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April 2016

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Presbyphonia: The Aging Voice

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Presbyphonia, also known as presbylarynx or aging voice, refers to the age-related alterations in the upper aerodigestive tract that result in changes to a person's voice. While presbyphonia itself is not pathologic, it can influence a person's ability to communicate and have social, work-related, and psychological effects. If the changes progress to the point where they impair an individual's ability to communicate effectively, then presbyphonia can significantly affect a person's quality of life.

Voice Production

Three components work together to produce the voice. One is the lung, which - in conjunction with the diaphragm and muscles of the rib, back, and abdomen - presents a stream of air to the larynx.

The second component is the larynx itself. As air passes through the larynx, the vocal cords vibrate, creating a variety of sounds that pass upward through the glottis.

Finally, the sound is resonated through the supraglottic vocal tract, which includes the throat, mouth, and nose. These air chambers shape the sound into words or song.

Age-Related Changes in Voice Production

The function or structure of all three of the above-mentioned components change with age.

Lung The lung's contribution to voice production changes because there is a decreased force (FEV1), and rate of contraction of the respiratory muscles, along with a stiffening of the thorax and loss of elasticity of lung tissue. These changes diminish the upward flow of air from the lungs through the larynx.

Larynx The larynx also changes. The cartilage in the larynx calcifies. The arytenoid joints within the larynx develop irregularities. And, the muscles of the larynx undergo atrophy with a corresponding increase in fatty infiltration and connective tissue. All of these changes reduce tension on the vocal cords, making the voice weaker and breathier.

These age-related laryngeal changes influence the pitch of the voice. Typically, the voice becomes weaker, breathier, and more high pitched. It can be difficult to hear the aging voice in noisy environments, such as restaurants or social gatherings. In addition, many individuals report significant vocal fatigue.

On visual examination of the larynx in older adults, one typically sees bowing or atrophy of the vocal cords with an elliptical glottic gap between them. These changes can be contrasted to the appearance of the larynx in a younger individual by comparing Figures 1 and 2 on the other side of this page.

Supraglottic Vocal Tract With age, the facial muscles atrophy and lose elasticity, as does the oral mucosa. Dental structure also changes (e.g., tooth loss). In addition, there are degenerative changes in the palatal and pharyngeal muscles. Finally, diminished salivary function leads to oral dryness, discomfort, and dysphagia. Some older adults have occasional episodes of aspiration.

All of these factors - changes in the lungs, larynx, and supraglottic vocal tract - lead to the classic senescent voice changes. These are listed in Table 1.

Table 1. Classic Senescent Voice Changes	
Weak	Rough
Breathy	Voice Fatigue
Pitch changes	Aspiration while speaking

Diagnosis

To make the diagnosis of presbyphonia, other conditions that can present with similar voice complaints must first be excluded. Examples include vocal cord nodules or cysts, vocal cord paralysis from a variety of conditions, including cancer, and Parkinsonism. Patients with depression, or frailty syndrome, may also demonstrate a softer/weaker voice. This may be helped by treatment.

TIPS ABOUT DEALING WITH PRESBYPHONIA

- When older adults have voice changes, they should undergo an examination with laryngoscopy and videostroboscopy to exclude pathological conditions, and if none are present, confirm that the findings are consistent with presbyphonia.
- Refer patients with presbyphonia for voice therapy with a speech and language pathologist.
- For patients whose quality of life is significantly impaired by presbyphonia, and who have not had satisfactory improvement with voice therapy, consider referral for procedures like injection laryngoplasty (medialization) or bilateral thyroplasty.

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The key diagnostic tests are (a) laryngoscopy during respiration, phonation, and at rest, and (b) videostroboscopy (examining the vibratory pattern of the vocal folds during phonation with a strobe light). Abnormalities of this vibration suggest conditions such as polyps or cysts.

Individuals with presbyphonia will have normal mobility of the vocal cords and normal vibration. But, they will have bilateral vocal cord atrophy that interferes with the ability to tightly appose the cords. This vocal cord insufficiency contributes to the weak, breathy senescent voice (Figure 2).

Treatment

A variety of treatments are available, the choice of which is usually based on how a person's voice changes affect quality of life. Most patients are encouraged to try voice therapy before moving on to invasive procedures.

Voice Therapy Voice therapy is administered by a speech and language pathologist and involves two components. The first component is education about voice production and vocal health. The second is voice exercises, in which patients are taught voice production techniques to strengthen the voice. Voice therapy is the first-line treatment and most patients participate in 4-8 therapy sessions.

Invasive Procedures For patients requiring additional treatment after voice therapy, there are both endoscopic and open procedures. Fewer than one in five patients with presbyphonia undergo these procedures.

Injection laryngoplasty (medialization injection) involves injection of material (calcium hydroxylapatite, hyaluronic acid, collagen, or others) adjacent to the vocal folds to close the glottic gap between vocal cords. It can be performed under general anesthesia or as a convenient office-based procedure.

Another more definitive approach, bilateral medialization thyroplasty, is an open surgical procedure performed under local anesthesia with mild sedation. The larynx is accessed via the neck and a small window is created in the laryngeal cartilage overlying the vocal cords. Material is implanted deep to the laryngeal cartilage to medialize the vocal cords.

If voice therapy has not provided adequate results, most laryngologists will recommend a trial of injection laryngoplasty first. If results are satisfactory, patients can repeat injections or proceed with definitive correction by undergoing bilateral medialization thyroplasty.

Which Treatment is Best?

There is limited research that focuses specifically on age-related presbyphonia. Several small studies have shown improvement in voice-related quality of life with specialized voice therapy and surgery. Others have shown poor outcomes with both voice therapy and surgery. Suffice it to say that rigorous prospective trials are needed to evaluate outcomes. Furthermore, it has become clear that glottis incompetence is only one component of age-related dysphonia. Future studies need to focus on the complex process of phonation and the specific changes with age.

Figure 1, left, shows the larynx of a young adult. Note the closely apposed vocal cords.

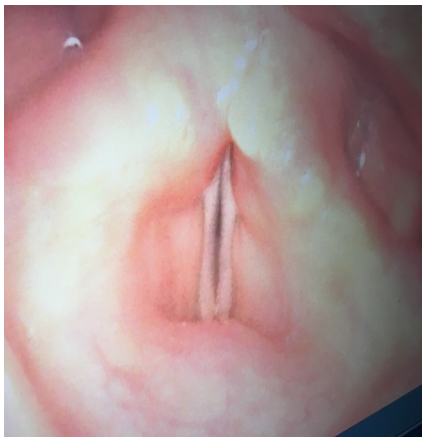

Figure 2, right, shows the larynx of an older adult. Note that the vocal cords are not tightly apposed, leaving a glottic gap.

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Supported by: Donald W. Reynolds Foundation, Arizona Geriatric Education Center and Arizona Center on Aging

This project was supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under grant number U1QHP28721, Arizona Geriatrics Workforce Enhancement Program. This information or content and conclusions are those of the author and should not be construed as the official position or policy of, nor should any endorsements be inferred by HRSA, HHS or the U.S. Government.