EFFECT OF OZONE THERAPY ON THE COURSE OF BURN SEPSIS

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Annotation. Burns represent a serious health, social and economic problem. Improving methods of treating victims of thermal trauma has led to a decrease in the incidence of sepsis, one of the most formidable and dangerous complications of burn disease, and has improved the results of providing specialized care to patients with extensive. However, infection still remains the main cause of complications of burn disease and death of burnt people. At the same time, the mortality rate of severely burned patients remains high even in specialized hospitals. Sepsis continues to carry a fatal risk that cannot be accepted.

For successful prevention and treatment of burn sepsis, early clinical and laboratory diagnosis and intensive comprehensive measures are required, including active surgical tactics aimed at timely restoration of the integrity of the skin, adequate antibacterial and immunotherapy in combination with treatment of burns with parenteral ozone therapy.

Key words: Burn, burn sepsis, surgical tactics, ozone therapy.

Relevance. The problem of thermal damage occupies one of the central places in surgery and traumatology. Currently, the incidence of burns in developed countries reaches 1:1000 population per year, and mortality from burns ranges from 1.5 to 5.9% [1,3].

The problem of diagnosing and treating generalized infection in severely burned patients, which consistently ranks first among the possible causes of death in patients with extensive burns, still remains relevant, since the mortality rate from burn sepsis, according to various authors, ranges from 23 to 82% [2,4].

Sepsis and septic shock are a major health problem. Every year, worldwide, it causes the death of more than a million people, with a fatality rate of approximately one in four. As a result, sepsis is the leading cause of death in non-coronary intensive care units and ranks 11th among all causes of death population [6].

An extensive burn injury is accompanied by the development of a whole complex of changes in the body of victims, called burn disease. In the pathogenesis of burn disease, one of the leading places belongs to infection. At the same time, the infectious process that begins in a burn wound tends to generalize and often leads to such a serious complication as sepsis [5,11,14].

Thus, the pathogenesis of burn sepsis is extremely complex and depends on numerous factors and their combinations. Only an assessment of changes in the body of a burned person based on constant dynamic observation allows one to predict and diagnose sepsis and build an effective scheme for complex pathogenetic treatment of this complication [12,15].

The development of various methods of ozone therapy, the creation of safe devices for the production of medical ozone with precisely controlled concentrations, a large number of experimental works carried out made it possible to find some new, pathogenetically substantiated methods of treating life-threatening conditions due to thermal injuries. For the treatment of emergency conditions due to thermal injuries, the following positive qualities of medical ozone are used. It has bactericidal and analgesic properties, improves microcirculation, normalizes immunity, the oxidant-antioxidant state of blood and cells [7,10].

In the acute period of burn disease and in emergency conditions, parenteral ozone therapy is mainly used. The positive effect of parenteral ozone on the victim's body is manifested, first of all, in the correction of disturbances in the delivery of oxygen and its consumption by tissues (in enhancing the oxygen transport function of the blood, etc.), in the regulation of humoral immunity, improving the rheological properties of blood, normalizing microcirculation, excessive hypercoagulation, reducing aggregation

platelets, decreased fibrinolysis, normalization of lipid peroxidation processes, and an analgesic effect [8,9].

The purpose of the study was to study the effect of ozone therapy in the complex treatment of burn sepsis.

Materials and methods of research. To achieve the goal and objectives of the study, data from a total of 130 victims with thermal injury who were treated in the combustiology department of the Samarkand branch of the Russian Research Center for Emergency Medicine were used from 2020 to 2023 (Fig. 1).

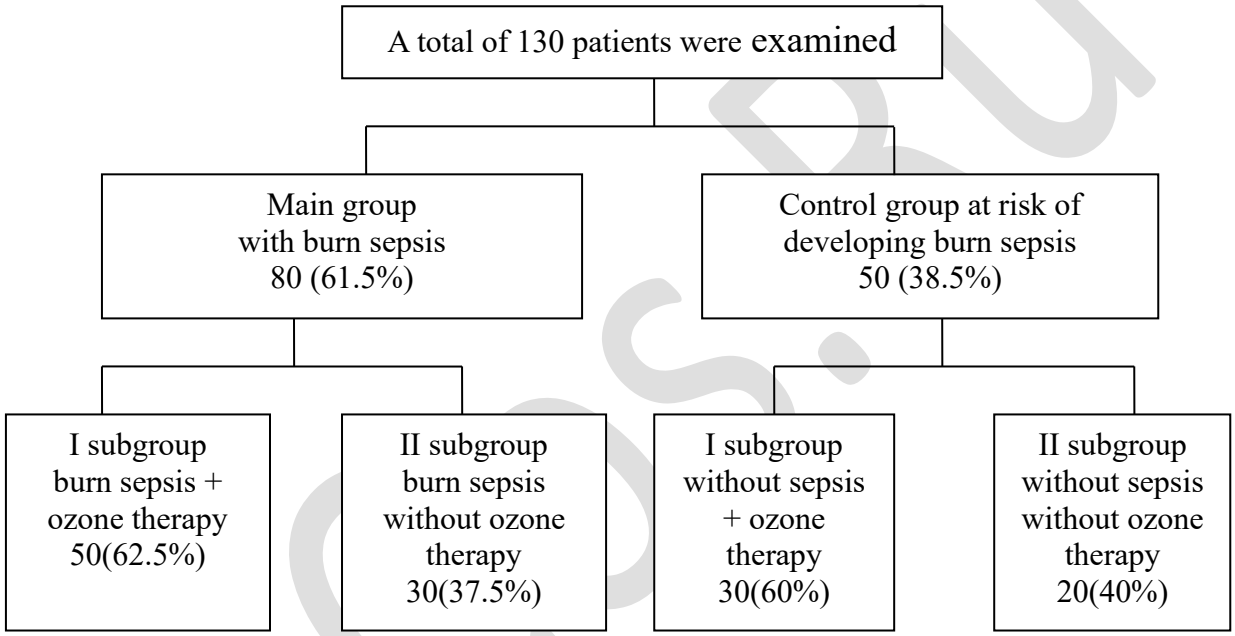

Fig. 1. Distribution of severely burned patients into study groups

In subgroup I, consisting of 50 patients (main subgroup II), treatment of burn sepsis was carried out using a traditional complex technique, and a course of ozone therapy was used for 10 days; ozonated saline solution (OSS) with a saturating concentration of 4.0 mg/l was administered in a volume of 200 ml once a day intravenously.

In subgroup II (main subgroup II) consisting of 30 patients, complex pathogenetic therapy for burn sepsis was performed without intravenous ozone therapy.

In subgroup I (control subgroup I), 30 burnt patients received traditional complex treatment in combination with ozone therapy, in whom burn sepsis was not detected.

And finally, in subgroup II of patients (control group), consisting of 20 patients, burn disease was treated with well-known traditional methods (without ozone therapy).

The fairly high effectiveness of ozone therapy in clinical practice has been established for a number of pathological processes and diseases: disorders of the main peripheral circulation, acute blood loss, in oncology, cardiac surgery, for diseases of the upper respiratory tract and lungs, viral infections, for infections of the reproductive system, in surgery - for the treatment of peritonitis , pancreatitis, cholecystitis and cholangitis, osteomyelitis, purulent wounds and trophic ulcers. The use of ozone in combustiological practice has not been sufficiently studied; the effect of ozone on regenerative processes in burnt patients with burn sepsis is unknown.

Burn sepsis was confirmed clinically, laboratory (PCT - procalcitonin test, CRP - C reactive protein) and by bacteriological examination in 80 (61.5%) patients. All patients received treatment appropriate to the severity of acute illness, including, in the case of sepsis development, its standard therapy.

Research results. In 50 (38.5%) burned patients, aged 42.75±2.51 years with a Frank index of 108.87±2.55 us. units and symptoms of burn sepsis, IVAOSS (intravenous administration of ozonized saline solution) in a volume of 200 ml was carried out within 11.54 ± 2.11 days after the burn, with an ozone concentration in the liquid of 4.0 mg/l, 1 time per day for 10 days (main subgroup I – sepsis with ozone).

30 (23.0%) burned at the age of 43.3±3.75 years with a Frank index of 105.75±3.54 us. units and symptoms of burn sepsis, therapy was carried out without IVAOSS (main subgroup II - sepsis without ozone).

30 (23.0%) burned patients, aged 47.85±3.95 years, with a Frank index of 98.54±2.11 us. units with the risk of developing burn sepsis, IVAOSS was also started for a period of 9.71±2.85 days after the burn using the same method as the main group (control group I subgroup - without sepsis with ozone).

20 (15.5%) burned at the age of 38.85±6.3 years with a Frank index of 90±9.5 us. units without manifestations of sepsis, treatment was carried out without ozone (control group II subgroup - without sepsis without ozone).

In all groups, the indicators of the blood antioxidant system were studied for 5 days. Blood was examined from the central vein 1 hour before administration, one, six and 24

hours after administration of the ozonized solution. The study of the blood antioxidant system included determination of catalase and reduced glutathione levels in plasma.

Ozone therapy in the first subgroup of the control group (without sepsis with ozone) led to the normalization of a slightly increased level of catalase, and in the second subgroup of the control group (without sepsis without ozone) this normalization was not observed. In subgroup I of the main group (sepsis with ozone), starting from 2–3 days, ozone therapy led to a persistent increase in the reduced level of catalase, with a residual increase at the end of the week, but in subgroup II of the main group (sepsis without ozone) this was not observed - catalase levels remained extremely low.

The use of ozone in subgroup I of the control group (without sepsis with ozone) led to a 1.2-1.5-fold increase in the reduced (4-fold compared to the control) level of reduced glutathione, in 33% of cases - even before its normalization, and in subgroup II of the control group (without sepsis without ozone), its level gradually decreased throughout the entire period of treatment and examination. The use of ozone in subgroup I of the main group (sepsis with ozone) led to a slight increase in the level of reduced glutathione immediately after the start of ozone therapy, but without its normalization at the end of the week, and in subgroup II of the main group (sepsis without ozone) its level remained critically low at throughout the entire period of treatment and examination.

Changes in the indicators of the body's antioxidant system in severe burn disease should be considered as a compensatory-adaptive mechanism aimed at limiting significant destruction in the burn wound. In the case of the development of burn sepsis with severe, in this case multiple organ failure, the liver parenchyma becomes unable to synthesize reduced glutathione and other factors of the antioxidant defense system in the corresponding pathological state.

Thus, we can formulate the following urgent indications for parenteral ozone therapy in combustiology:

1. In the treatment of burn shock (parenteral ozone therapy) against the background of calculated and individualized anti-shock therapy.

2. To correct immunity parameters in the treatment of acute burn toxemia and burn septicotoxemia.

3. To correct the syndrome of endogenous intoxication and multiple organ failure.

4. For intensive care of critical condition - burn sepsis.

In conclusion, it should be noted that:

1. Ozone therapy has a certain number of indications for parenteral use in the treatment of emergency conditions in combustiology - severe burn shock and acute burn toxemia.

2. Intravenous ozone therapy leads to significant positive changes in the antioxidant system, which is impaired in severe burns complicated by burn sepsis.

Thus, the data we obtained indicate a pronounced positive effect of parenteral ozone therapy on the course of the septic process in patients with burn sepsis. This allows us to recommend the inclusion of ozone therapy in the list of necessary drugs for complex therapy of sepsis in severely burned patients.

Conclusion. Ozone therapy led to noticeably earlier cleansing of burn wounds, a decrease in purulent discharge, microbial contamination; according to bacteriological studies (CFU $<10^7$-10^4 to 10^3-10^2), 34 (68.0%) patients in the control group had various complications.

A comparative analysis showed that the developed and implemented principles of intensive complex therapy for burn sepsis and rational surgical tactics in patients with deep burns contributed to a decrease in overall mortality in the second period (2016-2019) compared to the first (2020-2023) - with 72.5% to 45%.

Thus, the use of ozone therapy leads to a reduction in the number of complications and deaths in patients with burn sepsis.

Ozone therapy is a simple and cheap method of treatment, which leads to a reduction in treatment and bed days and has a significant economic effect.

Ozone therapy is an effective method of treating burn sepsis, due to the polyvalent therapeutic effects of ozone on the body, the availability and low cost of equipment, as well as ease of use in everyday combustiological practice. Parenteral ozone therapy leads

to significant positive changes in SIRS (systemic inflammatory response syndrome), biochemical blood parameters, increased protein levels, decreased blood clotting, decreased microbial contamination of burn wounds, and also activates the body's own antioxidant system, which is impaired in severe burns complicated by burns. sepsis.

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