

**EFFECT OF OZONE THERAPY ON THE COURSE OF BURN SEPSIS****R. F. Akhmedov, Kh. K. Karabaev, Yo. E. Khursanov**  
Samarkand state medical university, Samarkand, Uzbekistan**Key words:** burn, burn sepsis, surgical tactics, ozone therapy.**Таянч сўзлар:** куйиш, куйиш сепсиси, хирургик тактика, озонотерапия.**Ключевые слова:** ожог, ожоговый сепсис, хирургическая тактика, озонотерапия.

Burns represent a serious medical, social and economic problem. Improving the methods of treatment of victims of thermal injury led to a decrease in the incidence of sepsis, one of the most formidable and dangerous complications of burn disease, improved the results of specialized care for patients with extensive burns. Nevertheless, the infection still remains the main cause of complications of burn disease and death of burned people. At the same time, the lethality of severely burned patients remains high even in specialized hospitals. Sepsis continues to carry a deadly risk, and this cannot be reconciled. For successful prevention and treatment of burn sepsis, early clinical and laboratory diagnosis and intensive complex measures are required, including active surgical tactics aimed at timely restoration of the integrity of the skin, adequate antibacterial and immunotherapy in combination with the treatment of burned patients with parenteral ozone therapy.

**ОЗОНОТЕРАПИЯНИНГ ҚУЙИШ СЕПСИСИ КЕЧИШИГА ТАЪСИРИ****Р. Ф. Ахмедов, Х. К. Карабаев, Ё. Э. Хурсанов**

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Куйиш тиббий, ижтимоий ва иктисодий жиҳатдан жиддий муаммо ҳисобланади. Термик травма билан шикатланганларда даволаш усулларини такомиллаштириш натижасида куйиш касаллигининг энг даҳшатли ва хавфли асоратларидан бири бўлмиш сепсис билан касалланиш суръатини камайишига олиб келди, куйиш юзаси кенг бўлган беморларга ихтисослаштирилган тиббий ёрдам кўрсатиш натижаларини анча яхшиланди. Шундай бўлсада, инфекция ҳалигача куйиш касаллигининг асоратлари ва куйган одамларнинг ўлимининг асосий сабаб бўлиб қолмоқда. Шу билан бир қаторда, оғир куйган беморларнинг ўлим даражаси ҳатто ихтисослаштирилган стационарларда ҳам юқориликча қолмоқда. Сепсис ҳалокатли хавфни давом эттирмоқда ва буни қабул қилиш мумкин эмас. Куйиш сепсини профилактикаси ва даволаш учун эрта клиник ва лаборатор диагностикаси ва интенсив комплекс чора-тадбирлар, шу жумладан тери яхлитлигини ўз вақтида тиклашга қаратилган актив жаррохлик тактикаси, куйган беморларни даволаш билан бирга етарли равишда антибактериал ва иммунотерапия билан парентерал озонотерапияни биргаликда қўллаш талаб этилади.

**ВЛИЯНИЕ ОЗОНОТЕРАПИИ НА ТЕЧЕНИЕ ОЖОГОВОГО СЕПСИСА****Р. Ф. Ахмедов, Х. К. Карабаев, Ё. Э. Хурсанов**

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Ожоги представляют серьезную медицинскую, социальную и экономическую проблему. Совершенствование методов лечения пострадавших от термической травмы привело к уменьшению частоты развития сепсиса, одного из наиболее грозных и опасных осложнений ожоговой болезни, улучшило результаты оказания специализированной помощи больным с обширными. Тем не менее, инфекция и в настоящее время остаётся основной причиной осложнений ожоговой болезни смерти обожженных. При этом, летальность тяжело обожженных остаётся высокой даже в специализированных стационарах. Сепсис продолжает нести смертельный риск, и с этим невозможно смириться. Для успешной профилактики и лечения ожогового сепсиса, необходимы ранняя клиническая и лабораторная диагностика и интенсивные комплексные меры, включающие активную хирургическую тактику, направленную на своевременное восстановление целостности кожного покрова, адекватную антибактериальную и иммунотерапию в сочетании с лечением обожженных парентеральной озоне терапией.

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

The problem of diagnosis and treatment of 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 mortality from burn sepsis, according to various authors, ranges from 23 to 82 % [2,4].

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

An extensive burn lesion is accompanied by the development of a whole complex of changes in the body of the victims, called burn disease. In the pathogenesis of burn disease, one of the lead-

ing places belongs to infection. At the same time, the infectious process that began in the burn wound tends to generalize and often leads to such a severe complication as sepsis [5,11,14].

Thus, the pathogenesis of burn sepsis is extremely complex and depends on numerous factors and their combinations. Only the assessment of changes in the body of a burnt person based on constant dynamic observation makes it possible to predict and diagnose sepsis, to build an effective scheme for the 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 a precisely controlled concentration, a large number of experimental works made it possible to find some new, pathogenetically substantiated methods for the treatment of life-threatening conditions in thermal lesions. For the treatment of emergency conditions with thermal lesions, the following positive qualities of medical ozone are used. It has bactericidal, analgesic properties, improves microcirculation, normalizes immunity, oxidant-antioxidant state of blood and cells [7,10].

In the acute period of burn disease and in emergency conditions, mainly parenteral ozone therapy is used. The positive effect of parenteral ozone on the body of the victim is manifested, first of all, in the correction of violations of oxygen delivery and consumption by tissues (in strengthening 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, reducing fibrinolysis, normalizing the processes of lipid peroxidation, in the analgesic effect [8,9].

The **purpose of the study** is to evaluate the effect of ozone therapy in the complex treatment of burn sepsis.

**Materials and research methods.** To achieve the goals and objectives before the study, data from a total of 130 victims with thermal injury were used, they were treated in the combus-tology department of the Samarkand branch of the RSCEMC from 2017 to 2020 (fig. 1).

In the I-th subgroup, consisting of 50 patients (main subgroup II), the treatment of burn sepsis was carried out using the traditional complex technique, and a course of ozone therapy was used for 10 days. in a volume of 200 ml once a day intravenously.

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

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

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

Sufficiently high efficiency of ozone therapy in clinical practice has been established in a number of pathological processes and diseases: disorders of the main peripheral circulation, acute blood loss, in oncology, cardiac surgery, diseases of the upper respiratory tract and lungs, viral infections, 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

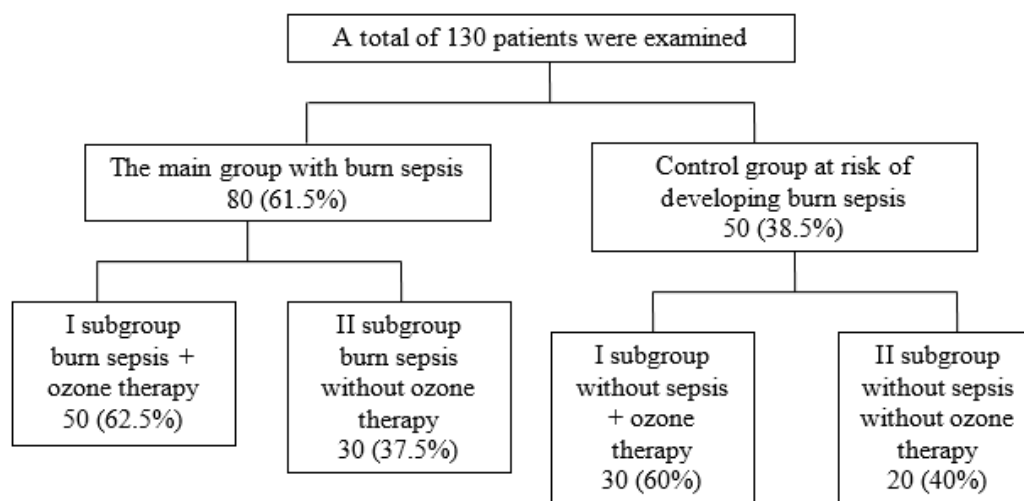


Fig. 1. Distribution of heavily burned in the study groups.

ozone in combustiological practice has not been studied enough, the effect of ozone on regenerative processes in burn patients with burn sepsis is unknown.

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

Research results. In 50 (38.5 %) burned patients, aged  $42.75 \pm 2.51$  years, with a Frank index of  $108.87 \pm 2.55$  c.u. units and phenomena of burn sepsis, intravenous administration of ozonized saline was carried out (intravenous administration of ozonized saline) in a volume of 200 ml within  $11.54 \pm 2.11$  days after the burn, with an ozone concentration in the liquid of 4.0 mg/l, once a day for 10 days (the main subgroup I is sepsis with ozone).

30 (23.0 %) burnt patients aged  $43.3 \pm 3.75$  years with a Frank index of  $105.75 \pm 3.54$  c.u. units and phenomena of burn sepsis, therapy was carried out without intravenous administration of ozonized saline (the main subgroup II was sepsis without ozone).

30 (23.0 %) burned, aged  $47.85 \pm 3.95$  years, with a Frank index of  $98.54 \pm 2.11$  c.u. units with the risk of developing burn sepsis, intravenous administration of ozonized saline was also started for a period of  $9.71 \pm 2.85$  days after the burn using the same methodology as the main group (control group I subgroup - without sepsis with ozone).

20 (15.5 %) burnt patients aged  $38.85 \pm 6.3$  years with a Frank index of  $90 \pm 9.5$  c.u. 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 antioxidant system of the blood 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 antioxidant system of the blood included the determination of parameters of catalase and reduced glutathione in plasma.

Ozone therapy in the subgroup I of the control group (without sepsis with ozone) led to the normalization of a slightly elevated level of catalase, and in the II 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, and 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 times compared to the control) level of reduced glutathione, and 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 for 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 incapable of the corresponding pathological condition for the synthesis of reduced glutathione and other factors of the antioxidant defense system.

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 ongoing calculated and individualized anti-shock therapy.
2. For the correction of immunity indicators 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 a critical condition - burn sepsis.

In conclusion, it should be noted that:

1. Ozone therapy has a 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, our data 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 essential drugs for the complex treatment of sepsis in severely burned patients.---

**Conclusion.** Ozone therapy led to a noticeably earlier cleansing of burn wounds, a decrease in purulent discharge, microbial contamination, according to bacteriological studies (CFU <107-104 to 103-102), 34 (68.0 %) patients in the control group had various complications.

The 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 (2017-2020) compared to the first (2014-2016) - from 72.5 % to 45 % .

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

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

Ozone therapy is an effective method of treating burn sepsis due to the polyvalent therapeutic effect of ozone on the body, the availability and low cost of equipment, as well as ease of use in everyday combustiology practice. Parenteral ozone therapy leads to significant positive changes in SIRS (systemic inflammatory response syndrome), blood biochemical parameters, an increase in protein levels, a decrease in blood clotting, a decrease in microbial contamination of burn wounds, and also activates its own antioxidant system, which is impaired in severe burns complicated by burns. sepsis.

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