

Clinical Study of Respiratory Function and Difference in Pneumonia History between Alzheimer's Disease and Vascular Dementia Groups

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Abstract. [Purpose] This study compared respiratory function and differences in pneumonia history between Alzheimer's disease and vascular dementia groups. [Subjects] Fifty-eight inpatients in the dementia treatment ward in a psychiatric facility were enrolled. [Methods] Patients underwent respiratory function testing twice using an 80-cm party horn. The Mini-Mental State Examination was also performed and motor functions were evaluated. Patient characteristics were obtained from medical records. [Results] Significant differences were noted between Alzheimer's disease and vascular dementia groups in the ability to blow the party horn to full length, pneumonia history, and presence of impaired mobility. [Conclusion] Party horn evaluation may be useful for determining the risk of pneumonia in patients with dementia.

Key words: Dementia, Aspiration pneumonia history, Respiratory function

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INTRODUCTION

Societies around the world are becoming increasingly aged¹⁾, and this aging of the population has been proceeding at an unparalleled speed in Japan. Furthermore, dementia has shown a notable corresponding increase. Among dementia patients, respiratory diseases have been reported as the cause of death in 55.5% of Alzheimer's disease patients and 33.1% of patients with vascular dementia²⁾. In addition, among nursing home residents with dementia, the probability of at least one episode of respiratory disease, such as pneumonia or bronchitis, is nearly 50%, and that of an eating problem is 85.8%³⁾.

Swallowing and breathing are closely related, and non-cooperation of both functions is a causal factor in aspiration pneumonia. Furthermore, a study of dementia patients found that pneumonia risk increased with increased degradation of brain function⁴⁾. However, understanding and correctly performing respiratory function tests is difficult for patients with dementia. Rehabilitation groups therefore require alternative methods of assessing the respiratory function of patients with dementia.

The purpose of the present investigation was to determine respiratory function and compare differences in pneu-

monia history between a group of patients with Alzheimer's disease and a group with vascular dementia, and also to assess the utility of party horns as a tool for the simple assessment of dementia patients' respiratory function.

SUBJECTS AND METHODS

Subjects

The participants were 58 inpatients (21 men, 37 women) in the dementia ward of a psychiatric facility. All subjects and their families were informed in advance of the purposes of the study and of the procedures involved, and their consent to participation was obtained prior to their enrolment. This study was approved by the Institutional Ethics Committee of Nagasaki University.

Methods

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 to ensure that it had unrolled completely. At the start of the study, all patients completed a motor function evaluation comprising passive range of motion and imitation of coarse motions of the upper and lower extremities, and the Mini-Mental State Examination (MMSE) was administered. Finally, in a rehearsal exercise, the patients practiced three times with a 10-cm-long party horn. After sufficient rest, the patients underwent respiratory function examination twice using the 80-cm-long party horn, with the aim of completely extending the party horn in both at-

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tempts. Information about patient characteristics was obtained from their medical records.

Subjects were divided into an Alzheimer's disease group (n=28; 5 men, 23 women) and a vascular dementia group (n=30; 16 men, 14 women). The numbers of patients who could not blow the party horn to full length in both attempts, with a medical history of pneumonia, and with impaired mobility were compared between the groups using the χ^2 test or Fisher's exact test. Age, height, and MMSE scores were compared between the groups using the unpaired t-test, with a significance level of 5%.

RESULTS

No significant differences in age, height, or MMSE were recognized between the Alzheimer's disease and vascular dementia groups. Significant differences between groups were seen in the ability to blow the party horn to full length on both attempts ($p<0.01$), history of pneumonia ($p<0.01$), and presence of impaired mobility ($p<0.05$) (Table 1).

DISCUSSION

Higashijima⁵⁾ stated that decreased respiratory function may reflect swallowing dysfunction in dementia patients. Furthermore, Pathan et al.⁶⁾ studied the correlation between respiratory function and dementia. They argued that the risk of hospitalization for pneumonia is high among dementia patients with restrictive ventilatory disorder due to the degradation of vital capacity. Restrictive ventilation disorder increases respiratory frequency to compensate for the reduced quantity of air inhaled. Gavazzi⁷⁾ noted that if swallowing and respiratory function become desynchronized due to increased respiratory frequency, the risk of pneumonia is greatly elevated.

As an index of respiratory function, the ability to blow the party horn to full length in both attempts showed correlations with both the MMSE score and the degree of impaired mobility. However, the MMSE score did not significantly differ between the Alzheimer's disease and vascular dementia groups. The frequency of impaired mobility was significantly higher in the vascular dementia group, but a history of pneumonia and inability to blow the party horn to full length in both attempts were more frequent in the Alzheimer's disease group.

Aggravation of dementia involves more than vascular characteristics, and Alzheimer's disease is associated with a high prevalence of oral apraxia. Oral apraxia develops in the early phase of Alzheimer's disease. The phenomenon of oral apraxia is associated with difficulty with opening and shutting the mouth, oral food stagnation, and disruption of chewing motor function. Furthermore, oral apraxia exerts negative influences on motor functions such as la-

Table 1. Comparison of the Alzheimer's disease and vascular dementia groups' characteristics

	Alzheimer's disease (n=28)	Vascular dementia (n=30)	
Age (years)	81.8±9.3	79.4±10.2	
Height (cm)	147.7±9.0	151.5±9.4	
MMSE (points)	5.6±5.6	7.3 ±5.3	
Medical condition (number)			
Not able to blow party horn to full length	18	8	**
History of pneumonia	15	4	**
History of impaired mobility	4	13	*
Mean ± SD, **p<0.01, *p<0.05			

ryngeal movement and respiration⁸⁾. Chouinard⁹⁾ stated that oral apraxia represents a risk factor for pneumonia. Patients with Alzheimer's disease cannot use the mouth or tongue well because of oral apraxia, and this may also lead to an inability to fully extend the party horn.

The present findings suggest that evaluation using a party horn may be useful for predicting the risk of pneumonia.

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