

DOI: 10.26693/jmbs07.01.051

UDC 616.314.17.-076.001.26

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A Modern View of Morphological Changes in the Gums in the Course of Inflammatory Processes

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The purpose of the study was the analysis of literature sources with the study of a modern view of morphological changes in the gums in the course of inflammatory processes.

Materials and methods. Review and analysis of scientific and medical literature based on databases such as Scopus, Web of Science, MedLine, PubMed, NCBI, the study of which does not exceed 10 years, including literature reviews and clinical trial results.

Results and discussion. The analysis of the literature indicates significant morphological changes in the gums in the course of chronic catarrhal gingivitis, which occurs in both the epithelium and their own plate. Thus, the epithelium responds with signs of keratinization disorders. In the course of inflammatory processes in gums, changes of the morphological organization both in epithelial and connective tissue component have been observed. The cytoplasm of the cells of the spiny layer contains granularity, the nuclei are pyknotic and hyperchromic, the boundaries between the cells lose clarity. There is a sharp increase in the amount of glycogen in the cells of the spiny layer. Connective tissue undergoes changes in the form of disorganization, which manifests itself in focal or diffuse gamma metachromasia. The focus of inflammation is clearly separated from the surrounding connective tissue by fibrous bands, which is accompanied by the accumulation of PAS-positive substances and glycosaminoglycans. Changes in the microcirculatory tract of the gums are manifested by dilation of capillaries, venules with diapedetic hemorrhages, endothelial proliferation, swelling of the basement membrane, and the appearance of pericellular oedema. There is moderate fibrosis of the own plate of a mucous membrane in deep layers and the phenomenon of sclerosis. There is also leukocyte infiltration with localization of cells between epitheliocytes, their necrobiotic changes in the form of accumulations of granular basophilic substance.

Conclusion. Based on the literature sources, it should be noted that there are only a few sources that characterize the change of the epithelium and its own plate in the course of inflammatory processes, and they are not enough to fully understand the morphological rearrangement of gums at the histological and ultrastructural levels. Special studies of mast cells and their impact on the occurrence and course of the inflammatory process in the gums have not been

conducted. Until now, the question of the secretion type of tissue basophils in the course of inflammatory processes in the gums remains open.

Keywords: gums, gingivitis, periodontitis, periodontal pocket, infiltration.

Connection of the study with planned research works. The paper is a fragment of the research project "Pathogenetic prevention development in pathological lesions in the oral cavity of individuals with internal diseases", state registration No. 0121U108263.

Introduction. Inflammatory diseases of periodontal tissues are widely spread among people and are a serious problem, especially for adults, where there is a tendency to their increase, reaching 98% of cases [1]. The presence of clinical forms, accompanied by severe disorders of the dental system, that affect the reactivity of the whole organism, makes periodontal disease one of the important problems of modern dentistry, indicating insufficient effectiveness of preventive and curative measures [2, 3, 4].

Establishing the main causes and mechanisms of inflammatory periodontal disease largely determines the basic principles and directions of finding the most effective methods of treatment and prevention of periodontal disease.

The purpose of the study. Analysis of literature sources with the study of a modern view of morphological changes in the gums in the course of inflammatory processes.

Materials and methods. Review and analysis of scientific and medical literature based on databases such as Scopus, Web of Science, MedLine, PubMed, NCBI, the study of which does not exceed 10 years, including literature reviews and clinical trial results.

Results and discussion of research. The analysis of the literature indicates significant morphological changes in the gums in the course of chronic catarrhal gingivitis, which occurs in both the epithelium and their own plate. Thus, the epithelium responds with signs of keratinization disorders. The cytoplasm of prickly cells acquires signs of vacuolar dystrophy, the nuclei are pyknotic and hyperchromic, the boundaries between cells lose clarity; there is a sharp increase in the amount of glycogen metabolite [5, 6].

Depending on the topographic areas of the gums, the changes in their own plate will be appropriate.

Thus, signs of intercellular oedema are more intense in the area of the epithelial attachment. There is disorganization of connective tissue, which manifests itself in the form of focal or diffuse gamma metachromasia. Infiltration of connective tissue with plasma proteins is somewhat less common, and the response to fibrin is determined. In the course of mild to moderate stages of gingivitis, argyrophilic fibres become dense. Collagen fibres in the area of inflammatory infiltrate, thicken, merge into dense bundles and lose tortuosity [7, 8, 9].

The site of inflammation is clearly separated from the surrounding connective tissue by fibrous bands. The process of fibrous degeneration of the gingival papilla is accompanied by the accumulation of PAS-positive substances and glycosaminoglycans.

In inflammatory infiltrates, the most frequent representatives of cellular elements were histiocytes and lymphoid cells, less often – plasma cells, as well as segmented, in some cases – eosinophilic leukocytes. Significantly increased is the number of mast cells that give a bright gamma metachromasia [10, 11].

Degranulating forms and free placement of granules predominate. Infiltrates are located mainly in the area of sulcular epithelium as well as attachment epithelium, and are focal in nature [12, 13].

Significant changes are observed in the vessels of the microcirculatory tract of the gingival plate, which manifests itself in the form of dilation of lymphatic vessels, capillaries, venules with diapedetic hemorrhages; there is endothelial proliferation, oedema of the basement membrane with pericellular oedema emergence.

In the course of more severe gingivitis, hyaline thrombi in the vessels of the microcirculatory tract as well as productive vasculitis are subepithelially determined [14, 15, 16].

In the course of histoenzymatic research, in the basal layer of an epithelium, the high content of succinate dehydrogenase, lactate dehydrogenase and acid phosphatase is noted; moderate quantity of these enzymes is observed in cellular infiltrates. The activity of glucose-6-phosphate dehydrogenase in infiltrates of vascular walls and epithelium is low. Thus, in the course of catarrhal gingivitis there is a picture of chronic non-specific inflammation [17].

Morphologically, hypertrophic gingivitis is characterized by intense invagination of the epithelium into its own plate. Prickly cells contain pyknotic nuclei, vacuolated cytoplasm. The processes of keratinization are disturbed, glycogen is unevenly distributed, a

significant amount of it is observed in the deep parts of the cells of the spiny layer [18].

In the own plate of the mucous membrane of the gums, symptoms of oedema, degenerative changes in the fibres in the form of mucoid oedema, sometimes with a positive reaction to fibrin in the walls of blood vessels are expressed.

The number of vessels is increased; there is their fullness and dilation of the lumen. The expansion of the venous chain of the microcirculatory tract predominates for the most part. Swelling and sometimes endothelial proliferation are noted [19, 20].

It is noteworthy that a characteristic and constant change in the morphological organization of the gums in the course of hypertrophic gingivitis is the infiltration of their own plate by lymphoid and plasma cells, with predominantly perivascular localization of the latter. In addition, a constant and inherent morphological feature in the gums, for this type of gingivitis – “mast cell” reaction with degranulation and metachromasia of the components of their own plate [21, 22] has been established.

There is moderate fibrosis of the own plate of a mucous membrane in deep layers and the phenomenon of sclerosis. In addition, there is leukocyte infiltration with localization of cells between epitheliocytes, their necrobiotic changes in the form of accumulations of granular basophilic substance. In some cases, against the background of the above-mentioned changes, areas of necrosis are observed, with a corresponding inflammatory reaction, the phenomena of abscessing and growth of granulation tissue [23, 24, 25].

Conclusion. Thus, concluding the analysis of the literature, it should be noted that there are only a few sources that characterize the change of the epithelium and its own plate in the course of inflammatory processes, and they are not enough to fully understand the morphological rearrangement of gums at the histological and ultrastructural levels. In addition, no highly specific studies have been performed on mast cells investigation and their effects on the occurrence and course of inflammation in the gums. Until nowadays, the question of the secretion type of tissue basophils in the course of chronic catarrhal and hypertrophic gingivitis remains open.

Perspectives of further research. Further research should focus on studying the level of cytokines in the oral fluid in the dynamics of the use of fixed prostheses.

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УДК 616.314.17.-076.001.26

СУЧАСНІ УЯВЛЕННЯ ПРО МОРФОЛОГІЧНІ ЗМІНИ В ЯСНАХ ПРИ ЗАПАЛЬНИХ ПРОЦЕСАХ

Попович І. Ю.

Резюме. *Мета дослідження.* Аналіз літературних джерел з вивченням сучасних поглядів на морфологічні зміни в яснах при запальних процесах.

Матеріали і методи. Огляд та аналіз наукової та медичної літератури на основі баз даних Scopus, Web of Science, MedLine, PubMed, NCBI, вивчення яких не перевищує 10 років, включаючи огляди літератури та результати клінічних випробувань.

Результати дослідження та обговорення. Запальні захворювання пародонта мають високу поширеність серед населення та представляють серйозну проблему, особливо серед дорослих, де відзначається тенденція до їх зростання, досягаючи 98% випадків. Проведений аналіз літературних джерел вказує на істотні морфологічні зміни ясен при запальних процесах, які відбуваються як у епітелії так і власній пластинці. При цьому епітелій реагує ознаками порушення зроговіння. При гінгівіті спостерігаються порушення зроговіння епітелію і розвивається явище паракератозу та акантолізу. Цитоплазма клітин шипуватого шару містить зернистість, межі між клітинами втрачають чіткість, ядра пікнотичні, гіперхромні. Визначається різке збільшення кількості глікогену в клітинах шипуватого шару. Відмічається дезорганізація сполучної тканини, що проявляється у вигляді вогнищевої або дифузної гамма-метахромазії. Вогнище запалення чітко відмежоване від оточуючої сполучної тканини фіброзними тяжами, що супроводжується накопиченням PAS-позитивних речовин і глікозоаміногліканів. Зміни мікроциркуляторного русла ясен проявляються розширенням лімфатичних судин, капілярів, венул з діapedезними крововиливами, з проліферацією ендотелію, набуханням базальної мембрани та появою перичелюлярного набряку.

Висновки. Виходячи із даних літератури, спеціальних досліджень, присвячених вивченню тучних клітин та їх впливу на виникнення та перебіг запального процесу в яснах, не проводилося. До цього часу остається відкритим питання типу секреції тканинних базофілів при хронічному катаральному та хронічному гіперпластичному гінгівіті.

Ключові слова: ясна, гінгівіт, пародонтит, пародонтальна кишень, інфільтрація.

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The authors of this study confirm that the research and publication of the results were not associated with any conflicts regarding commercial or financial relations, relations with organizations and/or individuals who may have been related to the study, and interrelations of coauthors of the article.

Стаття надійшла 12.12.2021 р.

Рекомендована до друку на засіданні редакційної колегії після рецензування