INTERNATIONAL JOURNAL OF
INTEGRATIVE AND
MODERN MEDICINE

Changes in Biochemical Indicators in the Development of Alveolitis

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Alveolitis is the most common post-extraction complication [1–4]. The main symptoms of alveolitis appear 1–3 days after surgery [5, 6] and are pain of varying intensity in the area of the socket of the extracted tooth, as well as pain radiation to the adjacent teeth, ear, temporal region, in some cases in the neck, eye and frontal area, blood clot prolapse, halitosis, fever to low-grade values, inflammation of the marginal edge of the gums, exposure of a fragment of the alveolar bone, grayish plaque on the walls of the socket, phenomena of regional lymphadenitis.

The result of this is the activation of immunoinflammatory processes occurring in the alveolar socket with the involvement of pro- and anti-inflammatory cytokines, adhesion factors, etc. In the lesions, there is an accumulation of activated T lymphocytes and macrophages, which leads to the initiation of the synthesis of mediators that increase inflammation (1,2,3,4,5,). After the first cytokine response, a cascade of reactions is activated, leading to a predominantly increased synthesis of tumor necrosis factor alpha (TNF-a) and pro-inflammatory cytokines, which leads to a pathological immunoinflammatory response (6,7,8,9.10).

An important role in the implementation of immune-mediated stages of inflammation is played by adhesion molecules, the main function of which is to maintain intercellular interactions, the migration of cells to the focus of inflammation, and the initiation of an immune response. There are 3 main families of adhesive molecules: selectins, integrins, immunoglobulins (11,12,13).

Selectins are expressed on the membranes of leukocytes (L-selectins), platelets (P-selectins) and endotheliocytes (P- and E-selectins). Integrins are expressed on the membranes of leukocytes, endothelial cells and ensure the adhesion of leukocytes to endothelial cells and extracellular matrix proteins — fibronectin, collagen, laminin, vitronectin.

Expression of Cell Adecion Molecules is Induction of Pro-Inflammatorya Kitokin (In Particular, IL 1, 6, 8, TNF, IFN), Free Radicals, Lipopolysaccharides, Leukotriene, Histamine, Thrombin, Complement Components, and Money Auter Factors (14,15).

With the help of the adhesion molecule (integrin (sVCAM-1) and selectins (P-, E-, L-), leukocytes migrate to the focus of inflammation and an inflammatory infiltrate is formed: adhesion (adhesion) to the endothelium of the vessels in the focus of inflammation; penetration through the epithelium; movement in the direction of the focus of inflammation under the influence of chemotaxis. The above data on the role of dissolvable forms of adhesive molecules have been studied in some pathological conditions. At the same time, there are no reports of similar studies in dental practice.

The aim of this study was to study the content of soluble cell adhesion molecules mediating the initial and final stages of leukocyte migration to the focus of inflammation (sP-selectin and sVCAM-1), as well as some previously unstudied factors associated with their level in the blood serum of patients with alveolitis.

Material and methods of research. A total of 48 patients aged 20 to 55 years were examined, with an average age of 35.6±3.0 (M±o). The diagnosis was made on the basis of a comprehensive examination, including the study of the dental status and immunological testing of all patients with clinical detection of alveolitis.

The determination of the content of soluble adhesion molecules of sP-selectin and sVCAM-1 in the blood serum and the concentration of neopterin were carried out by enzyme-linked immunosorbent assay (ELISA) using BioChemMac test systems (Russia). At the same time, the cytokine status was studied, including the assessment of the TNF-a content on the ROSH enzyme-linked immunosorbent

analyzer "COBAS" using the test kits of the same company. The data analysis was performed using the STATISTICA v. 6.0 package for Windows XP Descriptive statistics of the feature included the arithmetic mean (M), minimum and maximum values, median (Me) and interquartile range [Q25-Q75].

When comparing the results obtained, the Mann-Whitney test was used due to the discrepancy between the analyzed data and the law of normal distribution. The relationships between the traits were studied using Spearman's correlation analysis (R). The differences were considered statistically significant at $p < 0.05$.

Research results and discussion. In clinical and laboratory blood analyses of the examined patients with alveolitis, the following were preserved: reduced ESR 13 ± 6.13, mm/h, leukocytosis 8.93 ± 1.21 thousand, CRP 15.02 ± 7.87 mg/l, band shift 9.89 ± 2.38%. Analysis of the study results presented in Table 1 indicated an increase in serum concentrations of soluble adhesion molecules sP-selectin and sVCAM-1, neopterin, and TNF in patients with alveolitis.

The data obtained indicate that in patients with CRAS, an increased content of soluble adhesion molecules can affect the process of movement of leukocytes along the vascular bed, and then directly through the vascular wall in the tissue (focus of inflammation) to realize its effector potential.

The above should also be confirmed by the increase in the respiratory "explosion" of neutrophil granulocytes in patients with CRAS, the number of which increases. The most important role in the production of membrane antigens is played by the pro-inflammatory cytokine TNF, which is secreted in the focus of inflammation and ensures the expression of adhesive molecules, thereby mediating the migration of effector cells through the vascular wall and their infiltration of tissues. In this regard, it was of interest to try to discover the relationship between the sequence of adhesive reactions. A certain sequence of leukocyte emigration is due to the fact that the expression of various adhesive molecules does not occur simultaneously. At first, under the influence of inflammatory mediators, selectins are expressed. Already in the first minutes of the action of histamine, thrombin, bacterial endotoxins (lipopolysaccharide, LPS), and phospholipid PAT (platelet activation factor, PAF) on the vascular wall, there is a redistribution of P-selectin from its intracellular depot — granules of endothelial cells (Weibel-Palade bodies) — to the surface of the plasma membrane. After 1-2 hours, under the influence of complement fragments (C5a, Bb), leukotriene B4, TNF-α, L-selectins of leukocytes are expressed, and as a result of the action of bacterial LPS, IL-1, TNF-α, TNF-β, IL-8 and other cytokines, E-selectins, as well as their ligands, are expressed. Integrins, immunoglobulin superfamily proteins, and addresssins appear on the membranes of leukocytes and endotheliocytes much later. In this regard, the maximum rate of neutrophil release occurs in the first 2 hours and decreases significantly after 4-6 hours.

The interaction of selectins with their oligosaccharide ligands is not very strong (low-affinity) and is easily destroyed by the blood flow (reversible adhesion). The celectins attract the leukocytes to the vascular wall and hold them for a while, release them, and reattach them, which creates the effect of rolling along the vascular wall. Activation of integrins is accompanied by the expression of adhesion molecules of the immunoglobulin superfamily on the surface of endotheliocytes under the influence of TNF. All this ensures a strong connection of leukocytes with the vascular wall, their flattening on the surface of the endothelium (irreversible adhesion), as a result of which they penetrate through the expanded spaces between the endothelial cells of capillaries and venules (emigration of leukocytes). Thus, the role of macrophages is mainly to neutralize cells in which viruses, some bacteria and fungi parasitize, as well as to clear the focus of inflammation from dead cells, including neutrophils, and the formation of anti-inflammatory mediators. destroying (aryl sulfatase, histaminase, kininase, etc.) or neutralizing (heparin, chondroitin sulfate, proteinase inhibitors, antiphospholipases, antioxidants, polyamines, lipoxins, IL-10, histamine through H2 receptors) inflammatory mediators. Thus, the adhesion molecules selectin, integrins, neopterin, and TNF are modern markers of SOPR inflammation in alveolitis and can serve as criteria for predicting the severity and course of the disease.

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