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IMMUNOHISTOCHEMICAL FEATURES OF THE GRANULATION TISSUE STRUCTURE IN THE PRIMARY AND SECONDARY APICAL PERIODONTITIS

The study was performed as the part of research work “Development and introduction of new methods for diagnosis, treatment and prevention of dental caries and its complications, diseases of periodontium and oral mucosa” (state registration number 0110U003018).

ABSTRACT. Background The search of criteria of differential enzymatic activity of cyclooxygenase-2 and matrix metalloproteinases immunocompetent cells of granulomas in the primary and secondary apical periodontitis (AP) provides information about the features of lesions of periodontal stromal component, and it can be used as the basis for future therapeutic intervention. **Objective.** The purpose of this study was to compare the qualitative and quantitative characteristics of the cellular composition of granulation tissue, which formed during primary and secondary apical periodontitis; comparison of morphological characteristics of the structure apical granuloma with immunohistochemical indicators of markers expression of cluster of differentiation CD3, CD4, CD8, CD68, CD138, CD20 and cyclooxygenase-2 and matrix metalloproteinase 9. **Methods.** The study included 59 patients aged 18 to 50 years with apical periodontitis. Patients were divided into 2 clinical group: 1 – with primary periodontitis and 2 – with secondary periodontitis. For morphological studies using peryapikalnoyi granulation tissue biopsies. **Results.** Significant differences were found for the fractions of CD4⁺ T helper cells ($p=0,034$, $r=0,321$), CD20⁺ mature B lymphocytes ($p=0,001$, $r=0,671$), CD68⁺ macrophages ($p=0,011$, $r=0,684$) and CD138⁺ plasma cells ($p=0,002$, $r=0,645$). And, also likely decrease in the ratio of CD4⁺/CD8⁺ ($p=0,002$, $r=0,645$), by reducing the fraction of CD4⁺ T-helper cells, against reducing the number of leukocytes, expression of MMP-9 ($p=0,04$, $r=0,302$) and COX-2 ($p=0,013$, $r=0,321$) with secondary apical periodontitis, compared to the primary periodontitis. **Conclusion.** Disease progression and the beginning of the destruction of bone tissue with the formation of granulation tissue is the result of abnormal immune responses, III and IV type hypersensitivity reactions, with the formation of immune granulomas.

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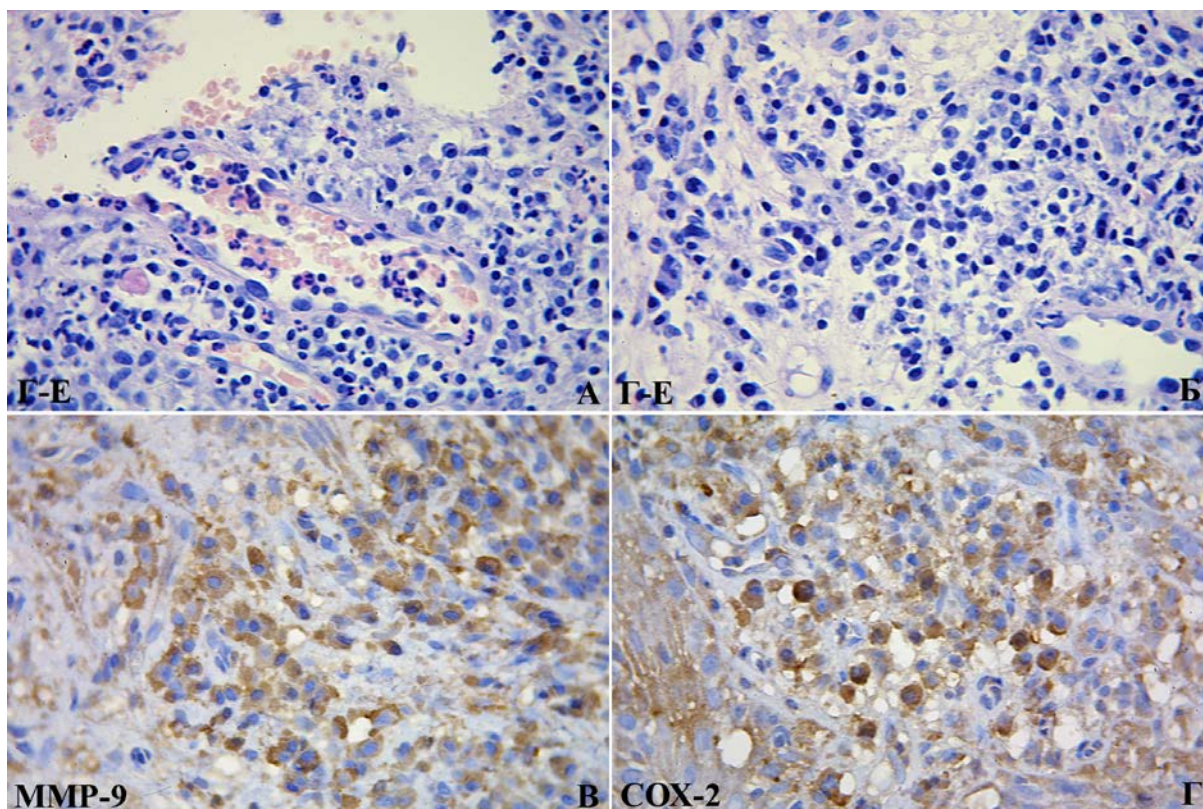


Fig. 1. A. Primary apical periodontitis: inflammatory infiltrate is characterized by large amount of polymorphonuclear leukocytes penetrating to the gingival tissues from the dilated paretic vessels, note the swelling of stroma; Hematoxylin&Eosin staining. $\times 400$. Б. Secondary apical periodontitis: different composition of the infiltrate: lymphocytes, plasma cells, macrophages, fibroblasts, notable fibrosis of stroma; Hematoxylin&Eosin staining. $\times 400$. B. Cytoplasmic reaction of high intensity (+3) with MMP-9 in the inflammatory infiltrate in primary apical periodontitis; immunohistochemical method, additional staining with Mayer's hematoxylin. $\times 400$. Г. Cytoplasmic reaction of moderate (+2) and high (+3) intensity with COX-2 in the inflammatory infiltrate in secondary apical periodontitis, especially in the lymphocytes and plasma cells; immunohistochemical method, additional staining with Mayer's hematoxylin. $\times 400$.

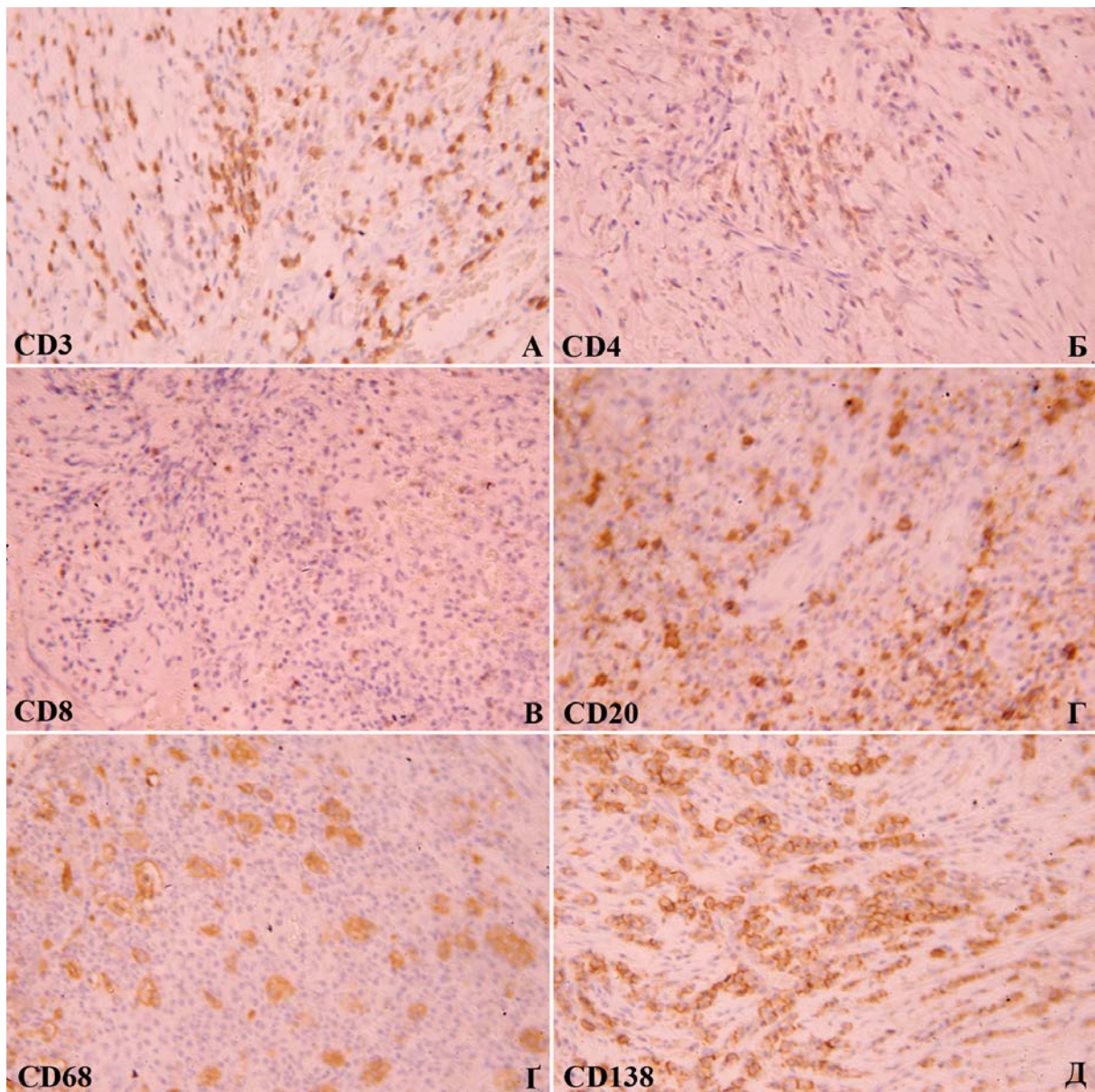


Fig. 2. Secondary apical periodontitis, immunohistochemical method, additional staining with Mayer's hematoxylin. A. Cytoplasmic reaction of T-lymphocytes with CD3. Б. Cytoplasmic reaction of T helper cells fraction with CD4. B. Cytoplasmic reaction of T suppressor cells fraction with CD8. Г. Cytoplasmic reaction of mature B lymphocytes with CD20. Г. Cytoplasmic reaction of macrophages and giant cells with CD68. Д. Cytoplasmic and membrane reaction of numerous plasma cells with CD138. x400.

References:

1. Mozgovaya LA, Zadorina II, Bykova LP, Godovalov AP. [Microflora of root canals during the treatment of chronic forms of apical periodontitis]. *Saratov Journal of Medical Scientific Research*. 2013;9(3):447-9. Russian.

2. Siqueira JF, Rôças IN, Ricucci D, Hülsmann M. Causes and management of post-treatment apical periodontitis. *British Dental Journal*. 2014;216:305-12. Cited in PubMed; PMID: 24651336.

3. Abbott PV. Classification, diagnosis and clinical manifestations of apical periodontitis. *Endodontic Topics*. 2004;8:36-54.

4. Dokić J, Tomić S, Marković M, Milosavljević P, Colić M. Mesenchymal stem cells from periapical lesions modulate differentiation and functional properties of monocyte-derived dendritic cells. *Eur J Immunol*. 2013;43:1862-72.

5. Popovska L, Zabokova-Bilbilova E, Mircheva E, Stojanovska V. Chronic periapical lesions: correlations with clinical finding. *Prilozi*. 2014;35(1):263-9. Cited in PubMed; PMID: 24802205.

6. Carneiro E, Menezes R, Garlet GP, Garcia RB, Bramante CM, Figueira R, Sogayar M, Granjeiro JM. Expression analysis of matrix metalloproteinase-9 in epithelialized and nonepithelialized apical periodontitis lesions. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2009;107(1):127-32. Cited in PubMed; PMID: 18926740.

7. Corotti MV, Zambuzzi WF, Paiva KB, Menezes R, Pinto LC, Lara VS, Granjeiro JM. Immunolocalization of matrix metalloproteinases-2 and -9 during apical periodontitis development. *Arch Oral Biol*. 2009;54(8):764-71. Cited in PubMed; PMID: 19497558.

8. Lukić A, Vasilijić S, Majstorović I, Vučević D, Mojsilović S, Gazivoda D, Danilović V, Petrović R, Colić M. Characterization of antigen-presenting cells in human apical periodontitis lesions by flow cytometry and immunocytochemistry. *Int Endod J*. 2006;39(8):626-36. Cited in PubMed; PMID: 16872457.

9. Fan R, Sun B, Zhang CF, Lü YL, Xuan W, Wang QQ, Yin XZ. Receptor activator of nuclear factor kappa B ligand and osteoprotegerin expression in chronic apical periodontitis: possible association with inflammatory cells. *Chin Med J (Engl)*. 2011;124(14):2162-6. Cited in PubMed; PMID: 21933620.