



## Improvements in the Treatment of Patients with Purulent Wounds on a Combined Background of Diabetes Mellitus and Diffuse Toxic Goiter

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### Abstract

The analysis of the world literature of recent years shows the need for scientific research to study the features of the course of the wound process, diagnosis and prevention, as well as the development of new improved methods of treatment of patients with purulent wounds on the background of endocrine pathologies such as diabetes mellitus and toxic goiter. The data of examination and treatment of 48 patients with purulent soft tissue wounds of various etiologies on a combined background of endemic goiter, sugar diabetes who were treated in the purulent surgical department of the clinical base of the Bukhara State Medical Institute in 2016-2022.

**Keywords:** endocrine pathologies, diabetes mellitus, purulent wound, metabolism, toxic goiter, soft tissue.

**Relevance:** There are a sufficient number of scientific papers in the literature devoted to the study of the features of the course of purulent wounds on the background of diabetes mellitus. Among which it is possible to note Bogun L.V. 2009; Boltaev T.S. 2020. Okhunov A.O. 2018. As a result of the research conducted by scientists of the World to study the prevalence, pathogenesis, diagnosis, treatment and prevention of purulent wounds against the background of endocrine pathologies of diabetes mellitus and toxic goiter, there are certain achievements, including by the authors (F. Santini, P. Vitti, L. Chiovato et al., Joshua D. Safer 2013) in their studies, the features of the course of skin pathologies against the background of toxic goiter were studied. The analysis of the world literature of recent years shows the need for scientific research to study the features of the course of the wound process, diagnosis and prevention, as well as the development of new improved methods of treatment of patients with purulent wounds on the background of endocrine pathologies such as diabetes mellitus and toxic goiter. The question of the method of choosing therapeutic tactics in the combination of diabetes mellitus with diffuse toxic goiter in patients with purulent surgical diseases has not been resolved. It is worth noting the absence of clinical parameters for assessing the risk of a wound process, which excludes the possibility of complications under the influence of hormonal disorders in thyrotoxicosis, as well as violations of protein, carbohydrate, mineral, hormonal metabolism

**The aim** of the current study was to improve the treatment of purulent wounds in the combined background of diabetes mellitus and diffuse toxic goiter, by the optimal option for correcting metabolic disorders.

**Material and methods:** The data of examination and treatment of 48 patients with purulent soft tissue wounds of various etiologies on a combined background of endemic goiter, diabetes mellitus, who were treated in the purulent surgical department of the clinical base of the Bukhara State Medical Institute in 2016-2022 were analyzed. All patients, depending on the method of treatment, were divided into 2 groups: group I – 21 (43.75%) patients with purulent surgical diseases of soft tissues in the combined background of diabetes mellitus and diffuse toxic goiter,



who also used the traditional method of treatment of purulent wounds. Group II included 27 (56.25%) patients with purulent surgical diseases of soft tissues in the combined background of diabetes mellitus and diffuse toxic goiter, which was supplemented by the traditional method of treatment of purulent wounds correction of metabolic disorders veshestv and microcirculation. The complex of the traditional method of treating purulent wounds included treating the wound with antiseptics - 3% solution of hydrogen peroxide, 0.02% solution of furacilin and necrectomy, using a 25% solution of dimethyl sulfoxide for local treatment, a gauze bandage with levomekol ointment on a water-soluble basis was applied. To correct the violation of mineral metabolism, mineral solutions (Disol, trisol, potassium magnesium asparaginate 200.0 ml per day) were prescribed. Protein preparations amino acids were used to correct protein metabolism (infezol, quamin 200.0 ml each). Correction of carbohydrate metabolism was carried out using hypoglycemic drugs (insulin therapy according to indications). In order to normalize microcirculation disorders, drugs that vasodilate and improve blood rheology were used (latren 200.0 ml, curantil 1t x 3 times a day, trental, heparin). To improve metabolic processes (xylitol - 200.0 ml / in; Berlitone 600 units / in or dialipone 300 mg / in), as well as thyrostatics (mercazalil, tyrosol according to indications) together with an endocrinologist. The examined patients underwent systemic antibiotic therapy taking into account the sensitivity of microflora secreted from wounds, detoxification therapy, as well as symptomatic treatment. All patients in the course of treatment, to assess the wound process studied clinical and laboratory data of mineral, carbohydrate, protein, hormonal metabolism, as well as disorders of bleeding of wound tissues. For the purpose of assessing the wound process, cytological studies were carried out. Cytological prints were made by the method of M.P. Pokrovsky and M. S. Makarov (1942). This procedure of conducting the study of the examined patients allowed us to identify a number of issues, the solution of which was necessary to achieve the goal:

- distinctive features of the course of purulent surgical diseases of soft tissues against the background of a combination of diabetes mellitus and toxic goiter;
- to identify the causes of the severity of the course of purulent surgical soft tissue diseases in patients with a combined background of diabetes mellitus and diffuse toxic goiter in order to develop an optimal option for correcting metabolic disorders in this category of patients. To solve the above issues, a laboratory analysis was carried out to study the indicators of mineral metabolism  $K^+$ ,  $Ca^{+}$ ,  $Na^+$ , carbohydrate metabolism, blood sugar level, hormones T3, T4, TSH, protein metabolism (total blood protein, PC by Mazuriku). The degree of blood circulation around the wound tissue was studied by determination of tissue oxygen saturation (TcPO<sub>2</sub>) using a transcutaneous oxygen monitoring device (Radiometer, Denmark). The essence of the technique of transcutaneous oximetry is as follows: after the preparation (calibration) of the monitor, the electrode is fixed with a sticky retainer to the skin of the wound edge, where a drop of contact fluid is applied for the first time.

Mathematical processing of the obtained data of the results was carried out by methods of variational statistics. The calculations were carried out on a Pentium – 4 computer in a software environment Microsoft Excel – 2013 spreadsheets using built -in variational statistics functions.

### **Result and discussions:**

Analysis of the results of intoxication indicators of patients with purulent soft tissue diseases of group I showed the following changes. As can be seen from the table, on the first day of treatment, the body temperature of patients averaged  $38.9 \pm 0.41$  °C. The content of blood leukocytes was on average  $9.6 \pm 0.22 \times 10^9 / L$ . The volume of the average molecules was in On the third day of treatment, there was a slight decrease in body temperature from  $38.9 \pm 0.41$  to  $38.7 \pm 0.21$ , the number of white blood cells decreased to an average of  $8.9 \pm 0.28 \times 10^9 / L$ . The volume of the average molecules averaged  $0.211 \pm 0.017$  units. There was a decrease in the indicators of LII and



ESR to  $2.1 \pm 0.09$  and  $42.3 \pm 1.54$ , respectively. By the fifth day of treatment, patients in the comparison group with purulent soft tissue diseases had a slight subfebrility ( $38.0 \pm 0.18$  °C). At the same time, according to all indicators of intoxication of the body: L, MSM, LII and ESR of blood their further decrease was noted, that is, there was a tendency to normalization –  $8.4 \pm 0.32 \times 10^9$ ;  $0.192 \pm 0.005$ ;  $1.9 \pm 0.07$ ;  $39.5 \pm 1.22$  accordingly. By the seventh day of treatment, these figures, although they tended to further the decrease, however, remained above the norm. With further treatment and follow-up by the tenth day, all analyzed indicators of intoxication, except MSM and blood ESR, were within normal limits. The following criteria for assessing the dynamics of the wound process in patients were the pH of the wound medium, the percentage of reduction in the area of the wound surface and On the day of admission, the initial pH of the wound medium was significantly lower (acidosis) and averaged  $4.2 \pm 0.14$ . The protein of the wound exudate was on average  $57.9 \pm 1.33$  g/l. At the same time, the PC averaged  $0.9 \pm 0.02$  units. By the third day of treatment, the pH of the wound medium averaged  $4.3 \pm 0.16$ , there was no decrease in the area of the wound surface on the third day. The protein fraction of the exudate of the wounds was on average  $54.3 \pm 1.38$  g / l, and in the blood –  $59.8 \pm 1.32$  g / l, while the PC according to Mazurik was  $1.1 \pm 0.04$ . By the fifth day of treatment The pH of the wound medium tended to shift to the neutral side, reaching the figure of  $4.7 \pm 0.14$ . The percentage of reduction in the area of the wound surface increased to  $0.6 \pm 0.03\%$  per day, and the PC by this time was  $1.3 \pm 0.03$ .

By the seventh day, the PC was equal to  $1.4 \pm 0.04$ , and the wound area per day significantly decreased by  $1.1 \pm 0.08\%$ . The pH of the wound medium was on average  $5.7 \pm 0.21$ . Only by the tenth day of treatment, the pH of the wound medium became neutral. The decrease in the area of the wound surface per day became equal  $2.2 \pm 0.11\%$ . The release of exudate from the wound has stopped, which, in our opinion, is due to the transition of the wound process from the 1st to the 2nd phase.

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 terms of wound cleansing. The revealed species composition of microflora sown from the exudate of infected wounds of patients with purulent diseases

Bacteriological examination of the secretions from the wounds of group I patients revealed in most cases, pathogenic staphylococcus was seeded in 9 (44.8%) patients. In 7 (33.3%) cases, *E. coli* was seeded. The next most frequently detected was proteus - 4 (19.1%) of observations. This was followed by enterococci detected in 3 (14.2%) cases, *Pseudomonas aeruginosa* was sown in 1 (4.7%). Analysis of the level of microbial contamination of purulent wounds in group I patients also revealed: at the time of admission, microbial contamination, on average, was 10.8 mt/g, on the next day after surgical treatment of the wound with the application of an ointment dressing, its values were 10.5 mt/g. By the 9th day complex treatment in these patients, the degree of microbial contamination.

The results of the analysis of the terms of wound cleansing and healing in group I patients shown in Figure 2 indicate that in patients of the analyzed group, wound cleansing from infection occurred on average by  $9.0 \pm 0.5$  days. By the eighth day, infiltrate resorption was noted.

At the same time, the beginning of the appearance of granulations was noted, on average, on the ninth-tenth day. Only by the thirtieth day was the predominantly regenerative type of cytograms detected. These data are confirmed by cytological studies.

The study of thyroid hormone indicators in group I patients with purulent soft tissue diseases on the background of diabetes mellitus and diffuse toxic goiter revealed that thyroid hormones of this group had significant deviations from the norm on the day of admission. In contrast, in the I group



of patients with traditional treatment, normalization of the parameters of the studied hormones occurred only by 9-10 days of treatment, which is on average two days late in the previous analogous groups of patients.

The next objective criterion for assessing the course of the wound process, The aim of our study was to determine the partial pressure of oxygen in the wound tissues. Determination of partial oxygen pressure in wound tissues was revealed on day 1, the initial O<sub>2</sub> voltage in wound tissues was 21.6 \* 1.4 mmHg, i.e. 72.0 % from the normal saturation level of intact roots. On the third day, against the background of complex traditional treatment, this indicator was 23.6 \* 1.9 (78.7% of the norm) mmHg, which did not significantly increase by 6.7% of the initial indicator. By the fifth day, the tissue RHO 2 index is set at 26.2\* 2.1 (87.3% of the norm) mmHg, further to the ninth – tenth.

Analysis of the results of transcutaneous oximetry of wound tissue in patients with concomitant endocrine diseases, diabetes mellitus and diffuse toxic goiter revealed, on the day of admission of patients, the initial indicator The PO<sub>2</sub> of the wound wall is significantly lower than normal, which is about 72.0% of the initial figures. During treatment, by the 9th day, these indicators gradually returned to normal. Analysis of the results of intoxication indicators in patients with purulent soft tissue diseases of group II revealed the following changes. As can be seen from the table, on the first day of treatment, body temperature patients averaged 39.2\*0.36 0 s. The content of blood leukocytes was equal to an average of 9.8\*0.28 x 10<sup>9</sup> /l. The volume of the average molecules averaged 0.252\*0.026 units. Similarly, an increase in LII and ESR was noted.

On the third day of treatment, there was a slight decrease in body temperature from 39.2\*0.36 to 38.1\*0.18, the number of white blood cells decreased to an average of 8.2\*0.19×10<sup>9</sup> /l. The volume of the average molecules averaged 0.186\*0.021 units. There was a decrease in the indicators of LII and ESR to 1.7\*0.08 and 37.2\*1.68, respectively.

By the fifth day of treatment, subfebrility remained (37.6\*0.18 0 S). At the same time, according to all indicators of intoxication of the body: L, MSM, LII and ESR of the blood, their further decrease was noted, that is, there was a tendency to normalization – 7,4\*0,28×10<sup>9</sup>; 0,152\*0,005; 1,4\*0,06; 29,2\*1,28 accordingly. In contrast to the analogous patients of the previous groups, by the seventh-eighth days of treatment, these indicators have normalized, which is on average 2 days ahead of the patients

I groups. In patients of the analyzed group, on the day of admission, the initial pH level The wound environment was significantly lower (acidosis) and averaged 4.2\*0.18. The protein of the wound exudate was on average 59.2\*1.43 g/l. At the same time, the PC averaged 0.9\*0.03 units.

By the third day of treatment, the pH of the wound medium averaged 4.8\*0.16, the percentage of reduction in the area of the wound surface per day averaged 1.3\*0.05%. The protein fraction of the exudate of the wounds was equal on average to 48.5\*1.28 g / l, and in the blood – 66.9\*1.42 g / l, while the PC according to Mazurik was 1.3\*0.05.

By the fifth day of treatment, the pH of the wound medium tended to shift in the neutral side, reaching the figure 5,9\*0,12.

By the seventh day, the PC was equal to 2.4\*0.06, and the wound area per day significantly decreased by 2.6\*0.05%. The pH of the wound medium was on average 6.6\*0.18. Only by the tenth day of treatment, the pH of the wound medium became neutral. The decrease in the area of the wound surface per day became equal 2,9\*0,08%. The release of exudate from the wound has stopped, which, in our opinion, is due to the transition of the wound process from the 1st to the 2nd phase.



The results of the analysis of the terms of wound cleansing and healing in group II patients shown in indicate that in patients of the analyzed group, wound cleansing from infection occurred on average by  $7.0 \pm 0.5$  days. By the fifth day, infiltrate resorption was noted. At the same time, the onset of granulation was noted, on average, on the seventh day. By the tenth day, a predominantly regenerative type of cytograms was detected. These data are confirmed by cytological and histological studies. Results of the study of indicators of mineral, carbohydrate metabolism and hormones.

The analysis of indicators of mineral and carbohydrate metabolism in patients of group III had the following features: on the day of admission of deviations from the norm, during treatment, normalization of indicators was noted at a significantly faster rate than in group II, ahead on average by 3 days.

In the course of treatment, by the 7th day, these indicators gradually normalized, ahead of group II patients by 2-3 days, in whom anticoagulants and vasodilators were included in the treatment complex, and correction of disorders of carbohydrate, mineral and protein metabolism was not carried out. Our study of group II patients with purulent surgical diseases of soft tissues against the background of combined pathologies, diabetes mellitus and diffuse toxic goiter with correction of disorders of mineral, carbohydrate, protein metabolism and microcirculation revealed the following features of the course of the wound process: all indicators of intoxication of the body, the pH of the wound environment and the indicators of the wound of 2 patients on the day of admission were significantly deviated from the norm as in group I. In the process of traditional treatment and early correction of hormonal, carbohydrate, mineral, protein metabolism and microcirculation disorders, these indicators in patients of group II in dynamics tended to normalize at an accelerated rate than group I, ahead by 2-3 days. At the same time, the average bed days were  $8.5 \pm 0.5$  days, when, as in group I of patients, these indicators were equal to  $10 \pm 1.4$  days.

Thus, when comparing the results of the study between II and Group III patients revealed the following: - inclusion in the complex of treatment of patients with early correction of hormonal, carbohydrate, mineral, protein metabolism and microcirculation disorders of purulent surgical diseases against the background of combined endocrine pathologies, diabetes mellitus and diffuse toxic goiter accelerates the normalization of all these indicators, including general intoxication, as well as the timing of purification and wound healing for 2-3 days than in similar patients of group II. All that It shows that against the background of combined endocrine diseases, diabetes mellitus and diffuse toxic goiter, the treatment of purulent surgical diseases of soft tissues is more difficult than with the separate occurrence of these endocrine pathologies.

### **Conclusion:**

1. With the traditional method of treatment, the application of levomekol ointment to the local treatment of a purulent wound leads to complete cleansing of the wound, normalization of clinical and laboratory indicators of intoxication. Indicators of the main evaluation criteria and dynamics of the wound process, the timing of wound cleansing from infection by the 2-3 days of treatment, the onset of granulation by the 3-4 days of treatment, the onset of epithelization by the 5-6 days of treatment.
2. In patients with purulent surgical diseases of soft tissues with a combined background of diabetes mellitus and diffuse toxic goiter there are violations of mineral, protein, hormonal metabolism, as well as microcirculation, and as a result, the healing and cleansing process of the wound proceeds much slower. Indicators of the main evaluation criteria and dynamics of the wound process, the timing of wound cleansing from infection by the 2-3 days of treatment, the onset of granulation by the 3-4 days of treatment, the onset of epithelization by the 5-6 days of treatment.



3. In the treatment of patients with purulent wounds on a combined background of diabetes mellitus and diffuse toxic goiter in addition to surgical simultaneous correction of hormonal, mineral, carbohydrate, protein metabolism, as well as microcirculation disorders is the optimal way to treat patients with purulent soft tissue diseases on a combined background of diabetes mellitus and diffuse toxic goiter.

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