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ADENOID RECURRENCE IN CHILDREN: RISK FACTORS

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Summary.

Adenotomy ranks among the most frequently performed procedures in otorhinolaryngology in the pediatric population. Although it is regarded as a relatively straightforward and highly effective surgical intervention, adenotomy carries a well-recognized risk of adenoid recurrence. The precise etiological factors underlying recurrence, as well as the associated risk determinants, have not yet been fully established

The aim of the study *was to evaluate the outcomes of surgical treatment of adenoid disease in the pediatric population and to identify the risk factors associated with postoperative recurrence.*

Materials and Methods. *A total of 112 children aged 2-15 years who had undergone adenotomy were enrolled in the study. A structured parental survey was administered to assess the primary symptoms of adenoid hypertrophy and their dynamics following surgery. In 56 children, follow-up evaluation was performed, encompassing nasal endoscopy of the nasopharynx and ears, tympanometry, and measurement of total immunoglobulin E (IgE), as well as immunoglobulin M (IgM) and immunoglobulin G (IgG) directed against the Epstein–Barr virus capsid antigen. Risk factors for adenoid recurrence were assessed by calculating the odds ratio (OR).*

The study was conducted in compliance with established bioethical standards and received approval from the Bioethics Committee of Bukovinian State Medical University. Statistical analysis was performed using Statistica 6 and BIOSTAT software. Quantitative data were processed by means of variational statistical analysis. Binary parameters, expressed as «–» and «+», were analyzed using Fisher's exact test for 2×2 and 4×4 contingency tables, as well as Fisher's angular transformation (φ) following conversion of absolute values to percentages. The role of each studied indicator as a potential risk marker was evaluated using clinical epidemiology methods. OR and 95% confidence intervals (CI) were calculated for each factor. A factor was considered clinically significant if OR exceeded 1.2; an OR below 0.8 was interpreted as indicative of a clinically significant protective effect.

This study constitutes part of a planned comprehensive research project of the Department of Pediatric Surgery, Otolaryngology, and Ophthalmology at Bukovinian State Medical University, entitled «Clinical and Pathogenetic Rationale for the Correction of the Functional State of Certain Homeostatic Systems in Patients in Specific Sections of Surgical Practice and Intensive Care» (state registration number 0125U002045).

Results. *The predominant preoperative complaints in the study group included persistent nasal breathing difficulty (77.6%), nocturnal snoring (77.6%), adenoid facies (19.6%), conductive hearing loss (50.9%), recurrent acute suppurative otitis media (24.1%), and recurrent acute bacterial tonsillitis (39.3%). Following adenotomy, nasal breathing was restored in 80.4% of patients, nocturnal snoring resolved in 77.7%, hearing was restored in 90.2%, the frequency of acute suppurative otitis media episodes was reduced in 69.6%, and the frequency of acute bacterial tonsillitis episodes decreased accordingly.*

Follow-up examination of 56 children identified the following risk factors for adenoid recurrence: adenotomy performed at an early age (OR 2.7; 95% CI 0.85-8.69), elevated total IgE (OR 1.9; 95% CI 0.45-7.86), elevated IgM (OR 4.1; 95% CI 0.93-17.93) and IgG (OR 2.4; 95% CI 0.67-8.59) directed against the Epstein–Barr virus capsid antigen, periodic fever with aphthous stomatitis, pharyngitis, and adenitis (PFAPA) syndrome (OR 2.3; 95% CI 0.71-7.86), and recurrent acute bacterial tonsillitis (OR 1.9; 95% CI 0.45-7.86). Concurrent tonsillotomy was identified as a protective factor against adenoid recurrence (OR 0.2; 95% CI 0.11-0.69).

Conclusions. *Adenotomy effectively restores nasal breathing, resolves conductive hearing loss, and reduces the frequency of middle ear infections. The reported recurrence rate ranges from 7% to 28%. Clinically, however, the presence of residual lymphoid tissue in the nasopharynx is of secondary importance; the determining factor is the persistence of symptoms attributable to nasal obstruction. Identified risk factors for adenoid recurrence include young age at the time of primary surgery, a history of atopic disease, prior Epstein–Barr virus infection, PFAPA syndrome, and recurrent acute bacterial tonsillitis.*

Keywords: *Adenoids; Recurrence; Risk factors; Adenotomy.*

Adenotomy ranks among the most frequently performed surgical procedures in otorhinolaryngology in the pediatric population [1, 2]. Although it is regarded as a relatively straightforward and highly effective intervention [3-5], complications may occur and include postoperative hemorrhage, velopharyngeal insufficiency, Grisel syndrome, and nasopharyngeal stenosis [6-8]. A well-recognized feature of adenotomy is the potential for adenoid recurrence [9-12]. This phenomenon may be attributable to anatomical considerations – the pharyngeal tonsil lacks clearly defined boundaries with the surrounding tissues, thereby precluding guaranteed complete resection [13-16] – as well as to technical limitations inherent to the procedure, most notably the absence of adequate visual control associated with conventional surgical technique [17-19]. Furthermore, adenotomy is performed predominantly in children at an age corresponding to peak lymphoid tissue activity in the pharynx [20, 21]. The precise etiological factors underlying adenoid recurrence, along with the definitive associated risk factors, have not yet been fully established [22-25].

The aim of the study was to evaluate the outcomes of surgical treatment of adenoid disease in the pediatric population. The following objectives were established: to assess the clinical efficacy of elective adenotomy based on analysis of the dynamics of predominant symptoms

(persistent nasal obstruction, adenoid facies, and conductive hearing loss); and to determine the rate of adenoid recurrence following adenotomy and identify the associated risk factors.

The study was conducted in compliance with established bioethical standards and received approval from the Bioethics Committee of Bukovinian State Medical University. Statistical analysis was performed using Statistica 6 and BIOSTAT software. Quantitative data were processed by means of variational statistical analysis. Binary parameters, expressed as «–» and «+», were analyzed using Fisher's exact test for 2×2 and 4×4 contingency tables, as well as Fisher's angular transformation (φ) following conversion of absolute values to percentages. The role of each studied parameter as a potential risk marker was evaluated using clinical epidemiology methods. OR and 95% CI were calculated for each factor. A factor was considered clinically significant if OR exceeded 1.2; an OR below 0.8 was interpreted as indicative of a clinically significant protective effect. This study constitutes a component of a planned comprehensive research project of the otorhinolaryngology course of the Department of Pediatric Surgery, Otolaryngology, and Ophthalmology at Bukovinian State Medical University, entitled «Clinical and Pathogenetic Rationale for the Correction of the Functional State of Certain Homeostatic Systems in Patients in Specific Sections of Surgical Practice and Intensive Care» (state registration number 0125U002045).

Materials and Methods

A total of 112 children aged 2-15 years underwent elective adenotomy, comprising 72 boys (64.2%) and 40 girls (35.8%). To evaluate treatment outcomes, a structured parental survey was administered, encompassing the predominant symptom profile prior to surgery, symptom dynamics following the intervention, and parental satisfaction with surgical outcomes.

The examination findings were recorded in case report forms developed specifically for this study. The study was conducted in compliance with established bioethical standards and received approval from the Bioethics Committee of Bukovinian State Medical University.

To identify risk factors for adenoid recurrence, 56 children were randomly selected from the total cohort of 112 for follow-up evaluation, comprising nasal endoscopy of the nasopharynx and ears, and tympanometry. Serum levels of total IgE, as well as IgM and IgG directed against the Epstein–Barr virus capsid antigen, were measured [25].

Statistical analysis was performed using Statistica 6 and BIOSTAT software. Quantitative data were processed by means of variational statistical analysis. Binary parameters, expressed as «–» and «+», were analyzed using Fisher's exact test for 2×2 and 4×4 contingency tables, as well as Fisher's angular transformation (φ) following conversion of absolute values to percentages [26].

The role of each studied parameter as a potential risk marker was evaluated using clinical epidemiology methods. OR and 95% CI were calculated for each factor. A factor was considered clinically significant if OR exceeded 1.2; an OR below 0.8 was interpreted as indicative of a clinically significant protective effect [27].

This study constitutes a component of a planned comprehensive research project of the otorhinolaryngology course of the Department of Pediatric Surgery, Otolaryngology, and Ophthalmology at Bukovinian State Medical University, entitled «Clinical and Pathogenetic Rationale for the Correction of the Functional State of Certain Homeostatic Systems in Patients in Specific Sections of Surgical Practice and Intensive Care» (state registration number 0125U002045).

Results and Discussion

Persistent nasal breathing difficulty was the predominant complaint prompting parents to seek medical attention, with nasal obstruction reported in 77.6% of children (Table 1). Following adenotomy, nasal breathing was restored in 80.4% of patients, demonstrating the clinical efficacy of the procedure. Of note, 6.2% of respondents reported no improvement in nasal breathing; this subgroup warrants further scientific and clinical investigation.

Nocturnal snoring and nocturnal open-mouth breathing represent additional characteristic manifestations of adenoid disease. These symptoms were present preoperatively in 77.6% of children. Following adenotomy, nocturnal snoring resolved in the vast majority of patients (77.7%), while nocturnal open-mouth breathing and rhonchopathy persisted in 4.4% (Table 1).

Facial deformity was a less frequently reported parental concern. Typical *facies adenoides* with exclusively oral breathing was observed preoperatively in 19.6% of cases. Following adenotomy, transition to nasal breathing was documented in 83.9% of patients, while persistent oral breathing with a half-open mouth was observed in 16.1% (Table 1).

In a proportion of cases, adenotomy was performed concurrently with partial palatine tonsillectomy. Based on the study data, approximately one third of children underwent both procedures simultaneously.

Persistent conductive hearing loss resulting from obstruction of the pharyngeal openings of the auditory tubes represents a frequent indication for adenotomy. Preoperatively, persistent hearing loss was observed in one third of children, while in 17.9% it occurred exclusively during upper respiratory tract infections. Hearing was restored following adenotomy in 90.2% of patients, while in 5.3% no improvement was documented (Table 1).

Recurrent acute otitis media was characteristic of approximately one quarter of children undergoing adenotomy, with approximately half reporting a history of one to two episodes. Following surgery, no episodes of acute otitis media were recorded in 69.6% of patients, while two or more episodes occurred in 13.4% during the follow-up period (Table 1).

Although acute palatine tonsillitis does not constitute a symptom of adenoid disease and does not influence the indication for adenotomy, its frequency indirectly reflects the antigenic load on the upper airways and the functional state of the palatine tonsils. Recurrent bacterial tonsillitis was observed preoperatively in 39.3% of children, compared with 6.3% following adenotomy (Table 1). These findings suggest that restoration of nasal breathing exerts a favorable effect on the lymphoid apparatus of the pharynx and the condition of the upper airway mucosa.

Table 1

Preoperative and postoperative symptom dynamics in children undergoing adenotomy

No.	Before surgery	Results		
		Yes	Only during episode	No
1.	Persistent nasal breathing difficulty	87 (77.6%)	18 (16.1%)	7 (6.3%)
2.	Nocturnal snoring and open-mouth breathing	87 (77.6%)	17 (15.2%)	10 (7.2%)
3.	Persistent conductive hearing loss	37 (33.0%)	20 (17.9%)	55 (49.1%)
		Yes		No
4.	Facial deformity	22 (19.6%)		90 (80.4%)
		Frequently	1-2 times	No
5.	Acute otitis media	27 (24.1%)	48 (42.9%)	37 (33.0%)
6.	Acute bacterial tonsillitis	44 (39.3%)	40 (35.7%)	28 (25.0%)
	After surgery	Results		
		Totally	Partially	No changes
1.	Restoration of nasal breathing	90 (80.4%)	15 (13.4%)	7 (6.2%)
2.	Resolution of nocturnal snoring	87 (77.7%)	20 (17.9%)	5 (4.4%)
3.	Restoration of nasal breathing pattern	94 (83.9%)		18 (16.1%)
4.	Hearing restoration	101 (90.2%)	5 (4.5%)	6 (5.3%)
		Frequently	1-2 times	No
5.	Acute otitis media	15(13.4%)	19(17.0)	78(69.6%)
6.	Acute bacterial tonsillitis	7(6.3%)	40(35.7%)	65(58.0%)
		Less frequently	The same	More frequently
7.	Episodes of acute respiratory viral infection	95 (84.8%)	15 (13.4%)	2 (1.8%)
		Yes	Partially	No
8.	Satisfaction with surgical outcome	86 (76.8%)	24 (21%)	2 (1.8%)

Although the frequency of acute respiratory viral infections (ARVI) is not directly attributable to adenoid disease, recurrent respiratory infections represent one of the most common reasons for parental referral for surgical treatment. While the majority of children experienced three to four ARVI episodes per year preoperatively, following adenotomy a reduction in both the frequency and severity of episodes was reported by 84.8% of parents (Table 1).

Adenotomy thus represents an effective surgical intervention that restores nasal breathing, resolves nocturnal snoring, prevents facial deformity, restores auditory tube patency, and reduces the incidence of acute otitis media and acute tonsillitis.

Cases in which surgical outcomes did not meet parental expectations are of particular clinical and scientific interest, as they may indicate adenoid recurrence. To determine the recurrence rate, 56 children were randomly selected for follow-up examination.

Although endoscopic examination revealed adenoid recurrence in 16 cases (28.6%), clinically significant choanal obstruction exceeding one third of the choanal lumen with associated nasal obstruction symptoms was detected in only 4 cases (7.1%). Of note, palatine tonsil hypertrophy of grade II or higher was additionally identified in 12 cases (21.4%).

The following potential risk factors were evaluated: age at the time of primary surgery, concurrent palatine tonsil surgery, history of atopic disease, humoral immune response to Epstein–Barr virus infection, PFAPA syndrome, and recurrent bacterial tonsillitis (Table 2).

Table 2

Risk factors for adenoid recurrence

No.	Risk factor	OR	95% CI
1.	Adenotomy performed at an early age	2.7	0.85-8.69
2.	Elevated total IgE	1.9	0.45-7.86
3.	Concurrent tonsillotomy	0.2	0.11-0.69
4.	Recurrent bacterial tonsillitis	1.9	0.45-7.86
5.	PFAPA syndrome	2.3	0.71-7.86
6.	Elevated IgG directed against the Epstein–Barr virus capsid antigen	2.4	0.67-8.59
7.	Elevated IgM directed against the Epstein–Barr virus capsid antigen	4.1	0.93-17.93

Adenotomy during early childhood – a critical period of immunogenesis characterized by heightened lymphoid tissue activity – may be regarded as a potential risk factor for recurrence. Surgery performed before the age of 3 years was associated with an approximately threefold increase in the risk of adenoid recurrence during the follow-up period (OR 2.7; 95% CI 0.85-8.69).

Atopic diseases, particularly those affecting the upper airway mucosa, should be regarded as potential risk factors for adenoid recurrence. Elevated total IgE was associated with an approximately twofold increase in the risk of recurrence (OR 1.9; 95% CI 0.45-7.86).

Concurrent tonsillotomy was identified as a protective factor against adenoid recurrence (OR 0.2; 95% CI 0.11-0.69).

Recurrent bacterial tonsillitis was associated with an increased risk of adenoid recurrence (OR 1.9; 95% CI 0.45-7.86). PFAPA syndrome was similarly associated with an elevated likelihood of recurrence (OR 2.3; 95% CI 0.71-7.86).

Elevated humoral immune response to Epstein–Barr virus, manifested by elevated IgG (OR 2.4; 95% CI 0.67-8.59) and IgM (OR 4.1; 95% CI 0.93-17.93) directed against the capsid antigen, was similarly identified as a risk factor for adenoid recurrence.

Conclusions

1. Adenotomy effectively restores nasal breathing, resolves conductive hearing loss, and reduces the incidence of acute otitis media.

2. The reported recurrence rate ranges from 7% to 28%; however, the presence of residual lymphoid tissue in the nasopharynx is of secondary importance relative to the persistence of symptoms attributable to nasal obstruction.

3. Identified risk factors for adenoid recurrence include young age at the time of primary surgery, a history of atopic disease, prior Epstein–Barr virus infection, PFAPA syndrome, and recurrent bacterial tonsillitis.

Prospects for Further Research

Further identification and systematic consideration of risk factors for adenoid recurrence in the pediatric population are expected to improve treatment outcomes and reduce the need for repeated surgical intervention.

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РЕЦИДИВ АДЕНОЇДНИХ ВЕГЕТАЦІЙ У ДІТЕЙ: ЧИННИКИ РИЗИКУ

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Резюме.

Видалення аденоїдних вегетацій у дітей є однією з найпоширеніших операцій в оториноларингології. Аденотомію можна віднести до відносно легких, рутинних і високоефективних хірургічних втручань. Особливістю аденотомії є ймовірність розвитку рецидиву аденоїдних вегетацій. Достеменно залишаються невідомими причини рецидиву аденоїдних вегетацій і чинники ризику.

Метою роботи було визначення ефективності хірургічного лікування аденоїдних вегетацій у дітей, а також чинників ризику розвитку рецидивів захворювання.

Матеріали і методи. Групу дослідження склали 112 дітей віком 2-15 років, котрим була виконана аденотомія. Анкетування батьків дозволило визначити основні симптоми аденоїдів і їх динаміку після операції. У 56 дітей при повторному огляді проведено ендоскопічне дослідження носоглотки і вуха, тимпанометрію, визначені рівні загального імуноглобуліну Е, імуноглобуліни М і G до капсидного антигену вірусу Епштейн-Барр. Визначення чинників ризику розвитку рецидиву аденоїдних вегетацій проводили за показником відношення шансів. Методи, використані в дослідженні, не заперечують основним біоетичним нормам та затверджене комітетом біоетики Буковинського державного медичного університету. Статистична обробка отриманих результатів проводилася за допомогою програм «Statistica 6» і «БІОСТАТ». Математична обробка проводилася з використанням варіаційного статистичного аналізу. Аналіз змін показників, які виражені у формі двох градацій («-», «+») здійснювали за допомогою точного методу Фішера для 4-польної та 2-польної таблиць та кутового φ-перетворення Фішера з попереднім переведенням абсолютних чисел у відсотки. Ідентифікацію досліджуваного показника як маркера ризику оцінювали методами клінічної епідеміології. Вираховували відношення шансів і 95% довірчі інтервали відношення шансів. Клінічно значимим фактор ризику вважали при значенні показника відношення шансів більшими 1,2. Клінічно значимим протективним ефектом володів показник при відношенні шансів менше 0,8. Дослідження є фрагментом планової комплексної науково-дослідної роботи курсу ЛОР хвороб кафедри дитячої хірургії, отоларингології та офтальмології Буковинського державного медичного університету «Клініко-патогенетичне обґрунтування корекції функціонального стану деяких гомеостатичних систем хворих в окремих розділах хірургічної практики та інтенсивної терапії», номер державної реєстрації 0125U002045.

Результати дослідження. Основними скаргами в групі дослідження до хірургічного втручання були стійке утруднення носового дихання (у 77,6%), нічне хропіння (77,6%), деформація обличчя за аденоїдним типом (19,6%), кондуктивна приглухуватість (50,9%), часті епізоди гострих гнійних середніх отитів (24,1%), часті епізоди гострих бактеріальних тонзилітів (39,3%). Виконання аденотомії дозволило відновити носове дихання (в 80,4%), позбутися нічного хропіння (в 77,7%), відновити слух (в 90,2%), зменшити кількість гострих гнійних середніх отитів (в 69,6%) і гострих бактеріальних тонзилітів.

За результатами обстеження 56 дітей встановлені чинники ризику рецидиву аденоїдних вегетацій: виконання першої операції в ранньому дитячому віці (OR=2,7; 95%CI=0,85-8,69), збільшення загального імуноглобуліну Е (OR=1,9; 95%CI=0,45-7,86), імуноглобулінів М (OR=4,1; 95%CI=0,93-17,93) і G (OR=2,4; 95%CI=0,67-8,59) до капсидного антигену вірусу Епштейн-Барр, PFAPA-синдром (OR=2,3; 95%CI=0,71-7,86), часті епізоди гострих бактеріальних тонзилітів (OR=1,9; 95%CI=0,45-7,86). Одночасне виконання тонзилотомії виявилося протективним чинником, що зменшує ризик розвитку рецидиву аденоїдів (OR=0,2; 95%CI=0,11-0,69).

Висновки. Проведення аденотомії дозволяє ефективно відновити носове дихання, усунути кондуктивну приглухуватість і зменшити частоту середніх отитів. Частота рецидиву складає 7-28% випадків, проте, важливим є не присутність лімфоїдної

тканини в носоглотці, а наявність пов'язаних із назальною обструкцією симптомів. Чинниками ризику розвитку рецидивів аденоїдних вегетацій виявилися ранній вік дитини, обтяжений алергологічний анамнез, перенесена Епштейн-Барр вірусна інфекція, PFAPA-синдром, часті епізоди бактеріальних тонзилітів.

Ключові слова: аденоїди; рецидив; чинники ризику; аденотомія.

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