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THE EFFECT OF A 25% DIMETHYL SULFOXIDE SOLUTION AND THE COMBINED USE OF ULTRAVIOLET IRRADIATION OF THE WOUND ON THE RESISTANCE OF THE MICROFLORA OF PURULENT WOUNDS

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RESUME

The purpose of the study was: to study the effect of physico-chemical methods on the resistance of microflora when using a 25% solution of dimethylsulfoxide and UFO wounds.

Resistance to 15 antibiotics was studied in 62 patients with purulent soft tissue diseases, on the day of admission and in the dynamics of local treatment. Patients, depending on the method of treatment, were divided into two groups: I-group 27 (43.5%), a 25% solution of dimethylsulfoxide was used as local treatment, II - group 35 (56.5%) patients had a combined use of a 25% solution of dimethylsulfoxide and UV wounds. The results of the study showed that a 25% solution of dimethyl sulfoxide, in addition to the bactericidal effect, has the property of suppressing the resistance of microflora. When they are used in combination with the wound UFO, the suppression of the resistance of the wound microflora increases. When they are used in combination with the wound UFO, the suppression of the resistance of the wound microflora increases.

Keywords: purulent wound, resistance, dimethylsulfoxide.

RELEVANCE

Epidemiological studies of a number of creators demonstrate that purulent wounds are considered one of the most important tasks of progressive medicine. The significance of this problem determines the widespread occurrence of purulent-inflammatory diseases and postoperative purulent complications, an increase in cases of generalization of infection, as well as the increasing ability of antibiotic-resistant strains of microorganisms. One of the most common postoperative complications in the surgical treatment of diseases of various etiologies is the development of purulent infection, which accounts for 15-25% of all causes of nosocomial infection. The incidence of infection depends on the type of surgery: clean wounds – 1.5–6.9%, conditionally clean – 7.8–11.7%, contaminated – 12.9–17% and purulent-10-40%. Mainly the causative agent is S. aureus [Cherkasov M. F., и etal. 2019].

Economic costs in the treatment of patients with wound infection are increasing, which significantly undermines thestate budget of the surgical hospital.

Another element of increasing the frequency of surgical infection is considered microbial contamination of wounds in the field of surgical intervention against the background of increased resistance, as well as virulence of nosocomial microflora [30; p. 468, 93; p. 28-33, 98; p. 248].

Intensive interest in the problem is explained by the fact that together with the formation of new technologies and the development of medicine, definitions about the course of the wound process arise and change [25; p. 85-86, 85; p. 592, 132; p. 93153; p. 38].

Currently available bactericidal substances, physiological, chemical and biological methods in a separate version are not always sufficiently effective [28; p. 28].

Medical science and practice face an urgent need to find affordable and, at the same time, effective medicines and approaches to the treatment of wound infection that meet modern requirements. Solving this problem requires deep knowledge of the pathogenesis of the wound process, the microbiology of a purulent wound.

For this reason, the flow of new attempts to find solutions to this problem, which is capturing the minds of medical professionals, scientists and experts, continues unabated.

In a large number of publications, the authors unanimously agree that one of the most significant reasons for the increase in the frequency and severity of purulent infection in surgery in modern conditions is the widespread spread of antibiotic-resistant strains of microorganisms and the decrease in the effectiveness of antibiotic therapy. It is especially important to take this into account in the development of purulent-inflammatory complications in the postoperative period, when the infectious process is caused by hospital flora, whose antibiotic resistance is most pronounced [Sazhin V. P., Avdovenko A. L., Yurishchev V. A. 2011; Yakovlev S. V., Kozlov R. S. 2009, etc.]. In the current conditions, an important role in the treatment program is assigned to adequate antibacterial therapy, the correct choice of which is impossible without taking into account the microflora that caused the purulent-inflammatory process. Underestimation of this factor leads to a prolonged course of the disease, and not rarely to a fatal outcome.

The aim of the study was to study the effect of physico-chemical methods on theresistance of microflora with the combined use of a 25% solution of dimethylsulphoxide and the Ural Branch of the Russian Academy of Sciencesы.

MATERIAL AND METHODS

The data of examination and treatment of 62 patients with purulent soft tissue wounds of various etiologies who were treated in the purulent surgical department of the clinical base of the Bukhara State Medical Institute in 2018-2020 were analyzed.

The examined patients underwent an emergency operation on the day of admission: opening of the purulent focus and sanitation of the purulent cavity with an antiseptic 3% solution of hydrogen peroxide, after drying, sanitation was performed with a chemical solution of 25% dimethylsulfoxide, followed by the application of levomekol ointment and an aseptic gauze dressing soaked with 25% hydrogen peroxide. with a solution of dimethyl sulfoxide. From the first day out of wound isolation, we conductedь both qualitative and quantitative studies of the microflora, as wellas determinedthedailydynamics of theствительности sensitivity of pathogenic microflora to our selected анantimiotics. In the course of treatment, a step-by-step selection of antibiotics for local and general use was carried out.

Depending on the treatment method, all patients were divided into 2 groups: comparison group I and main group II. I-groupy consisted of 27 (43.5%) patients who received local treatmente-applications with 25% dimethyl sulfoxide solution, II-group 35 patients with purulent soft tissue diseases who underwent additional treatment of early UVB in two biodoses according to the Dahlfeld-Gorbachev method using an OCN device.

Table 2.1 Distribution of patients depending on the type of treatment measures

Groups of patients with soft tissue wounds	Treatment method: after surgical treatment
I group (n=27)	25% dimethyl sulfoxide
II group (n=35)	25% dimethylsulfoxidea +UVB rass solution

In all patients of groups II, the dynamics of the treatment process and I was determinedby thelevel ofresistance of microflora to antibiotics. In thecourse of treatment, taking into account dynamic changes in microflora resistance a step-by-step selection of antibiotics for local and general use was carried out.
All patients were divided by gender and age according to the classification of age groups adopted at the regional seminar of the World Health Organization in Kiev in 1963 [83; p. 24-30]. Of the examined patients, 34 (54.8%) were male and 28 (45.2%) were female, aged 18 to 79 years (mean age was 49.7±-2.6 years). The majority of patients (80%) were at the most able-bodied age (from 20 to 50 years).
The area of purulent wounds in patients of the main and control groups averaged 37.8±10.26^{cm2}.
Of the 62 patients examined, 35 (56.4%) patients had purulent wounds after various purulent surgical diseases of soft tissues, such as phlegmon, abscess, suppurated hematoma, panaritcium, decubitus, purulent fistula, and 27 (43.6%) patients had suppurated postoperative wounds.

The method of wound rehabilitationы 25%-is applied with a 25% dimethyl sulfoxidesolution.
It shouldbe notedthat according to the results of earlier research conducted by the staff and our departmentsы, it was proved that the 25% concentrationя of dimethylsulfoxide is the optimal doseой in terms of the bactericidalx properties of the solution. Based on this, we decided to studye на резистентность the effect of a 25% concentration of dimethylsulfoxide solution on the resistance of microflora.
Immediately after surgical treatment of the acute purulent focusof выполнилиthe disease, sanitation was performedwith a 25% dimethyl sulfoxidesolution and gauze napkins moistened with the same solution were applied to the wound surfaceсалфеток. After performing all these steps, the wound was tamponed with the same gauze cloth soaked with a 25% dimethylsulfoxide solution. The top was fixed with aseptic gauze bandages once a day.

Method of conducting the Ural Federal District of the Russian Federation
Local UVR of the wound in the examined patients was performedusing standard devices OKN-11 and UVR-B (1988), with the following technical characteristics:
For ease of operation, the UFO-B device is equipped with a timer that allows you to adjust the exposure with an accuracy of 1 second.
In the dosage of UV rays, we used the Dahlfeld-Gorbachev method, which, in our opinion, is the most optimal, simplest of the many known methods for the dosage of UV radiation when used in medical practice.
The methodology is based on the following criteria:
- cutaneous erythema
- exposure time
- distances from the radiation source to the pathological focus.

The determination of biodose was performed with a Gorbachev biodosimeter, in the abdominal region, at a distance of 50 cm. The intensity of UV radiation is inversely proportional to the square of the distance from the source. Therefore, if we take the radiation intensity at 50 cm as a unit, then at 100 cm it will be equal to¼, at 70 cm -½, and at 35 cm-2 biodoses.
Objective assessment of the course of general and local manifestations of the process was carried out according to subjective indicators (the nature of wound discharge, resorption of infiltrate, the state of wound edges, features of granulation tissue development and epithelialization) and objective signs

(body temperature, general clinical blood test, leukocyte intoxication index, concentration of medium-molecular peptides in blood serum,
The resistance of microflora to antibiotics was determined by the disco-diffusion method (DDM). Which is baseda on the ability of ABPS to diffuse from the paper disks soaked in them into the nutrient medium, inhibiting the growth of microorganisms sown on the agar surface.

Outcomes and Discussions

The results of the study Iof group I patients revealed the following:
One of the characteristic criteria for assessing the wound process was the determination of the level of microbial contamination, the identification of the species composition of microflora and the timing of wound cleaning. In most casesи, pathogenic staphylococcus was seeded in patients, out of 27 patients, 9 (33.3 %) in the form of monoculture and 18 (66.7%) in associations. The risk of proteus detection was in 16 cases. This was followed by enterococci detected in 14 cases. Escherichia coli was present in 10 (13.9%) cases, streptococci in 6 cases, cand Pseudomonas aeruginosa was seeded in 2 (2.8%) patients. This study showed that the microbiological composition of wounds is quite diverse, despite the prevalence of individual pathogens. The spectrum of resistance of microorganisms to antibacterial drugs varies significantly, which indicates the absence of a universal antibacterial drug.
Dynamic control of the level of microbial contamination of purulent wounds in patients of this group revealed that at the time of admission, microbial contamination averaged 10^8 mt/g, and on the next day after surgical treatment of the wound with the application of an ointment dressing, its values were 10^5 mt/g.
The analysis of the dynamics of sensitivity of microflora from the isolation of purulent wounds revealed a number of interesting points, namely: in the treatment of purulent wounds with the use of dimethylsulfoxide solution, an increase in sensitivity to antibiotics was noted. The number of antibiotics to which the microflora becomes sensitive increases over time. In the course of treatment, the microflora becomes sensitive to new antibiotics, which were not observed before treatment.
The maximum peak of expected results was achieved starting from the 8th - 9th day of treatment.
At the same time, during treatment, on the 8th - 9th day, the maximum increase in the sensitivity of pathogenic microbes to antibiotics was noted. As can be seen from Table, the seeded microflora of purulent wound secretions obtained on the day of admission of patients, of the 15 antibiotics we selected, only 26.7% were sensitive. By the third day of treatment, the sensitivity to antibiotics increased to 40%, by the 4th, 5th, 6th, 7th, 8th and 9th days, there was a further increase in the sensitivity to antibiotics of the seeded microflora, so 53,3%, 73,3%, 73,3%, 80%, 86,7% accordingly.
The analysis of the studyя of the dynamicsand sensitivity of microflora from the isolation of purulent wounds II of group patients revealed the followingие features, namely: in the treatment of purulent wounds with the combined useof m UFO and a solution of 25% dimethylsulfoxide in two biodoses, a dynamic increase in sensitivity to antibiotics was noted during treatment. In dynamics, the amountof antibiotics increases, to which the microflora becomes more sensitiveo. In the course of treatment, asin the previousей group, the microflora к новbecomes sensitive to new antibiotics, to which there was no sensitivity on the day of admission.
In contrast to the I-group, the maximum peak of expected results was achieved starting from 6-7 daysoafter treatment на, being 1-2 days ahead of the control groupy.
At the same time, in the course of treatment, by 6-7 days, the maximum increase in the sensitivity of pathogenic microbes was noted. As can be seen from Table2, the microflora of secretions of purulent

wounds II of group II patients on the day of admission of 15 antibiotics, only у 20% were sensitive. By the second day of treatment, the sensitivity to antibiotics in the lake in creased to 33.3%, by the 3rd, 4th, 5th and 6th days, there was a further increase in the sensitivity to antibiotics of pathogenic microflora. 46,7%, 60%, 73,3%, 80% accordingly.
The average duration of treatment II in group II patients wase 4.5+0.6 dayson average.
Thus, our study II of group II revealed the following features:
- starting from the third day of treatment, when us in 25% solution of dimethylsulfoxidea, an increase in sensitivity to antibiotics of the pathogenic microflora of the wound is noted. At the same time, the maximumа эффективностeffectiveness is achieved by 8-9 days of treatment. All this can affect both the quality of treatment and the economic effect.
-the use of physico-chemical methods in combination with a 25% solution of dimethylsulphoxide and UV radiation, starting from the second day of the appearance of the sensitivity of microflora new antibiotics, to which в день microflora did not show sensitivity on the day of admission. Starting from the third day of treatment, there was a dynamic increase in the numbera of antibiotics to which pathogenic microflora are sensitive. With combined useи, the percentage of microflora sensitivity to antibiotics in the treatment process was higher than with their separate use, reaching the peak of indicators by the 5th - 6th days of treatment. The sensitivity of microflora to antibiotics has increased from 73.3% to 80%.
This situation makesам возможность по ходу лечения подбit possible for the clinician topать prescribe or changeяаль antibioticи forboth general and topical use in the course of treatment. и местного применения.

Conclusions

1. The use of a 25% dimethylsulphoxide solution for the purpose of antiseptic solution in the treatment of purulent wounds simultaneously suppresses the resistance of microflora.
2. When treating purulent wounds using a 25% dimethylsulphoxide solution, starting from the third day, there is an appearance of sensitivity to new antibiotics.
3. Theи combination of physico-chemical methods withethe use of a 25 % dimethylsulphoxide solution and the Ural Branch of the Russian Academy of Sciences in two biodoses (according to Dalfeldo-Gorbachov) increases the suppression of antibiotic resistanceand microflora by 86%.

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