

Allergic rhinitis as a systemic disease of respiratory tract

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Summary

Allergic rhinitis affects nearly 500 million people in the world and is now considered not only to be a local catarrh of the nasal passages, but a chronic systemic respiratory disease. Proof of generalization of this process is the frequent coexistence of asthma and allergic rhinitis. In recognition, the most important role is played by, first of all, a well-collected interview and physical examination. Treatment depends on the form of AR (periodic or chronic) and on the severity of symptoms (mild, moderate or severe). The first-line drugs are nasal glucocorticosteroids and second generation antihistamines. Appropriate treatment allows to reduce ailments and avoid complications, including upper (sinusitis, exudative otitis media, tonsillitis) and lower respiratory tract (bronchial hyperresponsiveness, bronchial asthma), which significantly reduce the quality of life of patients (QOL).

Key words: Allergy; Rhinitis; Asthma; Atopic

Introduction

Allergy diseases are now a global problem in health care, affecting 10-25% of the world's population, while in the European population it varies from 17 to 28.5% and the incidence is constantly increasing. Among them is allergic rhinitis (AR), which affects 500 million people in the world and is now considered not only to be a local nasal disorder, but has been shown to have a significant impact on the entire respiratory system. Indirect allergen provocation of the upper respiratory tract leads not only to the local inflammatory reaction, but also manifested by an inflammatory response from the lower respiratory tract. The

evidence for the generalization of this process in the airways is the well-known frequent comorbidity of allergic rhinitis and asthma.

Allergic rhinitis is a chronic disease that often remains undetected or downplayed, leading to numerous systemic complications and, consequently, a significant reduction in the quality of life (QOL) of patients. Allergic rhinitis is also a financial and social problem. The World Allergy Organization recognizes the alarming increase in the burden of allergic diseases and strives to recognize them as a public health problem.

Detection and treatment of allergic rhinitis requires an integrated diagnosis and treatment system, and above all vigilance from the doctor, especially in primary care, where the patient reports on the first visit. Early and effective treatment of AR affects the prevention of respiratory hypersensitivity and the development of bronchial asthma. [1,2,3,6,9,11,12]

Definition and etiopathogenesis

Allergic rhinitis is an inflammation of the nasal mucosa, which is the only one among allergic diseases caused exclusively by Ig-E-dependent allergy.

It is classified due to:

- causing symptoms for: seasonal and perennial,
- duration of symptoms for: intermittent and persistent.
- severity of symptoms to: mild, moderate and severe.

Moderate and severe form is characterized by at least 1 of 4 criteria: sleep disorder; obstruction in everyday, recreational and/or sporting activities; difficulties at school or at work; annoying symptoms. Children are more likely to have seasonal allergic rhinitis, while adults are dominated by perennial.

The etiological factors include inhalation allergens such as house dust mites, grass pollen and crop cereals, as well as trees, mold fungi, epidermis and animal secretions. Food allergens rarely cause symptoms of AR and rather in the context of cross reactions between inhalants and food allergens (allergic components common to various sources of allergens are found eg in: birch and apple pollen, house dust mites and shrimps or in cat allergens and pork meat) - persons such after eating a given food may feel similar symptoms that the "original allergen" causes. [3,4,5,14]

Risk factors

Risk factors of allergic rhinitis are:

1. Genetic factors and positive family history for allergic diseases.
2. Male sex.
3. Low birth weight.
4. Constantly elevated IgE levels (> 100 IU / ml before 6 years of age).
5. Environmental factors
 - environmental pollution - a higher incidence of allergic rhinitis in the urban population has been demonstrated, especially in industrialized countries
 - exposure to tobacco smoke
 - early introduction of solid or mixed foods into the infant's diet
 - infection with some viruses aged 0-3
6. Breastfeeding ≥ 12 months and physiological delivery - beneficial protective effects of breastfeeding and childbirth by natural forces have been demonstrated. [2,3,7,8,10,14]

Symptoms

Allergic rhinitis impairs the important function of the nose, which is cleansing, heating, humidifying the respiratory air and protecting against environmental factors. We distinguish two phases of the allergen response:

1. Early phase - release of histamine and leukotrienes in response to the combination of antigen with IgE antibodies on mast cells of the nasal mucous membrane;
2. Late phase - observed about 6-10 hours after exposure, conditioned by the release of leukotrienes by activated inflammatory cells, including eosinophils.

The predominance of the response phase in individual patients generates 2 types of patients: "sneezing and rhinorrhea type" (advantage of histamine effect) and "nasal blockage type" (advantage of the leukotrienes effect). The released factors penetrate into the nasal mucosa, irritating the endings of sensory nerves and blood vessels, causing:

- sneezing (irritation of sensory part of the trigeminal nerve),
- watery runny nose (mainly the effect of acetylcholine release from irritated parasympathetic nerves),
- swelling of the nasal mucosa (as a result of plasma leakage and congestion),
- nasal blockage,
- pruritus of the nose, often also conjunctiva (and redness), ears, palate or throat,
- impaired sense of smell,
- dryness of the oral mucosa,
- systemic symptoms - disturbances of sleep, concentration and learning, slight increase in body temperature, headache, depressed mood.

In 70% of patients, the symptoms worsen at night and in the early morning hours. [1,3,4,5,14]

Diagnosis

The diagnosis is based primarily on physical examination, ie a typical history of AR (seasonal and intermittent type of AR is dominated by sneezing, runny nose and glassy eyes, while patients with perennial and persistent type are dominated by symptoms of feeling of discharge on the back wall throat, chronic hyperemia and nasal blockage) and subjective, where the following symptoms may suggest AR:

- Breathing through the mouth
- Rubbing the nose or clear transverse folding of the nose
- Frequent snoring and cleansing throat
- Allergic eye shadows (allergic shiners)
- Paleness and swelling of the nasal mucosa.

As well as, confirming the allergic background, auxiliary research:

- Spot skin tests and / or
- Measurement of allergen specific serum IgE antibodies.

Other auxiliary tests, useful in differential diagnostics:

- Nasal provocation test (in case of unclear results of the above-mentioned tests)
- Frontal rhinoscopy and nasal endoscopy
- A pneumatic otoscopy to detect dysfunctions of the Eustachian tube
- CT of the nose and paranasal sinuses
- Cytological examination of a nasal swab (including an increase in the percentage of eosinophilia) - a non-specific study, also occurs in non-allergic rhinitis
- Spirometry - initially and periodically in the case of AR confirmation, to monitor the possible development of bronchial asthma. [1, 5,14]

Treatment

1. Elimination of allergens from the environment, eg: house dust mites by regular cleaning, drying and ventilation of utility rooms, in the case of pollinosis - reduction of allergen exposure in the pollen season, nasal irrigation, removal of the animal from the house in case of allergies to animal secretions.

2. Pharmacotherapy:

- **Antihistamines** (oral, nasal, conjunctival) - oral preparations recommended as first-line medicines; we distinguish first generation drugs - they are characterized by an immediate effect reducing sneezing and watery runny nose, but often cause drowsiness and dry mouth, contraindicated in asthma, glaucoma and prostatic hyperplasia; second generation have less sedative and anticholinergic effects, but their effect in reducing symptoms is smaller and requires longer administration
- **Glucocorticosteroids** (nasal, oral) - nasal preparations are currently recommended as first-line therapy alone or together with antihistamine drugs; peak of action after 2-4 weeks
- **Cromoglicic acid** (nasal, conjunctival, inhalation) - develop after about 2 weeks, they do not show adverse effects, but their effect is definitely lower than that of GCS and antihistamine drugs; first-line drug during pregnancy
- **Anti-leukotriene drugs - montelukast** - adjunct to primary AR therapy, have a weaker effect than GCS, but are recommended in the case of the coexistence of bronchial asthma due to the bronchodilator
- **Antiprostaglandines**
- **Alpha- sympathomimetics** - nose drops narrowing the vessels to temporarily relieve the blockage of the nose, not recommended for children
- **Specific immunotherapy** - currently the most effective treatment for AR caused by allergy to inhalation allergens. It reduces / eliminates the symptoms of the disease and the demand for drugs. Also reduces the risk of developing asthma and allergy to another inhalant allergens three times. It is used in the case of ineffective symptomatic treatment or pharmacotherapy intolerance. Recommended in the case of allergies to pollen and house dust mites (in patients over 6 years of age).

3. Surgical treatment - mainly treatment of long-term AR complications (nasal polyps, chronic sinusitis). [1,4,5,11,12,13,14]

Effects of untreated allergic rhinitis

Reducing the quality of life (QOL) manifesting itself primarily:

- Sleep disturbances and concentration, leading to excessive daytime fatigue and depression
- Chronic headache and sinuses
- *Allergic irritability syndrome*, characterized by increased irritability, nervousness, anger attacks, decreased concentration
- Preventing proper functioning at work or at school, which may lead to a lack of proper progress in learning and deterioration of the family's financial situation

Increased risk of bronchial asthma - epidemiological studies indicate that perennial rhinitis increases the risk of developing bronchial asthma 8 times. According to numerous publications, asthma is accompanied by AR in 15% to 38%, whereas rhinitis is accompanied by asthma in 6% to 85%. Whereas in children with bronchial asthma, the accompanying rhinitis increases the number of medical visits by 50% and is responsible for three times more frequent hospitalizations in intensive care units and treatment costs regardless of the severity of asthma.

Inflammation of the nasal epithelium is accompanied by silent clinical bronchial reactions, which is caused by the release of the same mediators of inflammation in the nose and the bronchi - negative relationship between eosinophilia and nasal flows was demonstrated and FEV 1. Both bronchial response to nasal allergen challenge and nasal response to challenge endobronchial. In addition, swelling of the nasal mucosa changes the airway to the mouth. As a result, the air being inhaled by the mouth is not adequately heated, moisturized and cleaned of impurities and allergens, which leads to direct penetration of allergens into the lungs.

Effective treatment of allergic rhinitis reduces the symptoms of asthma, improves PEF and FEV1 parameters in spirometry, which proves the theory of a common mediator mechanism of inflammatory reactions throughout the entire respiratory system.

Other complications and comorbidities (present in 75% of children with allergic rhinitis):

- Allergic conjunctivitis (in 33-56% of cases co-occurs with AR)
- Polyposis of the nasal mucosa
- Acute and chronic sinusitis, eosinophilic sinusitis
- Acute and exudative otitis media
- Dysfunction of the Eustachian tube
- Infections of the upper respiratory tract
- Sleep disorders, including snoring and sleep apnea
- Atopic dermatitis
- Food allergy
- Palatal tonsillary hypertrophy (affects 12% of unsuccessfully treated children)
- Hearing damage
- Smell impairment (about 50% of adults and children with AR)
- Disorders of speech development in young children
- Facial craniofacial disorders (elongation of the face) and abnormal bite (cross bite, protrusion of incisors)
- Deformation of the nasal septum
- Breathing through open mouth.

Financial costs, including direct costs (expenses for treatment, diagnosis, outpatient and inpatient care), indirect costs (financial losses resulting from absence from work and reduced work efficiency) and hidden costs (associated with co-morbidities), are high (an average of 300 to 1300 USD/patient/year in developed countries) and the data prove that even higher than those generated by bronchial asthma. [2,3,6,10,12,14,15]

Individualization of treatment

Properly selected pharmacological therapy and patient education, including the type of allergic rhinitis, patient's age, existence of comorbidities, response to treatment and tolerance reduce symptoms. Thus improving the quality of life of the patient and reduce the risk of symptoms and diseases often accompanying allergic rhinitis.

The axis of the pharmacotherapy of AR are intranasal glucocorticoids and the second generation of antihistamine drugs. Recommendations for other groups of drugs indicate their role in adjuvant therapy or an alternative in the ineffectiveness of the standard line of therapy. Valuable recommendations supporting the selection of appropriate therapy are the guidelines of ARIA (Allergic Rhinitis and its Impact on Asthma) established under the patronage of the World Health Organization (WHO). These recommendations were formulated primarily for primary care physicians who most often see patients with AR and give them (and their relatives) the first information about the disease. [11,12,13]

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