Factors Associated With Patient-perceived Hoarseness in Spasmodic Dysphonia Patients

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Summary: Objectives/Hypothesis. The American Academy of Otolaryngology—Head and Neck Surgery Clinical Practice Guidelines on Hoarseness distinguishes between hoarseness, which is a symptom perceived by the patient, and dysphonia, which is a diagnosis made by the clinician. Our objective was to determine factors that are associated with patient-perceived hoarseness in spasmodic dysphonia (SD) patients.

Study Design. Retrospective study.

Methods. Adductor SD patients who presented for botulinum toxin injections from September 2011 to June 2012 were recruited. The main outcome variable, Voice Handicap Index-10 (VHI-10), was used to quantify patient-perceived hoarseness. Clinical data, Hospital Anxiety and Depression Scale (HADS), and VHI-10 were collected. Clinician-perceived dysphonia was measured by a speech-language pathologist with Consensus Auditory Perceptual Evaluation of Voice (CAPE-V). Statistical analysis included univariate analyses and multiple linear regression.

Results. One hundred thirty-nine SD patients had VHI-10 score of 26.0 ± 7.2 (mean ± standard deviation), disease duration of $10.5 + 7.0$ years, CAPE-V overall score of 43.2 ± 21.8, HADS anxiety score of 6.7 ± 3.8, and HADS depression score of 3.6 ± 2.8. In univariate analyses, there were positive correlations ($P < 0.05$) between VHI-10 and female gender, CAPE-V overall, older age, HADS anxiety, and depression. There was no correlation with professional voice use and disease duration. In multiple linear regression ($R^2 = 0.178$, $P < 0.001$), age, HADS anxiety, female gender, and CAPE-V were significant.

Conclusions. Older age, higher anxiety levels, female gender, and clinician-perceived dysphonia are associated with higher levels of patient-perceived hoarseness in SD patients. Hoarseness is a very personal symptom. Multiple factors determine its self-perception.

Key Words: spasmodic dysphonia–dysphonia–hoarseness–quality of life–voice.

INTRODUCTION

Spasmodic dysphonia (SD) is a focal laryngeal dystonia with an overall prevalence of 5.9 per 100,000.[1–3] It is a chronic neurological disorder that causes task-specific contractions of the laryngeal muscles during speech. There are three types of SD: (1) Adductor SD primarily affects the intrinsic adductor laryngeal muscles (ie, thyroarytenoid, lateral cricoarytenoid, and interarytenoid muscles). (2) Abductor SD primarily affects the intrinsic abductor laryngeal muscle (ie, posterior cricothyroid muscle). (3) Mixed SD occurs when both adductor and abductor muscles are involved with dystonic contractions. Adductor SD is more common, comprising 82% of patients.[2] Because SD is a benign condition, the main treatment goal is to improve the patient's vocal quality. SD has no cure. Standard treatment for SD is repeated electromyographic-guided botulinum toxin injections of the affected muscles.[2] Dose and frequency of the botulinum toxin injections are guided by the patient's reports of vocal quality and side effects from treatment.

The American Academy of Otolaryngology—Head and Neck Surgery Clinical Practice Guidelines on Hoarseness distinguishes between hoarseness, which is a symptom perceived by the patient, and dysphonia, which is a diagnosis made by the clinician.[4] Patient-perceived hoarseness is the main driving factor behind treatment decisions for benign voice disorders. Two studies have examined factors associated with patient-perceived hoarseness in benign phonotraumatic lesions;[5,6] however, no study has examined these factors in SD patients. We hypothesized that some of the following factors may be significant: (1) clinician-perceived dysphonia, (2) duration of disease, (3) presence of anxiety and depression, and (4) professional voice use. Using the Voice Handicap Index-10 (VHI-10) to quantify patient-perceived hoarseness,[7] the objective of this study was to determine factors that are associated with patient-perceived hoarseness in SD patients.

METHODS

The institutional review board at the University of Washington approved this study. Any adductor SD patient who presented to the University of Washington for his or her botulinum toxin injection from September 2011 to June 2012 was eligible for the study. Exclusion criteria included abductor SD patients, non-English speaking patients, patients without the mental capacity to complete the study, and patients who declined to participate. Demographic data, clinical data, and professional voice use were collected. Disease duration was defined as the time of diagnosis of SD from the laryngeal electromyography to the study closure date (June 30, 2012). The VHI-10[7] and Hospital Anxiety and Depression Scale (HADS)[8] were completed by the

TABLE 1.
Demographic Data of the Study Population (n = 139)

Age (mean ± standard deviation) (y)	59.6 ± 13.7
Male (n [%])	33 (23.7%)
Adductor	139 (100%)
Professional voice user (n [%])	22 (15.8%)
Duration of treatment with botulinum toxin injections (y) (mean ± standard deviation)	10.5 ± 7.0
Length of time subsequent to previous injection (weeks) (mean ± standard deviation)	16.8 ± 6.7
Voice Handicap Index-10 (mean ± standard deviation)	26.0 ± 7.2
Consensus Auditory Perceptual Evaluation of Voice—Overall (mean ± standard deviation)	43.2 ± 21.0
Hospital Anxiety and Depression Scale—Anxiety (mean ± standard deviation)	6.7 ± 3.8
Hospital Anxiety and Depression Scale—Depression (mean ± standard deviation)	3.6 ± 2.8

patients. Consensus Auditory Perceptual Analysis of Voice (CAPE-V)[9] was administered by an expert clinician.

VHI-10 was used to quantify patient-perceived hoarseness. This standardized, validated questionnaire is a self-reported measure of patients' perceived handicap or impairment from their voice.[7] Patients answer 10 questions on a scale of 0–4 and total scores range from 0 to 40. A score above 11 is defined as abnormal. HADS is a standardized, validated measure of patients' self-reported symptoms of anxiety and depression.[8] There are seven questions pertaining to anxiety and seven questions pertaining to depression. Each question is scored on a four-point (0–3) scale. Scores range from 0 to 21 for anxiety and depression respectively. Normal for either subscale is a score of 0–7, highly suggestive of a mood disorder is a score of 8–10, and probable presence of a mood disorder is a score of ≥11. The subscales for anxiety and depression are considered independent.

Clinician-perceived dysphonia was quantified with CAPE-V. This measure was developed by the American Speech-Language-Hearing Association as a standardized guideline for an expert clinician to evaluate the quality of a patient's voice.[9] It includes six attributes: overall severity, roughness, breathiness, strain, pitch, and loudness. A visual analog scale of 100 mm is used to evaluate each attribute by indicating the degree of perceived deviance from normal. Higher scores indicate a larger abnormality (deviance from normal). In this study, a speech-language pathologist with more than 30 years of experience in voice performed all the CAPE-V evaluations.

Statistical analysis was performed using commercially available software (*SPSS Statistics* 20.0, IBM Corporation, Armonk, NY). Descriptive statistics including means and standard deviations were calculated. For univariate analyses, two-tailed unpaired Student *t* tests, Pearson correlation, and Spearman correlation for nonnormal variables were performed. The variables that were significant in the univariate analyses were included in a multiple linear regression model with VHI-10 as the outcome measure. An *a priori* probability level was set at 0.05.

RESULTS

Total sample size was 139. One patient was excluded because she had dementia. A second patient declined to participate. Six patients had abductor SD and were excluded. Demographic data for the study population is shown in Table 1. Patients had a mean age of 59.6 years with a standard deviation of 13.7 years. About

23.7% were male and all had adductor SD. Patients had a 10.5-year mean duration of treatment with botulinum toxin injections. VHI-10 score was 26.0 ± 7.2 (mean ± standard deviation) and CAPE-V score was 43.2 ± 21.0 (mean ± standard deviation).

In univariate analyses, Student *t* tests showed a significant association between VHI-10 and gender ($P = 0.006$). Females had a mean VHI-10 score of 26.0, which was significantly higher than males, who had a mean VHI-10 score of 23.2 ($P = 0.006$). There were also positive correlations between VHI-10 and CAPE-V overall ($r = 0.25$; $P = 0.002$), older age ($r = 0.20$; $P = 0.03$), HADS anxiety ($r = 0.27$; $P = 0.002$), and HADS depression ($r = 0.18$; $P = 0.04$). Pearson correlation was used for all variables, except for HADS depression, which had a nonnormal distribution, so Spearman correlation was calculated instead. There was no correlation with professional voice use and disease duration.

To further evaluate the variable of disease duration, patients who were newly diagnosed within the past year were separated and analyzed (Table 2). Seven patients were newly diagnosed within the past year and there were no significant differences with these patients and the long-term patients in terms of age, gender, professional voice use, VHI-10, CAPE-V, HADS anxiety, and HADS depression scores.

A multiple linear regression was calculated to predict VHI-10 from the following variables that were significant in univariate analyses: gender, CAPE-V overall, age, HADS anxiety, and HADS depression. A significant regression equation was found ($F[5, 128] = 6.762$, $P < 0.001$) with a R^2 of 0.178. Older age ($P = 0.01$), HADS anxiety ($P = 0.02$), female gender ($P = 0.05$), and CAPE-V ($P = 0.05$) were significant in predicting VHI-10 (Table 3). HADS depression was no longer significant.

DISCUSSION

Older age, higher anxiety levels, female gender, and clinician-perceived dysphonia (CAPE-V) are associated with higher levels of patient-perceived hoarseness (VHI-10) in SD patients. The multiple linear regression model was weak ($R^2 = 0.178$, $P < 0.001$). This means that approximately 17.8% of the value of VHI-10 can be predicted by these variables. Thus, there are other intangible factors that affect a patient's self-perception of hoarseness.

There has been a paucity of studies in this area. Behrman et al conducted a retrospective review of 100 patients with benign vocal-fold lesions to determine which factors predicted patient-