

Examination of vocal disorders of Parkinson's disease-associated diseases using a Phonation analyzer

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Introduction

Parkinson's disease (PD)-associated diseases are slowly-progressive ones that result in characteristic psychomotor symptoms [1,2]. In the patients with these disorders, anarthria is inevitably involved. In particular, the vocal disorder presents breath-related hoarseness. In the advanced stage of this disorder, the anarthria becomes a factor inducing aspiration pneumonia and is consequently related to the prognosis. No methods evaluating anarthria quantitatively exist currently. Symptoms of bulbar palsy are not usually noticed until manifestation.

We quantified the vocal disorder of patients with disease by a phonatory function survey instrument and examined association with the clinical condition.

Subjects

The subjects included 13 patients with Parkinson's disease (PD) and three patients with progressive supranuclear palsy (PSP). In the patients with PD, the Hoehn and Yahr stage was 3.7 ± 0.6 (mean \pm SD) and the age was 72.3 ± 0.6 years old. The age of the patients with PSP was 72.3 ± 0.6 . The period since contraction of the disease was 7.0 ± 2.6 and 8.5 ± 3.8 years in the patients with PD and those with PSP, respectively.

Methods

We conducted an examination of the phonatory function and examined the association with the UPDRS which is an index of the PD severity. We used a phonation analyzer, PA-1000 (Minato medical science Co., Ltd., Kyoto, Japan) for an examination of phonatory function. This is a phonatory function survey instrument originally developed for larynx function surgery. We can calculate the efficiency index of the voice from the

transaction ingredient (AC flow) of the expiratory flow that reflects mean exhalation fluxion (DC flow) and vocal cord vibration with this container.

We can calculate the efficiency index of the voice from mean exhalation fluxion (DC flow) and the transaction ingredient (AC flow) of the expiratory flow that reflects vocal cord vibration. In other words, the AC/DC ratio shows the efficiency with which expiratory flow is converted into sound by the vocal cords. We name this the efficiency index of the voice. We thought that this index might be available for an index of anarthria in PD-associated diseases, and examined it.

Results

Generally, the AC/DC ratio has a diagnosis when there is vocal cord dysfunction of 0.5 or less. At the AC/DC ratio in PD, PSP (Figure 1), nine of 13 patients showed a low level in PD. In PSP where breath-related hoarseness was more remarkable, all four of them were low level. We show the association between AC/DC ratio and UPDRS in PD in Figure 2. In the PD patients, the tendency for UPDRS and the AC/DC ratio to be inversely correlated was found. In other words, the PD patients for whom the efficiency index of the voice decreases are found to have seriously worse symptoms of PD.

Discussion

In the PD/PSP patients, the efficiency index of the voice decreased at high frequency. Because the AC/DC ratio correlated with PD severity in the PD patients, this index was thought to be useful as an index to reflect a picture of the disease. We may utilize the AC/DC ratio for utterance and planning of deglutition rehabilitation for an early diagnosis index of vocal disorders.

References

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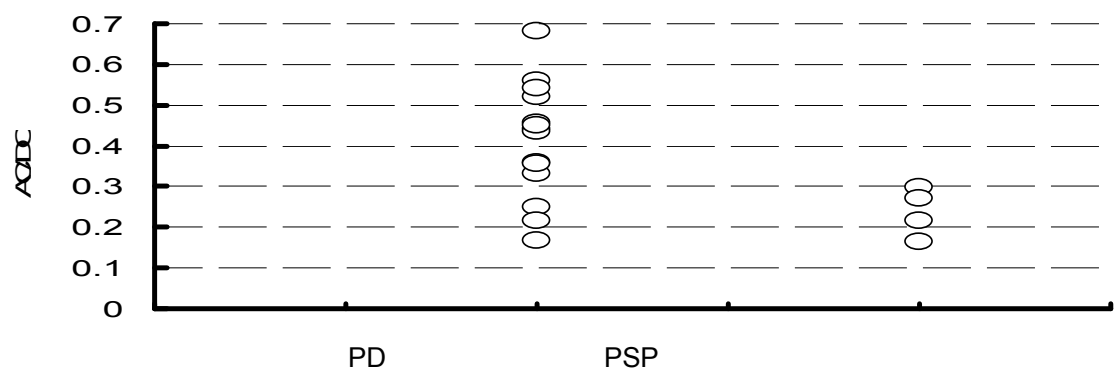


Figure 1. The AC/DC ratio in Parkinson’s disease (PD) and progressive supranuclear palsy (PSP).

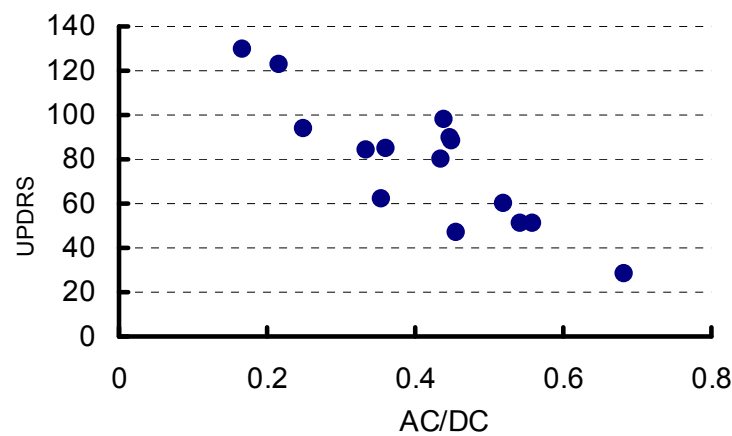


Figure 2. Association between AC/DC ratio and UPDRS in PD