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Morphofunctional peculiarities of tissue of oral cavity in chronic recurrent aphthous stomatitis with therapeutical correction

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Abstract. Chronic recurrent aphthous stomatitis (CRAS) belongs to the group of chronic, inflammatory, ulcerative diseases of the oral mucosa. The aim of this study was to identify the morphofunctional peculiarities in chronic recurrent aphthous stomatitis with therapeutical correction in soft tissues of the oral cavity of experimental animals in the modeling of chronic recurrent aphthous stomatitis. We performed experimental investigation for study of the morpho-functional state of tissues of the oral mucosa in CRAS and formed three groups of animals (rabbits) with different methods of treatment. Histological investigation have been performed. Conclusion of our research is that correction of tissual changes in chronic recurrent aphthous stomatitis could be obtained with application of gel with β -carotene, α -tocopherol, a mixture of vegetable oils; with ozone therapy and their combination.

Keywords: chronic recurrent aphthous stomatitis, histology, experiment.



Introduction

Chronic recurrent aphthous stomatitis (CRAS) belongs to the group of chronic, inflammatory, ulcerative diseases of the oral mucosa. Up to now, the etiopathogenesis of this condition remains unclear; it is, however, considered to be multifactorial [1, 2].

CRAS is the most common type of inflammatory efflorescence of the oral mucosa, with a prevalence of 2% to 10% in Caucasian populations. To treat them properly, physicians should know their clinical appearance and course, conditioning factors, underlying causes, and differential diagnosis [3].

The underlying etiology is not clear, though a series of factors are known to predispose to the appearance of oral aphthae, including genetic factors, food allergens, local trauma, endocrine alterations (menstrual cycle), stress and anxiety, smoking cessation, certain chemical products and microbial agents [4, 5].

Today, many aspects of CRAS remain unexplored and there is a necessity for further experimental studies to clarify the pathogenesis of that disease and creation of primary prevention and pathogenetically based treatment of patients suffering from CRAS including their clinical manifestations in oral cavity [6, 7].

The aim of this study was to identify the morphofunctional peculiarities in chronic recurrent aphthous stomatitis with therapeutical correction in soft tissues of the oral cavity of experimental animals in the modeling of chronic recurrent aphthous stomatitis.

Object and methods of studying

We performed experimental investigation for study of the morpho-functional state of tissues of the oral mucosa in CRAS as it had been suggested in the previously proposed and widely used scheme [8]; that allows to eliminate the influence of somatic pathology and social factors. Doses of used medicine were determined according to animal body weight. Group of 8 animals with obtained mucosal changes was our comparison group. We formed three groups of animals (rabbits) after modeling CRAS also. First group was treated with application of gel with β -carotene, α -tocopherol ("Katomas"), a mixture of vegetable oils; second group was treated by ozone therapy with the help of apparatus "Ozonimed" (exposure of 40 seconds in each ulcer at the 9th power), third group was treated with application gel "Katomas" and ozone therapy as it was described for second group. The specimens of soft tissues of the oral cavity of were stained with hematoxylin and eosin (H&E) [9] after the routine proceeding. Microspecimens were performed in the Department of Pathological Anatomy of the Kharkov Medical Academy of Postgraduate Education (head of the department Irina Yakovtsova). Morphometric studies were performed.

The procedure was done strictly in compliance with the Helsinki Declaration, European Convention for the protection of vertebrate animals (18.03.1986), European Economic Society Council Directive on the Protection of Vertebrate Animals (24.11.1986).

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Results and discussion.

Ulcerative defects of round or oval shape with 5 mm diameter with the imprinting surface and covered with whitish film have had been revealed on examination of the oral mucosa group of animals with modeling CRAS (fig.1). Performed therapeutical correction was realized in reducing or disappearance of visible ulcerative changes in all three groups of animals.



Fig.1. Presence of aphthous defect covered whitish film on the oral mucosa of rabbit before treatment after modeling CRAS.

Histological investigation of obtained microspecimens shows that CRAS process is implemented by complex of pathological changes in oral mucosa. Squamous epithelium is characterized by uneven thickness with necrotic, mainly erosive injuries (Fig. 2), but ulcers have been revealed also. Intraepithelial lymphocytes, eosinophils, signs of proliferation in the basal cellular layer, moderate development of papillomatous changes have been detected in untreated animals. Inflammatory infiltration is pronounced in lamina propria of oral cavity of animals from that group.

Examination of the oral mucosa revealed disappearance of visible pathological changes in all three investigated groups. There are no mucosal erosions, ulcers or aphthous defects in majority of experimental animals, but there are isolate no pronounced erosive changes in 2 rabbits from group which obtained treatment with gel only.

Epithelium is uniform in thickness but there are areas of no pronounced thickening (fig.3). At the same time meet its slight thickening. Superficial cells are flat, close to the spindle-shaped, the pyknosis phenomenon is not pronounced. The cytoplasm of superficial epithelial cells is represented as thin eosinophilic intensely colored rim.

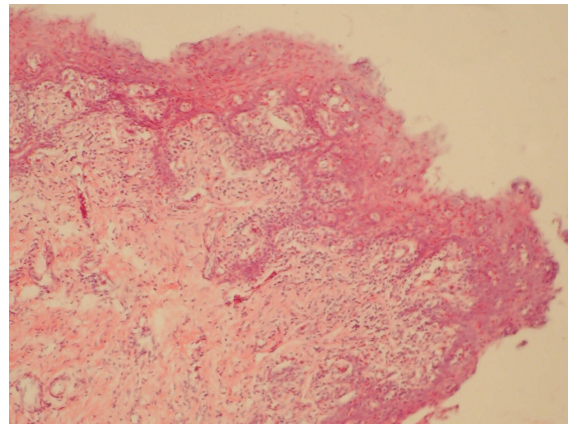


Fig.2. Pronounced focal thinning of the squamous epithelium with numerous erosion. The presence of eosinophils in inflammatory infiltrate both in the epithelium and lamina propria. Group of animals without treatment. H&E stain. Objective 10.

As approaching to basal membrane cells are increased in volume by both the nucleus and cytoplasm size. Form of cells is changed from an oval to elongate in this case with simultaneously changing the orientation of epithelial cells and almost vertical position in the basal. The nuclei of the basal epithelial cells well are defined, oval, uniform, hyperchromatic; cytoplasm is moderately basophilic (fig.4). Location of the basal cell layer is regular without "jumping" of the cells. Grouped intraepithelial lymph-leukocyte elements have been not detected. The basement membrane is uneven with non-uniform thickness. Akantotic strands of lamina propria are moderately pronounced.

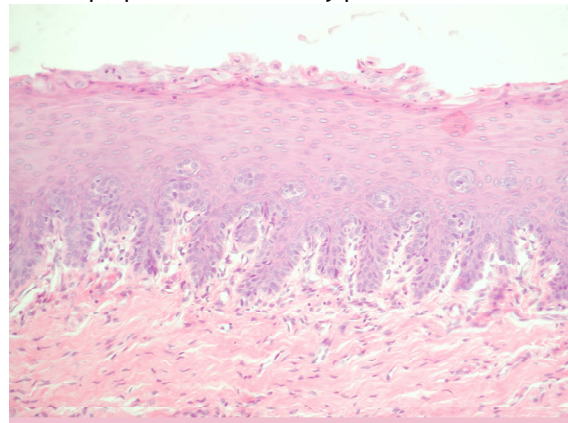


Fig.3. No pronounced necrobiotic processes in the superficial layer of the epithelium with isolate inflammatory cells. Restoration of the cellular layers of the epithelium. Moderately pronounced acanthosis. Moderately pronounced sclerosis of the papillary layer of the lamina propria. One of two rabbits with visible ulcerative changes from group which obtained treatment by gel only. H&E stain. Objective x20.

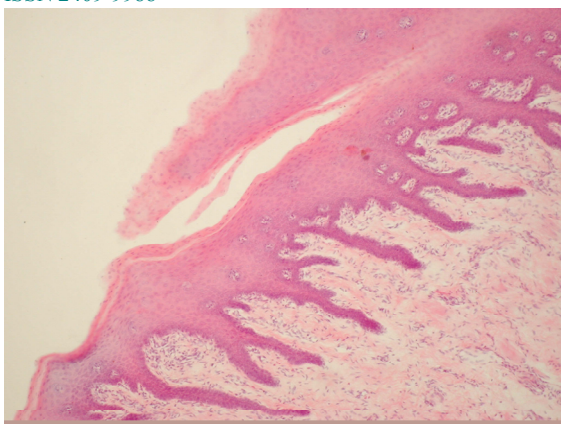


Fig.4. Well pronounced epithelialization in place of aphthous defect. Pronounced acanthotic bands. Marked basophilia of basal layer. The absence of inflammatory cells in the epithelium. Group which obtained treatment by ozone therapy only. H&E stain. Objective x10.

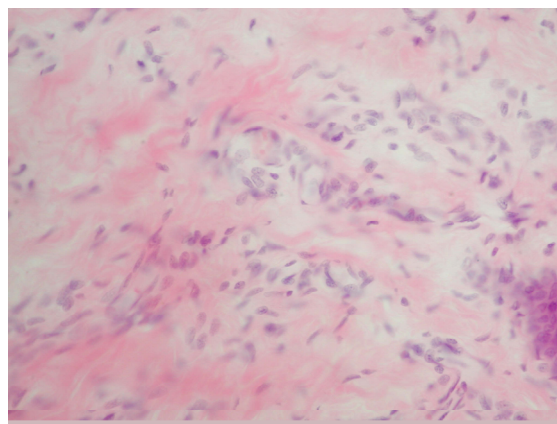


Fig.5. Superficial papillary layer of the lamina propria consists of loose connective tissue which is represented mainly elastic. Group which obtained treatment by ozone therapy only. H&E stain. Objective x40.

Superficial papillary layer of the lamina propria consists of loose connective tissue which is represented mainly elastic fibers (fig.5). Reticular layer is located deeper and is represented by rough connective tissue fibers.

Cellular consist of gingival mucous membrane is presented in the table 1.

Table 1.

Cellular consist (%) of gingival mucous membrane

	Comparison group (modeling CRAS)	Group 1 (gel)	Group 2 (ozone therapy)	Group 3 (ozone therapy and gel)
Histiocytes	4,62±0,21	31,12±3,03	32,21±2,42	39,26±2,15
Young fibroblasts	17,02±1,20	14,53±0,64	13,47±1,42	8,24±0,54
Fibrocytes	19,91±1,42	26,48±1,13	27,42±1,43	35,19±1,67
Lymphocytes	4,68±0,25	7,42±0,75	6,84±0,63	5,14±0,27
Plasma cells	4,83±0,24	6,01±0,11	4,31±0,67	3,01±0,04
Macrophages	4,72±0,38	3,68±0,42	6,02±0,42	4,17±0,33
Neutrophils	38,30±2,46	7,62±0,47	6,34±0,63	3,28±0,42
Eosinophils	5,49±0,23	2,59±0,52	3,22±0,05	1,19±0,03

Cellular elements located between connective tissue fibers (fibroblasts, histiocytes, lymphocytes, mast cells, macrophages) are isolated. Fibroblasts are presented by mature cells in papillary and reticular layers predominate. Lymphoid elements are scattered between the connective tissue fibers uniformly, without the formation of focal accumulations. Eosinophils are absent; signs of accumulation of inflammatory exudate have been not detected.

Changes which obtained as result of our treatment could be recognized as positive changes [10 ,11] with healing of injured areas.

Conclusion.

Correction of tissual changes in chronic recurrent aphthous stomatitis could be obtained with application of gel with B-carotene, α-tocopherol, a

mixture of vegetable oils; with ozone therapy and their combination.

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