# VIDEO ENDOSCOPIC METHOD OF ESTIMATION STATE OF NASAL AND PHARYNGONASAL CAVITY IN CHILDREN WITH BRONCHIAL ASTHMA

UDC 616.211/.327+616.248–053.2–072.1–056.3
Received 16.02.2012

© **S.V. Krasilnikova,** Otolaryngologist[1];
**T.I. Eliseeva,** PhD, Associate Professor, the Department of Children Diseases[2];
**A.V. Shakhov,** D.Med.Sc., Professor, Head of the Department of Otorhinolaryngology[3];
**A.V. Prakhov,** D.Med.Sc., Professor, Head of the Department of Children Diseases[2];
**I.I. Balabolkin,** D.Med.Sc., Professor, Corresponding Member of RAMS, Chief Research Worker of the Department of Pulmonology and Allergology[4]

[1]"Alexandria" — multi-field clinic of Nizhny Novgorod State Medical Academy, Gagarin Avenue, 50, Nizhny Novgorod, Russian Federation, 603057;
[2]Institute of Federal Security Service of Russian Federation, Kazanskoe shosse, 2, Nizhny Novgorod, Russian Federation, 603163;
[3]Nizhny Novgorod State Medical Academy, Minin and Pozharsky Square, 10/1, Nizhny Novgorod, Russian Federation, 603005;
[4]Scientific Children Health Centre of RAMS, Lomonosovsky Avenue, 2, Moscow, Russian Federation, 119991

**The aim of the investigation** is to study the information value of video endoscopy method to estimate the state of nasal and pharyngonasal cavity in children with bronchial asthma.

**Materials and methods.** There were examined 70 children with atopic bronchial asthma, mean age being 10.5±4.2 years. In addition to general clinical, allergic, and functional examination, all the patients were performed video endoscopic examination of nasal and pharyngonasal cavity using endoscopic equipment — rigid rhinoscopes (Karl Storz, Germany), with vision angle 0 and 30°, and diameter 2.7 and 4.0 mm.

**Results.** The use of video endoscopy in all children with asthma enabled to reveal the symptoms of allergic rhinitis in the remission or exacerbation stage, other pathologies of nasal and pharyngonasal cavity, including nonspecific infectious rhinitis, acute bacterial rhinosinusitism, anomalies of intranasal structures, pharyngeal tonsil hypertrophy being found in 89% (62/70).

Intraarticular structures anomalies were found in 63% (44/70) children with asthma. Against the background of these anomalies, rhinitis was of persisting character, children with the state of moderate severity (32 children) and severe course of the disease (12 children) prevailing. 14 patients anomalies were combined with hyperplastic changes of nasal mucosa.

Pharyngeal tonsil hypertrophy was found in 54% (38/70) of patients with asthma, frequently combined with the signs of venous stasis in the mucosa of inferior nasal conchas. 14 patients had combined hypertrophy of pharyngeal and palatine tonsils. On the whole, pathology of lymphoepithelial pharyngeal circle including chronic tonsillites and pharyngites was diagnosed in 69% (48/70) of children.

**Conclusion.** The results of video endoscopy application in children with bronchial asthma demonstrate high comorbidity of allergic rhinitis with other nasal and nasopharyngeal pathologies in childhood. A high information value of the technique enables to present the details of nasal obstruction causes in asthmatic patients offering the opportunities of individual therapy in this group of patients in order to receive maximum clinical effect and level down the negative effect of upper respiratory pathologies on bronchial asthma course.

**Key words:** bronchial asthma, video rhinoendoscopy, pathology of nasal cavity and nasopharynx, allergic rhinitis.

Pathogenetic mechanisms of bronchial asthma (BA) in childhood are mainly associated with atopy and IgE-dependant chronic allergic inflammation in respiratory tract [1]. Numerous investigations show inflammation in BA to have a persistent character and define the evidence of clinical signs of the disease [2]. The objective of BA therapy postulated by modern conciliatory documents is to achieve the control of asthma symptoms that is realized in the course of basic anti-inflammatory therapy [1, 3]. The implementation of the concept into clinical practice along with pharmacology development has allowed succeeding greatly in BA treatment. However, epidemiological studies show the number of patients with the controlled course of the disease in actual clinical practice not to approximate even 50% [4].

Such a situation explains great attention to studying the effect of comorbidities on asthma, and among these conditions the pathology of upper respiratory tract (URT) is of particular concern [5], allergic rhinitis (AR), allergic rhinosinusitis, polypous rhinitis/rhinosinusitis being the most studied ones [6]. The combination of these conditions and BA is estimated from the point of "one air way, one disease" [7]. Their pathogenetic basis is recognized to be a persistent allergic inflammation localized mainly in nasal and paranasal sinuses mucosa. The application of topical and systemic anti-inflammatory medicine enables to

For contacts: Eliseeva Tatyana Ivanovna, tel. +7 920-291-15-87; e-mail: eliseevati@yandex.ru

improve nasal breathing in considerable number of patients and has a positive effect on BA, but in some cases it is accompanied by continued nasal obstruction that requires further investigation.

The studies carried out earlier and based on routine rhinoscopy and radiodiagnosis [8] demonstrated that except AR and allergic rhinosinusitis, in BA patients there is high incidence rate of abnormalities of intranasal structures (AINS), pathologies of lymphoepithelial ring of pharynx, hyperplastic changes of nasal mucosa. Available clinical observations also show the necessity of more detailed estimation of URT in patients with asthma that requires practical application of new technologies.

The method of video endoscopy is one of those enabling to widen diagnostics possibilities in description of URT condition. Though the studies devoted to video endoscopic detalization of nasal cavity and nasopharynx pathologies weren't found in the accessible literature. There are only single works in which endoscopic method is used for additional description of rhinosinusitis course in children with BA [9].

**The aim of the investigation** is to study the information value of video endoscopic method to estimate the condition of nasal cavity and nasopharynx in children with BA [9].

**Materials and Methods.** The study was carried in Nizhny Novgorod Children Clinical Hospital No.1 and Clinic "Alexandria", Nizhny Novgorod State Medical Academy. 70 children and teenagers primarily with atopic BA were examined, among them there were 20 girls and 50 boys at the age of 3–17 years old, mean age being 10.5±4.2. The exclusion criteria were the symptoms of acute respiratory viral infection (ARVI) and the increase of temperature. The diagnosis was verified relying on the recommendations of National Program "Bronchial Asthma in Children. The strategy of treatment and prophylaxis" [1]. 28 children had mild BA (intermittent and persisting), 35 — moderate course of BA, and 7 — severe BA. All the patients underwent general, functional and allergological examination. The level of IgE in patients averaged 358.4±276.1 IU/ml. The study of URT included standard examination of ENT organs, video endoscopic examination of nasal and nasopharyngeal cavities using endoscopic equipment — hard rhinoscopes, "Karl Storz" (Germany) with viewing angle 0 and $30^0$, and diameter 2.7 and 4.0 mm.

On visual examination, the inflammatory changes of nasal mucosa were considered as clinical criteria of AR exacerbation associated by at least one of the following two symptoms daily within an hour or more: congestion, nasal discharge, sneezing, and tickling in the nose. In the period of exacerbation in most patients rhinoscopy and video endoscopy revealed typical changes such as edema and change of colour of conchal mucous, cyanotic or marble tint of mucosa, as well as the presence of seromucous discharge in nasal passages. In remission there were no complaints concerning nasal breathing. Rhinoscopy revealed no discharges and edema of conchal mucous.

Statistical analysis was performed using software package Statgraphic plus. The data are presented as M±m, where M — average, m — root-mean-square deviation. The reliability of differences was estimated using criteria $\chi^2$, Z (difference of shares), $p<0.05$ was considered to be statistically significant [10].

**Results and Discussion.** AR was diagnosed in all examined patients with BA on the basis of the data of case histories, rhynoscopic and video endoscopic examination, cytology of nasal discharge: in 19 patients — in remission, in 51 — in the period of exacerbation. Video endoscopic examination showed that in 25 children AR exacerbation was accompanied by the signs of bacterial inflammation in the form of marked hyperemia of nasal mucosa, purulent discharge in nasal passages (Fig. 1–3). Exacerbation of AR was diagnosed in all patients with no BA control, and in two patients — with controlled asthma. Intermittent character of AR (mostly children with pollen sensibilization) was found in 6 patients with mild BA. Persisting AR was revealed in the rest of patients with mild BA, as well as in patients with moderate and severe course of asthma.

The patients were distributed according to the severity of AR as follows: 9 children — mild BA, 47 — moderate, and 14 — severe. Among the patients with mild BA, mild course

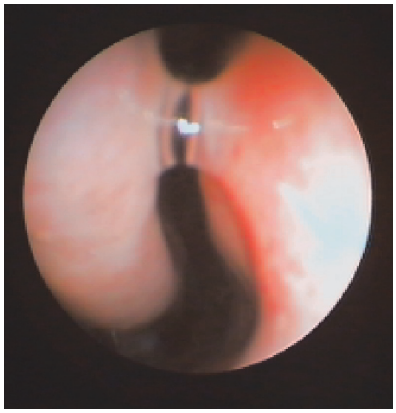

**Fig. 1.** Video rhinoscopy. Patient Z., 17 yrs. Diagnosis: BA, allergic, moderate, controlled. Allergic rhinitis, persistent, severe, the period of exacerbation

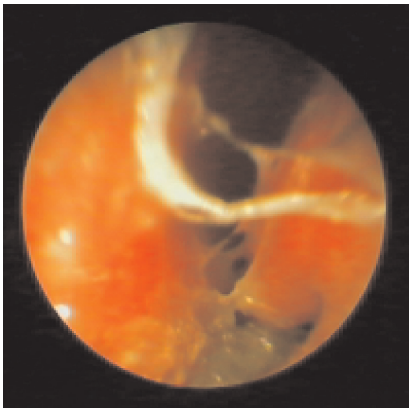

**Fig. 2.** Video rhinoscopy. Patient E., 14 yrs. Diagnosis: BA: allergic, moderate, exacerbation. Persistent allergic rhinitis, moderate, exacerbation. Nonspecific infectious rhinitis. Nasal septum deviation

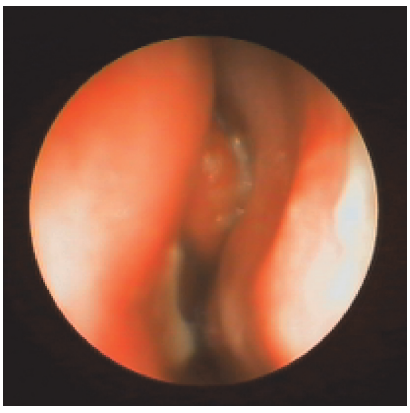

**Fig. 3.** Video rhinoscopy. Patient B., 3.5 yrs. Diagnosis: BA, allergic, mild, intermittent, controlled. Persistent allergic rhinitis, mild. Acute bacterial rhinosinusitis

of AR was diagnosed in 8 children, moderate — in 19, and severe — in 1. In patients with moderate course of BA, mild AR was found in 1 child, moderate — in 25, and severe — in 9. In severe BA patients, moderate course of AR was found in 3 children, and severe — in 4. The differences between the groups were statistically significant, $\chi^2$ = 18.9, p=0.0008.

However, video endoscopic findings showed isolated AR to be revealed only in a limited number of children with asthma, the great majority of patients — 89% (59/70) — in addition to AR, other variants of pathology of nasal cavity and nasopharynx were revealed including nonspecific infectious rhinitis, acute bacterial rhinosinusitis, AINS, hypertrophy of pharyngeal tonsil.

Abnormalities of intranasal structures (AINS) (including nasal septum deviation, turbinate and uncinate deviations) were revealed by video endoscopy in 63% (44/70) of asthmatic children. Among them 11 patients had mild BA (29% of total number of patients with mild BA), 26 — moderate severity of BA (74% of total number of patients with moderate BA), and 7 — severe BA (100% of total number of patients with severe BA). And the part of patients with AINS among the children with mild BA is statistically significantly lower than among the children with moderate and severe BA (Z=2.9, p=0.005; $\chi^2$=12.8, p=0.002). AR against the background of AINS had persistent character, moderate (32 children) and severe (12 children) variants of AR prevailing (Fig. 4).

14 patients had the combination of AINS and hyperplastic changes of nasal mucosa — 32% (14/44) of the total number of children with AINS, and 20% (14/70) — of the number of examined BA patients. There were hyperplastic changes of turbinate mucosa mainly in the following forms:

papillary hyperplasia of inferior nasal concha, mainly unilateral;

polypous changes of mucosa (Fig. 5);

hypertrophy of anterior or posterior parts of turbinate mucosa.

Among BA children with no architectonic changes of nasal cavity, hyperplastic changes of nasal mucosa were diagnosed only in 1 child. Thus, hypertrophic changes of nasal mucosa were found statistically significantly more frequently in BA patients with AINS than in those with no alterations of nasal architectonics (Z=2.21; p=0.035).

It should be mentioned that in comparison group (326 patients without BA) hyperplastic changes of mucosa were revealed only in 5 children (1.5% of the group). Two of them appeared to have rhinitis medicamentosa, 2 patients — AR (age 14 and 16 yrs), and in 1 patient aged 8 years old with the diagnosis of mucoviscidosis, video endoscopy revealed the polyps of nasal cavity. A part of the patients with hypertrophic changes of nasal mucosa among BA patients exceeded statistically significantly the part of the patients with the same pathology in comparison group (Z=5.83; p=0.0001).

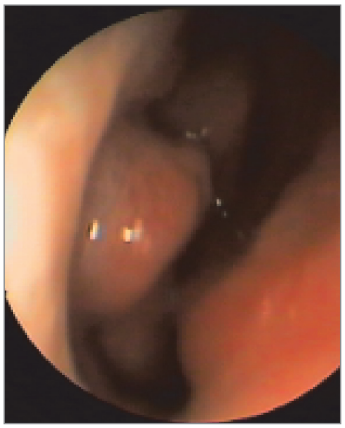

**Fig. 4.** Video rhinoendoscopy. Patient N., 17 yrs. Diagnosis: BA of moderate severity, allergic, controlled. Perennial allergic rhinitis, persistent, moderate severity. Nasal septum deviation + turbinate deviations

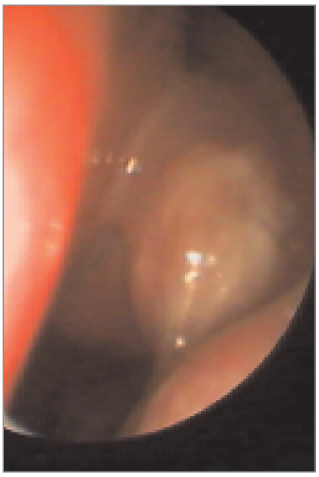

**Fig. 5.** Video rhinoendoscopy. Patient N., 17 yrs. Diagnosis: BA of moderate severity, allergic, controlled. Perennial allergic rhinitis, persistent, moderate severity. Nasal septum deviation + turbinate deviations. Developing polypus of middle concha, on the left

The application of video endoscopic method enabled to examine the pharyngeal tonsils (PT) in BA patients thoroughly. Enlarged tonsils were revealed in 54% (38/70) BA patients, it must have been a supplementary reason for nasal breathing disturbance. The characteristic of the most patients with hypertrophy of pharyngeal tonsils were the signs of venous stasis in inferior nasal concha mucosa. The course of AR in patients with hyperplasia of pharyngeal tonsils was persistent in character, and combined sensitization prevailed.

The most part of patients with enlarged PT belonged to preschool age group (up to 6 years old) — 17 children. All of them had the hypertrophy of adenoid vegetations (100%), only in 2 of them there being visualized II degree hypertrophy of pharyngeal tonsil — lymphoid tissue of PT half-closed the choana lumen. In 13 children with III degree hypertrophy the choana lumen was closed by two-thirds and more (Fig. 6). Complete obturation of choana lumen, and prolapse of hyperplastic PT tissue into the nasal cavity were found in 2 patients. The combination of PT hypertrophy and AINS was seen in 4 children of this age group.

The increase of adenoid vegetations of II degree and more was diagnosed in 67% among the primary school age (20 children). And the combination of adenotonsillar hypertrophy and AINS was revealed in 10 patients (a half of BA children of this age group). It should be mentioned that at this age there is the most intensive growth of maxillofacial skeleton and the formation of nasal cavity. There is a suggestion that the hypertrophy of pharyngeal and palatine tonsils can lead to the structural changes of structures adjacent to nasopharynx and affect the formation of maxillofacial skeleton [11].

Among 18 patients of senior school age (10–14) the

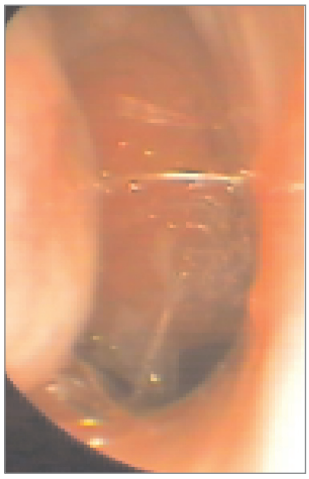

**Fig. 6.** Video rhinoendoscopy. Patient S., 8 yrs. Diagnosis: Allergic, persistent BA. Perennial allergic rhinitis, persistent, severe, exacerbation. III stage adenoids, allergic adenoiditis

hypertrophy of nasopharyngeal tonsil was found in 33% (6/18). In a teenage group (15 patients) enlarged adenoids were found in 1 patient. It should be mentioned that PT hypertrophy combined with altered architectonics of nasal cavity in all teenagers.

14 patients had the combination of PT hypertrophy and the hypertrophy of palatine tonsils, and in 2 patients there were "isolated" enlarged palatine tonsils. In general, the pathology of lymphoepithelial ring of pharynx including chronic tonsillitis and pharyngites were diagnosed in 69% (48/70) of BA children.

Thus, video endoscopic examination of nasopharynx in children with primarily atopic BA proved that all patients had AR symptoms. However, "isolated" AR was diagnosed only in 11% of them, the others having the combination of AR and with others pathologies including significant alterations of intranasal structures architectonics, adenotonsillar hypertrophy, hypertrophic changes of nasal mucosa.

The combination of AR with abnormality of intranasal structures was revealed in 63% (44/70) of examined patients. They had moderate and severe course of AR accompanied in some patients by hypertrophic changes of nasal mucosa. In general, the frequency of AINS was increasing as BA became severe.

The enlargement of pharyngeal tonsils was revealed in 50% of BA patients, mostly of pre-school and early school age. Nearly all teenagers were found to have the combination of enlargement of pharyngeal tonsils with AINS.

**Conclusion.** The results of video endoscopy application in children with bronchial asthma demonstrate high comorbidity of allergic rhinitis with other nasal and nasopharyngeal pathologiesin childhood. A high information value of the technique enables to present the details of nasal obstruction causes in asthmatic patients. It offers the opportunity of individual therapy in this group of patients in order to receive maximum clinical effect and level down the negative effect of upper respiratory pathologies on bronchial asthma course.

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