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Изменения слизистой оболочки полости носа при атрофическом рините. Обзор литературы

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АННОТАЦИЯ

В обзорной статье приведены результаты анализа литературы о современных представлениях этиологии и неблагоприятных факторах развития хронического атрофического ринита. Описаны изменения слизистой оболочки полости носа при хроническом атрофическом рините. Рассмотрены основные осложнения при этом заболевании, такие как кровотечения, перфорации перегородки носа, лицевые боли, синдром пустого носа, а также возможные способы лечения.

Ключевые слова: хронический ринит; слизистая оболочка полости носа; перфорация носовой перегородки; носовое кровотечение.

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Nasal mucosal changes in atrophic rhinitis. Literature review

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ABSTRACT

The review article describes the literature data on the etiology and adverse factors of chronic atrophic rhinitis. Nasal mucosal changes in chronic atrophic rhinitis are reviewed. The main complications of chronic atrophic rhinitis, such as epistaxis, nasal septal perforation, facial pain, empty nose syndrome, and possible treatment options are discussed.

Keywords: chronic rhinitis; nasal mucosa; nasal septum perforation; epistaxis.

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ECO•VECTOR

Atrophic rhinitis is a chronic degenerative inflammation characterized by progressive atrophy of the nasal mucosa with the formation of crusts, often with a foul odor [1]. This type of disease belongs to the group of non-infectious non-allergic rhinitis [2, 3]. In addition, chronic atrophic rhinitis is characterized by the involvement of goblet cells in the pathological process, disruption of local blood supply and peripheral innervation of the nose, and replacement of ciliated epithelium with stratified non-keratinizing squamous epithelium. The combination of these factors has a negative impact on the physiological functions of the nasal mucosa.

The following databases were used for the analysis of bibliographic resources: PubMed, Scopus, Web of Science, Elibrary.ru, and electronic resources available in the network of Academician I.P. Pavlov First St. Petersburg State Medical University of the Ministry of Health of the Russian Federation. The search was performed using the following keywords: *атрофический ринит / atrophic rhinitis*, *ринит/rhinitis*, *хронический ринит (chronic rhinitis)*, *неаллергический ринит (nonallergic rhinitis)*, *озена* (*ozena*), *nonallergic*, *occupational*, and *vasomotor*.

Atrophic rhinitis can be classified into primary and secondary forms according to its etiology. Primary rhinitis includes atrophic rhinitis caused by various hereditary factors, infections, deficiency of nutrients, including phospholipids; autonomic disorders, endocrine disorders, immune system abnormalities, etc. [4–7]. The function of the ciliated epithelium significantly depends on adequate levels of magnesium and potassium ions and normal acidity of nasal mucosa [8, 9]. Some authors describe age over 40 years as a risk factor for primary atrophic rhinitis [3, 10]. Ozena and rhinitis sicca anterior are often considered as separate disease entities [11]. If a co-infection occurs, various microorganisms such as *Klebsiella*, *Proteus* and *Escherichia coli* can be detected.

Primary atrophic rhinitis is usually more common in women, and the highest prevalence is reported in arid regions, especially in Europe, Asia, and Central Africa. The incidence of atrophic rhinitis tends to be higher in regions with poor environmental conditions [12]. Coal dust, oil and wood processing industries are considered as factors of permanent damage to nasal mucosa of people living near and directly working in these industries. Secondary atrophic rhinitis may develop as a result of radical surgery with removal of the nasal turbinates, radiation exposure, long-term cocaine addiction, or some infectious diseases (systemic lupus erythematosus, rhinoscleroma, etc.) [2, 5, 10, 11].

Atrophic rhinitis can lead to nasal septum perforation over time. This occurs not only when the mucosa is destroyed, but also involves the cartilage in the process, which leads to its thinning and lysis. Nasal septal perforation is often associated with the dry mucosa around the edges of the perforation, especially in the anterior nasal septum [13]. The impaired separating function of the septum leads to altered nasal airflow, affecting the mucociliary transport [14, 15]. Posterior septal perforation is less likely to manifest clinically and rarely requires surgical treatment.

Clinical manifestations of atrophic rhinitis depend on the severity of the symptoms. Typical symptoms include nasal dryness, crusts of varying size, and a foul odor in the nose. In some cases, nasal breathing may be painful due to the increased mucosal sensitivity caused by irritation of the trigeminal nerve. Many patients describe paradoxical nasal congestion even though the nasal cavity is often found to appear wide enough when examined. The reason is that a decrease in olfactory function, as well as suppression of trigeminal nerve afferent fibers, leads to loss of sensation of air passing through the nasal cavity [5, 6, 10]. While in rhinitis sicca anterior crusts are found only in the anterior parts of the nose, in classic chronic atrophic rhinitis they may also be localized in the posterior parts.

The nasal mucosa is known to contain a large number of cilia and goblet cells, especially in the posterior segments. Dryness may occur in deeper areas if the surgery is too radical and creates a too wide opening in the external nasal valve. Some authors suggested that excessive airflow to the caudal parts of the nasal cavity causes evaporation of mucus and moisture, which aggravates the chronic atrophic rhinitis [16–18].

Regarding olfaction, rhinogenic respiratory dysosmia is the most common disorder, reaching 72% of all causes of olfactory impairment [19, 20]. If conductive olfactory dysfunction (edema, polyps, anatomic features) occurs in different types of rhinosinusitis [21–24], atrophic rhinitis has its own characteristics. In the early stages of the disease, hyperosmia may be observed due to irritation of the olfactory nerve. Later, hyposmia and even anosmia may develop [25]. In addition, changes in the olfaction may be difficult to detect due to the blockage of olfactory receptors by nasal crusts and subsequent direct damage to olfactory nerve receptors [24, 26]. Due to the time constraints and difficulty of olfactory function determining, otolaryngologists rarely assess olfactory function in routine practice, focusing primarily on patient complaints [27]. Dysosmia should be considered in the differential diagnosis of endocrine and neurologic disorders [28], including post-COVID-19 [29].

Bleeding is a serious complication of atrophic rhinitis. Bleedings are often observed in patients with high blood pressure and in patients receiving anticoagulants. Constant crust formation leads to nasal congestion and the patient's desire to remove the crusts themselves, exposing deeper layers of the mucosa (the vascular layer of the perichondrium and periosteum). Bleeding is also common in patients

with posterior nasal septal perforations when the vomer and the perpendicular plate of the ethmoid bone are exposed [14, 15, 30, 31]. This can lead to anemia, weakness, depression, and even panic attacks [32, 33].

Atrophic rhinitis requires complex management. In the majority of cases, chronic rhinitis, like most other chronic diseases, is difficult to treat and requires regular supportive and symptomatic therapy [4, 5, 8, 11]. Therefore, patients should be explained the necessity of humidifying the air in their residencies, reducing the temperature of heating systems if technically possible, regular ventilation of the room. If there is a clear evidence of constant exposure to dust, including construction dust, it is recommended to use home air purifiers, anti-dust personal protective equipment at work, and also to change job and place of residence. Agents that may cause nasal dryness should also be avoided. Otolaryngologists and allergists are well aware that such agents include topical corticosteroids and retinoids used in dermatologic practice. In some cases, a deviated septum can cause dryness and require surgical treatment. In some cases, the patient's symptoms may be completely relieved by the elimination of the influence of the above factors.

In cases of atrophic rhinitis, when the nasal ciliated epithelium has been replaced by flat non-keratinized epithelium, its recovery is virtually impossible. Exceptions are surgeries to move pedicle flaps from the nasal floor to the nasal septum. However, in such cases, the nasal cavity floor should be normal. Therefore, the treatment of chronic atrophic rhinitis is mainly focused on maintaining the normal mucosa functioning. The groups of medicinal and non-medicinal agents listed below are widely used for this purpose.

The most common agents include isotonic saline solutions in the form of sprays, showers, drops, and also free-flow irrigation systems (neti pots). In general, such products effectively moisten the nasal crusts, facilitating their removal, moisturize the mucosa and contain microelements that increase the motor activity of the cilia [2, 3, 5, 11, 12]. Dexpanthenol-containing agents are of particular interest in this group. In addition to the above effects, dexpanthenol has a regenerative and local anti-inflammatory effect. The oily consistency of dexpanthenol creates a longer-lasting sensation of nasal cavity moisturizing, and often has a better effect, unlike a seawater solution.

Oil-based products are actively used in atrophic rhinitis treatment in addition to saline solutions. These may include both sprays and drops. Oil solutions provide a longer-lasting moisturizing effect and also form a coating that protects against environmental factors such as dust [3, 10, 11].

Nasal ointments are rare, but in some cases they allow to quickly achieve a therapeutic effect in the initial stage, after which patients can use saline solutions and oil products to keep the mucosa moisturized. In addition to the base (lanolin, petroleum jelly, etc.), nasal ointments usually contain an antibacterial component, which is particularly important in the presence of pathogenic and opportunistic bacteria and purulent nasal crusts [1, 2, 5, 6, 11, 33]. The ointment should be applied to the nasal vestibule and then rubbed in by squeezing the nostrils from the outside. It is not recommended to use cotton swabs or other means to apply the ointment deep into the nasal cavity as this may cause injury. Some patients report a positive effect of eye ointments when used endonasally.

Atrophic rhinitis is also treated with irritative therapy. An iodine-glycerin solution can be used intranasally as a spray or ointment [33]. This helps to stimulate goblet cells and increase blood flow to the nasal mucosa.

Surgical treatment of atrophic rhinitis is not very common, but the closure of nasal septal perforations, treatment of deviated nasal septum and formation of inferior turbinates in empty nose syndrome showed a positive effect in some cases [3, 15].

Atrophic rhinitis is a chronic disease of the nasal mucosa. The nature of symptoms may vary; some patients may experience only a sensation of nasal dryness, while others may notice severe bleeding from the posterior parts of the nasal cavity, impaired olfaction, and large crusts covering one half of the nasal cavity. In some cases, atrophic lesions lead to perforation of the nasal septum and make the patient psychologically obsessed with the disease. Before starting the treatment, it is important to eliminate the negative environmental effects on the nasal mucosa.

ADDITIONAL INFORMATION

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