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PURULENT-NECROTIC COMPLICATIONS OF DIABETES MELLITUS A NEW TREATMENT TACTIC

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Abstract

Research was conducted to create a new algorithm for diagnosing and complex treatment of sepsis in patients with purulent-necrotic complications of diabetes. Purulent-necrotic complications of diabetes in the Andijan regional ADTI clinic and the regional adult health center in the purulent surgical department, to create a new algorithm for diagnosing and complex treatment of sepsis in patients with purulent-necrotic complications of diabetes, to determine the stages of the algorithm for the use of complex treatment of sepsis, and to create a new algorithm for the complex treatment of sepsis.

Introduction

The term "sepsis" was introduced into medicine by Aristotle and is characterized by severe blood poisoning by the products of putrefaction of the body's own tissues, this is an acute or chronic disease characterized by the progressive spread of bacterial, viral or fungal flora in the body and poisoning of the body with their

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toxins. Sepsis can be the result of bacterial contamination of the body from a known source of inflammation, but quite often the entrance gates of infection remain unresolved [1,3,6,12].

Sepsis can occur acutely, sometimes almost at lightning speed (when, in the absence of proper treatment, death occurs within a few hours or days), or chronically. Currently, the nature of sepsis is changing significantly as a result of early antibiotic therapy. Despite the highest development of antibiotic therapy methods, the incidence of sepsis tends to increase, and mortality from this pathology averages 42-50% [2,]. In the USA, up to a million people get sepsis every year and 28-42% of these patients die, this indicator also corresponds to the CIS countries – in Russia, Uzbekistan, Belarus, mortality is up to 34-40%, and up to 90% of patients die from septic shock [10,14,15].

A revision in the opinion about the frequency of sepsis, which arose through the efforts of the French scientist R.The success of the conciliatory conferences of sepsis specialists in the world in 1991-1992 led to a rapid increase in these indicators, in addition, it gave us the opportunity to look at this problem more broadly and use all possible treatment methods in the arsenal of medicine [3,6,]. New methods and comprehensive programs have been developed for the diagnosis and treatment of sepsis, especially in patients with purulent-septic complications of diabetes mellitus, which, in our opinion, are considered manifestations of sepsis [4,5,6,10,12].

The role of toxins in the development of sepsis has been especially important recently, when the cytokine theory in the pathogenesis of sepsis, proposed by J.Ertel in 1982, is developing. According to this author, biologically active substances are produced under the action of bacterial exo- and endotoxins of the body. Endotoxin is a polymer whose biological activity largely depends on its lipid component (lipid A) and the concentration of one of the serum proteins, the so-called lipopolysaccharide-binding protein. Only in the form of a complex with this protein is endotoxin able to interact with a specific receptor located on the surface of macrophages [5,6,9,10,13,14]. The interaction of the complex with the receptor apparatus of macrophages is accompanied by the activation of macrophages and the synthesis of a group of small-molecule proteins, the so–called anti-inflammatory cytokines (TNF - tumor necrosis factor - alpha, interleukin–1,

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interleukin-6, interleukin-8, some factors of cell growth and differentiation - colony-stimulating factors, etc.).

These cytokines have a wide range of biological effects, manifested in diverse changes in metabolism, leukopoiesis, and hematopoiesis, properties of vascular wall endothelium, functions of regulatory humoral systems, and primarily the central nervous system [13,14,15,16,17]. In the last decade, the cytokine system has received close attention as the basis of the pathophysiological mechanism of sepsis, the principles of functioning of this system and the possibility of its regulation have been studied [5,6,7].

It should be noted that, according to many scientists, damage to the vascular endothelium is the main cause of the development of multiple organ failure in sepsis, which leads to an increase in deaths in patients with sepsis. The mechanism of endothelial vascular wall lesions is complex: the appearance of microbial cells in the blood stream activates the blood coagulation system. The complement system, blood cells, primarily macrophages and neutrophils, are activated, which are accompanied by the synthesis and release of a wide range of biologically active substances. Activation of neutrophils and platelets, an increase in their adhesive properties, degranulation and release of oxygen radicals lead to profound toxic changes and the appearance of their own toxic proteases. Severe irritation of the body under the influence of large doses of microbial toxins and endotoxins leads to the activation of macrophages themselves and is accompanied by the release of biologically active compounds: cytokines, platelet activation factor, colony-stimulating factors, TNF – tumor necrosis factor - alpha, arachidonic acid cycle metabolites, traboxane A2, prostaglandins, leukotrienes. T-lymphocytes are activated with the release of interleukin-2 and gamma interferon. These factors cause disorders of humoral regulation or direct damage to the endothelium. The clinical manifestation of all these processes is a generalized inflammatory reaction and sepsis [5,6,7,14,15,16,17].

In addition, gram-negative microorganisms are very common causes of the development of severe general surgical infection and the frequent development of lightning-fast, septic shock types of sepsis, and at the same time, multiple organ disorders occur with particular rapidity, which is caused by a significantly higher (more than 2 times) mortality in population studies [6,9,13].

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Sepsis caused by gram-positive flora begins slowly, proceeds classically, is accompanied from the very beginning by the development of a pronounced inflammatory component, is prone to the development of metastatic abscesses and a gradual long-term course with the gradual development of multiple organ failure. Laboratory studies of proteins in the acute phase have shown a higher concentration of proteins in patients with sepsis caused by gram-positive flora. However, at later stages of the septic process, these differences in the triggering factor are gradually leveled and the subsequent development of fundamentally common mechanisms of antibacterial resistance occurs, suppression of the pathogen against the background of antibacterial therapy, which, in turn, leads to the erasure of clinical and laboratory differences [9,13,15,17].

In order to create a new algorithm in the diagnosis and complex treatment of sepsis in patients with purulent-necrotic complications of diabetes mellitus, we conducted this study.

We were tasked to create a new algorithm for the diagnosis and complex treatment of sepsis in patients with purulent-necrotic complications of diabetes mellitus in patients with diabetes mellitus, to determine the steps of the algorithm for the application of complex sepsis treatment and to determine changes in indicators of humoral protection of the body in patients with diabetes mellitus to identify the pathogenesis of sepsis in such patients.

Material and methods. This study was conducted in the purulent surgery departments of the Altai State Medical Institute and the Andijan Regional Adult Health Center in 160 patients with purulent-necrotic complications of diabetes. These patients included diabetic foot (110 patients), necrotic soft tissue phlegmon (30 patients), Fournier's disease (10 patients), purulent-necrotic tissue melting of the scrotum and perineum, and putrefactive processes in the postoperative period (10 patients).

These patients were divided into three groups:

40 patients who received conventional treatment;

40 patients who received comprehensive treatment;

80 patients who received comprehensive treatment with phased rehabilitation.

The patients underwent general clinical blood and urine tests, biochemical analyses, daily blood sugar monitoring, identification of pathogens causing purulent-necrotic processes by culture and wound secretions, and humoral

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reactivity (blood cytokine levels), which are indicators of the degree of inflammatory response, the body's immune response, and the reaction to the introduction of foreign antigens.

Laboratory studies in patients with sepsis before treatment revealed that all patients had secondary, toxic anemia ranging from moderate to severe, hypoproteinemia, hypoalbuminemia, and dysproteinemia of the globular fraction of proteins due to hypergammaglobinemia. Key indicators of the inflammatory response, changes in blood cytokines in the form of interleukins (IL-1α, IL-2, IL-4, IL-6, IL-8), and the tissue damage factor TNF-α, underwent corresponding changes. Patients who received traditional treatment, who were given standard short-term preoperative therapy, including intravenous and intramuscular administration of antibiotics, detoxifying agents and vitamin therapy, the second group of 20 (52.6%) patients, along with antibiotic therapy, received complex conservative infusion therapy for the treatment of the septic process, including antiplatelet agents, protein, antioxidant, membranotropic, immunocorrective, detoxifying, vitamin therapy.

Membranotropic therapy consisted of tocopherol acetate (200-300 mg intramuscularly), Essentiale (10.0 ml per 200 ml of 5% glucose solution intravenously), rheosorbilate 250.0, ascorbic acid (10.0 ml per 250 ml of 5% glucose solution 2-3 times intravenously with insulin) for 5-8 days. Detoxification therapy included infusions of 5% glucose solution with insulin and saline solutions, before forced diuresis. For disaggregate therapy, curantil (0.15 g / day), trental (0.5 g / day), rheopolyglucin intravenously drip (400 ml / day) were used in courses of 3-4 days. Correction of immunological disorders was achieved through the administration of immunoglobulin, T-activin, specially formulated gamma globulins, and antistaphylococcal plasma. Vitamin therapy included vitamin C, vitamins A, and vitamin B. In both groups (control and study), active surgical treatment of the primary purulent sepsis focus, as well as some septicopyemic metastatic lesions, and external drainage of purulent cavities were performed. Patients in both groups subsequently underwent rehabilitation measures to restore impaired organ and system function.

Results and Discussion

As a result of the application of a complex of therapeutic measures for surgical sepsis in patients with diabetes mellitus, the stages of treatment algorithms

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developed by us, the following results were obtained: clinical manifestations of sepsis in the form of signs of deep intoxication of the body proceeded more smoothly, there were no manifestations of encephalopathy, consciousness was not lost, thermometry indicators were 39, 3 ± 0, 4 ° C, whereas in patients of the control group, septic manifestations of intoxication and signs of encephalopathy were more pronounced, consciousness was lost with all manifestations of septic shock and with the appearance of new septicopyemic foci, thermometry indicators were 40, 3 ± 0, 4 ° C. Pretreatment laboratory tests revealed that all patients had secondary, toxic anemia ranging from moderate to severe, hypoproteinemia, hypoalbuminemia, dysproteinemia due to an increase in the globular fraction of proteins due to hypergammaglobinemia, and a cytokine response.With traditional sepsis therapy, hemoglobin levels increased by 16%, the white blood cell count in peripheral blood decreased by 25%, the erythrocyte sedimentation rate halved, and body temperature returned to subfebrile levels. In patients who received comprehensive treatment with rational antibiotic therapy, these indicators were correspondingly higher: hemoglobin increased by 30%, the white blood cell count decreased by 38%, the ESR decreased threefold, and temperature returned to normal. With the proposed step-by-step rehabilitation algorithm, these indicators were even better: hemoglobin increased by 45%, white blood cell count decreased by half, and ESR and body temperature returned to normal. These indicators were obtained 17±2.4 days after inpatient treatment. Biochemical parameters also show changes in protein fractions, including hypoproteinemia, hypoalbuminemia, and dysproteinemia due to an increase in the globular fraction of proteins due to hypergamma and beta globinemia(Tables 1-3).

Table 1. Comparative peripheral blood parameters in patients with purulent-necrotic complications of diabetes mellitus

№	Study groups	Number of patients:	Hemoglobin		Leukocytes		ESR		Body temperature	
			до	после	до	после	до	после	до	после
1.	Patients who received traditional treatment.	40	63± 12	75± 8	13,4± 1,3	9,3± 0,9	43 ± 3,7	19 ± 2,1	40,3± 0,4	37,8 ± 0,7
2.	Patients who received comprehensive treatment.	40	61± 9	86± 7	12,5± 2,5	7,8± 1,1	39 ± 2,6	14 ± 0,6	40,1± 0,9	36,8± 0,4
3.	Patients who received comprehensive treatment with step-by-step rehabilitation.	100	63± 7	95± 4	12,9± 1,6	5,7± 0,9	37 ± 1,3	13 ± 1,2	39,8± 1,6	36,3± 0,3

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Table 2. Comparative protein metabolism parameters in patients with purulent-necrotic complications of diabetes mellitus

№	Study groups	Number of patients:	Albumin Mg/ml	¥-globulin %	β- globulin %
1.	Patients who received traditional treatment.	40	45,4±0,2	7,4±0,2	11,9±0,4
2.	Patients who received comprehensive treatment.	40	47,9±0,3	6,7±0,4	9,7±0,34
3.	Patients who received comprehensive treatment with step-by-step rehabilitation.	100	51,6±0,5	5,9±0,53	8,5±0,65

Interaction of the complex with the macrophage receptor apparatus is accompanied by activation of macrophages and the synthesis of a group of proteins known as anti-inflammatory cytokines (TNF-α, tumor necrosis factor-alpha, interleukin-1, interleukin-2, interleukin-4, interleukin-6, interleukin-8, and certain cell growth and differentiation factors, such as colony-stimulating factors, etc.). These cytokines have a broad spectrum of biological activity, manifested in a variety of changes in metabolism, hematopoiesis, vascular wall properties, and the function of regulatory systems, primarily the central nervous system. In the last decade, the cytokine system has received close attention as the basis for the pathophysiology

of sepsis, with studies exploring the principles of its functioning and the possibilities for its regulation. In our studies, we have also identified what can be described as significant stimulation of the cytokine system, which responds to all exposures to foreign antigens. A phased, comprehensive treatment algorithm was developed using rational antibiotic therapy, immunomodulators, immunostimulants, desensitizing, detoxifying, and hormonal therapy, as well as adequate surgical intervention at the site of the purulent-necrotic process. Over time and with the help of treatment, we observed a decrease in cytokine system stimulation.

Table 3. Serum cytokine activity indicators in patients with purulent-necrotic complications of diabetes mellitus

№	Study groups	Number of patients:	IL-1β, pg/ml	IL-2, un./ml	IL-6, un./ml	FNO-α, pg/ml
1.	Patients who received traditional treatment.	40	7,8±0,25	31,2±0,12	11,3±0,5	23,1±0,3
2.	Patients who received comprehensive treatment.	40	4,2±0,15	14,4±0,04	6,4±0,24	6,4±0,24
3.	Patients who received comprehensive treatment with step-by-step rehabilitation.	100	3,3±0,12	0,92±0,05	4,7±0,23	5,2±0,09

A phased, comprehensive treatment algorithm was implemented using rational antibiotic therapy, immunomodulators, immunostimulants, desensitizing, detoxifying, and hormonal therapy, as well as adequate surgical intervention at the site of the purulent-necrotic process. Over time, we observed a decrease in cytokine system stimulation.

CONCLUSIONS:

1. When studying the clinical manifestations and laboratory changes in sepsis in patients with purulent-necrotic complications of diabetes mellitus, manifestations of intoxication and signs of encephalopathy were more

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pronounced. Loss of consciousness occurred with all manifestations of septic shock and with the appearance of new septicopyemic foci. Thermometry readings were high (40.3 ± 0.4°C). Secondary toxic anemia and dysproteinemia were also observed, along with toxic stimulation of the body's cytokine system.

2. When using the proposed algorithm for the step-by-step use of complex treatment using rational antibiotic therapy, these indicators improved in statistically significant numbers than when using traditional treatment for sepsis.

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