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Short Article

Allergic rhinitis – a review of current diagnostic and therapeutic methods

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Abstract

Allergic rhinitis (AR) is a common disease characterized by inflammation of the nasal mucosa caused by exposure to allergens such as pollen, house dust mites, animal dander, and molds. Symptoms include sneezing, nasal itching, watery discharge, and nasal congestion, often associated with conjunctivitis. AR can significantly reduce patients' quality of life, affecting their ability to perform daily activities and causing sleep disturbances and fatigue.

Diagnosis of AR is based on a past medical history, assessment of clinical symptoms, and allergy tests, such as skin tests, and measure of specific class E (IgE) immunoglobulins in blood serum level. Treatment includes allergen avoidance, pharmacotherapy, and allergen immunotherapy. Antihistamines, intranasal glucocorticosteroids, cromones, and anti-leukotriene drugs are the basis of pharmacotherapy, helping to control symptoms and improve a patient's quality of life. Allergen immunotherapy, both subcutaneous and sublingual, is effective in modifying the course of the disease and reducing hypersensitivity to allergens.

New therapeutic and diagnostic approaches, such as biomarkers and biologics, are under investigation and may offer more personalized and effective AR treatment in the future. A

holistic approach to AR, including patient education and lifestyle modification, is crucial for long-term therapeutic success.

The article aims to review current diagnostic and therapeutic methods used in AR.

Keywords: “allergic rhinitis”, “AR”, “diagnostics”, “pharmacotherapy”

Introduction

AR occurs due to a reaction to inhaled allergens and is one of the most common chronic diseases in the world. It often co-occurs with asthma and conjunctivitis and is a global health problem. Literature data indicate that AR usually begins in the early stages of life. It is estimated that the incidence of this disease is over 5% at the age of 3 years [1]. It is estimated that on a global scale, AR occurs in 5% to even 50% of the population [2]. The etiology of AR is related to both genetic and environmental factors [3]. Allergens associated with AR include pollen (trees, grasses, and weeds), molds, and household allergens, such as house dust mites. Occupational allergens include plant and animal proteins, certain chemicals, isocyanates, persulfate salts, and wood. Risk factors for AR include the use of antibiotics, air pollution, and exposure to cats and dogs [1]. Patients report sneezing, runny nose, nasal obstruction, and itching [3]. It is worth noting that there is no universally accepted "gold standard" in the detection of AR. The diagnosis is often made based on clinical presentation and response to pharmacotherapy [4].

Skin prick tests

One of the techniques used in the diagnosis of AR is skin prick tests. This method is appreciated for its ease of implementation and low invasiveness [5]. Skin prick tests are a primary method of identifying specific allergic factors causing AR. These tests involve

placing a drop of an extract of a specific allergen on the skin of the forearms or back and then puncturing the skin within the drop to introduce the extract into the epidermis. The test uses allergens specific to the patient's environment (e.g. pollen, animal hair, molds, and house dust mites) [6]. The test can be interpreted after 15–20 minutes of examination [5]. A skin reaction in the form of a wheal (an irregular, pale wheal surrounded by an area of redness) indicates a positive test result [6]. The literature recommends a minimum 3-millimeter change as the threshold size for considering a wheal is a positive skin reaction. Although there are no age restrictions for skin testing, it is worth remembering that skin reactions are less pronounced in young children [4]. Relative contraindications to skin prick testing are pregnancy and peak expiratory flow in asthma patients of less than 70%. Moreover, the validity of the test should be considered in a population of patients with dermographism and severe skin changes. In patients taking drugs from groups such as antihistamines, antidepressants, or calcineurin inhibitors, the correct interpretation of test results may be impaired [5]. It is generally believed that skin prick tests are more sensitive and cost-effective than testing for specific IgE in blood serum [6]. The sensitivity of skin prick tests is estimated to range from 68% to 100%, and the specificity from 70% to 91% [1].

Examination of specific IgE

An alternative to skin prick tests may be the examination of allergen-specific IgE, performed using an immunoabsorption test or a radioallergosorbent test (RAST) [6]. The detection of IgE antibodies against specific molecules in serum can be used as a biomarker to predict the persistence of AR or the future occurrence of diseases such as asthma and oral allergy syndrome [1]. Measuring the serum level of allergen-specific IgE is particularly useful in patients with dermatitis and dermographism and in cases where the administration of antihistamines should be continued during the examination [7]. Serum IgE can be measured for a single allergen (singleplex; one sample test) or a panel containing several allergens (multiplex; multiple sample tests). Patients may be sensitive to more than one allergen. Therefore, multiplex tests play an essential role in the diagnosis of AR. The safety profile of the IgE testing is excellent, and the risk of anaphylaxis does not exist. The IgE test result should be assessed in correlation with the patient's clinical presentation. Literature data indicate that serum IgE testing has a sensitivity of 67-96% and a specificity of 80-100% [2].

Other diagnostic methods

In the doctor's office, medical practitioners can quickly assess the airflow through the patient's nose, for example, by observing whether fogging appears on a metal spatula held under the patient's nostrils. The nose can be examined inside using a nasal endoscope, and if it is not available, an anterior rhinoscopy can be performed using an ENT headlamp and a nasal speculum, or the examination can be performed using an otoscope with a large diameter tip [8].

When patients complain of AR's clinical symptoms but the results of skin prick tests or blood examinations are contradictory or insufficient, an intranasal provocation test may be performed. During this examination, the allergen is administered to the mucous membrane of the inferior and middle turbinates. When applying the allergen, the patient must hold his breath to avoid inhaling it into the lower respiratory tract. Following the intranasal challenge, the patient's clinical presentation is assessed. Parameters to be checked include nasal irritation, as assessed by the number of sneezes; the appearance of nasal discharge, as evaluated by anterior rhinoscopy; and extranasal symptoms, such as ocular, cutaneous, or respiratory reactions. The result of an intranasal challenge test is considered positive for the tested allergen if the patient scores more than 3 points for the listed parameters in the assessment scale dedicated to this test [9].

Routine imaging of the sinuses and nose is not recommended in patients with symptoms indicating the diagnosis of AR [10]. For patients with red flags symptoms such as unilateral complaints, bloody discharge, new appearance of nasal polyp(s), pressure on the orbit, or orbital cellulitis, it is advisable to refer the patient to an otorhinolaryngologist [8].

Prevention

Patients with AR should avoid exposure to cigarette smoke, pets, and allergens known to cause symptoms [11]. It may also be suggested that they wash their clothes at higher temperatures and maintain general hygiene at home [12]. Patient education is key, including information about the disease, awareness of symptoms, and the importance of following recommendations [13].

Pharmacological treatment

Patients with suspected AR who report to a qualified healthcare professional should be treated with an intranasal corticosteroid or an intranasal or oral antihistamine. When deciding on treatment, a physician should consider his experience, the patient's symptoms, preferences and

expectations, factors provoking symptoms, and possible comorbidities. Patients who have not achieved therapeutic success despite trying the previously mentioned drugs should have the diagnosis of AR confirmed. Patients' compliance with medical recommendations should also be verified, and the impact of comorbidities should be assessed. The next step is to modify pharmacotherapy. If the treatment is still ineffective or severe symptoms occur, consider using, for example, ipratropium, leukotriene receptor antagonists, cromones, and nasal decongestants. Other options include allergen-specific immunotherapy, short-term oral steroid therapy, or surgical consultation [13].

The primary method of treating AR is corticosteroids administered intranasally. They work by reducing the influx of inflammatory cells and inhibiting the release of cytokines, thereby reducing inflammation of the nasal mucosa. The onset of action may occur in less than 30 minutes, and maximum effectiveness is usually observed after two to four weeks of use [11]. Drugs from this group are generally well tolerated but may cause local side effects such as nosebleeds, nasal dryness, and throat irritation. Systemic side effects, such as those that may be feared with oral or parenteral administration of glucocorticosteroids, are infrequent. However, during long-term treatment in children, complications of steroid therapy should be regularly monitored [12].

Oral glucocorticosteroids can be used for a short period (up to 7 days) if AR resists treatment with other methods [14].

Antihistamines effectively relieve nasal itching and eye symptoms and reduce rhinorrhea [12]. In treating AR, drugs that act on the H1 receptor are used. Intranasal administration of an antihistamine allows for higher concentrations of the active substance directly in the target tissue, with the additional benefit of reduced risk of systemic side effects. A drug from this group available for clinical use is azelastine [15].

Second-generation antihistamines are helpful in many patients with mild symptoms requiring acute treatment [11]. The advantages of oral H1 receptor antagonists are once-daily administration, rapid and effective action, and low-cost therapy [1]. It is worth noting, however, that there is data in the literature indicating that intranasally administered glucocorticosteroids are more effective than antihistamines in alleviating nasal symptoms and improving the quality of life of patients with AR [12].

Combinations containing an intranasal glucocorticosteroid with an intranasal antihistamine are available. These include, for example, preparations containing fluticasone propionate with azelastine and mometasone with olopatadine. These medications are more effective than

individual drugs administered separately, are well tolerated (a small group of patients may complain of a bitter taste), and act within a few minutes (fluticasone propionate with azelastine) or 1 hour (mometasone with olopatadine). This type of therapy is usually used in patients who have not benefited from treatment with intranasal steroids alone, and these drugs can also be offered to non-compliant patients who treat symptoms sporadically [1].

Leukotriene receptor antagonists should be considered if oral antihistamines, nasal corticosteroids, and/or a combination of these drugs are not well tolerated or are ineffective in controlling AR symptoms. However, montelukast or zafirlukast seems less effective than intranasal glucocorticosteroid administration [6].

Intranasal cromone is available over the counter. This drug inhibits the degranulation of mast cells [11]. For some patients, cromolyn sodium is a reasonable therapeutic option [6]. However, long-term use of this medication may be problematic due to inconvenient dosage requirements (3-4 times daily) [16].

Oral and intranasal decongestants help reduce inflammation and nasal congestion, but it should be noted that topical preparations are more effective in restoring nasal patency than oral medications. Drugs of this group are very effective in short-term relief of nasal congestion but do not affect other symptoms of AR, such as sneezing, itching, and runny nose. Due to side effects and lower tolerance, oral decongestants should be prescribed only for a short period and with particular caution in the elderly, patients with hypertension, hyperthyroidism, or angle-closure glaucoma [17]. Intranasal drugs, such as oxymetazoline or phenylephrine, can be used for up to 7 days in adults [1].

Ipratropium bromide inhibits the action of acetylcholine by blocking its binding to receptors, reducing secretion by serous and mucoserous glands [18]. Evidence supports the use of intranasal anticholinergics in cases of severe rhinorrhea. It is recommended that these preparations be administered two or three times a day. Their side effects include dryness of the nasal mucosa, nosebleeds, and headache [11].

Immunotherapy

Immunotherapy should be considered if symptoms are not controlled despite avoiding exposure to the allergen and appropriate pharmacotherapy in compliant patients [1]. Patients with AR can be offered both subcutaneous and sublingual immunotherapy [3]. Allergen immunotherapy involves administering gradually increasing doses of a patient-specific allergen until a dose effective in inducing immunological tolerance is reached [6]. The

optimal duration of this therapeutic method usage has yet to be determined, but it is believed that the ideal duration of treatment should be three to five years [11]. Literature data indicate that at least three years of immunotherapy benefit patients with AR, which may persist for several years after treatment discontinuation [6].

Conclusions

In diagnosing AR, it is crucial to conduct a thorough medical interview to understand the history of the disease and possible triggering factors. Skin prick tests and examination of the level of specific IgE antibodies in the blood allow for precise identification of allergens causing symptoms. The treatment involves pharmacotherapy, including corticosteroids, antihistamines, and anti-leukotriene drugs, effectively alleviating the symptoms. A long-term therapeutic method is allergen immunotherapy, which can permanently improve the patient's health and reduce hypersensitivity to allergens.

Author's contributions

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Conflict of interest

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Bibliography:

1. Bousquet, J., Anto, J. M., Bachert, C., Baiardini, I., Bosnic-Anticevich, S., Walter Canonica, G., Melén, E., Palomares, O., Scadding, G. K., Togias, A., & Toppila-Salmi, S. (2020). Allergic rhinitis. Nature reviews. Disease primers, 6(1), 95. https://doi.org/10.1038/s41572-020-00227-0

2. Wise, S. K., Damask, C., Roland, L. T., Ebert, C., Levy, J. M., Lin, S., Luong, A., Rodriguez, K., Sedaghat, A. R., Toskala, E., Villwock, J., Abdullah, B., Akdis, C., Alt, J. A., Ansotegui, I. J., Azar, A., Baroody, F., Benninger, M. S., Bernstein, J., Brook, C., … Zhang, L. (2023). International consensus statement on allergy and rhinology: Allergic rhinitis - 2023. International forum of allergy & rhinology, 13(4), 293–859. https://doi.org/10.1002/alr.23090

3. Meng, Y., Wang, C., & Zhang, L. (2019). Recent developments and highlights in allergic rhinitis. Allergy, 74(12), 2320–2328. https://doi.org/10.1111/all.14067

4. Nevis, I. F., Binkley, K., & Kabali, C. (2016). Diagnostic accuracy of skin-prick testing for allergic rhinitis: a systematic review and meta-analysis. Allergy, asthma, and clinical immunology : official journal of the Canadian Society of Allergy and Clinical Immunology, 12, 20. https://doi.org/10.1186/s13223-016-0126-0

5. Mostafa, H. S., Qotb, M., Hussein, M. A., & Hussein, A. (2019). Allergic rhinitis diagnosis: skin-prick test versus laboratory diagnostic methods. The Egyptian Journal of Otolaryngology, 35, 262-268.

6. Small, P., Keith, P. K., & Kim, H. (2018). Allergic rhinitis. Allergy, asthma, and clinical immunology : official journal of the Canadian Society of Allergy and Clinical Immunology, 14(Suppl 2), 51. https://doi.org/10.1186/s13223-018-0280-7

7. Varshney, J., & Varshney, H. (2015). Allergic Rhinitis: an Overview. Indian journal of otolaryngology and head and neck surgery : official publication of the Association of Otolaryngologists of India, 67(2), 143–149. https://doi.org/10.1007/s12070-015-0828-5

8. Scadding, G. K., & Scadding, G. W. (2016). Diagnosing Allergic Rhinitis. Immunology and allergy clinics of North America, 36(2), 249–260. https://doi.org/10.1016/j.iac.2015.12.003

9. Gosepath, J., Amedee, R. G., & Mann, W. J. (2005). Nasal provocation testing as an international standard for evaluation of allergic and nonallergic rhinitis. The Laryngoscope, 115(3), 512–516. https://doi.org/10.1097/01.MLG.0000149682.56426.6B

10. Seidman, M. D., Gurgel, R. K., Lin, S. Y., Schwartz, S. R., Baroody, F. M., Bonner, J. R., Dawson, D. E., Dykewicz, M. S., Hackell, J. M., Han, J. K., Ishman, S. L., Krouse, H. J., Malekzadeh, S., Mims, J. W., Omole, F. S., Reddy, W. D., Wallace, D. V., Walsh, S. A., Warren, B. E., Wilson, M. N., … Guideline Otolaryngology Development Group. AAO-HNSF (2015). Clinical practice guideline: Allergic rhinitis. Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery, 152(1 Suppl), S1–S43. https://doi.org/10.1177/0194599814561600

11. Sur, D. K., & Plesa, M. L. (2015). Treatment of Allergic Rhinitis. American family physician, 92(11), 985–992.

12. Siddiqui, Z. A., Walker, A., Pirwani, M. M., Tahiri, M., & Syed, I. (2022). Allergic rhinitis: diagnosis and management. British journal of hospital medicine (London, England : 2005), 83(2), 1–9. https://doi.org/10.12968/hmed.2021.0570

13. Hellings, P. W., Scadding, G., Bachert, C., Bjermer, L., Canonica, G. W., Cardell, L. O., Carney, A. S., Constantinidis, J., Deneyer, L., Diamant, Z., Durham, S., Gevaert, P., Harvey, R., Hopkins, C., Kjeldsen, A., Klimek, L., Lund, V. J., Price, D., Rimmer, J., Ryan, D., … Fokkens, W. J. (2020). EUFOREA treatment algorithm for allergic rhinitis. Rhinology, 58(6), 618–622. https://doi.org/10.4193/Rhin20.376

14. Petersen, T. H., & Agertoft, L. (2016). Corticosteroids for allergic rhinitis. Current Treatment Options in Allergy, 3, 18-30.

15. Hoyte, F. C., & Katial, R. K. (2011). Antihistamine therapy in allergic rhinitis. Immunology and allergy clinics of North America, 31(3), 509–543. https://doi.org/10.1016/j.iac.2011.05.003

16. Berger, W. E., & Meltzer, E. O. (2015). Intranasal spray medications for maintenance therapy of allergic rhinitis. American journal of rhinology & allergy, 29(4), 273–282. https://doi.org/10.2500/ajra.2015.29.4215

17. Swain, S. K., & Singh, V. (2023). Current treatment options for allergic rhinitis: a review. Int J Res Med Sci, 11(7), 2750-5.

18. Catli T, Hancı D, Cingi C. Medical Treatment of Allergic Rhinitis. Frontiers in Clinical Drug Research–Anti Allergy Agents. 2016; 2:106.