

Chronic adenoiditis

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journals.sagepub.com/home/imr**Hai Wang** 

Abstract

In addition to acute adenoiditis and adenoid hypertrophy/vegetation, chronic adenoiditis is another disease of the adenoids. However, most physicians overlook chronic adenoiditis or confuse it with adenoid hypertrophy/vegetation. The incidence of chronic adenoiditis has increased in recent years as a result of higher rates of chronic nasopharyngeal or upper airway infections. The clinical characteristics of chronic adenoiditis can include but are not restricted to the following: long-term infection (especially bacterial infection); obstruction of the upper airway; infections of adjacent regions, such as the nose, nasal sinus, pharyngeal space, middle ear, and atlantoaxial joint; induced upper airway cough syndrome; and the presence of several “infectious-immune” diseases, including rheumatic fever, autoimmune nephropathy, and anaphylactoid purpura. To date, no consensus on the treatment of chronic adenoiditis is available. However, adenoidectomy can address the local obstruction, and some patients benefit from systemic or local anti-bacterial therapy. Physicians in the Departments of Otolaryngology, Respiration, and Pediatrics should be familiar with the clinical manifestations of chronic adenoiditis and try to develop effective treatment methods for this disease.

Keywords

Adenoids, adenoid hypertrophy, adenoidectomy, chronic adenoiditis, infection, upper airway obstruction

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Introduction

Although chronic adenoiditis is listed in the International Classification of Diseases-10-Clinical Modification (ICD-10-CM) as J35.02 (<http://www.icd10data.com>), most clinicians, including some otolaryngologists, are unfamiliar with this diagnostic terminology. In recent years, an increasing

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number of patients with chronic inflammation of the adenoids and complicated nasal, pharyngeal, and auricular diseases have been admitted to the Respiratory, Ophthalmology, Otorhinolaryngology, and Pediatrics Departments.¹ Therefore, chronic adenoiditis has become a common clinical disease. The aim of this review was to summarize the recent progress in the research on chronic adenoiditis and associated diseases and improve the awareness of this condition among clinicians.

Diseases of adenoids

According to the descriptions in most textbooks, there are only two types of adenoid diseases, acute adenoiditis and adenoid hypertrophy/vegetation. However, the diagnosis of “chronic adenoiditis” is described in some published articles and ICD codes.

Acute adenoiditis

The clinical manifestations of acute adenoiditis include sudden high fever, severe nasal obstruction, mouth breathing, and yellow snot dripping from the posterior pharyngeal wall. Nasal obstruction in infants can lead to dystithia, increased neutrophils, high C-reactive protein (CRP) levels in the peripheral blood, and enlarged adenoids on the lateral image of the pharynx.^{2,3} Because the adenoids are located behind the nose and cannot be directly observed through the mouth, misdiagnosis and missed diagnosis are relatively common in clinical practice. Nasal endoscopy has important value in diagnosing acute adenoiditis. However, this disease is generally overlooked by physicians in the Respiratory and Pediatric Departments of primary and general hospitals. Additionally, diagnostic devices are limited in these hospitals. The clinical manifestations of acute adenoiditis are relatively specific, and thus the

diagnosis is not difficult if physicians are familiar with these manifestations.

Adenoid hypertrophy/vegetation

Adenoid hypertrophy/vegetation is the most common condition reported. It is described in three sections in the ICD-10 as follows: J35.2 (hypertrophy of adenoids), J35.3 (hypertrophy of tonsils with hypertrophy of adenoids), and J35.8 (other chronic diseases of tonsils and adenoids: ...; Adenoid vegetations; ...). The manifestations of simple adenoid hypertrophy include mouth breathing, snoring (which is more severe in the supine position and can progress to obstructive sleep apnea-hypopnea syndrome [OSAHS] in severe cases), and adenoid-face.

Chronic adenoiditis

The use of the term “chronic adenoiditis” was rare in earlier studies. As a description of a clinical manifestation but not a specific term for the diagnosis of a particular disease, no exact definition or diagnostic criteria were available for “chronic adenoiditis”. As of August 2020, less than 100 studies on chronic adenoiditis have been published, and the first authors of more than half of these studies were from Russia. The first study on chronic adenoiditis, which was also authored by a Russian investigator, was published in 1967.⁴ However, eight studies on chronic adenoiditis have been published since January 2019, suggesting that this disease has received increasing attention.

Clinical characteristics of chronic adenoiditis

Manifestations of upper airway obstruction

Chronic adenoiditis involves an increase in the size of adenoids, which induces

continuous or intermittent snoring, mouth breathing, and dry mouth. These symptoms are identical to the manifestations of adenoid hypertrophy and can easily lead to confusion between the two conditions. Adenoid inflammation with concomitant obstructive hypertrophy, but not adenoid hypertrophy, is more commonly found in clinical practice. However, not all cases of chronic adenoiditis are accompanied by evident manifestations of postnasal obstruction.

Long-term inflammation

Adenoids are located at the center and are the pivot point of the upper respiratory tract. Adenoids have many folds or crypts with limited blood flow, and thus bacteria can easily aggregate in them. Rajeshwary et al.⁵ performed bacterial culture with 100 specimens from resected adenoids and found that only 7% of the specimens showed no bacterial growth. Similarly, Badran et al.⁶ found that only four out of 35 specimens of resected adenoids exhibited no bacterial growth. Ren T et al.⁷ conducted 16S rRNA sequencing by PCR for 67 specimens of adenoids and detected 3,121 strains of different bacteria. Rajeshwary et al.⁵ found that the most common bacteria included *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Staphylococcus aureus*, and *Moraxella catarrhalis*. Bacteria in adenoids generally include all of the bacteria found in the nasal cavity, nasal sinus, tonsils, and middle ear effusion.^{5,8-10} Emaneini et al.¹¹ found that *S. aureus* present in adenoids formed extracellular biofilms (BFs). A bacterial BF is a membrane-like substance formed by the polysaccharide matrix, fibrous proteins, and proteolipid proteins secreted by bacteria attached to the surfaces of tissues. BFs contain various types of bacteria and even DNA and RNA. In addition, BFs can enhance the antibiotic resistance

and anti-immune capacities of bacteria. Antibiotics and immune mechanisms of the body only kill free bacteria or bacteria on the surface of BFs. However, in the presence of relatively low antibiotic concentrations or a weak immune system, bacteria that survived in BFs can become free and consequently cause infection.¹² Therefore, adenoids may act as reservoirs for pathogenic bacteria in patients with upper respiratory diseases.¹³

Continuous glandular secretion

Wei et al.¹⁴ performed nasal endoscopy in patients with chronic adenoiditis and found the presence of mucosal edema at the surface of adenoids, which was accompanied by different degrees of mucus or pus adhesion. The adhesion of sticky or sticky purulent discharge, known as postnasal drip syndrome, was identified by looking through the mouth in about half of the patients.

Non-severe systemic infection and intoxication

Because the blood flow to adenoids is limited, the manifestations of systemic intoxication, such as fever, increased leucocytes/granulocytes, and elevated CRP levels, are not typically observed when chronic inflammation is not severe.

Complications and comorbidities of chronic adenoiditis

Adenoids are located at the center of the region between the nose, pharynx, and ears and play a central role in upper respiratory infection and the spread of infection from adenoids to other locations. In addition, inadequate immunity against infection can lead to the development of other diseases.

Rhinitis and rhinosinusitis

Marseglia GL et al.¹⁵ assessed 287 children with the manifestation of upper respiratory infection for more than 10 days. The findings of nasal endoscopy confirmed nasosinusitis in 256 children (89.2%), isolated rhinosinusitis in 207 children (80.85%), nasosinusitis accompanied by adenoiditis in 49 children (19.15%), and simple adenoiditis in 20 children (7%).

Chronic pharyngeal inflammation

Adenoids are important components of Waldeyer's ring. Pathogens, inflammatory cells, and their products can spread along the anatomical spaces and consequently induce acute or chronic infections of the pharynx and adjacent tissues, such as chronic pharyngitis, cobblestone throat, soft palatitis, abscesses of the posterior pharyngeal wall, and abscesses of the peripharyngeal space.

Lymphadenitis

Infection, especially chronic infection, of the nose and pharynx can lead to hyperplasia and the enlargement of the corresponding lymph nodes. This is the major cause of enlarged cervical lymph nodes and intraglandular parotid lymph nodes in children.

Suppurative/secretory otitis media

The pharyngeal opening of the auditory tube is located at the adenoids of the lateral nasopharyngeal wall and adjacent lymphoid tissues. The auditory tube mucosa is connected to the mucosa of the nasopharynx and tympanum and has a secretory function. Infections in adenoids can spread along the auditory tube to the middle ear and consequently induce suppurative otitis media¹⁶ and even mastoiditis. Hyperplastic adenoids can also block the auditory tube, which can subsequently

lead to increased tympanic pressure and earache or induce secretory otitis media.¹⁷

Ozostomia

Previously, ozostomia in children was thought to be primarily caused by gastrointestinal function disorders, such as gastroesophageal reflux and laryngopharyngeal reflux. Recent studies have demonstrated that chronic tonsillitis and tonsillar calculus are the major causes of ozostomia in adults.¹⁸ Tulupov DA et al.¹⁹ examined 37 children aged 5 to 18 years and found that ozostomia was caused by chronic tonsillitis, chronic adenoiditis, chronic rhinosinusitis, and sub-atrophic rhinitis in 31, three, two, and one child, respectively. Dinc ME et al.²⁰ used portable gas chromatography to measure the levels of volatile sulfur compounds, hydrogen sulfide, methyl mercaptan, and dimethyl sulfide in 40 children with adenoid hypertrophy and found significant differences compared with the controls. However, the levels between the two groups were comparable at three months after adenoidectomy.

Upper airway cough syndrome (UACS)

UACS, also known as post-nasal drip syndrome, is a common cause of chronic cough in adults and children and the first leading cause of chronic cough among Europeans and Americans. UACS was previously thought to be mainly caused by rhinitis, nasosinusitis, and allergic rhinitis. However, recent evidence indicated that adenoid diseases are the major cause of UACS.²¹⁻²³ As patients with chronic cough are mainly admitted to the departments of Pediatrics or Respiration for treatment, and the anatomical locations of adenoids are hidden, the misdiagnosis and missed diagnosis of chronic adenoiditis are common. The features of cough caused by chronic adenoiditis are as follows: (1) cough

occurring or worsening upon postural change and (2) cough mainly occurring after falling asleep or when waking up in the morning.

Other infection-induced diseases

Other infection-induced diseases include tic disorders, rheumatic fever, glomerulonephritis, nephrotic syndrome, and anaphylactoid purpura. Murphy TK et al.²⁴ reported that the manifestations of tic disorder in a child with severe OSAHS evidently improved after adenoidectomy. Motta G et al.²⁵ found that the titer of anti-streptolysin O increased significantly in children with repeated tonsillitis/otitis media. Palatine tonsillitis is closely associated with the development and recurrence of glomerulonephritis and nephrotic syndrome. Because the locations and functions of adenoids are similar to palatine tonsils, it is possible that adenoiditis also triggers these diseases.

Upper cervical spine syndrome/cervical spine dysfunction/atlandoaxial subluxation in children

The cervical spine in children is not completely developed, and the functions of support, movement, and protection are not fully established. Atlantoaxial joint instability is very common in children,²⁶ and pharyngeal inflammation is a common cause of atlantoaxial subluxation in children.²⁷ The pharynx and adenoids are adjacent to the atlantoaxial joint, with shared venous and lymphatic circulation. Inflammation can cause atlantoaxial joint effusion, transverse ligament hyperemia, and laxity, thereby resulting in spontaneous luxation or subluxation.

Diagnosis of chronic adenoiditis

To date, no universally accepted diagnostic criteria for chronic adenoiditis are available.

The diagnosis of chronic adenoiditis mainly depends on long-term local infection as follows: 1) reporting foreign body sensations at the pharynx, adhesion of the sputum, and postnasal dripping, along with long-term manifestations of throat clearing, nasopharyngeal inhalation, and expectoration; 2) can be accompanied with other symptoms, including nasal obstruction, running nose, sneezing, rhinocnesmus, dry throat, and headache; 3) physical examination can show evident retropharyngeal folliculitis and cobblestone-like changes, the adhesion of mucinous, or purulent secretion; 4) nasal endoscopy shows mucosal edema on the surface of adenoids accompanied with different degrees of mucus or pus adhesion; and 5) lateral X-ray imaging, local computed tomography scanning, or nasal endoscopy of the nasopharynx shows the enlargement of adenoids and obstruction of the upper airway, which suggests the concomitant presence of adenoid hypertrophy/vegetation.

Treatments for chronic adenoiditis

Owing to the limited understanding of the clinical characteristics and diagnosis of chronic adenoiditis, especially the confusion with adenoid hypertrophy, very limited treatment strategies and measurements are currently available for this chronic infection.

Adenoidectomy

Surgical or medical treatments are available for simple adenoidal hypertrophy, especially in patients with induced OSAHS. For patients with adenoidal hypertrophy accompanied by chronic infection, the surgical indications should be re-assessed after effective treatment with antibiotics. As described above, the infection of adenoids can trigger chronic diseases, including

nephritis, nephrotic syndrome, and rheumatic fever, and even lead to the recurrence and refractory of the diseases. The combined resection of palatine tonsils and adenoids may provide additional benefit for these patients compared with the simple resection of palatine tonsils. However, recurrence was found in some patients who received adenoidectomy, as the local infection was not completely cleared.²⁸

Anti-bacterial treatment

Karpova et al. found that systemic or local anti-bacterial treatments are effective for chronic adenoiditis induced by bacterial infection and that some patients benefited from these treatments.³ Nesterova et al.²⁹ divided 170 patients with chronic adenoiditis into three groups who were administered low-frequency ultrasound for nasopharyngeal disinfection, oral amoxicillin/clavulanic acid, or oral broncho-vaxom for treatment. The findings showed that the effectiveness of oral broncho-vaxom was higher than that of the other two treatments. Some researchers, especially those from Russia,³⁰ topically administer hyaluronic acid for the treatment of otolaryngological disorders, which has shown moderate or high effectiveness. This disease is mainly caused by bacterial infection; however, because of the accompanying issues, including poor local blood circulation, the presence of BFs, and bacterial drug resistance, no agreements have been reached regarding the indications, selection, and duration of antibiotic treatments. According to the diagnostic guidelines for rhinitis and rhinosinusitis,³¹ oral intake of amoxicillin and clavulanate potassium for 10 days is still a treatment choice for children, although the treatment effects remain unsatisfactory.³⁰

Montelukast and glucocorticoids for nasal inhalation

Both montelukast and glucocorticoids for nasal inhalation have good efficacies in treating adenoidal hypertrophy in some patients. However, because both chronic infection and hyperplasia co-exist in chronic adenoiditis, the treatment mechanisms of these two drugs for chronic adenoiditis need to be further investigated and validated.

In summary, chronic adenoiditis is a common disease that is easily overlooked in children. Infected adenoids may serve as a “bacteria pool” in the upper airway and are an important issue in chronic nasopharyngitis and otitis media. Chronic adenoiditis has unique clinical manifestations and is accompanied by various complications and comorbidities that are substantially different than those associated with adenoidal hypertrophy. Adenoidectomy may benefit some patients. More studies and investigations are needed to further the understanding of this disease, and pediatricians should pay particular attention to this condition.


Declaration of conflicting interest

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References

1. Bowers I and Shermetaro C. *Adenoiditis*. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing 2020; PMID: 30725616.
2. Spector S and Bautista AG. Respiratory obstruction caused by acute tonsillitis and

- acute adenoiditis. *N Y State J Med* 1956; 56: 2118–2119.
3. Karpova EP and Kharina DV. The possibilities for the rational pharmacotherapy of adenoiditis in the children. *Vestn Otorinolaringol* 2016; 81: 73–76.
 4. Psakhis BI and Sluvko AL. [Microflora of nasopharyngeal tonsils in chronic adenoiditis]. *Zh Ushn Nos Gorl Bolezn* 1967; 27: 18–22.
 5. Rajeshwary A, Rai S, Somayaji G, et al. Bacteriology of symptomatic adenoids in children. *N Am J Med Sci* 2013; 5: 113–118.
 6. Badran H, Salah M, Fawzy M, et al. Detection of bacterial biofilms in chronic pharyngitis resistant to medical treatment. *Ann Otol Rhinol Laryngol* 2015; 124: 567–571.
 7. Ren T, Glatt DU, Nguyen TN, et al. 16S rRNA survey revealed complex bacterial communities and evidence of bacterial interference on human adenoids. *Environ Microbiol* 2013; 15: 535–547.
 8. Liu CM, Cosetti MK, Aziz M, et al. The otologic microbiome: a study of the bacterial microbiota in a pediatric patient with chronic serous otitis media using 16SrRNA gene-based pyrosequencing. *Arch Otolaryngol Head Neck Surg* 2011; 137: 664–668.
 9. Van Hoecke H, De Paepe AS, Lambert E, et al. Haemophilus influenzae biofilm formation in chronic otitis media with effusion. *Eur Arch Otorhinolaryngol* 2016; 273: 3553–3560.
 10. Taylan I, Ozcan I, Mumcuoglu I, et al. Comparison of the surface and core bacteria in tonsillar and adenoid tissue with Beta-lactamase production. *Indian J Otolaryngol Head Neck Surg* 2011; 63: 223–228.
 11. Emaneini M, Khoramrooz SS, Shahsavan S, et al. Prevalence of Panton-Valentine leucocidin and phenotypic and genotypic characterization of biofilm formation among Staphylococcus aureus strains isolated from children with adenoid hypertrophy. *Microb Pathog* 2015; 89: 150–153.
 12. Kania R, Vironneau P, Dang H, et al. Bacterial biofilm in adenoids of children with chronic otitis media. Part I: a case control study of prevalence of biofilms in adenoids, risk factors and middle ear biofilms. *Acta Otolaryngol* 2019; 139: 345–350.
 13. Brambilla I, Pusateri A, Pagella F, et al. Adenoids in children: Advances in immunology, diagnosis, and surgery. *Clin Anat* 2014; 27: 346–352.
 14. Wei BJ, Ni DF and Zhang LS. Endoscopic surgery of adenoid in treatment for adult chronic adenoiditis. *Zhong Guo Er Bi Yan Hou Tou Jing Wai Ke* 2001; 8: 143–145.
 15. Marseglia GL, Pagella F, Klersy C, et al. The 10-day mark is a good way to diagnose not only acute rhinosinusitis but also adenoiditis, as confirmed by endoscopy. *Int J Pediatr Otorhinolaryngol* 2007; 71: 581–583.
 16. Tomonaga K, Kurono Y, Chaen T, et al. Adenoids and otitis media with effusion: nasopharyngeal flora. *Am J Otolaryngol* 1989; 10: 204–207.
 17. Kocyigit M, Ortekin SG, Cakabay T, et al. Frequency of serous otitis media in children without otolaryngological symptoms. *Int Arch Otorhinolaryngol* 2017; 21: 161–164.
 18. Yu CL, Tao LX and Li XH. Prevalence of tonsilloliths and CT diagnosis. *Zhong Guo Er Bi Yan Hou Tou Jing Wai Ke Za Zhi* 2017; 52: 604–607.
 19. Tulupov DA, Bakhmutov DN and Karpova EP. [Halitosis concomitant with chronic ENT pathology in children]. *Vestn Otorinolaringol* 2013: 59–61.
 20. Dinc ME, Altundag A, Dizdar D, et al. An objective assessment of halitosis in children with adenoid vegetation during pre- and post-operative period. *Int J Pediatr Otorhinolaryngol* 2016; 88: 47–51.
 21. Yu NF, Yu L and Weng ZY. Clinical research of causes and diagnosis of chronic upper airway cough syndrome in children. *Lin Chuang He Shi Yan Yi Xue Za Zhi* 2008; 7: 45–46.
 22. Zhu YL, Wang L and Liu F. Association between upper airway cough syndrome and adenoidal hypertrophy in children. *Zhong Guo Er Bi Yan Hou Tou Jing Wai Ke* 2013; 20: 486–486.
 23. Gu QL, Gao F and Chen YZ. Analysis of upper airway cough syndrome caused by adenoidal hypertrophy and adenoiditis in

- children. *Zhong Guo Zhong Xi Yi Jie He Er Bi Yan Hou Ke Za Zhi* 2011; 19: 343–346.
24. Murphy TK, Storch EA, Lewin AB, et al. Clinical factors associated with pediatric autoimmune neuropsychiatric disorders associated with streptococcal infections. *J Pediatr* 2012; 160: 314–319.
 25. Motta G, Esposito E, Motta S, et al. The treatment of acute recurrent pharyngotonsillitis. *Acta Otorhinolaryngol Ital* 2006; 26: 5–29.
 26. Li Z and Wang SH. Association between upper cervical spine syndrome and tic disorders in children. *Guang Xi Yi Xue* 2004; 26: 1169–1171.
 27. Fernández Cornejo VJ, Martínez-Lage JF, Piqueras C, et al. Inflammatory atlanto-axial subluxation (Grisel's syndrome) in children: clinical diagnosis and management. *Childs Nerv Syst* 2003; 19: 342–347. doi: 10.1007/s00381-003-0749-6. [Epub 2003 Jun 3].
 28. Mitchell RB, Archer SM, Ishman SL, et al. Clinical practice guideline: tonsillectomy in children (update)-executive summary. *Otolaryngol Head Neck Surg* 2019; 160: 187–205.
 29. Nesterova KI and Nesterova AA. The analysis of the influence of the adenoiditis treatment by different methods on the nasopharyngeal microbiocenosis in the children. *Vestn Otorinolaringol* 2015; 80: 56–60.
 30. Pignataro L, Marchisio P, Ibba T, et al. Topically administered hyaluronic acid in the upper airway: A narrative review. *Int J Immunopathol Pharmacol* 2018; 32: 2058738418766739.
 31. [Chinese guidelines for diagnosis and treatment of chronic rhinosinusitis (2018)]. *Zhonghua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi* 2019; 54: 81–100.