Vocal Fold Atrophy in a Japanese Tertiary Medical Institute: Status Quo of the Most Aged Country

***Akihito Yamauchi, *Hiroshi Imagawa, *Ken-Ichi Sakakaibara, *Hisayuki Yokonishi, *Rumi Ueha, *Takaharu Nito, †Niro Tayama, and *Tatsuya Yamasoba,** **†Tokyo, Japan*

Summary: Objective. Voice problems in the geriatric population are increasing worldwide. Since the demographic research of geriatric voice patients in Japan, the country of the most advanced Aging Society, is missing, the authors assessed the current trend of geriatric voice patients, especially patients with presbylarynx at a tertiary medical institute of Japan.

Study Design. Retrospective study.

Methods. From a review of the medical records of newly referred patients, patients aged 65 years and older and patients with vocal fold atrophy were selected, and demographic data, questionnaires, and parameters of aerodynamic and acoustic study, and videostroboscopy were analyzed in terms of age and gender. Subsequently, the difference between patients with presbylarynx and 20 vocally healthy elderly subjects were assessed with multivariate analysis.

Results. Of 1157 newly referred patients seen at the Voice Outpatient Clinic between 2006 and 2012, patients aged 65 years and older accounted for 37% (428 patients): there was 7% increase during the past 7 years and the prevalence was considerably higher than any other previous reports. Vocal fold atrophy accounted for 11% (128 patients) of all patients: dysphonia in patients with vocal fold atrophy aggravated as age advanced; there was a gender difference; and multivariate analysis revealed that reflux laryngitis, chronic medical condition, and vocal abuse were risk factors of presbylarynx.

Conclusion. In Japan, elderly dysphonic patients were prevalent and rapidly increasing in recent years. Age- and gender-related differences should receive attention. Preventive approach on risk factors such as reflux laryngitis, chronic medical condition, and vocal abuse should be considered in the management of presbylarynx.

Key Words: Presbylarynx–Aged society–Vocal fold atrophy–Epidemiology.

INTRODUCTION

Today, Japan faces unprecedented expansion of the population aged 65 years or older. According to the 2010 Revision of *UN World Population Prospects*, the generation ≥65 years accounts for 22.7% of the Japanese population, which is almost twice as high as in the United States (12.9%) and three times higher than the world average (7.6%). Takano et al[1] reported on the recent increase of newly referred geriatric patients in Japan, and they stated that the proportion of patients aged ≥65 years among those referred to the Voice Outpatient Clinic of the University of Tokyo Hospital was 9%, 13%, and 30% in 1985, 1995, and 2005, respectively. These data clearly illustrate the importance of geriatric medicine in Japan.

Dysphonia is one of the common, but undertreated, health problems of the geriatric population. Although the estimated prevalence of vocal problems among elderly persons ranges from 12% to 35%,[2–5] many of those surveyed believe that dysphonia is a natural part of aging[6] and only 15–20% have sought medical attention for their vocal problems.[4,5] Because communication problems are associated with social withdrawal, loss of employment, and anxiety and depression,[7,8] geriatric dysphonia should receive sufficient attention as a potential risk factor for these physiological and psychosocial morbidities.

Among the various causes of geriatric dysphonia, age-related vocal fold atrophy, or presbylarynx, has shown a rapid increase recently and is attracting considerable attention.[1,9–15] The prevalence of presbylarynx was reported to be 4.0% a decade ago,[9] but it is much higher and ranges from 18.9% to 24.5% in recent surveys.[1,14,15] Presbylarynx occurs due to age-related deterioration of the structures of the vocal fold, such as the epithelium, lamina propria, vocal muscles, cartilage, and joints.[11] The aerodynamic features of presbylarynx have been reported to include an age-associated decrease of the maximum phonation time (MPT) and an age-associated increase of the mean flow rate (MFR).[1] Morphologic features include vocal fold bowing, a prominent vocal process, spindle-shaped glottal gap, and a longer open phase.[16]

There are still some important aspects of presbylarynx that have not been clarified, such as the differences from vocally healthy elderly persons, the factors predisposing to presbylarynx, and age- or gender-associated differences of its prevalence and features. Accordingly, the purpose of the present study was to document the current trends among new geriatric patients referred to a tertiary medical center in Japan, as well as improve the understanding of presbylarynx by clarifying the above-mentioned aspects.

MATERIALS AND METHODS

Patients

The present study was based on a retrospective review of the medical records of patients who visited the Voice Outpatient

Accepted for publication July 8, 2013.

From the *Department of Otolaryngology, The University of Tokyo Hospital, Tokyo, Japan; and the †Department of Otolaryngology and Tracheo-esophagology, The National Center for Global Health and Medicine, Tokyo, Japan.

Address correspondence and reprint requests to Akihito Yamauchi, Department of Otolaryngology, The University of Tokyo Hospital, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8655, Japan. E-mail: drachilles23@yahoo.co.jp

Journal of Voice, Vol. 28, No. 2, pp. 231-236
0892-1997/$36.00

http://dx.doi.org/10.1016/j.jvoice.2013.07.003

Clinic of the Department of Otolaryngology and Head and Neck Surgery at the University of Tokyo Hospital (Tokyo, Japan) between 2006 and 2012. Patients aged 65 years or older and patients with a diagnosis of vocal fold atrophy were included in this study. The diagnosis of vocal fold atrophy was based on laryngoscopic or laryngostroboscopic findings such as bowing of the vocal fold, prominence of the vocal process, a spindle-shaped glottal gap, and an anterior glottal gap or a large open quotient during phonation. The diagnosis was made by three or four certified otorhinolaryngologists specializing in vocal treatment. Vocal fold atrophy in patients aged ≥65 years is termed *presbylarynx* in the present report. Patients with other laryngeal diseases such as vocal fold paralysis, vocal fold polyp, or laryngeal carcinoma were excluded. As for sulcus vocalis, patients with a type 1 sulcus (physiological sulcus) were included in the category of vocal fold atrophy, whereas patients with a type 2 sulcus (sulcus vergeture) or a type 3 sulcus (true sulcus vocalis) were excluded from this study.[17]

Study design

First, the number of patients aged ≥65 years was calculated to determine the recent trend.

Subsequently, for patients with vocal fold atrophy, the demographic data, subjective voice rating (obtained with three questionnaires), parameters of vocal function and quality, and laryngostroboscopy findings were analyzed. These clinical data were analyzed with stratification for age and gender.

Finally, clinical data were compared between patients with presbylarynx and vocally healthy elderly subjects voluntarily participated in the present study to determine risk factors for presbylarynx.

Assessment

Demographic data. Demographic data included the age, gender, history of serious medical problems (such as malignancy, ischemic heart disease, or cerebrovascular disease), *the chronic medical condition* (*CMC*) *score*, vocal abuse, smoking, alcohol intake, history of weight loss, history of allergic disease, and history of reflux laryngitis. The *CMC score* is an objective measure of the burden of CMCs, which was proposed by Mau et al[12] based on the Medical Outcome Study of Stewart et al.[18] The CMC score is calculated as follows: 6 points for coronary artery disease, chronic heart failure, or depression; 3 points for COPD; and 2 points for diabetes, back problems, or arthritis. Vocal abuse was defined as the presence of high daily demand on voice use: being a professional voice user (eg, school or kindergarten teachers, professional singers, managers, or executives) and active participation in singing, chorus, or poetry groups was judged as vocal abuse. The diagnosis of reflux laryngitis was based on positive reflux-associated symptoms (eg, throat clearing or globus pharyngeus), positive laryngoscopic findings of "posterior laryngitis" (eg, pseudosulcus or posterior commissure hypertrophy), and a positive response to short-term administration of proton pump inhibitor.[19]

Questionnaire assessment. For subjective assessment of vocal and laryngeal function, the voice handicap index-10 (VHI-10), voice-related quality of life (VRQOL), and frequency scale for the symptoms of gastroesophageal reflux disease (FSSG) were used.[20–22]

Aerodynamic and acoustic measurement. Vocal function and voice quality were evaluated by measuring aerodynamic and acoustic parameters. The aerodynamic parameters including the MPT, and MFR were measured with a Nagashima PE-77E Phonatory Function Analyzer (Nagashima Medical Inc., Tokyo, Japan). Acoustic parameters included the fundamental frequency (F_0), amplitude perturbation quotient (APQ), period perturbation quotient (PPQ), and harmonic-to-noise ratio (HNR), which were measured at the University of Tokyo with a dedicated software program.

Videostroboscopy. Videostroboscopy was performed either transorally with a rigid endoscope or transnasally with a flexible fiberscope to assess synchronization, amplitude, mucosal wave, phase difference, open quotient, glottal gap (if present), and supraglottic hyperactivity. The film segment when a patient was phonating /i/ at comfortable loudness and comfortable F_0 was selected for evaluation. Synchronization was assessed by the 2-point scale: 0 = poor or no synchronization and 1 = good or fairly good synchronization. Amplitude and mucosal wave was assessed by the 3-point scale: 1 = diminished or none, 2 = normal, and 3 = increased. Left-right difference of amplitude and mucosal wave, lateral phase difference, and longitudinal phase difference was assessed by the 2-point scale: 0 = absent and 1 = present. For longitudinal phase difference, the type, either posterior-to-anterior or anterior-to-posterior, was also evaluated.[23,24] Open quotient was assessed by 5-point scale: 0 = no opening, 1 = diminished open phase, 2 = normal open phase, 3 = prolonged open phase, and 5 = no closure. Supraglottic hyperactivity was defined by the excessive constriction of supraglottic structure including ventricular folds, aryepiglottic folds, and epiglottis. Supraglottic hyperactivity was assessed by the 2-point scale: 0 = no or mild supraglottic hyperactivity with good glottal exposure and 1 = moderate or severe supraglottic hyperactivity with poor or no glottal exposure.

Assessment on vocally healthy subject. Twenty healthy elderly subjects without vocal complaints (eight males and 12 females with a mean age of 73 years) were also recruited and underwent aerodynamic studies (eg, MPT and MFR) and acoustic studies (F_0, APQ, PPQ, and HNR). Aerodynamic and acoustic parameters as well as demographic data of vocally healthy subjects were compared with the presbylarynx patients to investigate factors predisposing to presbylarynx.[23,24]

Statistics

Differences of age and gender were evaluated for the above-mentioned parameters. For comparison between male and female subjects or younger (<65 years) and elderly (≥65 years) subjects, Student *t* test was used for normally distributed parameters, whereas the Mann-Whitney *U* test or chi-square test was used for other parameters. For *post hoc* analysis, Scheffe *F* test was used. To assess the correlation with age, Pearson correlation analysis was used for normally distributed parameters