

# THE ROLE OF OTOLARYNGOLOGICAL EXAMINATION AND NASAL EOSINOPHILIA IN THE COMPREHENSIVE DIAGNOSIS OF ALLERGIC RHINITIS IN CHILDREN

Zhonuzokov O.K., Nasretdinova M.T.

Samarkand State Medical University, Samarkand, Uzbekistan

Received: 2026-07-27 · Accepted: 2026-08-31

## Abstract

**Objective:** To summarize current data on the diagnostic role of in-person otolaryngological examination (anterior rhinoscopy/endoscopy) in combination with assessment of nasal eosinophilia ( rhinocytogram ) in the comprehensive diagnosis of allergic rhinitis in children.

**Material and methods.** We analyzed literature data on clinical and endoscopic signs characteristic of allergic inflammation of the nasal mucosa, on the methodology and semiquantitative grading of rhinocytological examination, as well as on the comparison of the endoscopic picture with the severity of nasal eosinophilia, including in relation to the differential diagnosis of allergic rhinitis, nonallergic rhinitis with eosinophilia (NARES), and infectious rhinitis.

**Results.** A semiquantitative scale for assessing nasal eosinophilia using a rhinocytogram (grades 0, +, ++, +++) with a clinical interpretation of each grade is presented (Table 1). Typical comparisons between rhinoscopic/endoscopic signs (mucous membrane color, turbinate condition, discharge nature, anterior active rhinomanometry parameters , and seasonality) and the severity of nasal eosinophilia are systematized (Table 2). It is shown that the combination of an objective in-person examination with a rhinocytological study increases the specificity of the clinical diagnosis of allergic rhinitis in children and allows one to suspect nonallergic eosinophilic rhinitis in the absence of confirmed sensitization.

**Conclusion.** Rhinocytological examination, complementing a standard otolaryngological examination, is a simple, minimally invasive, and reproducible method for objectively characterizing the nature of nasal mucosal inflammation in children and can be used as a routine component of a comprehensive diagnosis of allergic rhinitis, including in cases with an ambiguous clinical picture.

**Keywords:** allergic rhinitis, children, otolaryngological examination, rhinocytogram, nasal eosinophilia, non-allergic rhinitis with eosinophilia.

## 1. Introduction

A clinical examination by an otolaryngologist remains the first and mandatory step in the objective diagnosis of allergic rhinitis (AR) in children. However, the visual rhinoscopic picture of swelling and hyperemia of the nasal mucosa is nonspecific in itself and does not allow for the reliable differentiation of allergic inflammation from infectious or vasomotor inflammation [1,2]. An additional,

simple to perform, and minimally invasive method for objectively determining the nature of the inflammation is rhinocytological examination—a microscopic assessment of the cellular composition of a smear-print from the mucous membrane of the inferior turbinate, primarily the eosinophil content [3,4].

The presence of eosinophils in nasal secretions reflects the involvement of the eosinophilic component of inflammation, which is characteristic not only of classical IgE-mediated AR, but also of a separate clinical phenotype - non-allergic rhinitis with eosinophilia (non-allergic rhinitis with eosinophilia), rhinitis with eosinophilia syndrome (NARES), occurring with negative results of skin allergy tests and without an increase in specific IgE [5,6]. This is why the comparison of in-person rhinoscopic examination data with a semi-quantitative assessment of nasal eosinophilia is considered a significant addition to the standard diagnostic algorithm for rhinitis in children, especially in cases where the clinical picture does not allow a clear statement in favor of an allergic or non-allergic nature of the disease [4,7].

## 2. Materials and Methods

An analysis of literary data on the methodology of rhinocytological examination (technique for obtaining a smear-print from the mucous membrane of the inferior turbinate, semi-quantitative assessment of the cellular composition), on the diagnostic criteria of NARES, as well as on clinical studies comparing the severity of nasal eosinophilia with endoscopic and functional (rhinomanometry) findings in children with persistent rhinitis was conducted.

## 3. Results

Clinical and endoscopic picture.

The standard scope of an in-person otolaryngological examination for suspected AR in children includes anterior rhinoscopy or endoscopy of the nasal cavity with an assessment of the color and condition of the mucous membrane, the degree of swelling of the nasal turbinates, the nature of the discharge, and the anatomical features of the nasal cavity [1]. Allergic inflammation is more characterized by pallor or cyanosis of the mucous membrane against the background of pronounced swelling of the inferior turbinates and a watery, transparent discharge, whereas hyperemia of the mucous membrane and a mucopurulent nature of the discharge are more typical of the infectious genesis of rhinitis [1,2]. These signs, however, have limited specificity when used alone, which justifies the need to compare them with objective laboratory and cytological data.

Rhinocytological examination and gradation of nasal eosinophilia.

Material for rhinocytological examination is obtained by smear-imprint (scraping) from the mucous membrane of the inferior nasal turbinate, followed by staining and microscopy [3,4]. The eosinophil content is assessed semi-quantitatively; a gradation scale summarized from literature data is presented in Table 1.

The diagnostic threshold traditionally used to verify NARES is considered to be an eosinophil content exceeding 20% of the cellular composition of the smear, with negative results of skin allergy tests and/or no increase in specific IgE [5,6]. Moderate eosinophilia (5–20%) is most characteristic of mild to moderate allergic rhinitis, whereas a complete absence of eosinophils in the smear with a persistent clinical picture of rhinitis requires a targeted search for other, non-allergic causes of the disease [3,7]. Comparison of endoscopic data with the severity of eosinophilia.

A systematization of typical comparisons between rhinoscopic/endoscopic and functional signs, on the one hand, and the severity of nasal eosinophilia, on the other, is presented in Table 2.

Table 2. Comparison of otolaryngological (rhinoscopic/endoscopic) findings with the severity of nasal eosinophilia

As shown in Table 2, the combination of a characteristic endoscopic picture (pale edematous mucosa, watery discharge, decreased volumetric airflow according to anterior active rhinomanometry) with pronounced nasal eosinophilia and a clear seasonal/allergenic association significantly increases the likelihood of a true allergic genesis of rhinitis, whereas a discrepancy between these signs (for example, pronounced eosinophilia in the absence of a seasonal connection and negative allergy tests) serves as a basis for considering the diagnosis of NARES [5,6].

| Degree          | Eosinophil content in rhinocytogram                      | Clinical interpretation                                                                                                                |
|-----------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 0 (absent)      | Eosinophils were not detected                            | Allergic inflammation is unlikely; it requires searching for other causes of rhinitis.                                                 |
| + (light)       | Single eosinophils, up to 5% of the cellular composition | Possible initial or <u>subclinical</u> allergic inflammation                                                                           |
| ++ (moderate)   | 5–20% of cellular composition                            | Moderate eosinophilic inflammation, characteristic of mild/moderate allergic rhinitis                                                  |
| +++ (expressed) | More than 20% of the cellular composition                | Marked <u>eosinophilia</u> ; characteristic of both severe allergic rhinitis and nonallergic rhinitis with <u>eosinophilia</u> (NARES) |

Figure 1. Figure 1

| Rhinoscopic/endoscopic sign                              | Typically seen with marked nasal <u>eosinophilia</u>         | Typically with no/minimal <u>eosinophilia</u>                                                        |
|----------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Color of the mucous membrane                             | Pale, <u>cyanotic</u> or “marbled” <u>mucosa</u>             | <u>Hyperemic</u> mucous membrane (characteristic of infectious genesis)                              |
| Condition of the nasal <u>turbinates</u>                 | Swelling of the inferior <u>turbinates</u> , often bilateral | Swelling of the <u>conchae</u> is less pronounced or asymmetrical                                    |
| Nature of discharge                                      | Watery, clear discharge                                      | <u>Mucopurulent</u> or purulent discharge                                                            |
| Nasal breathing (anterior active <u>rhinomanometry</u> ) | Decreased total air flow, obstruction                        | The indicators are closer to the age norm                                                            |
| Association with seasonality/allergens                   | A clear link to pollen season or household allergens         | There is no connection with seasonality or it is associated with acute respiratory viral infections. |

Figure 2. Figure 2

## 4. Discussion

The presented data confirm that neither isolated clinical examination nor isolated assessment of nasal eosinophilia have sufficient diagnostic specificity for the differential diagnosis of rhinitis in children, whereas their combined use significantly improves the accuracy of clinical diagnosis [4,7]. Particular attention should be paid to the fact that the diagnosis of allergic rhinitis in children is often based primarily on the anamnesis and the results of skin allergy tests/specific IgE, whereas rhinocytological examination remains insufficiently widely introduced into routine practice, despite the ease of implementation and good tolerability of the procedure by children [4]. It has been shown that in some children with persistent rhinitis and negative results of skin allergy tests, significant nasal eosinophilia is detected, which emphasizes the practical value of the method for identifying the so-called local allergic rhinitis and related phenotypes that are not captured by standard systemic tests for atopy [7]. A limitation of the data reviewed is the lack of a single, universally accepted quantitative scale for grading nasal eosinophilia: the threshold values used in the literature for mild, moderate, and severe eosinophilia, as well as for verifying NARES, vary somewhat between research groups, which requires caution when directly comparing quantitative results obtained in different centers and justifies the need for further standardization of rhinocytological research methods.

## 5. Conclusion

The combination of an objective otolaryngological examination with a semi-quantitative assessment of nasal eosinophilia using a rhinocytogram increases the accuracy and specificity of diagnosing allergic

rhinitis in children, allows one to suspect non-allergic rhinitis with eosinophilia with negative results of standard allergy tests, and can be recommended as an accessible addition to the routine clinical and instrumental algorithm for examining children with persistent symptoms of rhinitis.

## References

1. Bernstein JA, Bernstein JS, Makol R., Ward S. Allergic rhinitis: a review. JAMA. 2024;331(10):866–877. doi : 10.1001/jama.2024.0530 [ PubMed ]
2. Roberts G, Xatzipsalti M, Borrego LM, et al. Pediatric rhinitis: position paper of the European Academy of Allergy and Clinical Immunology. Allergy. 2013;68(9):1102–1116. doi : 10.1111/all.12235
3. Gelardi M, Iannuzzi L, Quaranta N, Landi M, Passalacqua G. Nasal cytology: practical aspects and clinical relevance. Ital J Pediatr. 2012;38: 5 doi : 10.1186/1824-7288-38-51
4. Dodi G., Di Filippo P., Ciarelli F., Porreca A., Cazzato F., Matonti L., Di Pillo S., Neri G., Chiarelli F., Attanasi M. The role of nasal cytology and serum atopic biomarkers in pediatric rhinitis. Diagnostics (Basel). 2023;13(3):555. doi : 10.3390/diagnostics13030555
5. Jacobs RL, Freedman PM, Boswell RN Nonallergic rhinitis with eosinophilia (NARES) syndrome: clinical and immunological presentation. J Allergy Clin Immunol. 1981;67(4):253–262. doi : 10.1016/0091-6749(81)90019-1
6. Scarupa M.D., Kaliner M.A. Nonallergic rhinitis, with a focus on vasomotor rhinitis: clinical importance, differential diagnosis, and effective treatment recommendations. World Allergy Organ J. 2009;2(3):20–25. doi: 10.1097/WAO.0b013e318196ca1e
7. Gelardi M., Fiore V., Giancaspro R., et al. General classification of rhinopathies: the need for standardization according to etiology and nasal cytology. Eur Arch Otorhinolaryngol. 2023;280(11):4751–4758. doi: 10.1007/s00405-023-08117-3



## Indexed & Abstracted In

---

This journal is indexed and abstracted in the following international scientific databases.



Google Scholar



ISSN



ORCID



CiteFactor



ResearchBib



DOI



Zenodo



Grammarly

### Article Verification

Scan the QR code to verify the authenticity of this article

DOI: 10.4103/aams.0498