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FUNCTIONAL STATE OF THE VOICE FUNCTION IN ADOLESCENTS

ANNOTATION

In recent years, there has been no tendency to reduce the number of children and adolescents suffering from organic and functional voice disorders. Etiopathogenesis of dysphonias has not been studied enough, however, the most identified etiological factors include overexertion of the vocal apparatus, stressful conditions, and colds. A persistent disorder of the voice function can lead to a restriction of interpersonal relationships, difficulty in the process of social adaptation, which negatively affects the overall development, neuropsychic state, and the formation of the child's personality. The study of the features of voice pathology, in particular in childhood and adolescence, includes otorhinolaryngological, phoniatic, neurological, endocrinological, phonopedic, psychological and other types of examination. The use of traditional phoniatic research methods in children and adolescents is accompanied by certain difficulties associated with age-related anatomical features of the structure of the larynx and the lability of the nervous system. Some of them are not informative enough. X-ray examination is limited due to the radiation load on the growing organism, the need for strict fixation of the child during the study. Functional diagnostic methods do not always accurately reflect the nature and severity of pathological changes in the vocal apparatus.

Keywords: dysphonia, neuropsychic state, phoniatics, larynx, vocal apparatus.

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ФУНКЦИОНАЛЬНОЕ СОСТОЯНИЕ ГОЛОСОВОЙ ФУНКЦИИ У ПОДРОСТКОВ

АННОТАЦИЯ

В последние годы не наблюдается тенденции к снижению числа детей и подростков, страдающих органическими и функциональными нарушениями голоса. Этиопатогенез дисфоний изучен недостаточно, однако к наиболее выявленным этиологическим факторам относятся перенапряжение речевого аппарата, стрессовые состояния, простудные заболевания. Стойкое нарушение голосовой функции может привести к ограничению межличностных отношений, затруднению процесса социальной адаптации, что отрицательно сказывается на общем развитии, нервно-психическом состоянии, формировании личности ребенка. Изучение особенностей голосовой патологии, в частности в детском и подростковом возрасте, включает оториноларингологическое,

фониатрическое, неврологическое, эндокринологическое, фонопедическое, психологическое и другие виды обследования. Использование традиционных фониатрических методов исследования у детей и подростков сопряжено с определенными трудностями, связанными с возрастными анатомическими особенностями строения гортани и лабильностью нервной системы. Некоторые из них недостаточно информативны. Рентгенологическое исследование ограничено в связи с лучевой нагрузкой на растущий организм, необходимостью строгой фиксации ребенка во время исследования. Функциональные методы диагностики не всегда точно отражают характер и выраженность патологических изменений голосового аппарата.

Ключевые слова: дисфония, нервно-психическое состояние, фониатрия, гортань, голосовой аппарат.

Introduction. The problem of early diagnosis and timely correction of voice disorders is socially and economically significant, as voice-speech professions are becoming more widespread in modern society. Many pathological conditions leading to impaired voice function in adults develop in childhood and adolescence. The pathology of the voice in a child progresses gradually and is usually not accompanied by a violation of general well-being. This is the reason for the frequent inattention of parents, pediatricians and pediatric otorhinolaryngologists to the voice problem. The lack of primary screening contributes to a significant prevalence of vocal apparatus pathology in children, which, according to various literary sources, is up to 40% or more and tends to increase [1-4].

Due to the uneven growth of various parts of the vocal apparatus, the child's voice changes throughout his life in strength, pitch, timbre, range, and registers.

The first vocal reaction of the child is a reflex cry, which is some kind of poorly formed vowels. It is he who is assessed at birth on the Apgar scale, and this is practically the only case when the need to assess the child's voice is officially recorded in medical records. By the end of the second month, the sounds made by the baby acquire a different emotional coloring associated with his well-being. At this time, in the cries expressing displeasure, a solid voice attack appears. During cooing and babbling, more and more definite vowels and consonants are formed, which are pronounced on a soft attack of the voice. The formation of speech automatisms indicates a gradual transition of the infant's voice formation to a higher level (from the stage of unconditionally reflex reactions to the formation of more and more complex conditioned connections). In this period, the emergence and further consolidation of an increasing number of sounds is observed. The child reinforces the differentiation between voiceless and voiced consonants. As vocabulary and pronunciation develop, vocal responses become more complex. The child learns to control his voice. A small child likes to imitate animal voices, beeps, calls, and other sharp sounds, although this does not correspond to his vocal abilities [5].

At toddler and preschool age, a child easily masters stress, intonation by imitation; children who have an ear for music usually begin to sing, correctly conveying the motive of what they heard with their voice.

In the future, as the child develops, his voice develops. Intonation and modulation become richer, the range expands [6-9].

The development and change of the child's voice are closely connected with the changes and growth of the whole organism and, in particular, its vocal apparatus and central nervous system. In addition, we see that the development of the voice is inextricably linked with the development of the articulatory and respiratory apparatus, that is, we can say that the development of the voice is inseparable from the development of speech in general. Outside of speech, only elementary manifestations of the voice are possible: screaming, coughing, laughter [10]. It is known that the leading role in the development of speech is played by hearing, with the help of which the child perceives the speech of others, imitates it, and controls his speech. It is quite understandable that the same can be said about the effect of hearing on the voice. Only with good hearing can the voice be fully developed.

The problem becomes relevant when a young person chooses a future profession, when, according to the state of voice function, an applicant may be recognized as unsuitable or partially fit for the chosen type of professional activity, so timely detection and treatment of voice disorders in childhood is relevant [11].

A number of specialists deal with changes or disorders of the voice - speech therapists, acousticians, phoniatrists and otorhinolaryngologists. Given the difference in basic education (pedagogical, technical, medical), a universal classification of voice disorders is necessary.

The creation of a medical and pedagogical classification makes it possible to develop uniform standardized criteria and group all voice disorders according to the acoustic principle into changes:

- resonance (hypo- and hypernasality);
- pitch pitch;
- the strength of the voice;
- voice timbre (hoarseness or hoarseness),

which, in turn, should be divided according to:

- 1) duration (short-term, persistent);
- 2) severity (aphonia, dysphonia);
- 3) the nature of the violation (physiological and pathological, the latter also into functional and organic).

Organic voice disorders of varying severity include voice disorders caused by various pathologies (inflammatory, allergic, nodular or other formations, impaired innervation, etc.), the laryngeal fold proper, upper and lower respiratory tract (DP), which lead to changes in the structure of organs.

With functional dysphonia (aphonia)*, voice disturbances are temporary and transient, when an in-depth endoscopic examination does not reveal any structural pathology of the DP. Voice disturbance in these cases should be explained by the psychological, behavioral and emotional characteristics of the child [12].

An important factor in children is the age criterion of the norm. It is impossible not to take into account the factor of the formation and development of the child's voice. It is well known that children are characterized by incomplete closure of the vocal folds, due to the peculiarity of the falsetto mechanism of voice formation, the growth ("maturation") of the structures of the larynx and surrounding organs and tissues, as well as the lack of final differentiation of all layers of the vocal fold. In terms of "adult" classifications, all children can be diagnosed with "functional dysphonia". But unlike adults, the quality of the child's voice may not be disturbed at all or change periodically. Such conditions are defined as "physiological age-related dysphonia", as well as a normally occurring mutation. Acute mutational dysphonia should be attributed to pathological age-related voice disorders.

Voice changes can be caused by the action of various drugs (inhalants, etc.) - such conditions are called narcotic dysphonia.

Etiological factors of dysphonia (aphonia) depend on the age of the child. In our clinic, for a number of years, voice disorders in children and adolescents have been one of the priority areas of scientific research.

Studies have been conducted to assess the prevalence of voice disorders in children in Moscow. According to the data obtained, the prevalence of various voice disorders was 34.8%, while in more than 70% of cases neither parents nor teachers paid attention to abnormal voice quality. The main contingent consisted of children attending children's educational institutions (kindergartens and schools), as well as their peers who do not attend such institutions.

It was found that among functional dysphonias, the most common in children is hypertonic dysphonia - 93.1% of cases, hypertonic dysphonia accounted for 2.6%, hypotonic dysphonia - 4.3%. Among the causes of organic dysphonia, acute laryngitis (37.4%) and nodules of the vocal folds (35.8%) are ranked first with a slight difference, followed by acute stenosing laryngotracheitis and acute mutational dysphonia (7.2%), chronic laryngitis (6.5%) and supraglottic edema (5.9%).

The next direction of our work was the study of the characteristics of voice disorders in infants and young children [13]. An analysis of the negotiability of children showed that recently the quality of the voice has been given more attention and the change in voice serves as the basis for referring the child for a consultation with a specialist - an otorhinolaryngologist [14].

Examination of 70 children aged 1 month to 3 years, referred for endoscopic examination for dysphonia/aphonia, showed that dysphonia of varying severity was observed in 63 (90%) and aphonia in 7 (10%) patients.

The aim of the work was analysis of the pathology of the vocal apparatus in adolescents mastering the voice-speech profession.

Material and methods. The analysis of the pathology of the vocal apparatus was carried out according to the data on the appealability of adolescents (under 18 years old) to an appointment with a phoniatrist of the multidisciplinary clinic of TMA, the department of otorhinolaryngology. The state of the voice function in students was studied during a preventive examination of students of 1-5 courses of the medical faculty of TMA.

Results.

The proportion of patients with voice pathology among children who first applied to a phoniatrist was 64–68%, which is higher than the data we have encountered in the literature (40% and more). However, it should be noted that the phoniatic reception consists mostly of patients with complaints of voice disorders and does not cover the entire pathology of the ear, throat, nose.

According to the data obtained and according to the literature, the most common pathology of the vocal apparatus in childhood is nodules of the vocal folds, the so-called “screamer nodules”, or “vocal calluses”. Given the lack of alertness of specialists and parents, vocal cord nodules in children are a chronic disease that requires long-term medical treatment and mandatory phonopedic correction, since conservative treatment of this pathology is ineffective without changing the manner of voice leading. Surgical treatment of vocal fold nodules in children, taking into account the anatomical and physiological characteristics of the children's larynx, is extremely rare.

The next most common are acute and chronic inflammatory diseases of the larynx, often associated with chronic pathology of the nose, nasopharynx, and pharynx. An important role in the development of the pathology of the larynx is played by the syndrome of postnasal drip, due to the constant infection of the larynx with sputum, as well as the tension of the vocal folds with frequent coughing. An increase in the proportion of functional voice disorders (dysphonia and aphonia), as well as mutational dysphonia, was observed by us in older children and adolescents, when the influence of the functional state of the nervous and endocrine systems of a growing patient increases on the vocal apparatus.

The increase in the number of voice pathologies is facilitated by the growth of daily emotional and voice load associated with increased neuroticism of the child population, as well as the widespread development and popularity of the network of public and private children's musical and theater groups. Neglect of the principles of protection and hygiene of the voice in childhood, the long-term vicious mechanism of voice formation in a child subsequently leads to the formation of persistent and irreversible functional and organic diseases of the vocal apparatus. As a result, according to our observations, professions associated with voice tension are sometimes obtained by persons whose vocal apparatus is obviously not adapted to high voice loads, i.e., those who initially have contraindications for them.

A survey of students of the Faculty of French at the Moscow State Linguistic University showed that more than 30% of first-year students had some kind of voice dysfunction, and the pathology worsened by the senior years. The highest frequency of pathology of the voice function was observed in 4th year students (up to 60%), when, due to the addition of a second foreign language to the training program, the voice load increases sharply (Table 1).

Table 1

The frequency of revealed violations of the voice function in students of different courses

Course	Number of examined students, n	Number of students with voice impairment		
		total, n (%)	org. dysphonia, n (%)	funkt. dysphonia, n (%)
1	26	9 (34,6%)	2 (7,7%)	7 (26,9%)
2	21	10 (47,6%)	6 (28,6%)	4 (19,0%)
3	16	7 (43,8%)	2 (12,5%)	5 (31,3%)
4	15	9 (60,0%)	8 (53,3%)	1 (6,7%)
5	15	7 (46,7%)	4 (26,7%)	3 (20,0%)

Diagnosis of diseases of the larynx in children presents a certain difficulty due to the anatomical, functional and psychological characteristics of a small patient. Conducting such a simple and most accessible method for primary examination of the larynx, as indirect (mirror) laryngoscopy, is difficult due to the often negative attitude of the child to the examination, and in young children it is almost impossible. Direct

laryngoscopy is considered an alternative, however, the applicability of this diagnostic technique is limited by the complexity of its implementation, which requires general anesthesia and hospitalization of the patient. The importance of direct subanesthetic laryngoscopy increases with the simultaneous planned surgical treatment of laryngeal disease.

Promising in pediatric practice and in laryngology in particular are endoscopic techniques that have practically no age restrictions. With fibrolaryngoscopy, it is possible to simultaneously examine the region of the choanae, the nasopharynx, assess the state of adenoid vegetations and the mouths of the auditory tubes, and identify the pathology of the ENT organs, which may be the cause or background of the development of dysphonia. However, in accordance with the characteristics of different age groups, there are some features of the use of various endoscopic techniques.

Radiation methods of visualization of the larynx can significantly supplement the results of laryngoscopy, but one should keep in mind the radiation exposure to a small patient during the study, as well as the need for a long stay in a motionless state, which is often achieved by medical sleep or anesthesia.

The possibility of ultrasound examination of the larynx is discussed. The absence of known side effects, painlessness, non-invasiveness make this method the most promising in terms of examining children. Although the resolution of modern ultrasound equipment does not allow visualization of small neoplasms. This method is considered as the primary express diagnostic method for determining indications for further direct laryngoscopy.

The search for more effective and accessible methods for pediatric laryngology continues. Promising in this regard are methods based on acoustic analysis, productive, accessible, non-invasive, highly informative, quite applicable for screening examinations, diagnosis and control of the dynamics of treatment of dysphonia in childhood.

Conclusion.

Violations of the voice function in childhood are quite common. At the same time, the attention and alertness of adults who are close to the child (parents, teachers, medical specialists) to the problem of protecting the child's voice are insufficient. The most common pathology of the vocal apparatus in childhood - nodules of the vocal folds, is usually detected rather late and requires long-term treatment and phonopedic correction.

Diagnosis of pathology of the larynx in children is difficult due to age characteristics.

Increasing attention to this problem, improving primary diagnosis and introducing modern screening techniques (in particular, based on acoustic analysis of the voice) will reduce the prevalence of chronic forms of dysphonia in childhood and will contribute to the prevention of voice disorders in adults, including voice - speech professions.

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