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Use of plasma rayes at purulent-septic complicacions in Critical care Medicine

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One of the leading problems in the modern medicine, regarding critical care conditions, is prevention and treatment of purulent-septic complications, including nonhealing bedsores.Estimating the results of various realizations of concepts for preventing the mentioned pathology developed after damaged extremities, taking into account the experience acquired over past decades, it can be suggested that the leading prophylactic principle was and still remains to be the primary surgical treatment (1, 5, 8). It also needs to be mentioned that presently, a lot of other various ways and methods are being used for preventing and treating purulent-septic pathologies. But the results of the treatment, in regards of maintaining high level efficiency against purulent-septic and other complications, still require further improvements (3, 7, 9).

The use of high temperature impact methods has shown its effectiveness and is known for a long time. However, each of these methods, together with positive properties, have their own drawbacks (6). Over the past years, the use of plasma rays for treating purulent-septic complications and Decubital received wider importance. This method is thought to be a significant breakthrough in physical methods of impact on biological tissues, providing fast hemostasis, coagulation, sealing and reliable sterilization of damaged wounds (2, 4).

Key Words: plasma streams, purulent-septic complications

Actualite. The aim of this study was to determine the capabilities of plasma while using it for improving the results of treating purulent-septic complications and Decubital in patients with critical conditions. In accordance with the intended purpose of the study, a following task was given – to make a comparative evaluation of the effectiveness of clinical application of the plasma in purulent-septic complications and Decubital in critically ill patients and to develop methods of using plasma rays in the surgical treatment of purulent wounds.

Materials and methods. Since 2006, in the Institute of Critical Care Medicine and Republic antisepsis center, 84 patients in critical condition with purulent-septic complications and Decubital received treatment, including after injury, trauma, after planned and emergency operations. In the process of treating these patients, plasma rays were also used, which was generated by plasma surgical systems.

Schemes of treating septic patients were used, covering all stages of pathogenesis. These schemes always include local treatment of purulent wounds, including debridement, sanitation and drainage of purulent cavities and treating the wound surface plasma flows. Ligations were carried out, in which at some of the patients the irradiation of the area by the plasma was an indispensable element. Also, there was a general treatment of critically ill patients with purulent-septic complications of wounds by conventional methods, including infusion-detoxification, antibacterial, immunotherapy and general stimulating influence of plasma flows on biologically active areas.

All patients were divided into two groups. In the main group number 1, which consisted of 44 patients, the irradiation of the wounds with plasma along with standard methods was used. After excision of the tissues with purulent-necrotic changes, removing of free purulent discharge and purulent detritus, the wound surface was treated with plasma flows under the influence of which the remaining non-viable tissues, pus and fluid were evaporated; coagulation and hemostasis occurred

during the exposure, the coagulation film was formed. In all, 440 sessions of irradiation were performed (10 sessions per patient).

In the control group number 2, which consisted of 40 patients, a similar treatment was carried out without the use of plasma stream.

Results and discussion. In the group №1, during the first days after surgical treatment, 90% of patients had subjective improvement of health, reduction of pain in the wound, which was due to the anesthetic effect of plasma flows. In the group №2, improvement of health and pain relief was noted in only 55% of patients, in the rest the intense pain persisted.

Within three-four days, in 96% of group №1, further subjective improvement was noted; indicators of body temperature averaged 37.7^0 $0,3^0$C. The ratio of cells in the peripheral blood (10,4 ± 1,1 * 10^9/l) and lymphocytic index of intoxication (3,0 ± 0,3) was significantly decreased. In the group number 2, in this period, the improvement was observed in 62% of patients, the average body temperature were observed within $38,4^0$ ± $0,3^0$C, white blood cell parameters (11,5 ± 1,1 * 10^9/l) and index of intoxication (3,4 ± 0,2) was more moderately decreased.

On the fifth-seventh day after the operation, the condition of more than 70% of patients in group №1 were already assessed as relatively satisfying, and the rest - as moderate. Indicators of body temperature varied between $37,1^0$ ± $0,2^0$C, intoxication index progressively decreased to 2,4 ± 0,2, blood leukocytosis (mean values: 8,6 ± 1,0 * 10^9/l) was improved. In 30% of cases, the lack of growth of microorganisms in the wound was noted. In group 2, condition of the patients was relatively satisfying in only 44%, in 42% - moderate and in 14% - heavy. Index of leukocyte toxicity compared to the group 1 was decreased to a lesser extent (up to 2,8 ± 0,2), as well as indicators of leucocytosis (average values: 9,0 ± 1,2 * 10^9/l). However, in only 10% of the patients was the lack of growth of microorganisms observed.

Between 7-10 days, in the group №1, the state of 88% of the patients was rated as relatively satisfying. Indicators of body temperature was decreased to $36,9^0$ ± $0,2^0$C. Leukocyte intoxication index decreased to 1,9 ± 0,2, and the level of leukocytosis to 7,7 ± 1,1 * 10^9/l. The body temperature returned to normal in more than 80% of patients. Infiltration was decreased, edge of the wound compacted, and wounds were almost completely clean. In the group №2, the condition of only 65% of the patients was assessed as relatively satisfying. Compared to the group №1, indicator of intoxication and the level of leukocytosis were decreasing more slowly; the body temperature was normalized in 50% of patients.

By the end of the 2nd week, in patients of group №1, with an overall satisfying condition, the expressed pain reactions in the wounds were not present in any of the cases, peripheral blood was almost normalized, leukocytic intoxication indicators were also returned to normal in almost all of the patients. Body temperature within the normal range was observed in more than 90% of patients. During bacteriological examination, the pathogenic micro flora has not been determined. During this period, in the group number 2, in 40% of patients had severe pain reactions in the wounds, the others complained of varying degrees of severity of pain. Peripheral blood, compared to the group №1, was normalized later. Body temperature returned to normal in only 60% of patients. During bacteriological study the mixed micro flora was determined quite often, with a predominance of staphylococcal, gram-negative and fungal cultures.

Conclusions:

Thus, combined treatment of purulent-septic complications and nonhealing bedsores in critically ill patients, including the handling and irradiation of the purulent cavity with a new technology, which was based on the positive physical characteristics of the plasma flow, ozone, nitrogen oxide and ultraviolet rays, allows to obtain an expressed positive effect. This reduced the time of treatment of

patients, tissues in the wound were more rapidly regenerated, area decreases bedsores, septic complications occurred much rarely, postoperative period is improved and an earlier restoration of the function of the limbs is being provided. A new method of complex treatment of purulent wounds in critically ill patients with the use of plasma is very effective in purulent surgery and makes it possible to perform both qualitative prevention of surgical infection and treatment of the already developed purulent infection.

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ავტორები წარმოდგენილ კვლევაში, რომელიც ეფუძნება მკურნალობის გამოცდილებას ჩირქოვან-სეპტიური გართულებებით და ნაწოლების მქონე 84 პაციენტში, გვთავაზობენ ასეთი კატეგორიის პაციენტების ახალი ტექნიკით მკურნალობას, რომელიც დაფუძნებულია პლაზმური გამოსხივების გამოყენებაზე. ასეთი კატეგორიის პაციენტებში კომპლექსური მკურნალობა მოიცავს ჭრილობისა და ჩირქოვანი ღრუს დამუშავებას და პლაზმური ნაკადებით დასხივებას. შედეგად ჭეშმარიტად უმჯობესდება მკურნალობის შედეგები, მცირდება სეპტიური გართულებები და მნიშვნელოვნად უმჯობესდება კრიტიკულ მდგომარეობაში მყოფი პაციენტების ზოგადი მდგომარეობა. მიღებული შედეგები გვაძლევს საშუალებას, ჩირქოვან-სეპტიური გართულებების სამკურნალოდ, რომელიც კრიტიკულად მოავადე პაციენტებში წარმოადგენს მეტად მნიშვნელოვან საკითხს, რეკომენდაცია გავუკეთოთ მოცემულ ტექნიკას.