

Assessment of the Status of Local Immunity in Patients with Acute Purulent Odontogenic by Osteitis of the Jaw

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ABSTRACT:

The aim of this study was to study the characteristic features of local and systemic immunity in patients with acute purulent odontogenicostitis of the jaw. We examined 38 patients with acute purulent odontogenicperiostitis, who applied to the TSSI clinic. Clinical hematological immunological research methods were used. It was revealed that the most frequent associations of microorganisms in acute purulent odontogenicostitis of the jaws are *Staphylococcus aureus*, *Staphylococcus epidermicus*, registered in more than half of the cases. There was an increase in immunoglobulin G in the blood in acute purulent odontogenicostitis.

Key words: acute purulent odontogenicosteitis, microflora of the oral cavity, blood counts, immunogram.

INTRODUCTION.

Recently, there has been a tendency to increase the number of periostitis in young patients. At the same time, periostitis accounts for about 80% of all cases of temporary disability in dental diseases. Analyzing the literature sources of recent years, we can note significant changes in the local microbial landscape in the oral cavity, which is caused by the impact of a number of reasons: unfavorable environmental conditions, uncontrolled intake of pharmaceutical drugs, an unbalanced diet, and an increase in the number of patients with somatic diseases. The intensity of the course of the pathogenesis of odontogenic inflammation depends on the well-coordinated interaction of all immune factors. Violation of immunity, among other things, in the presence of concomitant diseases, increases the possibility of developing multiple periapical chronic foci. Competitive relations between representatives of the microbiocenosis, as well as the products of their metabolism, can influence the interaction of microorganisms with epithelial cells (4,13,19,23). Along with epithelial cells, neutrophils and macrophages, lymphoid follicles lying within the epithelial layer are of great importance in the local nonspecific protection of the mucous membranes. At the same time, the intensity of the pathogenesis of acute odontogenic inflammation depends on the well-coordinated interaction of two protective mechanisms: local and systemic immunity.

RESEARCH MATERIALS AND METHODS.

The clinical material was based on the data obtained during the examination and treatment of 38 patients with acute purulent odontogenicostitis who applied to the TSDI clinic. Our choice fell on this form of the disease due to the fact that according to the literature there is a significant increase in the number of patients with this pathology (by 40%) from the total number of patients with odontogenic inflammatory diseases. The age of the selected patients ranged from 4.5 to 6 years. This choice here was due to the fact that this age period is characterized by a normergic variant of the immune response. The observation groups included patients who did not have a developed general somatic pathology that could influence the course of the studied pathology. The disease developed more often in the lower jaw (74.3%) than in the upper jaw (25.7%), which corresponds to the information presented

earlier in the literature. To evaluate and compare the results obtained during the treatment of patients, an obshklinical examination was performed, as well as laboratory (microbiological), cytological (smear - scraping), bacteriological (inoculation from a purulent wound) and enzyme immunoassay were used. General clinical observations included: clarification of the patient's complaints, anamnesis of the disease and life, local examination, palpation of tissues, percussion of causal teeth.

The material for microbiological studies of the microflora of a purulent wound was the contents of the wound taken with two sterile cotton swabs. The concentration of immunoglobulin G, M, and A in the blood serum was studied by the enzyme immunoassay on an analyzer. The level of circulating immune complexes was studied in the blood using 7% polyethylene glycol and expressed in conventional units.

RESEARCH RESULTS AND DISCUSSION .

One of the most important factors of virulence and pathogenicity of *S. Epidermidis* and *S. Aureus* is the ability to form biofilms. When a certain density of cells attached to the surface is reached, the biofilm maturation stage occurs, during which the actual structure of the biofilm is formed due to the synthesis of polysaccharides by the cell. It should be noted that staphylococci produce a wide range of toxins: various enterotoxins, hemolysins, toxins, enzymes (lipase, phospholipase, metalloprotease, cytolytic hemolysins), the C5 complement protein, as well as some other proteins, which indicates its possible participation in the processes of protecting microbial cells from the human immune system. In this situation, odontoblasts are the first line of defense cells that control all the metabolic processes of the tooth pulp in normal and inflammatory conditions (24,25,26).

In pediatric practice, it is believed that in children, the chronic stage of pulp inflammation often develops not as a result of the transition from the acute stage, but as a primary-chronic process (20,21). Our studies have shown that the inflammatory process in the pulp of temporary teeth proceeds according to the type of acute reaction. Therefore, the symptoms of inflammation of the tooth pulp in children are pronounced for several hours, and then an abscess develops in the periapical tissues. Acute inflammation begins with a spasm of the arterioles under the action of catecholamines and vasoactive proteins-endothelins. Venous stasis leads to a change in the redox processes in the pulp and to the development of oxygen deficiency. Hypoxia is accompanied by the accumulation of organic acids in the cytoplasm of pulp cells. Due to the increasing osmotic pressure, there is pain in the tooth. An important role in the development of pain response in inflammation of the tooth pulp is also played by the irritation of the receptor endings by products of anaerobic glycolysis and the increase in their pain sensitivity by inflammatory mediators. This applies primarily to the presence of soreness of the affected jaw during palpation and movement, hyperemia of the oral mucosa on the affected side, infiltration and swelling of soft tissues on the affected side. The frequency of these objective local symptoms is representatively higher than the others detected in patients during admission to the inpatient department.

At the 2nd stage of the research, we conducted a microbiological study. The main causative agents of acute purulent odontogenicostitis of the jaws isolated in patients are presented in the table. As can be seen from the presented research results, the most frequent associations of microorganisms in acute purulent odontogenicostitis of the jaws are *Staphylococcus aureus*, *Staphylococcus epidermicus*, registered in more than half of the cases. Among the studied associations, *Streptococcus oralis* is less often distinguished.

Table -1
The main causative agents of acute purulent odontogenicostitis of the jaws isolated from patients (P±тр, %)

Name of the microorganism	Detection frequency
Staphylococcus aureus	72,4±4,2
Staphylococcus epidermicus	48,2±4,0
Staphylococcus haemoliticus	24,9±2,5
Streptococcus pyogenes	37,5±4,7
Streptococcus oralis	21,2±4,0
Pneumococcus niger	4,6±2,0
Pneumococcus aeruginosa	2,8±1,6
Bacteroidus spp.	5,1±2,1
Enterobacteriaceae	3,2±1,7
Escherichia coli	1,4±0,6

Thus, a bacteriological study of the wound discharge in patients with acute purulent odontogenicostitis showed that the basis of the microflora in the species ratio is staphylococci. These microorganisms accounted for 82 % of the total number of isolated strains.

In the studies of I. G. Ostrovskaya (2017), it was shown that IGG gives the greatest specificity to immune responses, highly effectively enhances phagocytosis and complement-dependent lysis, and also participates in the neutralization of adhesive pathogen molecules in the site of inflammation. In addition, the staphylococcus cell wall contains protein A, which can strongly bind to the Fc fragment of the immunoglobulin molecule, while the Fab fragment remains free and can bind to a specific antigen.

Table - 2
Indicators of immunoglobulins and circulating immune complexes in the blood serum of patients with acute purulent odontogenicostitis of the jaw

The parameter under study	Patients with acute odontogenicostitis of the jaw n=12	Healthy faces n=12
Иммуноглобулин А IgA, г/л	0,89±0,09*	1,54±0,14
Иммуноглобулин GIgG, г/л	16,04±0,67*	11,34±0,98

Иммуноглобулин E	IgE, г/л	61,63+5,14	65,38+4,79
Иммуноглобулин M	IgM, г/л	2,54+0,23*	1,67+0,16
Циркулирующие иммунные комплексы у.е.		77,83+6,38*	45,29+3,58

Note: * - significance of differences $P < 0,05$

More significant was the decrease in the level of IdA due to the development of acute purulent odontogenicostitis of the jaws compared to the control group, which is probably due to the increased synthesis of secretory immunoglobulin A. However, the concentration of IdM at the systemic level in patients is slightly increased. The level of circulating immune complexes in the blood of the representatives of the main group increased representatively. Thus, an imbalance in the "foreign agent - immune defense" system in the oral cavity can cause inflammation in the oral mucosa. As indicated by the obtained research results, in acute purulent odontogenicostitis, the ability of periodontal cells to recover is not observed, but rather indicates the development of irreversible processes, which requires surgical interventions and appropriate pharmacological correction.

CONCLUSIONS

1. In the clinical examination of patients with acute purulent odontogenicostitis of the jaws, a high frequency of individual local symptoms was established. The most frequent associations of microorganisms in acute purulent odontogenicostitis of the jaws are *Staphylococcus aureus*, *Staphylococcus epidermicus*, registered in more than half of the cases.
2. This pathology is accompanied by a shift in the parameters of white blood and marked hemic hypoxia is accompanied by increased levels of lactic acid in the cells, which may be one reason for the violation of local microcirculation and the accumulation of endogenous toxins.
3. An increase in immunoglobulin G in the blood in acute purulent odontogenicostitis is apparently associated with a violation of microcirculation and in this situation, it may not come from the blood plasma, or the formation of stably bound complexes of immunoglobulins with antigens occurs.

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