

# ENDOGENOUS INTOXICATION IN INFLAMMATORY DISEASES OF PARANASAL SINUSES IN PATIENTS WITH HEMOBLASTOSIS

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## ABSTRACT

According to our study, diseases of the nose and paranasal sinuses were found in 59.4% of patients with acute and chronic leukemias. In chronic leukemia purulent-inflammatory diseases had abortive clinical manifestation. In acute leukemia, especially during the induction of remission, purulent-inflammatory diseases of the nose and paranasal sinuses were associated with significant signs of purulent process. Inflammatory diseases of the paranasal sinuses are manifested by pronounced shift of hematological indices of intoxication that indicates increase of autointoxication, disturbance of adaptation mechanisms and transition of adaptive-compensatory immunological reactions in damaging ones.

## UDC CLASSIFICATION & KEYWORDS

■ 619:616.21-008.6 ■ Hemoblastosis ■ Inflammation ■ Paranasal Sinuses ■ Endogenous Intoxication ■

## INTRODUCTION

According to Abdulkadyrov [4], the prevalence of acute leukemia ranges from 3 to 5 per 100,000 population, and it is diagnosed in 75% of cases in adults and 25% in children. Recent studies [7,8] reported features of the course of diseases of the upper respiratory tract organs in hemoblastosis. Analysis of these researches demonstrates the need for a more in-depth study of this issue: clarification of their mechanisms and development of principles for conservative and surgical treatments of sinusitis associated with blood system diseases [7,8]. Pathological processes caused by blood diseases contribute to disruption of the processes of repair and regeneration of the mucous membranes of the upper respiratory pathways and reduce their resistance to infections [3,6]. At the same time, purulent-inflammatory processes decline the state and course of underlying pathology and have negative effect on the clinical and blood laboratory parameters, leading to the progression of symptoms of hemorrhagic syndrome, limitation or cessation of polychemotherapy.

According to modern concepts, patients with sinusitis develop autoaggression, which manifestation is the chronicity of illness and severe endogenous intoxication [1,2]. Microbial agents, or rather, their metabolic products – endotoxins play the significant role in the development of this condition. Independently of origin, the impact of endotoxins leads to impairment of common homeostasis in the organism, changes in cell membranes, cell metabolism, and disruption of the integrity of vascular bed of the skin.

The purpose of our research was to study manifestations of endogenous intoxication in patients with hemoblastosis.

## Materials and methods

The study included 276 patients with acute and chronic leukemias. Diagnosis was established with hematologists, based on clinical manifestations of peripheral blood and bone marrow. All the patients or their relatives gave their informed written consent and the study was approved by the local ethics committee.

Acute leukemia was detected in 32.7%, chronic leukemia in 68.3% of patients. The presence of inflammatory diseases of the paranasal sinuses were identified by clinical and instrumental investigations. The control group consisted of 20 healthy individuals.

To assess the degree of toxicity and efficacy of therapy in patients with acute and chronic leukemias we used the calculated integral parameters [5]: leukocyte intoxication index (LII), which characterizes the degree of endogenous intoxication; leukocyte index (LI), which reflects the relationship of humoral and cellular immune systems; index of the ratio of neutrophils and monocytes (NMRI), which allows to estimate the ratio of components of microphage-macrophage system; index of the ratio of lymphocytes and eosinophils (LERI), reflecting the ratio of hypersensitivity processes of immediate and delayed types. Hemogram was performed on the hematology analyzer at the Research Institute of Hematology and Blood Transfusion of the Ministry of Health of Uzbekistan. Integral hematologic indices were calculated using specially developed computer program.

## Results and discussion

Studies showed that in acute hemoblastosis, especially during the induction of remission, purulent-inflammatory diseases of the nose and paranasal sinuses were found in 59.4% of patients, with significant signs of purulent process. Microbiological studies found the prevalence of several microorganisms, often anaerobes. At the same time, chronic sinusitis appear in the form of purulent inflammation, inertly; they are poorly treated, often accompanied by nasal bleedings (epistaxis). Isolated lesions of single sinus were revealed in 10% of patients, poly-, hemi- and pansinusitis were identified in 58%, 10% and 22% of patients, respectively.

Inflammatory diseases of the paranasal sinuses develop with pronounced shift of hematologic indices of toxicity of the organism (Table 1). Table 1 shows that patients with leukemia in the presence of sinusitis develop endogenous intoxication,

Table 1. Integral indicators of body intoxication in hematological patients with chronic sinusitis,  $M \pm m$

Indicators	Control, n=20	Acute leukemia, n=53	Chronic leukemia, n=110
Leukocyte intoxication index (LII)	1.01±0.11	3.82±0.24*	3.02±0.21*
Leukocyte index (LI)	0.30±0.02	1.75±0.05*	1.41±0.02*
Index of the ratio of neutrophils and monocytes (NMRI)	9.01±0.52	19.49±1.74*	14.92±0.87*
Index of the ratio of lymphocytes and eosinophils (LERI)	12.01±1.11	119.27±7.51*	84.19±3.85*

Note: \* -  $P < 0.05$ .

Source: Author

which is more significant in acute leukemia. We assume that this is due to violation of the immune system, predominance of catabolic processes, reduction of common resistance of the organism and the aggressiveness of therapy.

Analysis of changes of leukocytes integral parameters in peripheral blood from patients found statistically significant difference, compared with healthy individuals. Thus, LII in patients with acute and chronic leukemia is increased in 3.8 and 3 times, respectively. We suppose this is because of increase in the number of segmented forms of leukocytes, plasmatic cells and decrease in the numbers of eosinophils, lymphocytes and monocytes. Reduction of the number of eosinophilic leukocytes with detoxication functional orientation, as well as lymphocytes and monocytes is regarded as a sign of immunosuppression, whereas appearance of their young and immature forms in the blood is evidence of strength of compensatory processes that ensure detoxification [5]. LI, which reflects the relationship of humoral and cellular parts of the immune system, was significantly different from control in 5.83 times in acute leukemia and 4.7 times in chronic leukemia, respectively. NMRI increases 2.16 and 1.66-fold, respectively, testifying to increased non-specific inflammatory process. LERI is significantly increased 9.93 and 7-fold, respectively in acute and chronic leukemias, indicating a growth of autointoxication, accordingly, increase in the severity of process, disturbances of adaptation mechanisms, as well as transition of adaptive-compensatory immunological reactions in the damaging ones [5]. In this case, there was impairment of immunologic reactivity.

According to Arifov [2], endotoxemia is frequently associated with microdamages, accompanied by development of thrombohemorrhagic syndrome. During inflammation, mononuclear phagocytes contribute to local increase of coagulating properties of blood, tissue fluid, and lymph. This is accompanied by thrombosis and impaired microcirculation. Fibrin formed in this case plays the protective role, limiting the area of inflammation. However, in parallel, in the area of inflammation, fibrinolytic activity is increased that leads to normalization of blood flow in microvessels and, at the same time, stimulating development of the destructive phase of inflammation.

Scientific researches carried out in otorhinolaryngology [2] and hematology [4] allow us to conclude that leukemic infiltration of organs, aggressiveness of chemotherapy and inflammatory reaction, which involve many body systems, play the important role in the development of multiple organ failure with combination of these pathologies. The above-mentioned is based in effects of a number of biologically active substances produced by immune cells and the subsequent activation of humoral systems, which form the organ damage. Neutrophils are found to perceive physical and chemical properties of environment with which they come into contact. This is due to the presence of neutrophil receptor system, which plays the important role in immunity, digestion phagocyte objects and regenerative processes. The functional possibilities of macrophages (alteration of metabolism, migration, adhesion, absorption, formation of digestive vacuoles and secretory degranulation) are fully marked only by stimulating effects. These effects include the circulating immune complexes, complement components, Ig of G, M and A classes, which activate the directional movement - chemotaxis.

## Conclusions

According to available data and our own study, we can do the following conclusions:

1. Diseases of the nose and paranasal sinuses were found in 59.4% of patients with acute and chronic leukemias. Of all the diseases, significantly more often were identified nasal bleedings (epistaxis), atrophic rhinitis, chronic etmoiditis, and chronic maxillary sinusitis.
2. In chronic leukemia purulent-inflammatory diseases had abortive clinical manifestation. In acute leukemia, especially during the induction of remission, purulent-inflammatory diseases of the nose and paranasal sinuses were associated with significant signs of purulent process.
3. Inflammatory diseases of the paranasal sinuses are manifested by pronounced shift of hematological indices of intoxication. Sharp (more than 10-fold) increase of index of the ratio of lymphocytes and eosinophils is evidence of increase of autointoxication, disturbance of adaptation mechanisms and transition of adaptive-compensatory immunological reactions in damaging ones.

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