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Histomorphologic Changes in the Gingiva of Dogs with Different Periodontal Diseases

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We present histomorphologic changes in the gingiva of dogs with different periodontal diseases. Periodontal diseases in dogs show big variety when it concerns the clinical symptoms — from comparatively slight color changes (slight erythema) of the marginal and papillary tissues to severe ulcerations, necrosis and sequestrations. Histologic changes vary in accordance with the combination of the severity and the localization of the pathologic process — from vasodilation to deep ulcers, where some parts of the mucosa are lost.

Key words: mucosa, periodontal complex, gingivitis, inflammation, veterinary dentistry.

Introduction

The periodontal complex includes morphologically different tissues which are in a biologic and functional union [3, 11]. The diseases of this complex, both inflammatory like gingivitis and periodontitis, and the like are often spread in the clinical practice in people [1] and in animals [2, 8]. These diseases represent a serious challenge for the modern human and veterinary dentistry.

The main etiologic factor for the inflammatory periodontal diseases is the dental biofilm.

Still there are many unrevealed issues, connected with the initiation and progression of the inflammatory process in the periodontal tissues, the pathomorphologic changes and also the changes in the immune system [7].

The purpose of this study was to evaluate histomorphologic changes in the gingiva of dogs with different periodontal diseases. To solve the purpose we set 2 definite tasks:

1. To determine the clinical changes in dogs' periodontal complex.
2. To examine the histomorphologic changes in the periodontal tissues after the progression of an inflammatory reaction.

Material and Methods

For the purpose of our study we used 24 mongrel dogs, age between 3 and 5 years and weight between 12 to 16 kg. The dogs had clinical signs of generalized chronic periodontal disease. Clinical examination was performed by the Williams' periodontal probe. The main clinical parameters — pocket probing depth, gingival recession, clinical attachment level, were put in a special periodontal chart. We took a biopsy material from the free marginal edge and the attached gingiva in the left mandibular canine region. The material was processed followed the standard dying technique with hematoxillin — eosine.

After the fixation the slices were viewed by light microscope "Ampival" with magnification 4.0 × 0.10.

Results

1. Clinical results

The clinical signs were systematized in 4 groups according to the severity of the pathologic process:

Ist group — local gingival hyperemia without a swelling, bleeding on probing;

IInd group — bleeding on probing, swelling, pocket probing depth up to 3 mm;

IIIrd group — bleeding on probing, swelling, pocket probing depth more than 3 mm, tooth mobility grade 1 or 2;

IVth group — severe bleeding on probing, swelling, tooth mobility grade 3, pocket probing depth more than 3 mm and presence of pus in the pockets.

2. Histological results

Most of the samples showed acantosis — an overgrowth of stratum spinosum. At the same time tearing of the intercellular connections was obvious, together with initial invert micropapilomatosis and blood vessels dilatation (Fig. 1, 2, 3).

There also was in some cases an initial degree of keratosis of the cells in stratum corneum. The other mucosal layers were extended. A wide spread invert papilomatosis and hyperemia were obvious (Fig. 4).

The superficial mucosal layer was ulcerated in two of the dogs. A local acantosis, necrosis and sequestration of the tissue was seen (Fig. 5).

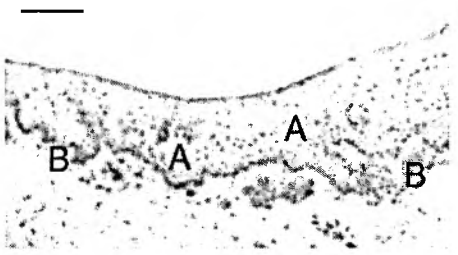

Fig. 1. Mucosa with acantosis (A), blood vessels enlargement and initial invert micropapilomatosis (B). × 4

Fig. 2. Mucosa with initial invert Micropapilomatosis (A). × 4

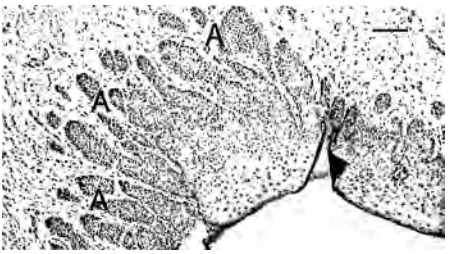

Fig. 3. Mucosa with advanced invert Micropapilomatosis (A). × 4

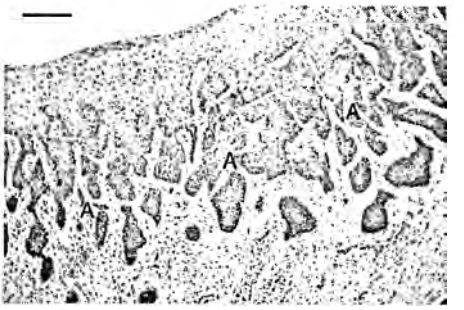

Fig. 4. Mucosa with wide spread invert micropapilomatosis (A). × 4

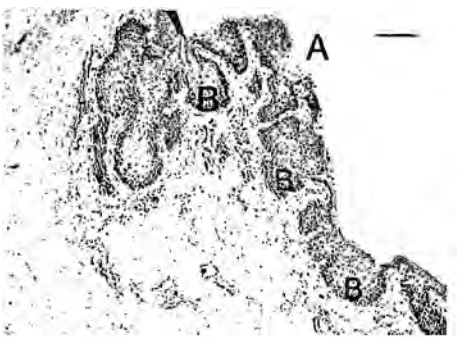

Fig. 5. Mucosa with ulceration (A) and focal acantosis (B). × 4

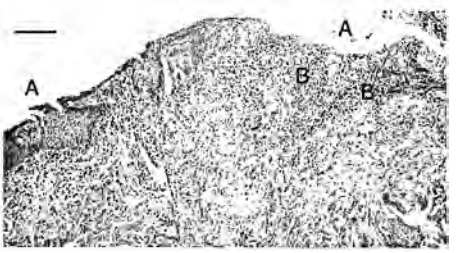

Fig. 6. Mucosa with ulceration (A) and diffuse deep nonspecific infiltrates (B). × 4

In the samples of one dog we found out severe granulocytes' infiltration with cariorexis of the nuclei in part of them. Some of the mucosa was necrotic and sequestrated. Thus ulcerations were formed, infiltrated with polymorphonuclear leucocytes and cellular debris (Fig. 6).

Duscussion

A variety of clinical signs were obvious. They characterized the severity of the disease, and also its type. The progression of the diseases is usually in both vertical and horizontal direction [4, 5].

The histologic changes in the initial stage are connected with cellular overgrowth in stratum spinosum (acantosis) and tearing of the intercellular connections. A pronounced micropapilomatosis was seen in the advanced stage of the disease.

The destruction of the epithelial cells and the desmosomes could be connected with a change of the interaction among them and also the expression of integrins [6]. This statement explains the possibility why in the advanced stage an ulceration, necrosis and sequestration of the tissue was seen in the superficial layer of the mucosa.

The progression of the disease is connected with lysis of collagen fibres of gingival connective tissue and an alveolar bone resorption. These processes lead to an increased tooth mobility. The pathologic changes in the periodontal tissues are also due to the cytotoxic activity of the involved root surface, damaged by the absorbed endotoxins and other inflammatory mediators [13]. Only one part of endotoxins' molecule — LIPID A — is with certain biologic activity, stimulates vascular permeability, activates the complement cascades, the production of interleukins and the involvement of the immune system [12].

Along with the destruction of the periodontal tissues a fibrosis and definite changes of the non-collagen ingredients is seen. These changes are different in the different clinical stages and the different periodontal disease in dogs [9, 10].

Conclusions

1. Periodontal diseases in dogs show big variety when it concerns the clinical symptoms — from comparatively slight color changes (slight erythema) of the marginal and papillary tissues to severe ulcerations, necrosis and sequestrations.
2. Histologic changes vary in accordance with the combination of the severity and the localization of the pathologic process — from vasodilation to deep ulcers, where some parts of the mucosa are lost.

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