

Reliability and Validity of Speech Evaluation in Adductor Spasmodic Dysphonia

*†Saori Yanagida, *Noriko Nishizawa, *Ryusaku Hashimoto, †Kenji Mizoguchi, †Hiromitsu Hatakeyama, †Akihiro Homma, and †Satoshi Fukuda, *†Hokkaido, Japan

Summary: Objectives. The aim of this study was to evaluate speech in patients with adductor spasmodic dysphonia (ADSD) by perceptual evaluations and acoustic measures, and to examine the reliability and validity of these measures.

Methods. Twenty-four patients with ADSD and 24 healthy volunteers were included in the study. Speech materials consisted of three sentences constructed from serial voiced syllables to elicit adductor voice breaks. Three otolaryngologists rated the degree of voice symptoms using a visual analog scale (VAS). VAS sheets with five 100-mm horizontal lines were given to each rater. The ends of the lines were labeled normal vs severe, and the five lines were labeled as overall severity of each of the four speech symptoms (strangulation, interruption, tremor and strained speech). Nine words were selected for acoustic analysis, and abnormal acoustic events were classified into one of the three categories. To evaluate the intra- and inter-rater and intermeasurer reliabilities of the VAS scores or acoustic measures, Pearson *r* correlations were calculated. To examine the validity of perceptual evaluations and acoustic measures, the sensitivity and the specificity were calculated.

Results. Pearson *r* correlation coefficients for overall severity showed the highest intra- and inter-rater reliabilities. For acoustic events, the intrameasurer reliabilities were $r = .645$ (frequency shifts), $r = .969$ (aperiodic segments), and $r = 1.0$ (phonation breaks), and the intermeasurer reliability ranged from $r = .102$ to $r = 1.0$. Perceptual evaluation showed high sensitivity (91.7%) and specificity (100%), whereas acoustic analysis showed low sensitivity (70.8%) and high specificity (100%).

Conclusion. Both perceptual evaluation and acoustic measures alone were found likely to overlook patients with true ADSD.

Key Words: Adductor spasmodic dysphonia–Speech evaluation–Visual analog scale–Reliability–Validity.

INTRODUCTION

Spasmodic dysphonia (SD) is a disorder of speech and voice resulting from irregular and uncontrolled spastic movements of the laryngeal muscles.¹ SD is characterized as a chronic neurologic disorder that causes task-specific contractions of the laryngeal muscles during speech.² There are three types of SD: (1) adductor spasmodic dysphonia (ADSD), which is the most common type and affects the adductor laryngeal muscles; (2) abductor SD, which accounts for about 30% of all diagnosed patients and affects the abductor laryngeal muscles; and (3) mixed SD, which is quite rare and presents with signs observed in both ADSD and abductor SD.

The voice symptoms in ADSD are characterized by an irregular and uncontrollable tight or strained voice, sudden changes in pitch or loudness, and involuntary voice interruptions. For experienced phoniatricians, a diagnosis of SD is not difficult because of its characteristic symptoms. However, the exact determination of this disease requires a combination of a number of special evaluation methods such as a detailed interview and a speech-

pathologic evaluation, along with a neurophonological examination and a laryngeal endoscopy. Therefore, general otolaryngologists who do not specialize in speech pathology may miss signs of SD, resulting in misdiagnosis and a delayed or an inadequate therapeutic intervention.

To establish a reliable diagnostic tool for ADSD, it is necessary to determine the proper terms representing its characteristic voice symptoms and to relate them to objective measures such as acoustic parameters or speech perturbation.

Evaluation methods are classified as perceptual, acoustic, or aerodynamic measurements.^{3–11} Various words used to express voice symptoms in ADSD, such as staccato, feeble, intermittent, jerky, grunting, effortful, overpressured, aphonic, laryngealized, aspirated, aperiodic, and dysprosody, have been reported.^{12,13} However, there are few reports on correlations between perceptual evaluations using these terms and acoustic measures in ADSD.^{14,15}

Erickson¹⁶ and Cannito et al¹⁷ reported that voice symptoms in ADSD are more remarkable in voiced consonant sentences than in voiceless consonant sentences. It is speculated that abnormal laryngeal adductor or abductor motor coordination in SD can cause not only “voice” problems but also “speech” problems in SD patients. We may, therefore, gain a better understanding of the symptoms in SD by considering syntactic complexity, articulation place or manner, and voiced or voiceless distinction.

The aim of the present study was to evaluate speech in patients with ADSD by perceptual evaluations and acoustic measures, and to examine the reliability and validity of the measures by comparison with normal controls.

Accepted for publication June 28, 2017.

This work was supported by a JSPS Grant-in-Aid for Young Scientists (B) to the first author (Grant Number 16K16438).

From the *Department of Communication Disorders, School of Rehabilitation, Health Sciences University of Hokkaido, Hokkaido, Japan; and the †Department of Otolaryngology-Head and Neck Surgery, Hokkaido University Graduate School of Medicine, Hokkaido, Japan.

Address correspondence and reprint requests to Saori Yanagida, Department of Communication Disorders, School of Rehabilitation, Health Sciences University of Hokkaido, 2-5, Ainosato, Sapporo, Hokkaido 0028072, Japan. E-mail: s.yanagi@hoku-iryo-u.ac.jp
Journal of Voice, Vol. ■■, No. ■■, pp. ■■–■■

0892-1997

© 2017 The Voice Foundation. Published by Elsevier Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.jvoice.2017.06.022>

METHODS

Participants

Twenty-four patients with ASD (20 women and 4 men, mean age 39.7 ± 14.5 years) participated in the present study. The patients were all native Japanese speakers. All patients were evaluated at the Health Sciences University of Hokkaido Hospital between December 2013 and July 2016. The diagnosis of SD was made by an otolaryngologist in conjunction with a speech-language hearing therapist based on the results of a detailed interview, a laryngeal endoscopy, and a speech-pathologic evaluation. Twenty-four healthy volunteers matched to the patients with ASD with regard to age and sex also participated in the study as normal controls. Control subjects had no history of neurologic disorders or vocal pathology. The voices of the subjects were perceptually screened by a speech-language hearing therapist and were judged to fall within normal limits.

Speech materials

Speech materials were three short sentences: (1) Ame ga yandara umi ni mogurou (Let's go diving in the ocean when the rain stops.); (2) Ano yama no ue niwa aoi yane no ie ga aru (There is a blue-roofed house at the top of the mountain.); and (3) Daijobu no imi wa iroiro aru you desu ("Okay" has various meanings.). The speech materials were constructed from serial voiced syllables to elicit abductor voice breaks (Table 1).

We performed acoustic recordings of the speech materials at the first examination for each patient. Recording was made in a quiet room using a digital audio recorder (Frontier TASCAM HD-P2 portable stereo audio recorder; TEAC Corp, Tokyo, Japan) at a sampling rate of 44.1 kHz, and a condenser microphone (AKG C1000 S CE; Harman International, Stamford, CT) under similar conditions. The microphone was kept at a distance of 20 cm from the lips. Recordings of the third sentence were missing

TABLE 1.
Speech Materials

No.	Sentences
1	Ame ga yandara umi ni mogurou. (Let's go diving in the ocean when the rain stops.)
2	Ano yama no ue niwa aoi yane no ie ga aru. (There is a blue-roofed house at the top of the mountain.)
3	Daijobu no imi wa iroiro aru you desu. ("Okay" has various meanings.)

Notes: The nine bold words are targets to measure three acoustic events. The boldfaced font was not present during the reading aloud of each sentence by the participants.

for three of the patients as they were evaluated using a different protocol. Another patient also misread part of the second sentence, resulting in the deletion of the sentence from the voice record.

Assessment

Perceptual evaluation

Three otolaryngologists specializing in phoniatrics rated the degree of voice symptoms using a visual analog scale (VAS). VAS sheets with five 100-mm horizontal lines were given to each rater. The ends of the lines were labeled normal vs severe; the left end always corresponded to a score of 0 (ie, normal), and the right end corresponded to a score of 100 (ie, severe). The five lines were labeled as overall severity of each of the four voice symptoms: strangulation, interruption, tremor, and strained speech (Figure 1). Audio files for rating were created for each participant, totaling 48 files. Each file was made of a 1000-ms lead of sine wave (440 Hz, amplitude .8) followed by 1000 ms of silence and the

[Procedures]

1. Listen to the speech sample.
2. Scoring the degree of overall severity and each voice symptoms (strangulation, interruption, tremor, strained speech).
3. Draw a vertical line where you think the most suitable section.

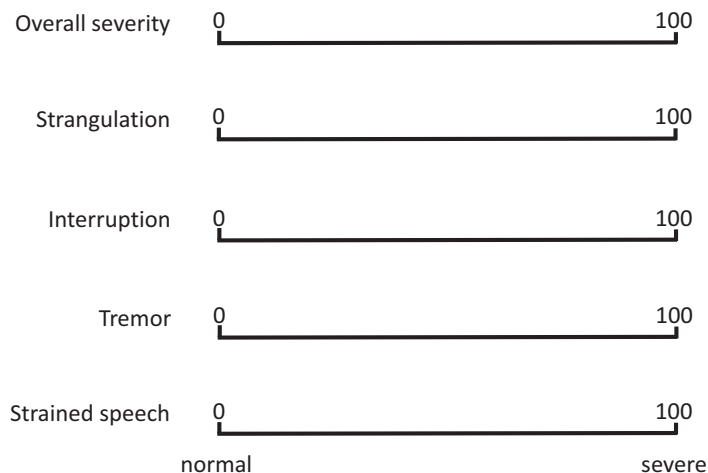


FIGURE 1. Perceptual evaluation form using a visual analog scale. Each rater listened to the speech sample and was asked to place a single vertical line on the visual analog scale sheet with 100-mm horizontal lines.

Download English Version:

<https://daneshyari.com/en/article/8961044>

Download Persian Version:

<https://daneshyari.com/article/8961044>

[Daneshyari.com](https://daneshyari.com)