



Adenoidectomy: current approaches and review of the literature

Adenoidektomi: Günümüz yaklaşımları ve literatür derlemesi

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ABSTRACT

Adenoid is a secondary lymphoid organ located in the nasopharynx. Due to its location, it plays an important role in the host defense of the upper respiratory tract. Immunoglobulin G3 and immunoglobulin A1 antibodies are prevalent antibodies in the adenoid tissue. Adenoidal hypertrophy is a common condition in children causing symptoms such as mouth breathing, nasal discharge, snoring, sleep apnea, and hyponasal speech. It also plays a role in the pathogenesis of rhinosinusitis, recurrent otitis media, and otitis media with effusion. Currently, adenoidectomy is one of the most commonly performed pediatric surgical procedures worldwide. Although there is still poor evidence in the literature, recurrent upper respiratory infections, otitis media with effusion, and obstructive sleep apnea syndrome are considered to be the main indications of adenoidectomy. Adenoidectomy can be carried out with several techniques and instruments. Although rare, surgery possesses some risks and may cause emotional distress both for the patient and the family. Non-surgical treatments such as intranasal steroids are also used in the treatment of adenoid hypertrophy. In this review, we discuss the current literature on the adenoid function, adenoidectomy indications, and treatment of adenoid hypertrophy.

Keywords: Adenoidectomy; adenoidectomy indication; adenoidectomy technique; function of adenoid; immunology of adenoid.

ÖZ

Adenoid, nazofarenkste yer alan sekonder lenfoid organdır. Yerleşim yeri nedeniyle, üst solunum yolundaki konak savunmasında önemli bir rol oynar. Immünglobulin G3 ve immünglobulin A1 antikorları, adenoid dokusunda yaygın bulunan antikorlardır. Adenoid hipertrofisi çocuklarda ağız solunumu, burun akıntısı, horlama, uyku apnesi ve hiponazal konuşma gibi semptomlara neden olan yaygın bir durumdur. Bununla birlikte, rinosinüzit, tekrarlayan otitis media ve efüzyonlu otitis media patogeneğinde rol oynar. Günümüzde adenoidektomi tüm dünyada en sık uygulanan pediatrik cerrahilerden biridir. Literatürde henüz yeterli kanıt mevcut olmamasına rağmen, tekrarlayan üst solunum yolu enfeksiyonları, efüzyonlu otitis media ve tıkayıcı uyku apnesi sendromunun adenoidektominin başlıca endikasyonları olduğu düşünülmektedir. Adenoidektomi birçok teknik ve araç ile uygulanabilmektedir. Nadir olmasına karşın, cerrahi bazı riskler taşımakta ve hem hasta hem de aile için duygusal stres yaratabilmektedir. Adenoid hipertrofisinin tedavisinde intranasal steroid gibi cerrahi dışı tedaviler de kullanılmaktadır. Bu derlemede adenoid fonksiyonu, adenoidektomi endikasyonları ve adenoid hipertrofisinin tedavisine ilişkin mevcut literatür tartışıldı.

Anahtar Sözcükler: Adenoidektomi; adenoidektomi endikasyonu; adenoidektomi tekniği; adenoid fonksiyonu; adenoid immünolojisi.

Adenoidectomy is one of the most commonly performed pediatric surgical procedures all over the world today, either alone or in conjunction

with tonsillectomy and/or insertion of ventilating tubes.^[1] Annual adenoidectomy rates differ between countries.



Adenoidectomy is an old surgical procedure. The main purpose of the adenoidectomy is to eliminate the nasopharyngeal reservoir of potential respiratory pathogens and to remove the cause of obstruction at the nasal airway. Conventional curette adenoidectomy, first described in 1885, is still a widely used technique today.^[2] Several other techniques, including the use of endoscopes and powered instruments such as microdebrider and coblation are also available. Although the complications of adenoidectomy are rare, all precautions should be taken to prevent unwanted results.

We review the recent literature on this common surgical procedure, its indications and techniques.

FUNCTION OF ADENOID TISSUE

The adenoids (pharyngeal tonsils, Luschka's tonsil) are a mass of nasopharyngeal lymphoid tissue forming part of Waldeyer's ring. It is proposed that they are the 'Cinderella' of Waldeyer's ring because adenoids have rather been neglected in contrast to tonsils.^[3] Adenoids are a single entity located in the upper posterior pharynx that consists of flat longitudinal folds, with sero-mucous glandular ducts opening on the base. The adenoids do not have crypts, and the capsule is fine and incomplete. Adenoids are covered by ciliated columnar pseudo-stratified epithelium with goblet cells and non-keratinous stratified epithelium. They originate from lymph node clusters in the nasal-pharyngeal wall.^[4]

Adenoids and tonsils play an important role in host defenses of the upper respiratory tract against invading antigens. These tissues have four histological compartments participating in the immune response; the crypt epithelium, the follicular germinal center with the mantle zone and interfollicular area. Antigens are taken up by M-cells of the crypt epithelium and this process results in the generation and dissemination of antigen-specific memory and mainly dimeric immunoglobulin (Ig)A-producing effector B-lymphocytes.^[5] Boyaka et al.^[6] showed that adenoids and tonsils contained especially B cells, which produced more IgG than IgA in epithelial and subepithelial compartments, in contrast to other mucosal compartments. In that study, it was demonstrated that IgG1, IgG3 and IgA1 were prevalent antibodies in both adenoids and tonsils. It is known that protein antigens

generally induce IgG1, IgG3, and IgA1 antibodies. Another study also showed that CD5 (+) B cells, part of the natural memory immunity, are a first line of defense in the upper respiratory tract. These B cells are in greatest number in children under three years of age.^[7] Adenoids and tonsils are also suggested to play a role as inductive sites for nasal vaccines and effector sites for antibody responses.^[6] Immunological findings suggest that removal of adenoids in young children should be avoided to minimize the risk of immune compromise.^[7] However in children aged 4-10 years a slight decrease in IgG, IgA and IgM and no decrease in IgE levels were found in the postoperative four- to six-week period. Thus it was said that adenotonsillectomy does not appear to cause significant immune deficiency in these ages.^[8] Studies in the literature generally include tonsillectomy and adenoidectomy together so that the evidence that immune status is altered by removal of the adenoids alone is not clearly known.^[9]

ADENOIDECTOMY INDICATIONS

Santorini described the nasopharyngeal lymphoid aggregate (Lushka's tonsil) in 1724. Wilhelm Meyer coined the term 'adenoid' in 1868. After he reported a series of 48 'adenoidotomies' performed by the pernasal route, the operation became popular in a short period of time. Today, benefit from adenoidectomy varies widely and there is little evidence on its long-term effects.^[3]

Adenoidal hypertrophy is a common condition in children. Lymphoid tissue develops after birth. It reaches maximum size during early childhood and starts to regress at 8-10 years of age.^[10] In some children overgrowth of adenoids may cause upper respiratory tract obstruction. In these cases hypertrophy of the adenoids can cause such symptoms as mouth breathing, nasal discharge, snoring, sleep apnea, and hyponasal speech. Therefore it takes part in the pathogenesis of rhinosinusitis, recurrent otitis media (OM), and OM with effusion.^[11] The causes of adenoid hypertrophy are not fully known. Some of the triggers that have been associated with symptomatic enlargement of adenoidal tissue include microbial stimuli and external irritants such as cigarette smoke. Another factor associated with adenoid hypertrophy is allergic rhinitis because children with allergic rhinitis have a greater susceptibility to adenoid hypertrophy

than non-allergic children.^[12] In some of the studies it was demonstrated that sensitization to inhalant allergens changed the immunology of adenoidal tissue. More eosinophils, CD1+ Langerhans cells, and interleukin (IL)-4 and IL-5 messenger RNA+ cells were seen in the adenoid tissue of atopic children. This finding supports the hypothesis that allergic sensitization takes place in the pathogenesis of adenoid hypertrophy.^[13]

Adenoid enlargement is uncommon in adults. One study has suggested that adenoid hypertrophy is underestimated in adults. The prevalence of adenoid hypertrophy in patients above the age of 17 years is around 64%.^[14] The presence of adenoid hypertrophy in adults can be associated with chronic inflammation. Regressed adenoidal tissue in childhood may re-proliferate in response to infections and some irritants. Besides this, adenoid hypertrophy may be seen in adults with deficient immunity, especially in patients with organ transplantation or human immunodeficiency virus infection.^[15]

On the web site of the American Academy of Otolaryngology Head and Neck Surgery (<https://www.entnet.org/content/clinical-indicators-adenoidectomy>), indications for adenoidectomy are given as follows (One or more required):

- Four or greater episodes of recurrent purulent rhinorrhea in prior 12 months in a child smaller than 12 years of age. One episode should be documented by intranasal examination or diagnostic imaging
- Persisting symptoms of adenoiditis after two courses of antibiotic therapy. One course of antibiotics should be with a B-lactamase stable antibiotic for at least two weeks.
- Sleep disturbance with nasal airway obstruction persisting for at least three months.
- Hyponasal speech
- Otitis media with effusion lasting more than three months or associated with additional sets of tubes
- Dental malocclusion or orofacial growth disturbance documented by an orthodontist or dentist
- Cardiopulmonary complications including cor pulmonale, pulmonary hypertension,

right ventricular hypertrophy associated with upper airway obstruction.

- Otitis media with effusion (age 4 or greater).

Recurrent upper respiratory tract infection is one of the important indications for adenoidectomy. Evidence for the effectiveness of adenoidectomy for this indication is still limited. In one recent study, the effectiveness of adenoidectomy in children with recurrent upper respiratory tract infections was evaluated. Episodes of upper respiratory tract infections (in days) and middle ear complaints with fever (the number of episodes and duration in days) did not differ significantly between the children that underwent adenoidectomy and the children that were followed-up. Furthermore, the prevalence of upper respiratory tract infections decreased over time in both groups but children in the adenoidectomy group had significantly more days with fever than children in the watchful waiting group. Therefore the authors concluded that a strategy of immediate surgery confers no clinical benefits over a strategy of initial watchful waiting.^[16] It may be said that for the small number of children with uncomplicated recurrent or chronic rhinosinusitis who fail conservative management, adenoidectomy may be helpful.^[3]

The other condition where adenoidectomy may be beneficial is OM. Otitis media is a multifactorial disease. It is known that viral infection of the upper respiratory tract is a predisposing risk factor for inflammation and bacterial invasion of the middle ear mucosa. Adenoid size in children with and without OM with effusion (OME) is not significantly different so that reducing the adenoid size and eliminating physical obstruction is not the sole basis of adenoidectomy in case of OME.^[3] Chronic inflammation of the adenoids and increased bacterial load result in squamous cell metaplasia, changing reticular epithelium, fibrosis of the interconnective tissue and reduced mucociliary clearance in children with OME compared to children without OME.^[17] Adenoidectomy is thought to remove the reservoir of pathogens that transiently colonize in the upper respiratory tract mucosa and contribute to the development of OM.^[18] Recently, it has been suggested that chronic OM is associated with the persistence of

bacterial pathogens in biofilms despite the use of antibiotics. This finding has been supported by animal studies.^[19] A prospective clinical trial also showed that bacterial biofilms of *H. influenzae*, *S. pneumoniae*, and *Moraxella catarrhalis* were directly detected in the middle ear mucosa of children who underwent tympanostomy tube placement for chronic OM.^[20] Besides these bacteria, *Helicobacter pylori* (*H. pylori*) has been detected in adenoid and tonsil tissues suggesting that tonsils and adenoids act as reservoirs of this bacterium.^[21-22] *Helicobacter pylori* infection is very common in almost every population and may act as an immunosuppressor.^[21-23] Saki et al.^[22] suggested that stomach secretions containing *H. pylori* enter the oral cavity and bacteria colonize in dental plaques, tonsils, and adenoid tissues. However, published data about the *H. pylori* presence in oropharyngeal lymphatic tissue are inconsistent due to the low sensitivity of diagnostic tests.^[23] The American Academy of Otolaryngology Head and Neck Surgery suggested that if a child becomes a surgical candidate because of OME, tympanostomy tube insertion is the preferred initial procedure. Adenoidectomy should only be done when there is nasal obstruction or chronic adenoiditis, or in repeated tympanostomy tube insertions.^[24]

It is known that aerobic and anaerobic organisms generally colonize the nasopharynx and adenoids of healthy individuals. Similar polymicrobial floras with a higher frequency of pathogens are found in inflamed or hypertrophic adenoids. Using antimicrobial therapy can alter the colonization patterns and select for resistant organisms.^[25,26] Children with recurrent adenoiditis or OME are usually treated with multiple courses of antibiotics before surgery. Nevertheless, many of them continue to house pathogenic bacteria that are resistant to antibiotics in the nasopharynx and the adenoids.^[27] In a review, adenoidectomy was suggested to have a beneficial effect on the nasopharyngeal bacterial flora, causing a decrease in the load of potential pathogens, specifically *Streptococcus pneumoniae* and *Haemophilus influenzae*, and helping reestablishment of normal non-pathogenic flora.^[28]

Obstructive sleep apnea syndrome (OSAS) and sleep disordered breathing (SDB) are important indications for adenoidectomy. Pediatric OSA affects 2-3% of children. Untreated

OSA can be associated with cognitive deficits, behavioral problems, daytime sleepiness, impaired school performance, and poor quality of life. Adenotonsillar hypertrophy is the most commonly recognized anatomic risk factor for pediatric OSA.^[29] However a Cochrane review found no randomized controlled trials in the management of obstructive sleep apnea in childhood. Although some data showed benefits, there was lack of strong evidence to support surgical treatment.^[30] The American Academy of Pediatrics Subcommittee on Obstructive Sleep Apnea Syndrome reviewed 2,115 articles related to OSAS in childhood. The committee concluded that adenotonsillectomy was curative in 75-100% of children with OSAS but the role of adenoidectomy alone was unclear.^[31] Adenoidectomy seems to be helpful in the management of OSAS and SDB but the benefit is largely due to tonsillectomy and adenoidectomy together. Some of the children undergoing adenoidectomy for treatment of upper airway obstruction require tonsillectomy at a later date. Thus, the role of adenoidectomy alone is uncertain.^[3]

A remarkable finding that has been associated with adenoid hypertrophy is loss of sensation of smell and taste in some children but there are only a few published studies in the literature.^[32-34] All of these studies confirmed improvement in olfaction after adenoidectomy. Increased growth after adenoidectomy may be related to improved appetite that in turn may be associated with improvement in smell and taste.^[3]

Recent publications emphasize that nasal-respiratory obstruction can cause vertical facial growth, crossbite, increase in overjet and dentition narrowing.^[35] It was demonstrated that adenotonsillectomy improved some dental measures in patients who are in their growth phase. Early diagnosis and treatment of adenotonsillar hypertrophy is important because of its potential negative effects on dental and facial growth.^[10]

TREATMENT OF ADENOID HYPERTROPHY

Adenoidectomy has been the standard treatment protocol of adenoid hypertrophy for years. However surgery possesses some risks and may cause emotional distress for the patient and the family. Alternative treatments to surgery, such as intranasal steroids have been proposed for the treatment of children with adenoid

hypertrophy.^[36] Over the past years many studies were published about using intranasal steroids for chronic nasal obstruction symptoms due to adenoidal hypertrophy in children.^[37-41] Using intranasal steroids can be an effective alternative to surgical treatment in children with adenoid hypertrophy. Treatment of allergic rhinitis or IgE-mediated inflammation has been shown to improve adenoid hypertrophy.^[12] In this context, recommended treatment options are montelukast and intranasal steroids.^[42]

Montelukast is an oral cysteinyl leukotriene receptor antagonist used for allergic rhinitis. Expression of cysteinyl leukotriene receptors was found increased in tonsillar tissues of children with OSA.^[43] In a clinical trial, montelukast was used for 16 weeks in children with sleep-disordered breathing. Adenoid size was found to be decreased and obstructive apnea/hypopnea index, apnea index, respiratory-related arousal index, and sleep pressure scores were improved significantly with montelukast treatment.^[44]

Demain and Goetz^[37] first reported the successful use of intranasal steroid treatment in children with adenoid hypertrophy. In a review of five randomized controlled trials, intranasal steroids are suggested to significantly improve symptoms of nasal obstruction in children with adenoidal hypertrophy.^[45] Effects of different corticosteroids including beclomethasone dipropionate,^[37,39] flunisolide,^[46,47] fluticasone propionate,^[38,48] and mometasone furoate^[40,41,49] were studied. However, the most appropriate drug, the most efficient dose and optimal treatment duration are still a matter of debate.^[48] It is not clear how the steroids reduce the nasal airway obstruction but there are some figured theories. The reduction in adenoid size may occur directly due to lympholytic effect, since adenoid tissue is shown to have many glucocorticoid receptors and messenger RNA.^[50] Intranasal steroids also change the adenoid flora and this may also contribute to their effects on adenoid size and inflammation.^[37]

Adenoidectomy with or without tonsillectomy is one of the most common surgeries in pediatric patients. Several techniques and instruments including curettage, microdebridement, laser, coblation and suction electrocautery can be used for surgery. Techniques and instruments have been changing over the years.^[51]

The standard technique is carried out with adenoid curettes/an adenotome under general anesthesia. Total excision of the tissue is the most important goal. Classical adenoidectomy can be performed without direct visualization of the nasopharynx. Partial visualization of the adenoids is possible by retracting the soft palate and using mirrors. Some surgeons confirm clearance of the adenoids by digital palpation. Frequent control by digital palpation is useful for avoiding complications. The conventional curettage technique has some disadvantages. When adenoid tissue has intranasal extension, this technique can be inadequate.^[51] Uncontrolled and excessive resection of adenoid tissue with a sharp curette may damage prevertebral muscles.^[52,53] The risk of velopharyngeal insufficiency is also increased with an aggressive blind adenoidectomy. In order to overcome technical drawbacks and achieve better results, several surgical techniques have evolved over years. Popularization of endoscopic sinus surgery led to the use of power-assisted instruments for adenoidectomy. Initially, power-assisted adenoidectomy was being performed transorally, with indirect visualization. Together with the use of endoscopes and direct visualization, the intranasal route has subsequently become popular.

In a review by Pagella et al.^[51] the techniques are classified as non-endoscopic, usually performed with a laryngeal mirror, and endoscopic-assisted. Endoscopic control can be achieved either transnasally or transorally. A microdebrider can also be inserted through the nasal cavity or used through the oral cavity. Some surgeons use power-assisted instruments to remove the entire adenoid tissue, while others use the microdebrider as a step of the surgical procedure.

Öztürk and Polat^[52] and Costantini et al.^[53] suggested that power assisted endoscopic adenoidectomy (PAEA) is an alternative method for decreasing the risk of recurrence. This technique is also considered an effective choice for revision surgery since it provides complete removal of adenoid tissue in a shorter operating time. Extension of adenoid tissue into the choana and nasal cavity necessitates the use of an approach other than classical curettage, such as PAEA. In PAEA, the curved blade that

properly fits into the nasopharynx simplifies the removal of adenoid tissue under the assistance of endoscopic visualization. Using the endoscope also minimizes the risk of collateral injury to the neighboring nasopharyngeal structures and pharyngeal muscles. Some authors use a microdebrider as a tool for PAEA. Disadvantages of the microdebrider include high costs, dependency on suction capability of the equipment, difficulty in maneuvering the tip of the instrument in the surgical field, and the need for training and experience.^[52-54]

Costantini et al.^[53] used a curved microdebrider and 70° scopes to perform transoral adenoidectomy. For better resection of adenoids especially around the torus tubarius or choana, a transnasal microdebrider and transnasal endoscopic control technique was proposed. However, application of this technique can be difficult especially in patients with narrow nasal passages. Pagella et al.^[55] recently introduced the transoral endonasal-controlled combined adenoidectomy (TECCA) method. The TECCA method can be used in patients with narrow nasal passages and reduces the risk of damaging the surrounding structures. Main disadvantages of this technique are high costs and prolonged operation time.

Pagella et al.^[56] also combined endoscopic and conventional methods. The authors reported that a significant mass of residual adenoid tissue is observed in about 50% of cases after conventional curette adenoidectomy. A combination of conventional curette and endoscopic adenoidectomy with microdebrider is proposed as an effective and safe method for complete and accurate removal of the mass, without significantly prolonging operative time. Nevertheless, this group considers the endoscopic techniques as the most suitable, and among these TECCA should be considered as the most ergonomic technique to perform a power-assisted adenoidectomy.^[51] A recent study suggested that transnasal endoscopic examination at the end of curettage adenoidectomy is an appropriate method to assess the residual adenoid tissue after conventional curettage adenoidectomy. This method is also reported to be more time saving than the transoral or transnasal endoscopic-guided adenoidectomy.^[57]

Endoscopic surgery has another advantage in terms of postoperative hemorrhage. A review of the literature shows that surgery under direct visualization has lower rates of postoperative hemorrhage.^[54]

Another instrument to perform adenoidectomy is suction electrocautery. It was first described by Wright et al.^[58] Suction electrocautery can be performed either under indirect vision using a mirror or under direct vision using an endoscope.^[58] The National Institute for Health and Clinical Excellence (NICE) guidelines suggested that this technique should be performed by specifically trained surgeons.^[59,60] However, a study on preferred tonsillectomy and adenoidectomy methods among the members of the American Society of Pediatric Otolaryngology (ASPO) suggested that electrocautery adenoidectomy (ECA) was the most common method used for adenoidectomy.^[61] An electrical current is applied from the suction cautery to the adenoid tissue to liquefy and ablate it under indirect/direct visualization with a laryngeal mirror. Using a small suction tip increases the accessibility to tissues around the choana and torus tubarius. Studies comparing suction cautery adenoidectomy with conventional curette adenoidectomy have shown that estimated blood loss was lower with cautery. A study on risk of postoperative hemorrhage showed that the data failed to demonstrate diathermy as a risk factor for hemorrhage following adenoidectomy despite a known interaction between diathermy and hemorrhage in tonsillectomy.^[62] Operation time was found to be shorter than the conventional curette technique. No evidence of nasopharyngeal stenosis and scarring was seen in the majority of studies with suction electrocautery technique.^[59,63] Some studies have suggested an increase in pain and complication rates but a meta-analysis did not confirm those results.^[63] Casserly et al.^[64] studied bacteremia during adenoidectomy. The authors reported that transient bacteremia occurs after pediatric adenoidectomy, but that does not correlate with symptoms or signs. Neither suction diathermy adenoidectomy nor curettage adenoidectomy offers a particular advantage in terms of decreasing the incidence of bacteremia.

The other technique for adenoidectomy is coblation adenoidectomy. It is carried out using

a 0° nasal endoscope and a wand. The size of the adenoids is identified and the border to be reached is assessed by endoscope. The suitable wand to be able to reach all the nasopharyngeal areas is chosen. Foot pedal ablation is activated when the wand is close to the inferior edge of the adenoids, avoiding direct contact. Di Rienzo Businco et al.^[65] reported that coblation adenoidectomy, compared with cold curettage, has the advantages of decreased intra- and postoperative bleeding, better safety, precise adenoid removal and less injury to adjacent tissues. Ozkiris et al.^[66] reported that the coblation technique provides a less-bleeding surgical bed but a longer operation time when compared to the curettage technique.

Laser adenoidectomy is another alternative technique to conventional curettage. Ida et al.^[67] reported that laser adenoidectomy is a safe and effective procedure, especially when applied with concurrent tube insertion for the treatment of chronic serous OM. Ida et al.^[67] and Worley et al.^[68] used a gold laser in their studies. They performed gold laser adenoidectomy using a ball-tip adenoidectomy hand piece with suction under indirect visualization. They did not use packing or suction electrocautery for hemostasis. Ida et al.^[67] reported that there is no apparent difference in complications and in recovery times with laser adenoidectomy as compared to other modalities. Worley et al.^[68] suggested that the laser group had a shorter procedure time and a lower incidence of otorrhea compared to curettage adenoidectomy. The cost and accessibility of laser for adenoidectomy is still arguable.

When we consider all the surgical techniques, all methods seem to be safe and effective, but the personal experience of the surgeon is important for the choice of the instruments.

There is limited data on adenoid regrowth and correlation of regrowth with age. The incidence of adenoid regrowth that requires revision surgery is reported as 0.5-3.0%. Age less than three years and primary surgery are the factors that are linked to revision surgery in case of recurrent symptoms. Multivariate analyses suggest that primary surgery is the more important, independent, and direct risk factor for revision surgery when compared to younger age.^[69,70]

Another controversial topic in adenoidectomy is the need for histological examination of the specimens. Although histopathological examination does not change the clinical course of the patient, it is performed for unexpected malignancy or rare diseases. Studies on histopathological examination of adenoid tissue are rare in the literature. A recent study showed that routine microscopic examination of adenoidectomy specimens, especially in young patients with a normal patient history and normal clinical findings is unnecessary. Histopathologic examination should be done only in selected cases, such as in patients with suspicious clinical findings or in patients with a history of previous malignancy.^[71] A guideline for histological examination of adenoids and tonsils does not exist and the cost benefit ratio of routine histology appears questionable.^[72] However, due to legal and ethical reasons, histological analysis can be done.^[4]

In conclusion, adenoid tissue plays an important role in the immune system. Although adenoidectomy is a common childhood surgery, definite indications for surgery, alternative treatment options, and evidence for the effects of adenoidectomy on immune status of the patient after surgery are still unclear. Randomized, controlled clinical trials evaluating the effectiveness of this surgery should still be carried out.

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