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MORPHOCLINICAL ASPECTS OF CHRONIC HYPERTROPHIC RHINITIS (LITERATURE REVIEW)

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Summary

Objectives. Currently, chronic nasal obstruction due to hypertrophic rhinitis represents one of the most common problems in rhinology. Thus, it is important to mention that the etiology of the increase in size of the lower nasal turbinates can be varied and must be well specified, since the same aspect of the clinical picture can have a completely different substrate from a morphological point of view. In-depth knowledge of the changes in the structure of the turbinates are necessary and useful to form a correct diagnostic and therapeutic approach. The purpose of the given study was to perform a detailed analysis of the contemporary data of the specialized literature in order to determine the morphological conformation of the nasal mucosa in chronic hypertrophic rhinitis.

Materials and methods. For the research, the articles available in the electronic resources, on various specialist platforms, with open access, were used. Subsequently, the articles with relevant topics for the subject were selected and analyzed depending on the common aspects necessary to carry out the study.

Results and discussions. Chronic hypertrophic rhinitis represents an important medical management problem in recent years. These have led to an increase in efforts in terms of a better understanding of both the pathophysiological mechanisms involved in the appearance of this pathology, as well as the most appropriate diagnostic methods and the most reliable therapeutic means for an effective treatment of this conditions.

Conclusions. Chronic hypertrophic rhinitis represents the increase in volume of the nasal mucosa and implicitly the nasal turbinates, with the reduction of the respiratory space. It affects both adults and children, but is more common after the age of 20. The causes that lead to the appearance of chronic hypertrophic rhinitis are not exactly known. Whatever the trigger, however, the result is the same – a hyperactivity at the level of the nerve endings, which is manifested by the enlargement of the nasal mucosa. The goal of treatment is to reduce the symptoms caused by the inflammation of the affected tissues and to increase the patient's quality of life.

Keywords: chronic hypertrophic rhinitis, inferior nasal turbinates, nasal obstruction, nasal mucosa

Introduction

The respiratory nasal mucosa presents a whole series of defense and resistance mechanisms against the multiple harmful factors in the inhaled air. However, these mechanisms can sometimes be disturbed, which leads to serious consequences not only for the respiratory system itself, but also for the body's activity as a whole. From this point of view, chronic hypertrophic rhinitis is a fairly common condition. Today, the clinical aspects of this disease are largely studied. However, in the specialized literature, the morphological peculiarities in chronic inflammation of the nasal mucosa are less frequently presented.

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Materials and methods

An analytical, qualitative, secondary study was carried out, and more than 97 articles were studied as bibliographic reference sources. Subsequently, 22 relevant primary sources were identified and selected, significant according to the impact score, with a scientific, reproducible and transparent approach to the subject under discussion, with subsequent data analysis. Intending to minimize errors, a sample data extraction sheet was initially produced, listing all common components to be extracted from the primary studies. In order to diversify the conclusions, the results of international studies were supplemented with materials available in the specialized literature of domestic researchers. Therefore, carrying out a qualitative type of research, a narrative synthesis of the data was undertaken. Additionally, the bibliography of some initially selected articles was also studied, with the aim of identifying other articles relevant to the given subject. The articles were identified on common medical platforms, such as: PubMEd, Medline, Elsevier (Scopus), Research4life program, NCIB, Google Search. For the search, terms such as: chronic hypertrophic rhinitis, hypertrophy of the inferior nasal turbinates, hypertrophy of the turbinates, hypertrophic rhinitis, inferior nasal turbinates, were used.

Results and discussions

The nose – the first component of the upper respiratory tract, is responsible for heating, moistening and, to a large extent, purifying the inspired air, which ensures its respiratory function, with influence on all organs and systems of the body [1, 2]. The term "nose" usually refers to the external nose, the internal being represented by the nasal cavities [3]. They are

housed by a shell composed of bone tissue and fibro-elastic cartilages and communicate with the neighboring paranasal sinuses, the nasopharynx and the external environment [1, 2, 3, 4].

The amount of heat needed to warm the inspired air is provided by the blood circulating through the blood vessels that irrigate the nasal mucosa. The fact that the temperature of the air at the back of the nasal passages is practically independent of the initial one (the one at the entrance to the nasal passages) serves as confirmation. For example, the optimal temperature for the normal activity of cilia – component parts of the mucociliary apparatus is between 26-33ºC, and dryness is a factor that destroys it [5].

As an otorhinolaryngological organ, the nose also has other functions – olfactory, protective, aesthetic, etc. It is important to mention the presence on the side wall of the nasal fossae of the turbinates, also called "turbines", which give it an irregular shape, which leads to the slowing down of the air flow. Thus, a longer and more adherent contact between the mucous membrane and the inspired air is achieved [2, 4]. In carrying out the physiological functions of the nose, especially that of nasal breathing, the lower nasal concha (concha nasalis inferior) is of particular importance – an independent bone, the longest of the turbinates, which, together with the floor of the nasal cavity and the side wall of the nose, delimits the meatus inferior, where the nasolacrimal canal opens [2, 3, 4]. Air enters the nostrils at an angle of 60 degrees and the first point of resistance is the nasal valves, after which the air stream takes a slightly oblique direction up and back towards the middle meatus and, finally, descends towards the cones, through which it reaches the nasopharynx. The exhaled air travels a diametrically opposite path [5].

Here, the increase and decrease of internal diameters (due to the nasal turbinates) result in air turbulence – another important factor in increasing the contact between air and the respiratory mucosa [3]. Even the composition of the air plays a leading role in regulating respiratory flow. If the inhaled air has a high concentration of CO2, the breathing rate will become faster. The respiratory region of the mucosa corresponds to the lower wall of the nasal cavity, the lower and middle turbinates and the corresponding meatus [1, 2].

The mucosa is adherent to the periosteum or perichondrium of neighboring structures. In certain areas, the cells of the respiratory epithelium can be columnar (cylindrical) or bistratified cubic, and the proportion of ciliated/non-ciliated cells is variable [1]. The respiratory epithelium consists of basal, goblet and ciliated cells [6, 7]. Vibrating cilia almost completely cover the surface of the nasal cavity mucosa, except for the olfactory region. The epithelium of the inferior and middle nasal turbinates also possesses a prominent basement membrane, abundant vascularization and agglomerations of seromucous glands, which vary from simple tubular to tubulo-alveolar [6].

The goblet cells, together with the sero-mucous glands in the lamina propria [8], will be the ones responsible for the mucus secretion – necessary for the normal functioning of the vibrating cilia and the moistening of the air current entering the nasal passages [4, 6]. These secretions make the surface sticky, which allows particles from inhaled air to be trapped. The process of moistening the inspired air is under the control of the nervous and endocrine system [9 Hellings].

Vibrating cilia spread the mucus through coordinated movements towards the pharynx ("mucociliary escalator") [10, 11, 1]. The lack of nasal secretions, even for a short time, has a negative impact not only on the activity of the vibrating cilia, but also on the gas exchange at the level of the pulmonary alveoli: the gas exchange between the air in the alveoli and the blood in the pulmonary capillaries can only be done through a moist layer, which covers the surface of the alveoli [5]. Being susceptible to a whole series of environmental factors, the respiratory nasal mucosa presents some resistance mechanisms [12], among which we mention: physical (coughing, sneezing, etc.) and chemical reflexes, made by certain components of the nasal secretion – inhibitors of microbial adhesion, cecropins, β-defensins, lactoferrins, lysozyme, transferrins, interferons, interleukins, immunoglobulins (especially IgA), prostaglandins, trypsin-like proteinase inhibitors, ionic potential, antioxidants of mucus and serous secretions [4].

There are numerous internal or external factors that could affect nasal resistance by congesting the nasal mucosa: medicinal, endocrine, psychogenic, food, professional, etc. [3]. The extreme sensitivity of the receptors in the nasal mucosa to the chemical factors that reach the surface of the mucosa, explains the deregulation of the vasoconstriction/vasodilation mechanism, when the quality of the breathed air is degraded, or when the physiological protection mechanisms are not used at optimal parameters. In addition, the existence of anatomical obstacles in the way of air flow (nasal septum deviation, trauma, tumors or the presence of foreign bodies), or of neighboring diseases (purulent discharges from the sinuses, vegetations, adenoids), accelerates the alteration of the mechanisms of self-regulation [13].

As a result of these causes, the nasal obstruction syndrome develops, the most common in clinical practice and which generates the most serious complications, especially in children. The consequences of the impermeability of the nasal passages are multiple, diverse and serious, we list some: morphological, reflex, smell, taste, intellectual, voice, olfaction disorders. Thus, a disease is generated, which affects about 16-50% of the population, considerably reducing their quality of life – chronic hypertrophic rhinitis [14]. A few decades in the past, it was considered that the cause of the development of this condition is a chronic infection of the upper respiratory tract.

Today, researches have come to the conclusion that infections can be among the causes of chronic hypertrophic rhinitis, but they are certainly not the only and indisputable source. In the first place, the researchers put the deficiency of the mucociliary apparatus mentioned above. Numerous studies show changes in the function of the cilia of the nasal epithelium in chronic rhinitis [11, 15, 16], and N.A. Cohen [17] obtains controversial results in an attempt to find the explanation of these deficiencies. Other causes are considered to be: trophic and circulatory disorders of the mucous membrane of the nasal cavity, frequent acute inflammations,

spontaneous temperature and humidity variations of the inspired air [18].

It is indispensable to mention that the causes are not unitary, but multiple, this is why in such a condition as chronic hypertrophic rhinitis, it is necessary to thoroughly analyze the patient's anamnesis, to indicate the specific cause that determined the disease.

From a macroscopic point of view, in chronic hypertrophic rhinitis, there is a degeneration of the nasal mucosa accompanied by edema and polyps (polypoid edematous type), the nasal mucosa thickens, becomes slightly cyanotic, irregular, covering and obstructing the nasal passages. In the beginning, there is first a temporary blockage of the nasal passages through the hypertrophy of the turbinates – which has the characteristic of migrating from one side to the other (rhinitis "on a tipping point") [18]. Thus, permanent hypertrophy of the turbinates appears, namely organic hypertrophy, which represents the "filling" of the lower nasal turbinates with connective tissue, and they block the airways, definitively affecting the nasal respiratory flow. This creates major discomfort for the patient, forcing him to breathe through the mouth [9].

However, tissue hypertrophy can also occur in other areas of the nasal cavity, for example on the anterior third of the nasal septum or on the posterior edge of the vomer [18]. In order to distinguish the catarrhal form of rhinitis from the hypertrophic one, the anemization test is performed (a vasoconstrictor substance is applied to the thickened nasal mucosa – 0.1% epinephrine solution). Thus, in the case of hypertrophic rhinitis, in which there is true hypertrophy – the "thickening" will practically not decrease at all otherwise – we cannot talk about hypertrophy of the turbinate [18].

Microscopically, the respiratory epithelium cover may be interrupted in some places, and the cilia of some cells may disappear. Regarding the number of sero-mucous glands present in the lamina propria of the nasal turbinates, glands responsible for the production of mucus, it has been demonstrated that in chronic hypertrophic rhinitis it does not vary in relation to the norm [15], which leads us to the idea that the increased secretion of mucus in this type of rhinitis results from a hyperactivity of the above-mentioned glands or from their increase in volume, but by no means from their multiplication.

Depending on the affected tissues and structures, some authors classify chronic hypertrophic rhinitis into cavernous and fibrous, the cavernous one being associated with the hyperplasia of glandular and vascular structures, and the fibrous one – with the degeneration of the mucous membrane [19].

A permanently blocked nose leads to respiratory, emotional and social deficiencies. Clinical symptoms usually appear in children over 4-5 years of age, and the peak of the disease corresponds to puberty [14]. The evolution of chronic hypertrophic rhinitis is slow and progressive, sometimes complications occur. In the case of hypertrophy of the posterior ends of the lower nasal turbinates, compression of the pharyngeal openings of the auditory tube may occur, resulting in tubotympanitis or serous-mucous otitis. The hypertrophy of the anterior end of the inferior nasal turbinate can compress the opening of the nasolacrimal canal, which leads to disruption of the lacrimal transit and to the eventual development of inflammatory processes of the sac and lacrimal channels. Sometimes, the strongly hypertrophied inferior nasal turbinate can press on the nasal septum, causing the development of local inflammatory processes (mucositis) and various reflective phenomena: headache, cardio-vascular, broncho-pulmonary disorders, allergic reactions [19].

Other associated complications can be sinusitis, hypo- and anosmia, voice tone disorders [20]. Pharmacological treatment includes topical steroids, antihistamines and decongestants, but the treatment must be applied with particular caution, since any drugs applied here can affect the mucociliary apparatus both morphologically and physiologically [15]. Long-term use of nasal sprays with vasoconstrictor substances improves the situation for a few hours, but over time produces addiction and tachyphylaxis. However, in the case of untreated early rhinitis (still reversible), the hypertrophy goes from physiological to organic, chronic nasal obstruction, secondary to fibrosis, becoming irreversible [18].

In this stage of hypertrophy, the only way to re-permeabilize the nasal passages is represented by volumetric reduction surgery. In the specialized literature, the following treatment methods are noted: partial or radical mucotomy with cold instruments (scissors, microdebrider, loop), lateralization of the inferior turbinate, turbinoplasty, laser surgery, cryotherapy, volume reduction with ultrasound, argon-plasma surgery, cauterization classic monopolar or bipolar, infrared coagulation, Vidian neurectomy [17, 21, 22].

However, it is important to mention the study carried out by O.V. Morozova [20], which indicates the great regenerative capacity of the respiratory epithelium, as well as the persistence of local humoral immunity, even in the conditions of the chronicity of the pathological process.

Conclusions

This study highlights the morphological peculiarities of the nasal mucosa in patients with chronic hypertrophic rhinitis. In the organic phase of this disease, the problem of surgical treatment arises, which must be carried out by gentle methods with maximum preservation of the internal lining of the nasal passages.

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