

CLINICAL AND LABORATORY EVALUATION OF APPLICATION OF THE PHYSICAL METHOD OF INFLUENCE ON PURULENT WOUNDS OF SOFT TISSUES

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Abstract: *in 112 patients with acute purulent diseases of the soft tissues of various etiologies, an analysis of the treatment results was carried out, which were conditionally divided into two groups. The 1st comparison group included 72 patients who used the traditional method of treatment, which included surgical treatment of a purulent lesion with subsequent application of a hydrophilic ointment under a bandage. In the second (main) group of 40 patients after surgical treatment, a purulent foci was additionally treated with a plasma flow of argon.*

In the course of this work, a comparative analysis of the dynamics of biochemical parameters, the rate of purification and healing of wounds, as well as the duration of stay in hospital treatment showed the advantage of using a physical method of wound treatment. In the course of this work, a comparative analysis of the dynamics of biochemical parameters, the rate of purification and healing of wounds, as well as the duration of stay in hospital treatment showed the advantage of using a physical method of wound treatment.

Keywords: *purulent wounds of soft tissues, physical method, plasma flows of argon.*

КЛИНИКО-ЛАБОРАТОРНАЯ ОЦЕНКА ПРИМЕНЕНИЯ ФИЗИЧЕСКОГО МЕТОДА ВОЗДЕЙСТВИЯ НА ГНОЙНЫЕ РАНЫ МЯГКИХ ТКАНЕЙ

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Аннотация: *у 112 больных с острыми гнойными заболеваниями мягких тканей различной этиологии был проведен анализ результатов лечения, которые были условно разделены на две группы. В I-ю группу сравнения включены 72 больных, у которых использован традиционный метод лечения, включавший хирургическую обработку гнойного очага с последующим наложением мази на гидрофильной основе под*

повязкой. Во II-й (основной) группе 40 пациентам после хирургической обработки гнойного очага дополнительно применялась обработка плазменным потоком аргона. В ходе проведенной работы сравнительный анализ динамики биохимических показателей, скорости очищения и заживления ран, а также сроков пребывания на стационарном лечении показал преимущество применения физического метода обработки раны.

Ключевые слова: гнойные раны мягких тканей, физический метод, плазменные потоки аргона.

The problem of purulent-inflammatory diseases currently remains relevant for clinical surgery. Despite significant successes related to the expansion and deepening of knowledge about the etiology, pathogenesis, clinic of surgical infection based on the latest achievements of immunology, microbiology, biochemistry, a decrease in the number of patients with purulent surgical diseases has not been observed [1, 3]. Therefore, in surgical practice, the problem of qualified care for patients with surgical infection of soft tissues (SIST) remains as relevant [4]. Plasma surgical technology occupies a special place among many physico-chemical methods for treating wounds. Numerous experimental and clinical studies indicate the following advantages of plasma flows (PF): almost bloodless dissection, high-quality hemostasis and sterilization of the wound surface. Creating optimal conditions for the regeneration of tissue substrate [4, 5]. Information on the use of the energy of plasma flows of inert gases in medicine began to appear in the foreign press since 1969 [2].

Objective: to evaluate the clinical effectiveness of local application of a PF of argon to a wound in the treatment of patients with purulent SIST.

Materials and methods. 112 patients admitted to the surgical clinic of the Bukhara State Medical Institute and to the Department of Wounds and Wound Infections of the "National Medical Research Center for Surgery named after A.V. Vishnevsky" Ministry of Health of the Russian Federation, with acute purulent diseases of the soft tissues of various etiologies, an analysis of the treatment results was carried out. Patients were conditionally divided into 2 groups. The 1st comparison group included 72 patients who used the traditional method of treatment, which included surgical treatment of a purulent lesion with subsequent application of a hydrophilic ointment under a bandage. In the second (main) group, 40 patients after surgical treatment of the purulent foci were additionally treated with a plasma flow of argon. The study included patients with uncomplicated course of the wound process without concomitant pathology.

Results and its discussion. The comparison group I included 72 patients with acute purulent diseases of soft tissues of various localization (abscesses, phlegmon, carbuncles, suppuration of postoperative wounds, mastitis, hydradenitis). At admission, all patients had symptoms of general intoxication - mild to moderate severity. In parallel with the general symptoms, local manifestations of the inflammatory process were noted - hyperemia, swelling and tissue infiltration in the wound area. More than 90% of patients were admitted within 2 to 8 days after the onset of the disease.

All patients with purulent diseases of the soft tissues on the day of admission underwent emergency surgery to open the purulent foci, and the purulent cavity was sanitized with an antiseptic 3% hydrogen peroxide solution, and a hydrophilic ointment was applied under aseptic gauze dressings daily 1 time per day. Systemic antibacterial therapy was prescribed with broad-spectrum drugs (semisynthetic penicillins, third-generation cephalosporins).

Analysis of the results of indicators of intoxication of the body of patients with purulent diseases of soft tissues of the 1st group revealed the following changes: on the first day of treatment, the patient's body temperature averaged $38.9 \pm 0.40^\circ\text{C}$. The content of white blood cells was equal to an average of $9.6 \pm 0.5 \times 10^9 / \text{L}$. The volume of medium molecules averaged 0.196 ± 0.018 units. Similarly, there was an increase in LII and ESR; On the third day of treatment, a slight decrease in body temperature from $38.9^\circ \pm 0.48$ to $37.7^\circ \pm 0.14$ was noted, the number of white blood cells decreased to an average of $8.2 \pm 0.35 \times 10^9 / \text{L}$. The volume of medium molecules averaged 0.163 ± 0.007 units. There was a decrease in LII and ESR to 1.9 ± 0.09 and 37.4 ± 1.54 , respectively; By the fifth day of treatment in patients of the comparison group with purulent diseases of the soft tissues, a slight sub febrile condition remained ($37.2^\circ \pm 0.16^\circ\text{C}$). Moreover, for all indicators of body intoxication: L, MSM, LII and ESR of the blood, their further decrease was noted, that is, there was a tendency to normalization - $7.4 \pm 0.29 \times 10^9$; 0.156 ± 0.007 ; 1.7 ± 0.07 ; 33.3 ± 1.33 , respectively;

By the seventh day of treatment, these figures, although they had a tendency to further decrease, however, remained above the norm.

With further treatment and observation by the tenth day, all the analyzed indicators of intoxication, except for ESR of the blood, were within normal limits.

The following criteria for assessing the dynamics of the wound healing process in patients were the pH of the wound medium, the percentage reduction in the area of the wound surface, and PC indicators according to M.F. Mazurik. In patients of the analyzed group, on the day of admission, the initial pH of the wound medium was significantly lower (acidosis) and averaged 4.4 ± 0.18 . Protein of exudate wounds was equal to an average of $59.3 \pm 1.61 \text{ g/l}$. PC at the same time averaged 1.0 ± 0.01 units;

By the third day of treatment, the pH of the wound medium averaged 4.6 ± 0.18 , the percentage reduction in the area of the wound surface per day averaged $1.2 \pm 0.03\%$. The protein fraction of wound exudates was on average 56.9 ± 1.49 g / l, and in the blood - 68.1 ± 1.94 g / l, while the Mazurik PC was 1.1 ± 0.03 . By the fifth day of treatment, the pH of the wound medium tended to shift to the neutral side, reaching 5.2 ± 0.13 . The percentage reduction in the area of the wound surface increased to $2.6 \pm 0.08\%$ per day, and the PC by this time amounted to 1.4 ± 0.04 ; By the seventh day, the PC was equal to 1.5 ± 0.02 , and the wound area per day significantly decreased by $3.5 \pm 0.16\%$. The pH of the wound medium was on average 5.6 ± 0.22 . Only by the tenth day of treatment did the pH of the wound medium become neutral. The decrease in the area of the wound surface per day became equal to $3.5 \pm 0.16\%$. The exudate from the wound ceased, which, in our opinion, is due to the transition of the wound process from the 1st to the 2nd phase.

In patients of the analyzed group, the elimination of microbes from wounds occurred on average by 5.0 ± 0.5 days. By the 3rd day, resorption of infiltrates was noted. The appearance of granulations was noted, on average, on the fourth day. These data are confirmed by cytological studies.

A survey of patients in the comparison group revealed that with the traditional method of treatment, applying a hydrophilic ointment under a dressing accelerates wound cleansing and normalizes clinical and laboratory parameters. At the same time, to assess the course of the wound healing process, both indicators of body intoxication (L, MSM, LII, ESR) and biochemical parameters of wound exudates (pH, wound exudates protein, Mazurik PC) are of important diagnostic and prognostic value.

Thus, in patients of the comparison group, wound cleansing from infection was noted only by the 5th day, the beginning of the appearance of granulations by the 6-7th day, the beginning of epithelization by the 8-9th day, insufficient correction of oxygen saturation of the wound tissue by 10th day of treatment. Biochemical parameters of wound exudates are normalized only by the 10th day of treatment. The average duration of treatment of patients in the comparison group was 11.5 ± 0.7 days.

The II (main) group included 40 patients with acute purulent diseases of the soft tissues who underwent surgical treatment of the purulent focus on the day of admission (also of a conditionally radical nature). Then, an additional treatment with a plasma stream of argon once a day was used. The wound was treated with the Plasmaran plasma scalpel in therapeutic mode from a distance of 20-25 sm from the plasmatron nozzle to the treated surface at a rate of 30-35 seconds per square meter. The procedures were repeated on dressings until the wound was completely cleansed. A study of intoxication indicators in patients with purulent diseases of the soft tissues of the main group revealed the following. on the first day of treatment, the patient's body temperature averaged $38.6 \pm 0.08^\circ\text{C}$. The content of white blood cells was equal to an average of $8.8 \pm 0.36 \times 10^9$ / L. The volume of medium molecules averaged 0.211 ± 0.009 units. Similarly, there was an increase in LII and ESR to 2.4 ± 0.12 and 45.4 ± 1.66 mm / h, respectively.

The pH of the wound medium was 4.3 ± 0.19 , the exudate protein was 58.4 ± 2.52 g / l, and the PC according to M.F. Mazurik was 1.1 ± 0.04 . On the third day of treatment, the pH of the wound medium averaged 4.8 ± 0.22 . Granulation of tissue appeared in the wounds, the area of the wound surface per day was reduced by an average of $1.5 \pm 0.07\%$. Protein of wound exudates was 52.5 ± 2.39 g / l; PC according to M.F. Mazurik 1.3 ± 0.06 . On the fifth day of treatment, the pH of the wound medium reached 5.6 ± 0.25 , the percentage reduction in the area of the wound surface approached normal numbers - $3.0 \pm 0.12\%$ per day. PC according to M.F. Mazurik in this period was equal to 1.6 ± 0.07 . On the seventh day, the pH of the wound environment approached neutral - 6.3 ± 0.23 , while the Mazurik PC was 1.7 ± 0.07 , the daily decrease in the wound surface was $3.7 \pm 0.16\%$. It should be noted that all analyzed biochemical parameters and the rate of wound healing by 7 days of treatment were within normal values. A comparative analysis of the treatment results of both groups revealed a significant advance of 2-3 days in terms of cleansing and wound healing in patients of the second group. Rapid normalization of the pH of the wound medium in patients of the II group was noted already on the 7th day of treatment. In patients of group I, the pH of the wound medium became neutral only by the 10th day of treatment. Patients of group II on the 5-6th day of treatment had a regenerative type of cryptogram, while in group I the cytological picture had an inflammatory and inflammatory-regenerative character.

The use of a PF of argon to the wound in patients of the second group contributed to the complete cleansing of the wound from infection by 3-4 days of treatment. On the 2nd day, they observed active resorption of the infiltrate around the wound. The appearance of granulations was noted on the 4th day of treatment, and epithelization - 5-6 days, which was significantly ahead of these indicators in terms of time in the 1st group by 1.5-2 days. The average duration of treatment of patients of the II group was 7.5 ± 0.7 days.

Conclusion:

1. The use of surgical treatment of a purulent lesion by exposure to a wound with an argon plasma flow in patients with acute purulent diseases of soft tissues is the most optimal, because it contributes to faster and better cleaning of the wound surface from purulent-necrotic tissues and microbial bodies, reduction of intoxication and acceleration regenerative processes, which together allows you to reduce the time of their treatment and rehabilitation.

2. The proposed physical method for the treatment of patients with acute purulent diseases of soft tissues with an uncomplicated course of the wound process allows us to direct the fight against antibiotic resistance, and thereby avoid the complications associated with the use of antibiotics.

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