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Morphological and functional features of human frontal sinus anterior wall glands

Abstract

The paper studies features of structural organization of glands of anterior wall of human frontal sinus.

It has been found that compound alveolar-tubular glands are located in sub-mucous base of the human frontal sinus mucosa. Acines and duct system are formed by glandular cells of cylindrical shape and small cambial epithelial cells. Migrant cells, i.e., macrophages and lymphocytes were constantly found in the periacinar and periductal connective tissues. The majority of mast cells were characterized by the centrally disposed nucleolus, indicating about the prevalence of heparin, including into secretory granules.

Keywords: frontal sinus, mucosa, glands.

Introduction. Topographoanatomical and morphofunctional features of formations of facial part of the head still remain relevant for researchers of both morphological and clinical specialties [1-3]. The nasal cavity with its paranasal sinuses, presenting an integer system where each anatomical formation performs their specific function have not been fully studied [4]. Study of the tumor processes in nose and its paranasal sinuses showed that they originated from epithelial elements of various parts of the glands' mucosa [5]. Therefore, study of the structure of the various parts of the glands and lining epithelial elements is crucial for the proper understanding of the processes of lesion set on in the paranasal sinuses.

Purpose. The paper was aimed at the detail analysis of structural organization of glands of anterior wall of human frontal sinus.

Materials and Methods. Mucous membrane of the anterior wall of the frontal sinuses of people of both sex, aged from 22 to 86 years, died for the reasons not associated with paranasal sinuses diseases, has been analyzed according to the international regulations of conduct of biological research.

Fragments of mucous membrane of the anterior wall of the frontal sinuses were fixed in 2,5% glutaraldehyde solution and poured in EPON-812 according to the standard procedure [6]. Semi-thin sections were made on ultramicrotome of Sumy "Selmi" UMTF-7 PA. The resulted sections were stained with 1% solution of toluidine blue according to Lynn J.A. [7]. Microimaging of sites, selected for illustrations was performed using a microscope with digital Biorex 3 microphotohead with software programs, adapted to these studies.

Results and Discussion. The analysis of semi-thin sections of mucous membrane of the anterior wall of the frontal sinus revealed compound branched alveolar-tubular glands, involving acines and duct system.

The acines' wall consisted of cylindrical cells. Secretory granules were found in the apical cytoplasm of epithelial cells. While staining with toluidine blue the granules showed α -reaction, indicating about the prevalence of proteins as their compound.

In acines of the anterior wall of the human frontal sinus cells were found at different stages secretion, i.e., inflow of secretory products from the blood vessels, secretion synthesis and accumulation, excretion, regeneration, indicating morphologically about the protein type of secretory products.

Two types of nuclei of secretory epithelial cells of acines of the anterior wall were distinguished. In cells with optically clear cytoplasm nuclei were orbicular with

predominantly decondensed chromatin, indicating about their functional activity. Nucleoli were centrally disposed. Nuclei with optically dark cytoplasm were prolate, oriented perpendicularly to basal membrane, with predominant heterochromatin.

Cambial cells of small size, located on the basal membrane between the basal parts of adjacent epithelial cells, were also found in the acines of the anterior wall of the frontal sinus. Optically dark prolate nuclei, oriented perpendicularly to basal membrane, were surrounded by rather narrow stripes of basophilic cytoplasm.

Acines' lumens were filled with inhomogeneous secreta of medium optical density.

Single intraepithelial lymphocytes were often found in epithelium of acines' wall, indicating about presence of local host defense system in the secretory epithelium of glands of mucous membrane of human frontal sinus anterior wall. Additional evidence of this fact was the presence of mast cells with centrally disposed nuclei, found in the connective tissue, surrounding the acines.

The wall of excretory ducts of glands of mucous membrane of the anterior wall of the frontal sinus was formed by the low-prismatic epithelial cells. Orbicular nuclei with mostly decondensed chromatin were found in the basal parts of weakly basophilic cytoplasm with low number of organelles, and single secretory granules, mostly arranged in one layer.

Sometimes cells were arranged in two layers in the wall. In this case the shape of the cell layer, adjacent to the basal membrane, was prolate. Basophilic cytoplasm was of anhistous form at the light-optic level. Mostly decondensed chromatin was found in the prolate nuclei. Nucleoli were disposed eccentrically.

Weakly basophilic secreta were localized in ducts' lumens, in which undissolving basophilic secretory granules were sometimes found.

In the periductal connective tissue in the immediate vicinity from the basal membrane, surrounding the ducts, vessels of capillary type and cells of leukocytic type, i.e., macrophages, mast cells and, rarely, lymphocytes were located.

Conclusions. Compound alveolar-tubular glands are located in sub-mucous base of the human frontal sinus mucosa. Acines and duct system are formed by glandular cells of cylindrical shape and small cambial epithelial cells. Migrant cells, i.e., macrophages and lymphocytes were constantly found in the periacinar and periductal connective tissues. The majority of mast cells were characterized by the centrally

disposed nucleolus, indicating about the prevalence of heparin, including into secretory granules.

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