

MORPHOLOGICAL CHARACTERISTICS OF THE MUCOUS MEMBRANE OF THE NASAL CAVITY AND THE NASAL SINUSES WITH ALLERGIC RHINOSINUSITIS (EXPERIMENTAL STUDY)

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✓ Resume

Allergic rhinitis was experimentally modeled in guinea pigs and the histological nature of the inflammatory process of the mucous membrane of the nasal cavity and paranasal sinuses was studied in acute sinusitis occurring against the background of allergic rhinitis. Pathomorphological changes were more pronounced in the wall of the nasal cavity and maxillary sinus.

Key words: experiment, acute sinusitis, morphological changes, mucous membrane.

МОФОЛОГИЧЕСКАЯ ХАРАКТЕРИСТИКА СЛИЗИСТОЙ ОБОЛОЧКИ ПОЛОСТИ НОСА И ОКОЛО НОСОВЫХ ПАЗУХ ПРИ АЛЛЕРГИЧЕСКОМ РИНОСИНУСИТЕ (ЭКСПЕРИМЕНТАЛЬНОЕ ИССЛЕДОВАНИЕ).

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✓ Резюме

На морских свинках экспериментально моделирован аллергический ринит и был изучен гистологический характер воспалительного процесса слизистой оболочки полости носа и околоносовых пазух при остром синусите, протекающем на фоне аллергического ринита. Патоморфологические изменения были более выраженными в стенке полости носа и верхнечелюстной пазухи.

Ключевые слова: эксперимент, острый синусит, морфологические изменения, слизистая оболочка.

АЛЛЕРГИК РИНОСИНУСИТЛАРДА БУРУН ВА БУРУН ЁНДОШ БЎШЛИҚЛАРИ ШИЛЛИК ҚАВАТИНИНГ ТАЖРИБАДА МОРФОЛОГИК ТУЗИЛИШИ

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✓ Резюме

Тажрибада денгиз чучқаларида аллергия ринитни шакллантириб, бурун ва бурун ёндош бўшлиқларини шиллик қаватларидаги яллиғланиш даражаси ўрганилган. Морфологик ўзгаришлар бурун бўшлиғи ва юқори жағ суяги бўшлиқларида кескин намён бўлган.

Калит сўзлар: тажриба, ўткир синусит, морфологик ўзгаришлар, шиллик қават.

The relevance of research

One of the common childhood diseases is acute sinusitis and the greatest number of patients falls on the age from 4 to 15 years. The number of such patients increases annually by 1.5% - 2% [3,4,5,7,9,10]. Allergic rhinitis (AR) is one of the main factors in the development of acute sinusitis [2]. According to a number of authors [1,2,4,6,8] in childhood, acute sinusitis in 94% - 97% of cases has an allergic genesis. Clinical research methods cannot always fully reveal the essence of the inflammatory process, therefore, the study of morphological changes in the mucous membrane in acute sinusitis with AR is undoubtedly relevant. It is the histological research methods that allow us to more deeply, at the tissue level, study the characteristic changes in the nasal mucosa and paranasal sinuses. Examining the tissue of nasal concha in patients with allergic rhinitis, Polner S.A. (1999) revealed thickening of the mucous membrane, and in some cases, small-poly-like formations on its surface, metaplasia of the lining epithelium into a multilayer flat.

Goblet cells were observed in large numbers, sometimes mucus was noted in the cells themselves. In

order to study the morphological structure of the nasal mucosa and paranasal sinuses in AR. Arifov S.S. and Daliev A.G. (2015) recommend conducting experimental studies, which will improve the methods for diagnosing the disease and conduct dynamic monitoring of its course. An analysis of the literature data showed that almost all the work on the study of the morphological picture in allergic rhinitis was fragmentary. The morphological parameters of the structure of the mucous membrane of the nasal cavity and paranasal sinuses, the thickness of the intrinsic layer and the nature of the vascular reaction in acute sinusitis of allergic genesis are not fully understood.

Objective: To experimentally study, the morphological structure of the nasal mucosa and paranasal sinuses in acute sinusitis occurring in the presence of allergic rhinitis.

Material and research methods:

Based on the foregoing, we experimentally on guinea pigs histologically studied the nature of the inflammatory process of the mucous membrane of the nasal cavity and paranasal sinuses in acute sinusitis occurring in the presence of allergic rhinitis.

Depending on the time of exposure to the allergic factor, the animals were divided into 3 equal groups (10 guinea pigs each), two groups for the experiment and one control group. The mass of guinea pigs ranged from 200 to 300 g. The phenomena of AR were experimentally modeled by instillation of 0.1 ml in the left nasal cavity. 0.2% solution of dinitrochlorobenzene once a day for 7 days. At the same time, after removing the wool on the back, 0.1 ml was greased once a day. 0.2% solution of dinitrochlorobenzene for 7 days. Before the next lubrication, wool on the back was removed every 2-3 days.

Results of the study: The histological picture of the nasal mucosa and paranasal sinuses of guinea pigs in the control (normal) group. In guinea pigs, the paranasal sinus, as in humans, is represented by the maxillary sinus. The mucous membrane of the maxillary sinus is thicker than the mucous membrane of the nasal cavity due to the presence of a large number of mucous and serous glands in it. The integumentary epithelium is also represented by a multi-row cylindrical epithelium, in contrast to the integumentary epithelium of the nasal cavity; the number of goblet cells in the epithelium is insignificant. The basement membrane is thin and bright. Own plate is loose with a large number of thin-walled vessels and free-lying cells of hematogenous origin. In the submucosal layer, there are many glandular structures, sinusoidal venous vessels.

On the side of the bone plate is surrounded by a thin periosteum, which merges tightly with the fibrous structures of the submucosal layer.

Thus, the paranasal sinuses in anatomical and quantitative terms are similar to human, although their maxillary sinus is narrow. The integumentary sinus mucosal epithelium is represented by a multi-row cylindrical ciliary epithelium, but compared to the epithelium of the nose, it is low and without goblet cells. In the submucosal layer of the wall of the maxillary sinus, the vascular network is well developed and is represented by wide sinusoidal venous vessels. This is a hallmark of the structure of the nose and maxillary sinus from the human.

The morphological structure of the soft tissues of the wall of the nasal cavity and maxillary sinuses with a combination of acute sinusitis and allergic rhinitis is presented as follows: during a microscopic examination it was noted that the soft tissues of the walls of the nose of guinea pigs underwent pronounced pathomorphological changes in the form of development of discirculatory, dystrophic, disorganization, destructive, inflammatory processes.

Apparently, the beginning of these pathomorphological changes is the defeat of the walls of blood vessels, especially the microvasculature, then of other large vessels in the form of increased permeability of the wall due to their alternative damage and against the background of existing inflammatory processes in the form of sinusitis.

Subsequently, these alternative changes were accompanied by the development of an acute allergic inflammatory process. The integumentary epithelium is somewhat thickened and deformed compared with the previous series of experiments due to lengthening and thickening of the cilia, proliferation of epithelial cells and swelling of goblet cells. The basement membrane of the integumentary epithelium is also unevenly thickened due to swelling of the fibrous structures and proliferation of connective tissue cells. Locally on the basement membrane, there are foci of destruction and a vacuolar defect.

Own plate is completely destroyed and merges with tissue elements of the submucosal layer. Arterial vessels

are somewhat narrowed, their wall is thickened due to proliferation of their own cells and infiltration by inflammatory cells (Fig. 1).

The venous vessels are dilated and full-blooded with diapedetic hemorrhages in the surrounding tissue. Interstitial connective tissue is edematous and loosened with foci of inflammatory and allergic infiltration. The results of histochemical staining by the method of Schiff iodine reaction showed that, in contrast to the series with allergic rhinitis, in the presence of background sinusitis in the integument epithelium and in the vessel wall, as well as in the interstitial tissue, the number of Schiff iodine reaction is positive substances significantly increased.

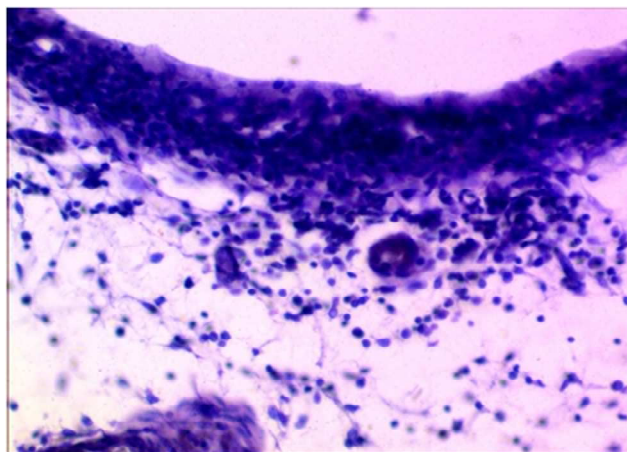


Fig. 1. Arterial narrowing, dystrophy and destruction of the integumentary epithelium, inflammatory infiltration of the nasal mucosa in AR on the background of sinusitis. Coloring: hematoxylin-eosin. inc: approx. 10, vol. 40.

When staining with the Weigert method, it was noted that a decrease in the content of elastic fibers was noted in the basement membrane and in the composition of the submucosal connective tissue. Which indicates an excessive accumulation of acid mucopolysaccharides as a response to allergic rhinitis and damage to tissue elements of the wall of the nasal cavity of background sinusitis.

With sinusitis on the background of AR, the mucous membrane of the maxillary sinus is significantly thickened due mainly to the presence of diffuse inflammatory infiltration.

In the submucosal layer, only plethora of blood vessels, interstitial edema are noted (Fig. 2).

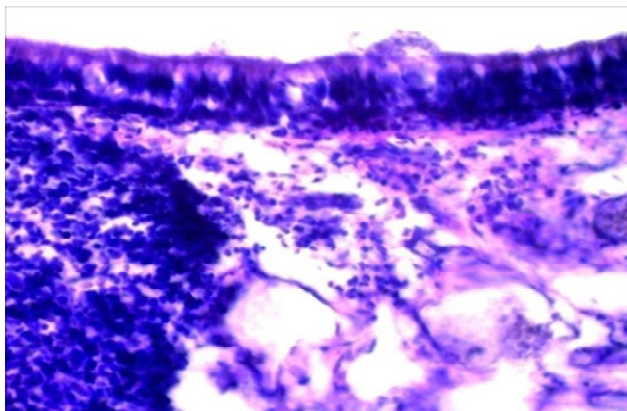


Fig. 2. Focal inflammatory infiltrates in the wall of the maxillary sinus. Coloring: hematoxylin-eosin. inc: approx. 10, vol. 40.

The integumentary epithelium is thickened, sinuous due to compression by its underlying inflammatory infiltration. There are no cilia on the surface of the integumentary epithelium, the multilayer cylindrical epithelium itself is metaplasized in several places into a multilayered epithelium, the nuclei of epithelial cells are located at different levels, compared with the norm they are hyperchromic.

The basement membrane is uneven, sinuous, thickened in some areas, not determined in others. Own plate and submucosal layer do not differ due to diffuse inflammatory infiltration. Inflammatory infiltrates are mainly concentrated around the vessels, sometimes reaching the integumentary epithelium, forming convex sections towards the lumen of the cavity and with atrophy of the integumentary epithelium. Such inflammatory infiltration is accompanied by the development of secondary changes in the form of hemorrhage, destruction and necrosis of tissue elements.

Conclusion

1. Thus, the results of a morphological study of tissue elements of the wall of the nasal cavity and paranasal sinuses showed that with experimental sinusitis against the background of allergic rhinitis, both general pathological and characteristic changes in the background inflammatory process develop.

2. Characteristic changes for allergic rhinitis began with damage to the walls of blood vessels, especially the microvasculature, then other large vessels in the form of increased permeability of the wall due to their alternative damage and migration of inflammatory cells through the vessel wall into the surrounding tissues.

3. Inflammatory infiltrates and discirculatory phenomena have led to the development of secondary changes in the form of protein dystrophy in the cytoplasm of the integumentary epithelium and mucoid, fibrinoid swelling, fibrinoid necrosis in all fibrous structures of the connective tissue of the lamina propria and submucosal layer.

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