis	9	10	
Pneumonia history	11	11	

Mean ± SD, **p<0.01, *p<0.05

RESULTS

There was a significant difference between the two groups in the use of thickening fluids and texture-modifying foods ($p<0.01$), but not in age, height, respiratory diseases, or motor paralysis (Table 1).

DISCUSSION

The major finding of the present study was that the ability to blow air out of the lungs as measured using a party horn was related to the use of thickening fluids and texture-modifying foods for swallowing dysfunction management. This result suggests that reduced respiratory function may reflect a swallowing dysfunction in dementia patients.

Swallowing and breathing are closely related. A lack of co-operation between both functions is a potential cause of pneumonia. Furthermore, dementia has been reported[7] to be associated with a high probability of pneumonia with the progress of the core symptoms of dementia. Therefore, Zheng et al.[8] stated that breathing plays a necessary role in the prevention of pneumonia and food transport for swallowing. Higashijima[9] stated that the relationship between swallowing and respiration changes, even in normal older people, with age, bolus size, texture-modifying foods, and degree of thickening fluids. According to preliminary research, swallowing and respiratory function were found to be related in dementia patients. Sasao et al.[10] recommended using a party horn as a tool to evaluate respiratory function as it is simple and easy, but that it should not be used for the evaluation of the severity of respiratory dysfunction.

Our present result demonstrates that reduced respiratory function may reflect swallowing dysfunction in dementia patients. However, it was not possible to evaluate the effects of the MMSE score, dementia types, and drug therapy.

We suggest that respiratory function examination by a party horn is useful for food determination to reduce the risk of aspiration by dementia patients.

Future studies with greater numbers of subjects and evaluation of the reliability of the party horn as a tool for evaluating respiratory function are needed.

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