



MODERN APPROACHES TO DIAGNOSTIC AND TREATMENT OF ADENOIDITIS IN CHILDREN

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Abstract. Diseases of adenoids are one of the most frequent types of ENT pathology in childhood. They often occur against the background of frequent episodes of acute respiratory viral infections (ARVI), bacterial rhinosinusitis, allergic rhinitis. Infectious agents are mainly adeno- and rhinovirus, Epstein-Barr virus, and bacteria include *Haemophilus influenzae*, *Streptococcus pneumoniae*, *Streptococcus pyogenes*, *Moraxella catarrhalis*, *Staphylococcus aureus*. Sometimes it is possible to trace a hereditary predisposition to the development of adenoid diseases in children. Among the diseases of the ENT organs, in children of preschool and primary school age, hypertrophy of the pharyngeal tonsil and chronic adenoids are most often detected, which is due to the anatomical location of the pharyngeal tonsil and its physiological features.

Key words: ENT organs, adenoids, treatment, children

Adenoids are growths in the size of the nasopharyngeal tonsils, which, as a result of the increase, cause difficulty in nasal breathing, hearing loss and lead to other problems of the child's body. Being in a normal state, during a visual inspection, the tonsil is not visible. Adenoids are part of the immune system, which helps fight infection and protects the body from bacteria and viruses. They begin to grow from birth and are at their largest around the time a child is three to five years old.

Today, chronic inflammatory diseases of the lymphadenoid pharyngeal ring are the most common among chronic forms of childhood pathology, and operations in this area remain the most frequent surgical intervention in children [1,2]. Therefore, the development of modern effective methods of conservative treatment of children with pathology of the lymphadenoid pharyngeal ring is relevant not only for children's otorhinolaryngologists, but also for pediatricians and family doctors. Taking into account the above, it becomes clear that the pathology of the lymphadenoid tissue of the pharynx, which is quite common among children, is an urgent problem of modern medical science and requires the appropriate attention of specialists. Diseases of the pharyngeal tonsil in the structure of pathology of the upper respiratory tract in children of preschool age make up to 30% [3].

Anatomical and physiological features of the pharyngeal tonsil in children

The surface of the pharyngeal tonsil has the appearance of folds placed sagittally. There are a total of 5–9 oblong, roller-like folds, which are separated by grooves (slits) and are similar to crypts. Follicles and a diffuse accumulation of lymphoid elements are located in the thickness of the folds. Normally, the thickness of the pharyngeal tonsil is 5–7 mm, the width is 20 mm, and the length is 25 mm [4]. These sizes are relative, but their increase indicates hypertrophy of the pharyngeal tonsil (adenoid vegetations).

The pharyngeal tonsil does not have crypts, but only grooves into which the eyes of the glands fall, does not have a capsule and is covered with a multi-row ciliated epithelium.



The pharyngeal tonsil is supplied with blood by the ascending pharyngeal artery. Venous blood drains into the veins of the pharyngeal plexus. The pharyngeal tonsil is innervated by nerve fibers of the branches of VII, IX, X pairs of cranial nerves and sympathetic fibers from the periarterial plexuses [5,6].

Clinical picture

The main ones are airway obstruction and/or symptoms of recurrent upper respiratory tract infections. The frequency of SARS in children with adenoid diseases increases significantly - it can reach 10 episodes per year. The course of infections is longer, they are more often complicated by rhinosinusitis and otitis media. Hypertrophied and/or inflamed adenoids are exactly the "weak" place in the nasopharynx that increases susceptibility to respiratory infections.

Clinical manifestations of adenoid diseases

- Obstructed nasal breathing
- Snoring
- Humility
- Constant mouth breathing
- Frequent prolonged runny nose
- Sleep apnea

Classification of pharyngeal tonsil diseases

All diseases of the pharyngeal tonsil are divided into inflammatory and tumorous [7,8].

Inflammatory diseases:

- acute adenoiditis;
- recurrent adenoiditis;
- chronic adenoiditis;
- pharyngeal tonsil abscess;
- hyperplasia of pharyngeal tonsils (adenoid growths, adenoid growths, adenoids).
- tumor diseases:
- benign (cyst);
- malignant (lymphosarcoma).

Acute adenoiditis

Adenoiditis in childhood is characterized by the course both against the background of the growth of adenoid tissue (hypertrophy of the pharyngeal tonsil) and in the absence of the latter. The terms "adenoids" and "adenoiditis" can complement each other, that is, indicate whether adenoid vegetations are accompanied by an inflammatory process or not [9,10,11].

Patients with acute adenoiditis (acute inflammation of the pharyngeal tonsils) complain of pain and a burning sensation in the nasal part of the pharynx and nasal cavity, difficulty breathing through the nose, mucous-purulent secretions from the nose, snoring during sleep, general weakness, and "closed" hoarseness. The sensation of plugging the ear indicates changes in the auditory tube.

During anterior rhinoscopy, the phenomena of acute rhinitis are observed. During posterior rhinoscopy, an increase in the pharyngeal tonsil, its hyperemia, mucopurulent secretions, which flow down the hyperemic back wall of the pharynx, are noted.



The disease lasts 5–6 days, but often turns into a subacute or chronic form. Often, the acute process passes to the tubal tonsils and then to the side rolls. At the same time, during pharyngoscopy, swollen rolls, sharply hyperemic follicles with the presence of whitish point plaques on some of them are visible. The disease can be complicated by acute otitis media, throat abscess, pharyngitis, laryngitis.

During differential diagnosis, it is necessary to take into account diphtheria of the nasal part of the pharynx; it occurs rarely, but is difficult to diagnose.

Treatment includes the use of aerosols with antiseptics 2–3 times a day, vasoconstrictor, antiseptic nasal drops (4–5 drops 3 times a day). It is advisable to use multivitamins, antihistamines and tonics. If the treatment is ineffective and the subacute form of the disease develops, the nasal cavity is washed with solutions of antiseptics and decoctions of medicinal herbs, and antibiotics are used according to the antibiotic chart for 10 days. Shorter courses of treatment (5–7 days) often do not ensure the eradication of bacterial microflora [9].

Chronic adenoiditis

The frequency of development of chronic adenoiditis is up to 10% in patients without hypertrophy of the pharyngeal tonsil, and in its presence it is much higher (21.5–83.7%).

In the development of chronic adenoiditis, suppurative cocci, bacteria, viruses and opportunistic microorganisms are most important, which, against the background of a decrease in local and general immunity due to the action of exo- and endogenous factors, lead to the development of chronic inflammation of the pharyngeal tonsils. The latter most often occurs as a result of transferred acute adenoiditis. Pathomorphological changes are almost similar to those in chronic tonsillitis. Often, the inflammatory process spreads to the lateral rolls, the auditory tube, and the mucous membrane of the pharynx.

The child periodically notices difficult nasal breathing, frequent and prolonged runny nose, sleep and appetite disturbances. Hoarseness, subfebrile body temperature, headache, general weakness, enuresis, a feeling of congestion in the nasal part of the pharynx and ear, dry mouth and slight pain in the nasal part of the pharynx, cough due to the flow of mucous secretions in the larynx are also registered.

During the general examination, pallor of the skin, a decrease in the layer of subcutaneous fat, impaired development of the jaw and respiratory systems, and an increase in occipital and cervical lymph nodes are noted. Often these children lag behind in physical and mental development as a result of chronic intoxication. During rhinoscopy, the inflammatory process in the pharyngeal tonsil is noted; mucous, mucopurulent and (rarely) purulent secretions that flow into the oral and laryngeal parts of the pharynx and even into the larynx, trachea.

During an endoscopic examination of the nasal part of the pharynx, the surface of the adenoid vegetations is loose, pale gray or vitreous, the swelling resembles nasal polyps. At the bottom of the nasal cavity, the back surface of the soft palate, the back wall of the nasal part of the pharynx, mucous secretions of a milky white color are found. There is no plaque, which excludes diphtheria. However, patients with chronic adenoiditis should always be swabbed for diphtheria bacillus because the nasal part of the pharynx is a reservoir for it.



Patients with chronic adenoiditis often have diseases of the nasal cavity, paranasal sinuses, auditory tube and ear, pharynx and larynx, as well as pathological changes in the lower respiratory tract, cardiovascular and immune systems. Violation of systemic immunity is manifested in suppression of the phagocytic and T-cell link, imbalance of immunoglobulins (immunoglobulin — Ig) A, M, G and secretory Ig A.

2-3 courses of conservative therapy are carried out, which consists in the use of antihistamine, immunocorrective, stimulating drugs, vitamins, aerosols (Aqua Maris® line of drugs, Meralis® nasal spray based on sea water with minerals and trace elements), electroaerosols with antiseptics, antibiotics and washing of the nasal part of the pharynx with a 10% solution of povidone-iodine, diluted 10–30 times, or with another modern antiseptic.

In case of failure of conservative therapy, adenoidectomy is performed under general anesthesia. As a rule, surgical treatment is carried out for hypertrophy of the pharyngeal tonsils of the II-III degree; however, the indication for the operation is not so much the size of the adenoids, but the development of disorders caused by them in the child's body.

The Dane Wilhelm Meyer is considered the founder of pharyngeal tonsil surgery, who discovered a bulging tissue in the nasal part of the pharynx, similar in appearance and color to earthworms, and made a ring-shaped knife (curette) to remove this tissue. Adenoidectomy — the removal of a hypertrophied pharyngeal tonsil — was performed by V. Meyer for the first time in 1868 in Copenhagen according to his own method using an instrument he had designed himself. This operation has not only become the most common surgical intervention in children - it is considered the most successful surgical method of treatment in general. With the help of a qualitatively performed adenoidectomy (if it is performed according to the indications, technically correctly and in advance), it is possible to positively influence the work of the respiratory and hearing organs, the physical and mental development of the child, as well as to determine and improve the quality of his future life [4,9].

It should be noted that adenoidectomy should be performed only after the inflammatory process subsides, regardless of the degree of enlargement of the pharyngeal tonsil and the patient's age [9].

Hypertrophy of the pharyngeal tonsil

Etiological factors in the development of hypertrophy of the pharyngeal tonsils and adenoiditis in childhood are not only recurrent viral and bacterial infections, but also allergic diseases, concomitant pathology of the immune and neuroendocrine systems, metabolic disorders [10,12,13].

The main clinical sign of the presence of adenoids is difficulty in nasal breathing, sleeping with the mouth open, general and local manifestations of inflammation. The degree of nasal breathing disorder depends on the size, shape and structure of the adenoids, the relative size of their volume to the size of the cavity of the nasal part of the pharynx, as well as accompanying inflammatory changes [4,7]. Obstruction of nasal breathing and limitation of the mobility of the soft palate due to impaired blood circulation in it, as well as changes in the volume of the upper resonators cause speech function disorders, the so-called rhinolalia clausa posterior. At the same time, children pronounce nasal consonant sounds with great difficulty; their speech becomes muffled



and fragmentary. Significant difficulty in nasal breathing leads to breathing through the mouth, children are in a state of constant oxygen starvation. Their chest is narrow and flattened on the sides, the breastbone is slightly forward ("chicken breast") [9,13]. Breathing through the mouth leads to insufficient moistening, warming and purification of inhaled air, constant cooling of the oral cavity, pharynx and lower respiratory tract. A mass of microorganisms and dust particles inhaled through the mouth settles on the mucous membrane of the pharynx and trachea, causing colds, sore throat, pharyngitis, diseases of the bronchi and lung tissue.

Adenoid vegetations during sleep can increase due to venous stasis and lead to a pronounced violation of respiratory function up to the cessation of breathing due to intermittent obstruction of the upper respiratory tract, i.e. to obstructive sleep apnea syndrome. Therefore, children with adenoids often sleep restlessly, with their mouths open, they often snore, and saliva flows from their open mouths. Often, with adenoids and adenoiditis, mucus flows from the nasal to the oral and laryngeal parts of the pharynx, which leads to a prolonged cough.

The inflammatory process often spreads to the nasal cavity, forming rhinitis, rhinosinusitis with abundant secretions from the nasal cavity, irritation of the skin of the bridge of the nose and the upper lip, which becomes hyperemic, thickened, and covered with cracks [9]. As mentioned above, often these pathological conditions develop in parallel with recurrent and chronic inflammatory diseases of the bronchopulmonary system, therefore such patients are simultaneously in the field of vision of otorhinolaryngologists, pulmonologists and pediatricians.

Diagnostics

Diagnosis of adenoid diseases consists in a thorough examination of the nasopharynx. In rare situations, a finger examination of the nasopharynx can be performed. Computed tomography (CT) or magnetic resonance imaging (MRI) of the head and neck are not indicated to evaluate the size of adenoids, but if they were performed for another reason (for example, chronic rhinosinusitis or brain pathology), then with the help of these methods it can be carefully assess the size of the adenoids and their ratio to the choans. An MRI should also be considered if a child's adenoid tumor is suspected.

Flexible (fiberoptic) nasopharyngoscopy is considered the gold standard for diagnosing and assessing the degree of adenoid hypertrophy. This method provides direct visualization of the nasal cavity and nasopharynx. The diagnostic accuracy of flexible nasopharyngoscopy can be of primary importance in determining the indications for adenoidectomy. Only after an endoscopic examination can the degree of hypertrophy of the adenoids is determined. The most common is the classification, according to which three degrees of enlargement of adenoids are distinguished (Table 1).

Degree	Characteristics
I	small-sized adenoids (cover the upper $\frac{1}{3}$ of the choanal lumen)
II	medium-sized adenoids (cover $\frac{2}{3}$ of the blade)
III	adenoids of large size (cover all or almost all of the choanal lumen)



Treatment

Treatment of adenoid diseases is conservative and surgical. It depends on the degree of obstruction of the respiratory tract and the presence of other concomitant diseases that can be complications.

Surgical treatment

Indications for adenoidectomy – surgical removal of adenoids – are:

- chronic (more than 12 weeks) adenoiditis with rhinorrhea, despite at least a 3-week course of antibiotics;
- chronic (more than 12 weeks) sinusitis, despite at least a 3-week course of antibiotics;
- 4 or more episodes of recurrent adenoiditis with purulent otorrhea in the last 12 months in a child under 12 years of age;
- chronic secretory otitis in a child aged 4 years or older with a history of ineffectiveness of previous tympanostomy surgery;
- hypertrophy of adenoids, detected endoscopically/radiologically, with symptoms of airway obstruction, having one of the following manifestations:
 - in children under 3 years of age, there is a syndrome of breathing disorders during sleep lasting more than 3 months with information from parents about apnea, sobbing, shortness of breath during night sleep;
 - in children aged 3-17 years, RDS with assessment of ventilation adequacy at night, including snoring, mouth breathing, apnea;
- pathological conditions that may be associated with sleep-disordered breathing (including growth retardation, poor academic performance, enuresis, behavioral problems, and more);
- obstructive sleep apnea syndrome, diagnosed by polysomnography, with an apnea/hypopnea index >1.0.

Conservative treatment

Operations on adenoids and tonsils are very common, but recently, due to the short-term risks of surgical treatment and the advent of alternative methods of therapy, their frequency has decreased. If there are no indications for surgical intervention, conservative drug treatment is prescribed. According to the tactics of treatment, all children with adenoid problems can be divided into 3 groups (Table 2). This distribution may not depend on the degree of tonsil hypertrophy.

Group	Characteristics	Tactics of treatment
A	Children with minimal manifestations of adenoid diseases that do not require surgical and medical treatment	General strengthening measures (hardening, sanatorium-resort treatment, dispensary observation)
B	Children who do not have indications for surgical treatment	Drug treatment, strengthening measures, dispensary observation
C	Children who have indications for surgical treatment	Surgery

One of the modern and relatively new methods of adenoid treatment is cryotherapy. It consists in point impact on adenoids with liquid nitrogen, the



temperature of which is minus 100-180 degrees Celsius. With this effect of cold on the affected tissue, its subsequent dying and rejection occurs. A new, healthy tissue is formed in its place.

Indications for cryotherapy:

- Adenoiditis (stages 1 and 2);
- Acute rhinitis;
- Chronic rhinitis;
- Frequent colds due to adenoids.

The procedure of cryotreatment of adenoids in children is completely painless and takes place in a playful way. LOR administers local anesthesia through the nose. After that, special tubes are inserted into the nasal passages. Through them, liquid nitrogen is applied to the adenoids. The procedure lasts a few seconds. During cryotherapy, a white vapor begins to come out of the child's nose, which is associated with the smoke from a steamship or the breath of a baby dragon. This situation is used to conduct the procedure in a game manner. The total number of such approaches is from 2 to 3 times.

After the first cryotherapy session, the recovery process takes place, which usually takes up to 2 weeks. After 2-3 months, the procedure is repeated.

At the time of cryotherapy, the child must be clinically healthy. Immediately before the procedure, the child does not need to be fed.

Advantages of cryotherapy:

- Treatment of adenoids in children without surgery;
- Painlessness of the method;
- Reducing the number of colds;
- Hardening of the body;
- Parallel cryoirrigation of ENT organs is possible for the prevention of other ENT diseases.

Cryotherapy (or "cold treatment") is one of the most effective methods of treatment for many ENT diseases. Learn more about how cryotherapy is used in the treatment of snoring and in the treatment of tonsils (tonsillitis).

Cons of cryotherapy:

- The desired result is not always achieved (most often in children with 3rd degree inflammatory processes);
- Aggravation of symptoms is possible within a few days after the procedure.

Endonasal corticosteroids (for example, mometasone furoate) are indicated for long-term elimination of adenoid hypertrophy. The recommended starting dose is 50-100 mcg/day until the effect is achieved (for example, 4 weeks). Then the dose can be reduced to a maintenance dose (25-50 mcg/day for 2 weeks per month), which provides a long symptom-free period. Pan-American recommendations [7] state that the course of treatment for hypertrophy of adenoids should be 8-12 weeks. Mostly, in various studies, a higher dose was first prescribed for 4-8 weeks, and then it was reduced and the treatment was continued for the same amount of time.

A new trend in the treatment of adenoid diseases is the use of respiratory cytoprotectors, represented by Ectobris. Since children with diseases of adenoids suffer from SARS significantly more often and for longer, cytoprotection of the mucous membrane of the upper respiratory tract is aimed at strengthening it, reducing



inflammation of adenoids, duration and frequency of exacerbations of adenoiditis. Cells of the mucous membrane of the respiratory tract under the influence of cytoprotector become more resistant to the influence of negative factors (viruses, bacteria, allergens, etc.) and react less with inflammation to them. Inflammation is less pronounced and lasts less. This can also explain the need to use Ectobris in case of exacerbation of adenoiditis.

Conclusions.

Thus, adenoid diseases are one of the most frequent chronic diseases of childhood. Accurate diagnosis and the use of modern medicines will help with adenoid diseases. Medical treatment is an effective alternative to surgical treatment, so it is worth using the chance of high-quality and safe non-surgical treatment. The emergence of modern methods of conservative treatment makes it possible to reduce the number of surgical interventions in children.

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