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IMPROVEMENT OF COMPLEX TREATMENT OF PURULENT PROCESSES OF DIABETES MELLITUS

УСОВЕРШЕНСТВОВАНИЕ КОМПЛЕКСНОГО ЛЕЧЕНИЯ ГНОЙНЫХ ПРОЦЕССОВ САХАРНОГО ДИАБЕТА

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Summary. Ozone application in a complex treatment of patients with diabetes complicated by pyoinflammatory processes has an apparent therapeutic effect and prevents the development of the relapse and complications of the disease promoting significant improvements of direct and remote results of treatment of the given pathology.
Key words: diabetes mellitus, pyoinflammatory processes, lipid peroxydation, ozonotherapy

Резюме. Применение озона при комплексном лечении пациентов с сахарным диабетом, осложненным гнойно-воспалительными процессами, имеет очевидный терапевтический эффект и предотвращает развитие рецидива и осложнений заболевания, способствуя значительному улучшению прямых и отдаленных результатов лечения данной патологии.
Ключевые слова: сахарный диабет, гнойно-воспалительные процессы, переокисное окисление липидов, озонотерапия.

Introduction. Diabetes mellitus remains one of the pressing problems of medicine, since it is one of the most common endocrine diseases with a steady upward trend. Along with oncological and cardiovascular diseases, diabetes mellitus is one of the most common causes of disability and mortality in patients [4, 6, 8]. Over the past ten years, the prevalence of diabetes in Ukraine has increased by 1.5 times and is estimated to be up to one million patients Scientific data analysis shows a steady increase in the number of patients with diabetes, and in developed countries reaches more than 6% of the population [2, 5].

Despite some advances in the treatment of diabetic patients with severe localized wound infection, surgical treatment results can not be considered satisfactory [2, 7]. The accumulated experience in the medical practice of the use of physical factors with a therapeutic purpose of influence on the stimulation of reparative processes associated with targeted pharmacotherapy, confirm the correctness of the search attempts. Ozonotherapy have been widely used for this purpose in recent years [1, 8].

It is known that the condition of the blood coagulation system plays an essential role in the healing of wounds in the surgical treatment [1, 5, 6, 7]. Special studies devoted to the influence of ozone on the blood coagulation system, as a factor affecting the wound healing in diabetes mellitus with purulent-inflammatory complications have not been found in the available scientific literature. Hence, it is important to study the ozone influence on blood clotting in diabetes with pyoinflammatory processes [2, 3, 4, 6].

From the surgical point of view, topicality of this problem is first of all stipulated by the fact that purulent-necrotic processes develop in more than 30-70% diabetic patients and 50% of hospitalized patients need surgical care concerning these complications [1, 3, 4].

With regard of to the mentioned facts, it becomes evident that the effective methods of complex treatment of purulent processes in diabetic patients should be searched in order to introduce into clinical practice the effective methods of conservative treatment and new ways of reparative processes activation. For this purpose ozonotherapy has recently become widely used.

Material and methods. 124 diabetic patients with pyoinflammatory complications have been examined. The main group - 53 (42.7%) patients, along with comprehensive treatment underwent intravenous ozone therapy. The control group -71 (57.2%) patients were treated by conventional methods.

Intravenous administration of ozonized physiological solution was performed in all patients of the main group, along with traditional therapy, similar in composition to the control group of patients [6]. Coagulogram indices, lipid peroxidation, parameters were determined.

Discussion of results.

According to some authors, in diabetic patients with pyoinflammatory lesion of soft tissues the level of lipid peroxidation end product – malonic aldehyde in the wound increases. Inhibition of AOP manifests by a significant decrease in tissue retinol and tocopherol in particular, as well as decreased activity of glutathione reductase. The most effective treatment methods in terms of lipid peroxidation stabilization are those including ultraviolet blood irradiation, low-intensity laser irradiation and sorbents application [7, 9].

Hypercoagulation syndrome with microthromboses development and whieh is manifested by is pathognomonic an increased thrombocytes aggregation activity. Combined with decreased anticoagulant and fibrinolytic blood activity it stipulates the widespread use of reocorrectors together with anticoagulants and antiaggregants [8].

The results of the coagulogram study in diabetic patients with pyoinflammatory complications (Table 1) showed that in the control group of patients on admission, during the treatment and at discharge significant changes were not detected concerning to the prothrombin index, recalcification time, thrombin time, hematocrit, and fibrinogen. In the context of ozone therapy application in the main group of patients on admission, during the treatment and at discharge the significant coagulogram parameters changes were not revealed.

Table 1. Coagulogram characteristics in diabetic mellitus patients with pyoinflammatory complications using ozonotherapy

Indices	Main group			Control group		
	On admission	During treatment	At discharge	On admission	During treatment	At discharge
Prothrombin index (%)	89,96±1,3	94,50±1,6	90,73±1,2	94,39±1,2	81,96±1,9	87,36±1,8
Recalcification time (s)	105 ±0,9	100±0,7	98±1,1	110±0,8	105±1,1	99±0,7
Thrombin time (s)	19,30±0,4	19,43±0,6	19,50±0,4	19,35±0,6	19,40±0,3	19,43±0,3
Hematocrit (%)	36,84±0,2	32,29±0,1	32,75±0,3	40,47±1,1	38,15±0,2	37,81±0,3
Fibrinogen (g/l)	6,77±0,2	5,90±0,1	5,70±0,1	6,41±0,1	4,87±0,2	4,12±0,1
P	>0,05	≤0,001	≤0,001	>0,05	≤0,001	≤0,001

Note: P – index of statistical significance

These changes against a background of typical positive clinical effects of ozone therapy can be regarded as a favourable signs of coagulogram parameters for the application of this method of treatment in diabetic patients with pyoinflammatory complications.

The analysis of lipid peroxidation indices, AOP, OPM parameters in diabetic patients with pyoinflammatory complications (Table 2) showed that in the control group of patients on admission, during the treatment and at discharge significant changes were not detected as to the activity of AOP factor – ceruloplasmin, lipid peroxidation product – malonic aldehyde and OPM. In the context of ozone therapy application in the main group of patients on admission, during the treatment and at discharge the parameters were not considerably changed either.

Table 2. Characteristics of lipid peroxidation, AOP, OPM parameters in diabetic patients with pyoinflammatory complications

Indices	Main group			Control group		
	On admission	During treatment	At discharge	On admission	During treatment	At discharge
Ceruloplasmin (E/g of plasm)	5,2±0,10	5,1±0,30	5,1±0,10	5,3±0,30	5,5±0,7	5,5±0,50
Malonic aldehyde (micromole/l of serum)	0,23±0,10	0,24±0,05	0,20±0,10	0,22±0,10	0,23±0,10	0,19±0,10
Degree of oxidative modification of proteins (ΔE/ml of plasm)	2,2±0,05	2,2±0,04	2,0±0,06	1,5±0,05	1,4±0,03	1,6±0,04

In our opinion the coagulogram parameters, lipid peroxidation, AOP, OPM indices against the background of typical positive clinical effects of ozone therapy application can be regarded as favorable biochemical signs for the use of the given method of treatment in diabetic patients with pyoinflammatory complications.

Determination of blood glucose levels at 3, 6, 14 days after surgery in both groups showed that in patients in the primary and control groups, the level of glycemia at the beginning of treatment was approximately at the same level. However, at a later date, starting from the 7th day of treatment, the patients in the main group after intravenous administration of the ozonized saline solution determined the probable difference between these parameters compared with the control group. Subsequently, blood glucose levels in both groups were aligned with a tendency for greater reduction and stabilization in the main group.

As a result of disturbances of metabolic processes occurring in patients with diabetes with purulent-inflammatory processes of soft tissues, favorable conditions for the development of pathogenic microorganisms in the zone of inflammatory process are created. Distorted by the long-term hyperglycemic state, metabolism leads to significant disorders of metabolic processes in biological tissues of the human body.

Microcirculatory disorders that arise along with this, combined with defects of the nervous trophy, significantly impair the protective properties in the zone of already localized, under such conditions, inflammatory process.

The increased propensity to thrombosis in small vessels potentiates manifestations of local tissue ischemia and, as a result, leads to further progression and proliferation of purulent-inflammatory process. Usually, the course of the disease is approaching fatal changes in the tissues of the body, the most vulnerable are the lower limbs.

Such features of the manifestations of the disease indicate the need for further search for medical, operational and technical and other types of therapeutic innovations of general and local orientation, aimed at suppressing the development of the microflora in the nucleus of purulent inflammatory focus.

Taking into account the above mentioned, the optimally chosen method of complex health improvement on the affected area of the patient, implemented taking into account the quantitative and specific characteristics of the microbial spectrum in the cell purulent-inflammatory process, provides the expected success of the treatment.

Conclusions.

1. Implementation of the positive effects of ozone therapy in the clinic in diabetic patients with pyoinflammatory complications is not accompanied by the development of damage reactions on the level of hemostasis parameters and blood biochemical parameters.

2. The above mentioned fact confirms the expediency of intravenous ozone therapy application clinically in this category of patients.

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