INTRODUCTION

The malignant laryngeal tumors were rarely diagnosed in 19th century. Just after the cigarettes mass-production started in the beginning of 20th century, they became more frequently diagnosed (1). Phononimicrosurgical resection of small glottic carcinoma is very successful in 90% to 95% of patients, but in case of advanced tumor of the vocal cords, it cannot replace other surgical procedures.

Therapeutic indications are pointed at removing of the malignant tumor at first, but also at the preservation of other functions larynx has, as well as to try to solve the problem of voice disorder, which appears after the tissue resection or total removal of larynx (2).

The voice of patients indicated for surgical procedures in treating of dysphonia is already damaged before the operation. The problem, which exists at the level of glottis patients usually try to solve by compensative mechanisms. The quality of voice after the interventions in larynx depends on the type and width of resection, disturbance of physiological phonation mechanisms, and ability to establish optimal phonation automatism. The damage of laryngeal structure, especially its glottic part and vocal cords as its central part, no matter if they are just fibrous or they are partially or totally absent, leads into the development of substitutive phonation mechanisms (3). Depending on performed surgical method and condition in larynx after the operation, there is a different adaptation of some structures at creation of voice.

After the partial vertical laryngectomies Mandell et al. (6) found by videospiroscopic examination that in the vibrating part of resected larynx contralateral false vocal cord comes first, second is the contralateral arytenoid mucosa, and third is contralateral true vocal cord. In the group of patients with arytenoidectomy, the most frequent location of vibration is contralateral arytenoid mucosa, and in the group of patients without arytenoidectomy, mostly vibrated is the contralateral false vocal cord. The best quality of voice is achieved with the participation of true vocal cord, then with the vibration of false vocal cord, and at the end by vibration of arytenoid mucosa.

The common characteristic of almost all findings after the phonosurgical interventions are the signs of hyperkinesis at the level of larynx, so the task of vocal rehabilitation is to establish the phonation automatism as close to normal as possible. The most frequent substitutive phonation mechanisms are vestibular, ventricular, and chordoventricular phonation. There are some variations of these phonation mechanisms, which are conditioned not only by applied surgical technique, but as they are also individual characteristic, they can be the consequence of applied rehabilitation methods.

ABSTRACT

The voice of patients indicated for surgical procedures in treating of dysphonia is already damaged before the operation. The problem, which exists at the level of glottis patients usually try to solve by compensative mechanisms. The quality of voice after the interventions in larynx depends on the type and width of resection, disturbance of physiological phonation mechanisms, and ability to establish optimal phonation automatism. The damage of laryngeal structure, especially its glottic part and vocal cords as its central part, no matter if they are just fibrous or they are partially or totally absent, leads into the development of substitutive phonation mechanisms. The most frequent substitutive mechanisms are: vestibular, ventricular, and chordoventricular phonation. There are some variations of these phonation mechanisms, which are conditioned not only by applied surgical technique, but as they are also individual characteristics, they can be the consequence of applied rehabilitation methods. The diagnosis of voice condition before and after the oncosurgical procedure is done by: laryngostroboscopy, subjective acoustic analysis of voice, and objective acoustic analysis of voice (sonography or computer analysis of acoustic signal). The most of laryngeal carcinomas appear in glottic region, so the function of phonation imposes itself as the objective parameter to measure the quality of life after the oncosurgery of larynx.

That is the reason why according to the priority, it is just behind the principle of "oncologic radicalism". Phonation as the most complex laryngeal function seems to have secondary importance. All known operative techniques, especially partial resections, have the preservation of phonation as their goal.

KEY WORDS: Laryngeal Neoplasms; Voice; Laryngectomy; Phonation
for deglutition. Crevier-Buchman et al. (11) emphasize that in patients after supracricoid partial laryngectomy with cricohyoidoepiglottopexy, in creation of neoglottis, cricoarytenoid and suprahyoid part of epiglottis participate by their approximation.

Laccourreye et al. (12) in patients with surgically formed tracheal-aryngopharyngeal shunt after Pearson (13) analyzed the voice with subjective and objective parameters. They found statistically significant increase of Fo (preoperative, medium value 110.7 Hz; postoperative, medium value 162.7 Hz), as well as the noise components of voice. Although there existed the significantly lesser number of words spoken in one minute (preoperative 155 Hz; postoperative 97 Hz), they consider that such voice and speech are sufficient for the social contact. The diagnosis of voice condition before and after oncosurgery is performed by: laryngostroboscopy (14,15), subjective acoustic analysis of voice (16-20) and objective acoustic analysis of voice (sonography or computer analysis of acoustic signal) (21-23).

THE MOST OFTEN SUBSTITUTIVE PHONATION MECHANISMS

Cordoventricular voice

It is also called glotto-ventricular voice. It arises by approximation of healthy vocal cord and contralateral ventricular fold, above the diseased-surgically treated vocal cord, as the consequence of striving for compensation of disturbed organic structure or function. We see it mostly after cordectomy or in cases of vocal cord sulcus, but it can appear in other conditions. There is a fast voice fatigue (Figure 1).

Ventricular voice

By the approximation of two ventricular folds, we get the ventricular voice. Glottic approximation deficit caused by disturbance of function (vocal cord movements) or its deficiency or significantly changed structure (massive loss), leads into creation of ventricular voice. The development of ventricular voice exists after oncosurgery (horizontal glottectomy), in recurrent nerve paralysis or fixation of cricoarytenoid joint as in hypertrophy of ventricular folds (congenital or inflammatory).

The existence of ventricular voice is explained by the connection of ventricular folds and stylopharyngeal muscles. As ventricular folds are not supposed to be used for phonation, the voice produced in this way is not of good quality and there is fast fatigue and hyperkinetic stereotype of vibration (Figure 2).

Vestibular voice

Forced movements of aryepiglottic folds, which imitate sphincter function, lead into the development of vestibular voice. Besides, it can arise as the consequence of oncosurgical procedure, in which the most part of larynx is resected and it appears after the loss of function of both vocal cords, because of both laryngeal recurrent nerve paralysis. The voice is compensated by involvement of the structures mentioned above. In rare cases, the vocal cords are intact, and the patient uses vestibular voice, like after the lung injury or prolonged intubations. The voice is created with great effort along with fast fatigue and hyperkinetic stereotype of vibration. (Figure 3: The sonography finding).

PHONIATRIC DIAGNOSTICS

The findings of laryngoscopy

In cordoventricular compensation, laryngoscopy usually shows an incomplete approximation between the vocal cord and contralateral ventricular fold, as the consequence of striving for compensation of disturbed organic structure or function. The development of ventricular voice exists after oncosurgery (horizontal glottectomy), in recurrent nerve paralysis or fixation of cricoarytenoid joint as in hypertrophy of ventricular folds (congenital or inflammatory).

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subjective acoustic analysis of voice shows heavy hoarseness and breathiness with significant decrease of voice pitch. When there is a vestibular voice, subjective acoustic analysis of voice, determines significant hoarseness and breathiness. The findings of objective acoustic analysis of voice (sonography) Sonographic findings in cordoventricular compensation (Figure 1) are characterized by shortening of harmonics (incomplete harmonics) and decreased number of harmonics as well as great distance between harmonics along with the presence of noise (24). Sonographic findings in ventricular voice (Figure 2) are characterized by poor harmonic structure and presence of a lot of noise, which completely covers harmonic components (24). Sonographic findings in vestibular compensation (Figure 3) are made of rare harmonics and lots of noise (24).

CONCLUSION The success of laryngeal oncosurgery is primarily estimated by the removal of pathologic process. The most of laryngeal carcinomas appear in glottic region, so the function of phonation imposes itself as the objective parameter to measure the quality of life after oncosurgery of larynx. That is the reason why according to the priority, it is just behind the principle of “oncologic radicalism”. Phonation as the most complex laryngeal function seems to have secondary importance. All known operative techniques, especially partial resections, have the preservation of phonation as their goal.

REFERENCES


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