Videolaryngostroboscopy as a diagnostic method in the clinical practice of otorhinolaryngologists and physicians in dental medicine

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Abstract

Background

The method of stroboscopy of the larynx makes it possible to examine the movement of the vocal cords, through periodic illumination. Most often electronic videolaryngostroboscopes are used. They allow visualization of the vocal cords.

Methods

The research is conducted using a certain technique. The patient sings a certain vocal, in a tonality that is comfortable for him, and by means of a microphone, the energy of the sound signal is electronically converted into light. Through laryngostroboscopy, patients are examined before and after prosthetic treatment, to assess voice capabilities. Pathological processes or functional dysphonias can also be established.

Results and discussion

There are two possibilities for visual perception when analyzing the phonatory oscillations of the glottis: Frozen, still image of vocal fold movement and A moving image (delayed movements of the vocal folds). Laryngostroboscopy can aid the determination of important questions related to the physiology of voice function, as well as assessment and prognosis of voice capabilities before and after prosthetic treatment.

Conclusions

Laryngostroboscopy is used to study the nature of functional disorders of the voice, preliminary differential diagnosis of benign and malignant neoplasms of the vocal cords, to evaluate the results of treatment, to determine the ability of people to work, the profession that is associated with a large vocal and vocal workload and studies the problems of voice physiology.

Key words: videolaryngostroboscopy, ENT practice, dental medicine, prosthetics, phoniatrics, vocal disorders

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Background

The method of stroboscopy of the larynx is one of the methods that allows us to visualize the natural movement of the vocal cords. The stroboscopic effect is a physiological phenomenon of the visual organ based on periodic illumination of a continuously moving object. The actual phonatory oscillations of the vocal folds are replaced by delayed, visualized visual percepts with properties of real movements. As for otorhinolaryngological for the first time Töpler and Ortel already in the period 1866-1878 apply the stroboscopic effect to decompose the motion of fast-moving objects.

We distinguish between mechanical and electronic laryngostroboscopes. Currently, only electronic ones are used, which are based on the principle of automatic self-regulation with the help of microphone and laryngophone control. They consist of a control panel, xenon flash lamp, tone generator with microphone, laryngophone, foot and hand regulator. (15)

The purpose of the following research is to find out whether the patients have disorders of the phonation type or of the articulatory type with the help of a laryngostroboscope and a microphone allowing sound recording and analysis, and if a pathological process is detected, it should be referred for consultation with an ENT surgical specialist, for further behavior.

Methods

It is necessary to note that patient research is carried out after their prior written consent for the protection of personal data

The study itself includes:

- Detailed anamnesis of the patient's complaints, current and past diseases, hereditary diseases in the family
- Otorhinolaryngological examination to establish or exclude pathology in the area of the larynx, including by the method of laryngostroboscopy
- Dental examination to establish dental and oral status, type of bite, presence of harmful habits (bruxism, biting of buccal mucosa, tongue, objects, etc.), presence of pathology in the temporomandibular joints (TMJ), etc. by a specialist - a doctor of dental medicine. Application according to indications and the necessary imaging studies. (3), (4), (14)
- Complete speech therapy examination and examination by a specialist speech therapist to rule out a speech disorder. (5)
- Processing of the obtained research results using statistical methods. Appropriate presentation using figures and tables.

Results and discussion

The technique for conducting the examination with a laryngostroboscope is performed as follows:

The patient sings a certain vocal ("E") in a comfortable tonality. By means of a laryngophone (microphone) connected to the stroboscope, the energy of the sound signal is electronically converted into light. In this way, the pulsed xenon lamp starts to glow and goes out with the same frequency as the frequency of oscillation of the vocal folds.

There are two possibilities for visual perception when analyzing the phonatory oscillations of the glottis:

- Frozen, still image of vocal fold movement – stroboscopic comfort is the result of perfectly matching the number of flashes of the xenon lamp with the oscillation phase of the illuminated vocal folds.
- A moving image (delayed movements of the vocal folds) – a result of the misalignment (derangement) of the illumination phase with respect to the oscillations of the vocal folds. This effect is achieved through the foot (hand) control by actively changing the number of flashes of the pulse lamp relative to the phonating vocal folds.

Stroboscopic indicators with which a moving image is analyzed:

- The frequency of movement of the vocal folds - even, uneven, movement of the free edge of the glottis from the bottom up, lack of vibratory mobility
- Oscillation amplitude – normal, increased, decreased
- Motion stroke – equal opening and closing phase for one period of vibration motion.

Laryngostroboscopy determines:

- Questions related to the physiology of voice function, as well as assessment and prognosis of voice capabilities before and after prosthetic treatment. (10-13)

Because the prosthetic treatment also affects the speech function, through the fabrication of various prosthetic structures. Therefore, the connecting elements of partial removable prostheses must be located in the phonetically neutral zone, as is the vestibular and lingual contour of the teeth.

The goal is to make structures that are, on the one hand, strong enough not to fracture when performing a chewing function, and thin enough not to affect the patient's speech function. (1), (2), (6)

The following processes are also performed:

- Diagnosis and differential diagnosis of functional dysphonias - in hyperkinetic forms - oscillations with shortened amplitude and prolonged closing phase and reverse parameters in hypokinetic forms. (17)
- Diagnosis of processes related to infiltration of a pathological process in the vocal muscle - incipient glottic carcinoma, severe laryngitis with myositis, postoperative cicatricial changes - a lack of movement of a certain section of the vocal fold (the so-called "deaf" zone) is detected. (16)

Conclusions

Laryngostroboscopy is used to study the nature of functional disorders of the voice, preliminary differential diagnosis of benign and malignant neoplasms of the vocal cords, to evaluate the results of treatment, to determine the ability of people to work, the profession that is associated with a large vocal and vocal workload and studies the problems of voice physiology. (7-9)

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