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Vocal Hoarseness (Trachyphonia)

Causes and Treatment

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1 Definition

"Hoarseness" (trachyphonia) is frequently used as an umbrella term for an alteration of any kind in vocal quality. This alteration in sound, including a tremulous voice, a weak voice, fatigue, a change in vocal pitch, breathy-sounding voice, or a strained voice, may indicate a number of underlying causes [1].

Trachyphonia accounts for approximately 1% of general practitioner appointments. The following are the principal conditions leading to trachyphonia: acute laryngitis (42.1%); chronic laryngitis (9.7%); functional disorders of the voice (30%); neoplasms (benign, between 10.7% and 31%; malignant, between 2.2% and 3%); neurological causes, e.g., vocal fold paresis (between 2.8% and 8%); age-related change (2%); and psychological (between 2% and 2.2%). Only seldom does trachyphonia point to a systemic disorder. Management of trachyphonia has been addressed in a small number of randomized controlled trials (RCTs), which involved few participants. Voice therapy is frequently of benefit in the management of vocal disorders, of both functional and organic type, as indicated by evidence of level 1a [2].

Dysphonia, mainly trachyphonia, occurs in approximately 1 in 100 patients in general [3]. Around 30% of individuals suffer from hoarseness at some point in their life [4]. Dysphonia may refer to any situation in which the voice is abnormal, whether a voice sounding more trachyphonic (i.e., hoarse), being less able to perform voice tasks, or voice having strained quality.

2 Pathophysiology

Trachyphonia may occur secondary to increased muscular tone, which affects the vibrational characteristics of the vocal cords, the inability to close the glottis when phonating, or a change in the mass of the vocal cord, as may occur with a tumor [2].

3 Etiology

Frequently occurring or significant reasons for trachyphonia include [5]:

Inflammation or irritation

- Allergic reactions and irritant substances (such as smoking, alcohol)
- Direct injury (by being intubated)
- Pollutants found in the environment
- Infection (affecting the upper airways, such as laryngitis caused by a virus)
- Inhalation of steroids
- Reflux as far as the larynx and pharynx
- Overuse of the voice

may be air pollutants (e.g., chemical exposure), gastroesophageal reflux disease (GERD), persistent sinusitis associated with postnasal drip, long-term alcohol misuse, and persistently straining the voice. Smoking not only puts the patient at risk of developing laryngeal SCC; the fumes are also irritant to the voice and may produce nonneoplastic pathological alterations, e.g., keratosis or diffuse polyp formation over the vocal cords [2].

Laryngopharyngeal reflux (LPR) is a condition produced by the reflux of stomach contents (hydrochloric acid and digestive enzymes) to a point above the superior sphincter of the esophagus. This reflux changes the morphology and function of the laryngopharynx [13, 14]. There is considerable evidence that inflammation of the posterior larynx is found in reflux cases. There are interarytenoid hypertrophy and ulcer formation from contact with refluxed fluids, which may or may not also be associated with granulomatous change [15].

Chronic laryngitis occurs at a rate of 3.5/1000 within the population as a whole [16]. It is one step on the path to malignancy of the vocal cords [5, 17]. The following are each considered to be key components of malignant transformation:

- Tobacco usage
- Inhalational steroids
- Breathing in noxious pollutants
- GERD that affects the laryngopharynx

It is common for leukoplakia to occur. Persistent laryngitis may present with hoarseness, feeling something stuck in the throat, and a recurring urge to clear the throat [16]. The management consists of keeping away from the noxious substance in question and using stroboscopic examination at regular intervals as a screening measure in cases of the development of malignant neoplasia [5, 9]. It has been demonstrated through meta-analysis that dysplastic laryngeal mucosa (leukoplakia) has a 14–16% risk of malignant transformation after 43 months on average (range 4 months to 16 years) [18, 19].

4.3 Benign Vocal Fold Lesions

Nodules may be referred to as “singer’s” or “screamer’s” nodes. They occur on both sides and typically exhibit a fair degree of symmetry [20]. Nodules occur more frequently in adult females and children. Misuse of the voice is also common. Nodules begin as an area of edema, then fibrosis arises, and enlargement of the lesion as microinjury continues to occur [1].

4.4 Laryngeal Cancer

SCC develops from the laryngeal mucosa. Metastatic spread is commonly observed in the regional lymph nodes in the neck. At the beginning, there is an appearance of

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Paradoxical Vocal Cord Motion. In this condition, the vocal cords are adducted when the patient breathes in and abducted when breathing out, which results in loud stridor on inhalation. It may mimic asthmatic wheeze. This condition will be examined in greater detail later [1].

7 Associated Systemic and Neoplastic Diseases

A number of endocrinological conditions may feature trachyphonia. This is especially so in hypothyroidism and acromegaly. Inflammatory disorders of the joints, e.g., rheumatoid arthritis, may have laryngeal involvement and hence produce a hoarse voice. Somewhat rarely, sarcoidosis or amyloidosis may result in trachyphonia. Amyloid deposition may be confined to the larynx or be generalized, with the larynx only one of the several sites of deposition [29].

Papillomata can form in the larynx at any age as a result of infection by the human papillomavirus [30]. Leukoplakia seen in the larynx is the external appearance of changes which may represent a benign, premalignant, or malignant neoplastic lesion. Dysplasia (possibly seen as leukoplakia) and SCC have a strong association with tobacco use, alcohol misuse, and GERD [31, 32]. Laryngeal SCC may frequently become apparent initially when the patient complains of dysphonia; however, coughing, bloodstained expectoration, discomfort in the larynx, or painful swallowing can also often be seen in such cases.

8 Treatment

The approach to treating trachyphonia comprises detecting and managing any underlying causes, vocal hygiene, vocal therapy, plus the management of particular conditions that affect the vocal folds [33].

8.1 Vocal Hygiene

Evidence favors educating patients about vocal hygiene to address dysphonia [34, 35]. There have been studies investigating the effect of training patients in the following: how to alter the environment, such as humidifying the air and avoiding smoke, dust, and other air pollutants; changing particular actions, such as not coughing excessively or clearing the throat; changing how they use their voice, such as not shouting or speaking for lengthy amounts of time in a high voice; and modifying the diet by drinking more fluids, not eating excessively, not consuming large amounts of caffeine or alcohol, and avoiding spicy meals. While it could be demonstrated that education generally resulted in improved vocal outcomes, there was no particular intervention that had demonstrable benefit on its own [33].

8.2 Voice Therapy

Voice therapy or vocal training comprises several methods that do not involve surgery but do result in beneficial change to the voice. Voice therapy aims to change how patients use their voice, in such a way as to minimize any damage to the larynx. Vocal therapists suggest exercises, including voice exercises, as well as behavioral modifications, such as paying attention to vocal hygiene, resting the voice, relaxing the musculature, and breathing in the most appropriate way. Appointments are typically of 30 minutes to 1 hour in duration, once a week for a period of between 8 and 10 weeks. A successful outcome is dependent upon the patients taking part actively in the treatment, being careful about vocal hygiene and practicing their exercises [33].

8.3 Surgical Procedures

Unilateral Paralysis – There are operations to treat vocal cord paralysis when it is unilateral by medializing the paralyzed cord. This allows the glottis to close sufficiently, with benefits to vocal production, deglutition, and the ability to cough [36]. Injection laryngoplasty refers to a variety of ways in which material can be injected laterally to the vocal fold, either via the mouth or through the neck. This material may remain permanently or eventually be resorbed and may include autologous fat, collagen, hyaluronic acid, or hydroxylapatite. In a medialization thyroplasty, an implant (generally made from silicone or Gore-Tex) can be inserted via an artificial aperture cut through the thyroid cartilage. There have also been attempts to reattach the nerves supplying the larynx, but results from these attempts have been mixed [37].

Bilateral Paralysis – The rationale for treating bilateral paralysis of the vocal cord is mainly to ensure that the airway remains patent. Operations which increase the patency of the airway typically result in a reduction in the quality of the voice. Potential interventions are the following: tracheotomy, vocal fold lateralization, partial resection of the posterior vocal fold and/or arytenoid, and reattachment of the nerves to the larynx [1].

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