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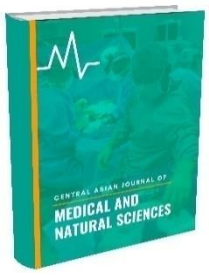

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# The Influence of an Electro Activated Aqueous Solution on the Dynamics of Biochemical Parameters and the Rate of Wound Healing in the Treatment of Purulent Diseases of Soft Tissues on an Outpatient Basis

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**Abstract:** We studied the results of a study of 130 patients with purulent diseases of soft tissues on an outpatient basis. The results of the study showed the use of an electro activated aqueous solution has a positive effect on the dynamics of biochemical parameters and the rate of healing of the wound process for 2-3 days and is a more economical, simple and convenient method of treating purulent wounds on an outpatient basis.The study showed physicochemical methods of treatment of patients with the use of anolyte EAR and EAR catholyte is an effective way of treating purulent soft tissue diseases on an outpatient basis.

**Key words:** EAR anolyte, EAR catholyte, dimethyl sulfoxide, purulent wound

**Relevance.** Surgical infection is one of the main tasks of modern medicine. Its importance is due to the wide spread of inflammatory diseases, the frequency of which does not decrease, but tends to increase. Patients with this pathology account for more than a third of all patients with a surgical profile (1; p. 427, 7; p. 591., 2; p. 14 -18., 3; s 60-61). Despite the achievements of medical science in the treatment of purulent soft tissue diseases in inpatient conditions, the results of treatment of this category of patients in an outpatient setting do not sufficiently satisfy clinicians and patients. (11; p. 72-73) In our opinion, this is mostly due to two reasons with sufficient provision of modern technology in hospitals, which lags far behind in outpatient clinics. The second important reason is that most of the scientific development is directed to the study of new methods of treatment in inpatient settings, in few cases there is research devoted to the improvement and new methods of treatment in outpatient settings. The latter requires the development of the most simple, economical and convenient methods of treatment for use on an outpatient basis. ... In our opinion, the use of physical and chemical methods is a more convenient way to treat purulent soft tissue diseases on an outpatient basis. We have sufficient experience in the use of a chemical preparation of 25% dimethylsulfoxide solution in the treatment of purulent diseases of soft tissues. We obtained positive results in the treatment of purulent diseases of soft tissues with the use of a 25% solution of dimethylsulfoxide in the complex of treatment. (11; s 68-69., 12; s 43-45). From physicochemical methods in the treatment of purulent diseases of soft tissues, the use of a chemical preparation of a 25% solution of Dimexide in combination with a physical method - treatment of a wound with plasma flows of argon, as well as the use of a chemical preparation of a 25% solution of Dimexide in combination with ultraviolet irradiation of the wound effectively affects antibiotic resistance of

microbes, improves the wound healing process.A number of scientists in their works give preference to the use of electro-activated aqueous solutions of EAR obtained by the STEL apparatus in the treatment of purulent diseases of soft tissues of various etiologies. (6; p. 15, 7; p. 54-56). We have used electroactivated aqueous solutions of anolyte and catholyte for the treatment of purulent diseases of soft tissues. For the preparation of an electroactivated aqueous solution, the apparatus of the NPF "Espero-1" was developed in 1998 by domestic scientists, employees of the Tashkent Institute SredazNIIgaz S.A. Alyokhin. Bioelectroactivator of the Espero type is approved by the farm committee RUz for obtaining drugs used in clinical practice and was widely used by employees of the VV Vakhidov Research Institute and clinics of Tashkent State Medical Institute No. 2. The aim of the study was to determine the effectiveness of the use of an electro activated solution on the dynamics of biochemical parameters and the rate of wound healing in the treatment of purulent diseases of soft tissues on an outpatient basis.

**Material and methods.**The paper provides the results of a study of 130 patients with purulent soft tissue diseases who received outpatient treatment at the BukhGosmi base, family polyclinic No. 6 of the Bukhara City Medical Association 2018-2021. All examined patients, depending on the method of treatment, were divided into two groups: Group I included 62 patients purulent diseases of soft tissues, for which Levomekol ointment was used for local treatment under a gauze bandage with a solution of 25% dimethyl sulfoxide solution 1 time a day. Group II 68 patients as a local treatment used sanitation and application of the wound with an electroactivated aqueous solution with the application of Levomekol ointment under a gauze bandage once a day.

Taking into account the properties and mechanism of action of various types of biologically active solutions to the wound process; - We used the "electroactivated anolyte solution" EVR-A in the treatment of the first phase of purulent surgical diseases of soft tissues.

In all patients, the pH was measured in dynamics - the measurement of wound discharge.

**Results and discussion.**

The control group consisted of 62 patients. Of the 62 patients in the first comparison group, 42 (67.7%) patients had purulent wounds after various purulent surgical diseases of soft tissues, such as phlegmon, abscess, suppurative hematoma, panaritium, suppurative atheroma paraproctitis, suppurative epithelial-coccygeal cyst, and 20 (32 , 3%) - purulent postoperative wounds. All patients who went to the clinic to see a surgeon with purulent soft tissue diseases underwent complex treatment: antibiotic therapy, symptomatic therapy was prescribed, and an urgent operation was performed. For the purpose of preoperative preparation, patients underwent premedication 20 minutes before the operation by administering 1 ml of 1% diphenhydramine solution and 2 ml of 50% analgin solution. After the expiration of the premedication period, patients under local infiltration anesthesia according to Vishnevsky 0.5% - 1% novocaine solution in an amount from 10.0 ml to 40-60 ml, and if novocaine is intolerant - 1% lidocaine solution in an amount up to 10-20 ml, complete surgical debridement of the wound was performed. The latter included opening a purulent focus, excision of non-viable tissues within healthy ones, additional treatment of the wound with antiseptic solutions: (hydrogen peroxide, furacilin solution), tamponing, which was also used in treatment tactics in patients of the comparison group.

As a local treatment, wound sanitation with a 25% solution of dimethyl sulfoxide in combination with Levomekol ointment was additionally used under aseptic gauze dressings once a day.

**The study of the dynamics of biochemical parameters of blood and wounds in patients with purulent diseases of soft tissues of group I are shown in Table 1.**

**Table 1: Dynamics of biochemical parameters of blood and wounds in patients of group I (n = 62)**

| Indicators | Observation time | | | | | |
|---|---|---|---|---|---|---|
| | Admission day | Day3 | Day5 | Day7 | Day10 | Day14 |
| PH of the wound environment | 4,1±0,32 | 4,6±0,28 | 4,9±0,21* | 5,2±0,23*** | 6,8±0,33 | 7,0±0,36 |
| % reduction of the wound surface | 0 | 0 | 1,7±0,11*** | 2,6±0,12** | 2,9±0,14 | 3,7±0,16 |
| Wound exudate protein (g / l) | 56,7±1,22 | 54,7±2,28 | 51,3±2,14* | 48,6±2,2 | 42,1+1,18 | - |
| Total blood protein (g / l) | 59,8±2,11 | 62,6±2,36 | 66,4±2,20 | 69,4±2,7 | 72,6±2,80 | 72,8±2,3 |
| PC according to M.F. Mazuriku | 1,05±0,04 | 1,14±0,05 | 1,29±0,06* | 1,42±0,07* | 1,72+0,05 | - |

Note: * - differences relative to the data of the previous day are significant (* - P <0.05, ** - P <0.01, *** - P <0.001)

In the first days of wound treatment, the pH of the wound environment was 4.1 ± 0.32; wound exudate protein 56.7 ± 1.22 (g / l); total blood protein 59.8 ± 2.11 (g / l); PC 1.05 ± 0.04.

Against the background of complex treatment with the use of a 25% solution of dimethyl sulfoxide by day 3, the pH of the wound environment was 4.6 ± 0.28, that is, there was a shift towards the neutral side. The protein content in the wound exudate decreased on average to 54.7 ± 2.28 g / l. Total blood protein 62.6 ± 2.36 (g / l); Recalculation of PC revealed its growth on average to 1.14 ± 0.05 units. By the 5th day of treatment, the pH of the wound environment was closer to the neutral environment (4.9 ± 0.21). The daily percentage of reduction in the area of the wound surface averaged 1.7 ± 0.11%. The protein of the wound exudate decreased on average to 51.3 ± 2.14 g / l. Total blood protein 66.4 ± 2.20 (g / l); At the same time, the PC according to M.F. Mazurik was equal to 1.29 ± 0.06 units.

By the 7-10th day of treatment, the pH of the wound environment shifted closer to neutral values of 5.2 ± 0.23 and 6.8 ± 0.33. The decrease in the area of the wound surface reached an average of 2.6 ± 0.12% and 2.9 ± 0.14%. The protein of the wound exudate decreased to 48.6 ± 2.2 g / l and 42.1 + 1.18 g / l. Total blood protein 69.4 ± 2.7 (g / l) and 72.6 ± 2.80 g / l; PC was equal to 1.42 ± 0.07 units. and 1.72 + 0.05 units.

By 13-14 days of treatment, the pH of the wound environment had a stable neutral value. The reduction in the area of the wound surface reached an average of 3.7 - 0.16%. Dynamic control of the level of microbial contamination of purulent wounds in the analyzed group revealed the following: at the time of admission, the microbial contamination of the wound was 107-108 mt / g. After surgical treatment of the wound and topical application of a 25% solution of dimethyl sulfoxide, it decreased by 4 orders of magnitude, in the course of treatment, its further decrease was noted, and already by 2-3 days of treatment, the microbial contamination of the wound in these patients was at and below the

critical level, amounting to with 103mt / g - 102mt / g of fabric. All patients underwent antibiotic therapy taking into account the sensitivity of the wound microflora.
The use of a 25% solution of dimethyl sulfoxide on wounds in the complex treatment of patients with purulent diseases of the soft tissues of the body contributed to the complete cleansing of wounds from infection by 7.2 ± 0.6 days of treatment. By day 6.5 ± 0.4, active resorption of the infiltrate around the wound was observed. The beginning of the appearance of granulations was noted by 8.0 ± 0.5 days of treatment, and epithelialization by 11.0 ± 1.5 days.

These data are confirmed by cytological studies. So, on the third day, a large number of destructive and degeneratively altered leukocytes, mainly with an incomplete and perverted type of phagocytosis, were determined in cytological preparations. On the seventh day, the cytological picture was mostly of an inflammatory and inflammatory-regenerative nature, and on the tenth day, 10.0 ± 1.5 days, a predominantly regenerative type of cytograms was ascertained. In 68 patients of group II with various purulent wounds, the effectiveness of local application of EAR was studied.

As things were noted during the treatment of the examined group II patients with purulent diseases of soft tissues, taking into account the antibacterial and reparative properties of EAR, in the first phase of the wound, EAR-A was used in combination with 25% dimethylsulfoccide, levomekol ointment under the bandage, during the transition of the wound process to the second phase for For sanitation and application of the wound, EAR-K was used in combination with 25% Dimexidum, Levomekol ointment for bandages. The results of the analysis of biochemical parameters of blood and wounds of the II group of patients are shown in Table 2.

**All analyzed biochemical parameters of blood and wounds of patients with purulent diseases of soft tissues of group II on the day of admission were significantly low.**

**Table 2: Dynamics of biochemical parameters of blood and wounds in patients with purulent diseases of soft tissues of group II (n = 68)**

| Показатели | Время наблюдения | | | | | |
|---|---|---|---|---|---|---|
| | 1 день | 3 день | 5 день | 7 день | 10 день | 14 день |
| РН раневой среды | 4,0±0,22 | 4,6±0,22 | 5,4±0,35* | 6,2±0,27* | 7,1±0,35* | 7,4±0,28 |
| Процент уменьшения площади раневой поверхности | 0 | 0 | 1,5±0,07*** | 3,0±0,12*** | 3,7±0,16*** | 3,8±0,16 |
| Белок экссудата раны (г/л) | 56,4±2,12 | 52,5±2,39 | 50,9±1,70** | 47,3±1,33 | 41,2+1,11 | - |
| Общий белок крови (г/л) | 62,8±2,27 | 63,7±2,81 | 67,1±2,4 | 71,9±2,80 | 73,1+2,6 | 73,4±2,4 |
| ПК по М.Ф.Мазурику | 1,11±0,03 | 1,21±0,04** | 1,31±0,06** | 1,52±0,03 | 1,77+0,05 | - |

Note: * - differences relative to the data of the previous day are significant (* - P <0.05, ** - P <0.01, *** - P <0.001)

**Conclusion.**

1. The use of a solution of electro activated solution EAR-A and EAR-K is an effective, simple, convenient and economical way of physicochemical method for the treatment of purulent wounds on an outpatient basis.
2. The use of EAR-A solution effectively affects the process of cleansing and the speed of healing of purulent wounds.
3. The use of EAF solution in the treatment of purulent diseases of soft tissues is a simple, convenient and effective method of treatment, which can be successfully used in the treatment of purulent wounds on an outpatient basis.

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