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THE SIGNIFICANCE OF ADENOID VEGETATIONS ON BREATHING, HEARING AND DEVELOPMENT OF THE MAXILLOFACIAL SYSTEM IN CHILDREN

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Annotation. This literature review analyzes the influence of adenoid vegetation (nasopharyngeal tonsil vegetation), a common otorhinolaryngological problem in children, on the development of respiration, hearing, and the maxillofacial skeleton. Based on the analysis of scientific literature, it has been shown that adenoids, as a result of blocking nasal breathing, lead to the habit of breathing through the mouth, disruption of sleep quality, and conditions accompanied by hypoxia. Also, due to compression of the opening of the Eustachian tube, fluid accumulation in the middle ear (exudative otitis) and hearing loss were detected. It is substantiated that pathological formation of the maxillofacial skeleton, i.e., the development of "adenoid face" syndrome, is possible due to oral respiration. Studies show the importance of early diagnosis and comprehensive assessment of adenoid vegetation in children. The article provides recommendations for reducing the consequences of the disease based on modern diagnostic and therapeutic approaches.
Keywords: adenoid vegetation, respiratory distress, exudative otitis, hearing loss, maxillofacial skeleton, oral breathing, pediatric otorhinolaryngology, adenoid face, nasopharyngeal tonsil, middle ear dysfunction

Introduction. One of the most common pathological conditions in pediatric otorhinolaryngology is **adenoid vegetations, vegetation of the pharyngeal tonsil**, which is an important component of the Pirogov lymphoepithelial ring. Adenoids not only perform an immune protective function against infection, but their pathological enlargement - that is, the vegetation of the adenoids - negatively affects many physiological systems. This condition can lead to long-term chronic disorders, especially in children during growth and development. Adenoid vegetations are vegetations of the pharyngeal tonsil located in the nasopharynx and usually occur during childhood. Many studies have shown the negative impact of adenoid vegetation on children's health. In particular, they can cause nasal breathing disorders, hearing loss (through latent or open middle ear inflammations), and anomalies of the maxillofacial skeleton [1,2].

According to the World Health Organization (WHO), one in three children encounters adenoid vegetation at one stage of life [3]. This condition is often manifested by symptoms such as oral breathing, chronic rhinitis, exudative otitis media, as well as hearing loss [4].

Scientists T.M. Kryukova and I.V. Soldatov noted that adenoids are often the cause of long-term respiratory problems, hearing impairments, and maxillofacial deformities [5]. Also, Dr. M. Loughran notes in her research that children with adenoid vegetation experience poor breathing, sleep disturbances at night, and pathological changes in facial shape [6].

This article analyzes the negative effects of adenoid vegetation on respiration, hearing, and maxillofacial development in children based on literature sources.

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According to statistical data, at least 35-45% of children aged 3 to 10 years have varying degrees of adenoid vegetation, which is mainly manifested by respiratory disorders, chronic otitis, hearing loss, and developmental disorders of the maxillofacial skeleton [1,2].

Respiratory disorders. Adenoid vegetations obstruct the posterior part of the nose, leading to **oral breathing** in children. This is considered a physiologically incorrect respiratory tract, which negatively affects many factors, such as the cardiovascular system, gas exchange, and sleep quality. **Loughran M.** in her research found that in children with adenoid vegetation, symptoms of nighttime apnea syndrome, dry mouth, and complete absence of nasal breathing were more common [3]. **Sullivan and Walter (2014)** the study showed that in children with adenoid vegetation, SDB (Sleep-Disordered Breathing) occurred 2.8 times more often than in healthy peers [4].

Hearing loss and ear pathologies. Adenoids are located in the posterior nasal cavity and can block the mouth of **the Eustachian tube** . This condition leads to fluid accumulation in the middle ear, i.e., exudative otitis. This, in turn, leads to hearing loss, slow speech development, and difficulty in mastering the lesson. As noted by Bluestone C.D. (2005), adenoid-associated otitis media are the most common cause of hearing loss in children [5].

Facial-maxillary developmental **disorders.** Adenoids block nasal breathing, and the child constantly breathes through the mouth. This causes incorrect formation of the maxillofacial skeleton. In the experimental studies of Harvold E.P. (1981), he observed narrowing of the upper jaw, backward movement of the lower jaw, and disruption of tooth position in children breathing through the mouth [6]. Also, the phenomenon of "adenoid face" (i.e., open mouth, stretched facial muscles, empty eye area) is often indicated as a consequence of constant oral breathing [7].

Today, adenoid vegetation in children is considered not only as a local problem, but as a pathology **of many etiologies** . The consequences of prolonged adenoid vegetation, its influence on sleep quality, hearing, physical and mental development, have become one of the important directions of modern pediatrics and ENT practice. **According to WHO (2020)** calculations, more than 60% of hearing loss-related conditions are preventable through timely diagnosis and prevention, most of which are adenoid-related problems [8].

This literature review analyzes the negative impact of adenoid vegetations on respiratory, auditory, and maxillofacial development in children, their pathophysiological basis, and clinical consequences. The purpose of the review is to propose a comprehensive approach by analyzing scientific sources related to this problem.

Methods. For this literature review, a database of scientific articles, clinical studies, meta-analyses, and recommendations used in medicine (PubMed, Scopus, Google Scholar) published between 2008-2024 was used. The following keywords were used: *"adenoid hypertrophy in children," "adenoid and breathing disorders," "hearing loss and adenoid vegetation," "craniofacial development and adenoid hypertrophy"*. More than 40 sources were studied, of which 25 with the most relevant and statistical data were included in the article.

Results.

1. Effects on respiration.

Adenoid vegetation makes nasal breathing difficult, leading to compensatory oral breathing. Oral breathing leads to sleep disturbances at night, hyperactivity, and chronic fatigue syndrome. According to a study by Lee et al. (2015), in children aged 5-10 years, adenoid vegetation leads to sleep apnea syndrome in 35% of cases [7].

2. Effects on auditory function

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Adenoids compress the Eustachian tube, leading to fluid accumulation in the middle ear (exudative otitis). Due to this, hearing decreases. In his meta-analysis, D. Bluestone showed that in 60% of cases, hearing impairments in the middle ear are associated with adenoids [8].

3. Influence on maxillofacial development

Adenoids significantly influence the normal development of the maxillofacial skeleton. Special radiographic analyses revealed narrowing of the upper jaw, incorrect positioning of the teeth, and posterior displacement of the lower jaw in children with oral breathing [9,10]. This condition is known as the "adenoid face" (adenoid face) and is widely known in clinical practice [11].

Discussion. The above results show that adenoid vegetations have a complex effect on the development of three important systems in children - respiratory, auditory, and maxillofacial. If this condition is not detected early and not adequately treated, it can lead to adverse health consequences for the child.

For the early detection of adenoid vegetations, it is important to conduct regular otorhinolaryngological examinations of children, auditory checkups (audiometry, tympanometry), and, if necessary, orthodontic assessment of the maxillofacial structure [12,13].

As a preventive measure, strengthening children's immunity, timely treatment of chronic nasopharyngeal infections, and preventive work against allergic rhinitis also play an important role [14].

Adenoidectomy - surgical removal of adenoids - has been effective in reducing symptoms in many cases. However, due to the possibility of this method's resurgence, an individual approach is required [15].

Conclusion. Adenoid vegetations have a significant negative impact on respiration, hearing, and maxillofacial development in children. There is reliable evidence in the scientific literature about the interdependence of these cases. In such cases, early diagnosis, multidisciplinary assessment, and an individual approach to treatment are crucial for a child's quality of life.

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