

MODERN METHODS OF COMPLEX TREATMENT OF PURULENT DISEASES IN DIABETES MELLITUS

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Resume: It is known that the interaction of diabetes and purulent infection with their simultaneous development leads to a complex and peculiar pathological process, causing a "syndrome of mutual burden" that requires a special comprehensive examination and treatment, deep understanding and adequate correction of changes occurring in the body. The mortality rate of patients with purulent diseases on the background of diabetes remains high and ranges from 6 to 44%, and it has been stable in recent years. Despite the successes achieved in the prevention and treatment of diabetic foot, 40-60% of all amputations of the lower extremities are still performed in patients with this pathology.

Key words: gastrointestinal tract, endogenous intoxication index, colonies forming units, leukocyte intoxication index, medium-weight molecules, non-clostridial anaerobic infection.

Relevance. Normal wound healing is possible only with the elimination of ACex damaging factors, an impeccable supply of oxygen to tissues, equalization of ACex deficiencies in full-fledged microcirculation, and normal immunization (Rakhmanov R.K. et al., 2008; Windsor J.A. et.al., 2011). Since these factors occur in DM, wound healing is disrupted. It is known that the terminal stage of hemostasis disorders, regardless of the etiology and pathogenesis of the underlying disease, is accompanied by the development of endogenous intoxication (EI) (Kitabchi AE et.al., 2006; Cheta D.et.al., 2004) Endotoxemia is understood as a complex response of the body to a massive influx of endogenously formed toxic substances into the bloodstream, accompanied by an intense effect on its defense systems of foreign antigenic substances. Being to a certain extent a protective reaction, endotoxemia at a certain stage acquires the character of a painful phenomenon, leading to a significant disruption of the activity of organs and systems of the body, while it is characterized, as for many biological reactions, by an excessive response, inadequate to the stimulus that initiated it (Povzun S.A., 2002). This concept should be distinguished from the term "endotoxemia", which often, especially in foreign literature, refers to the presence of bacterial endotoxins of gram-negative microflora in the blood (Svetukhin A.M. et al., 2010; Beutler B.A., 2009; Brown J.M. et.al., 2008; Fast D.J. et.al, 2008; Marks J.D. et. al., 2006). EI suggests a link between the pathogenesis of the disease and the effects on the body of toxic products formed as a result of certain other disorders of vegetative functions (Vozianova J.I. et al., 2003). Another component of EI is associated with the development of infection. At the same time, in understanding the polyvalent toxic effect, a significant place is given to the essence of microbiological phenomena associated with the release of microbial exo- and endotoxins into the external environment (Stepanov N.G. et al., 2011; Jones S.L. et.al., 2009). As a result of these processes, multiple organ failure may develop, closing the vicious circle of endotoxemia in diabetes. In this case, the process acquires an autocatalytic character and ends with a systemic violation of general and tissue metabolism (Reshetnikov E.A. et al., 2010; Turner R.C. et.al., 2004). Careful surgical tactics against the background of extreme lability and extensive metabolic disorders in patients with diabetes leads to the fact that surgeons more often observe seriously or very seriously ill patients who

simultaneously have an untreated purulent process and uncompensated diabetes. At the same time, we must not forget that when a combined pathology occurs, there are not two independently developing processes, but an interconnected, mutually aggravating new form of the disease with peculiar qualities that require the surgeon not only to undergo surgical treatment, but also to deeply comprehend and adequately correct the changes occurring in the body (Shomansurova Z.M. et al., 2006; Heine R.J., 2004). Critical degrees of ischemia in DM patients are characterized by the severity of hemorheological disorders, chronic intravascular hypercoagulation of blood, and the presence of EI syndrome (Tolstykh P.I. et al., 2003). EI syndrome is known to have a multidisciplinary nature. In patients with diabetic angiopathies, it is manifested by hyperglycemia, ketonemia, dysproteinemia, and the presence of toxins of bacterial origin (Caporale A. et al., 2006; Murakami K. et al., 2010), circulating immune complexes (CIC) with capillarotoxic effects (Efimov A.S. et al., 2003), an increased content of killer cells responsible for the autoimmune destruction of pancreatic β cells (R.M.Khaitov et al., 2009). According to modern concepts, the syndrome of "mutual burden", which occurs in patients suffering from diabetes and purulent surgical infection, is mainly due to metabolic disorders and immune defenses and is often accompanied by severe EI (Solerte S.B. et al., 2004). When there is a lack of insulin, carbohydrate metabolism is disorganized, which is manifested by hyperglycemia, glucosuria and a decrease in glycogen in tissues, primarily in the liver. In addition, the biosynthesis of fatty acids from glucose and protein biosynthesis is suppressed (Kozlov L.V. et al., 2009; Dunn F.L., 2004; Betteridge D.J., 2010). Due to the accumulation of nonesterified fatty acids in the blood, a state of ketoacidosis occurs (Orujeva S.A. et al., 2010; Iwai M et al., 2008; Noth R.H. et al., 2004). All listed metabolic disorders are reflected in significant shifts in blood biochemical parameters (metabolic acidosis, alkalosis, hyperlactate acidemia, hypoalbuminemia, dysproteinemia, increased sodium content in red blood cells, decreased amount of chlorides in both red blood cells and plasma). Tissues are constantly experiencing oxygen starvation (Pearson G.C. et al., 2011; Dangirdas J.T. et al., 2006; Parving H.H. et al., 2010). In patients with diabetes, purulent surgical infection causes significant lability of metabolic processes, which can lead to decompensation of the underlying disease as a result of developing inflammatory acidosis and additional destruction of insulin by proteolytic enzymes (Baynes C. et al., 2012; Singer D.E. et al., 2006).

The purpose of the study. Improving the results of surgical treatment of purulent diseases in DM by including new pathogenetically proven methods of ES and AS with polyphedan in the complex of therapeutic measures.

Materials and methods of research. To solve these tasks, we studied the results of treatment of 159 patients with purulent-septic diseases on the background of diabetes. Depending on the methods of detoxification, the fight against surgical infection and the effect on the purulent wound, the studied patients were divided into 2 clinical groups (Table.1.): the first group 107 consisted of patients who underwent ES and AS with polyphedan; the results were compared with the control (2) group of 52 patients treated with conventional, traditional methods of therapy.

The results of the study and their discussion. In patients with severe diabetes, the number of leukocytes at admission reached $(14.20 \pm 0.79) \times 10^9/l$, LII - 8.65 ± 0.98 cu, IEI was 4.22 ± 0.82 cu (Table 8). Despite the treatment, the number of leukocytes on 3-5 days continued to remain high - $(14.06 \pm 0.63) \times 10^9/l$, an increase in LII by 8% was noted, and IEI increased by only 9%. This indicates that in this category of patients, the disease was accompanied by severe

intoxication. More significant shifts were observed on days 10-12. At the same time, the number of leukocytes remained high and decreased by only 11% - $(12.61 \pm 0.80) \times 10^9/l$.

The LII decreased to 5.92 ± 0.83 reference units ($p < 0.05$), and the IEI exceeded the baseline data by 36%. A significant decrease in leukocytes was noted only by days 14-15, although it remained high - $(11.87 \pm 0.66) \times 10^9/l$, LII decreased by 37% ($p < 0.05$), IEI increased to 6.25 ± 0.97 cu. Despite ACe treatment, these indicators, although there was a positive trend, even After two weeks of therapy, the same values were significantly higher in healthy people. This once again confirms the presence of severe intoxication in this category of patients and the insufficiently high effectiveness of traditional detoxification measures. The significant frequency of vascular lesions in DM indicates the relevance of hemostasis research in this disease (Ena Ya.M. et al., 2008; Lokhvitsky S.V. et al., 2006; Shvalb P.G. et al., 2010).

Significant changes in hemostasis were noted in ASex patients with DM upon admission (Table 9). The prothrombin index was increased and ranged from $114.69 \pm 3.34\%$ ($p < 0.001$). Hyperfibrinogenemia is the most prominent indicator of ASA. In our observations, the fibrinogen concentration was increased and reached 8.84 ± 0.63 g/l, which is 3.2 times more than in healthy individuals ($p < 0.001$). The fibrinolytic activity of blood was significantly reduced - 123.62 ± 12.42 min, when in healthy donors it reached 212.50 ± 13.14 min ($p < 0.01$). There was a marked decrease in blood clotting time - up to 3.31 ± 0.68 min and plasma recalcification time - 48.30 ± 2.42 s, which is 1.8 and 2 times less, respectively, than in healthy individuals ($p < 0.001$).

Plasma tolerance to heparin was increased 1.5 times and reached 12.70 ± 0.54 min ($p < 0.001$). As a result of the complex therapy, the PTI decreased by 5% on days 7-8 relative to the baseline data, and on days 14-15 it decreased to $103.40 \pm 2.25\%$, which is 10% less than upon admission ($p < 0.01$). The fibrinogen concentration decreased to 6.73 ± 0.41 g/l on days 7-8, which is 24% less than the initial data ($p < 0.01$), and by days 14-15 this difference was 36%. ($p < 0.01$), but the ACe still remained above normal values. Fibrinolytic activity increased by 20% on days 7-8, and by 56% on days 14-15, reaching 192.70 ± 18.76 minutes, although it was below normal.

The blood clotting time and plasma calcification time increased by 20% on days 7-8, and on days 14-15 reached 4.61 ± 0.48 minutes and 71.44 ± 1.34 seconds, which is 39% and 48% higher, respectively, than before the start of treatment, but did not reach the indicator in healthy individuals. Plasma tolerance to heparin remained stable, decreasing by only 6% on days 14-15. As a result of the conventional treatment, the pH of the wound medium on day 3 was characterized by a tendency to alkalinization. In the following days, this dynamics increased, and by day 7, the pH increased by 17% relative to the baseline values. On day 10, the reaction of the medium became less acidic and reached 6.88 ± 0.30 , which significantly differed from the initial values ($p < 0.05$).

On day 14, the acidity of the wound exudate decreased to normal values - 7.04 ± 0.27 ($p < 0.05$). The MSM level in patients with severe diabetes at admission was very high - 0.713 ± 0.082 CU (Fig.2). A significant decrease in MSM was noted only on 10-12 days after the start of treatment and amounted to 0.468 ± 0.054 CU, which is 1.5 times lower than the baseline values ($p < 0.05$). On days 14-15, this difference was 57% - 0.310 ± 0.053 CU ($p < 0.01$), but the ACe was still significantly higher than normal values, which indicates that intoxication, although reduced, has not yet been completely eliminated. On the contrary, the PC value was very low on the 1st day of admission to the hospital - 0.68 ± 0.16 CU, on the 3rd-5th day this indicator increased slightly - by 12%, and on the 14th-15th day to 1.05 ± 0.13 cu, but did not reach the norm and significant differences from the baseline values (Fig3.). Immediately after the opening of the purulent focus in the wound, these patients showed marked acidosis, reaching 5.09 ± 0.42 .

In the following days, the tendency towards alkalization was very slight. On day 10, the reaction of the medium became less acidic and reached 6.16 ± 0.32 ($p < 0.05$). On day 14, the acidity of the wound exudate decreased to 6.65 ± 0.29 ($p < 0.01$), but it did not reach normal values. One of the main difficulties in the problem of wounds and wound infection in DM patients is the lack of objective laboratory criteria for assessing the course of the wound process. Clinicians need objective tests to predict the course of wound infection and the degree of risk of infectious complications for an objective comparative assessment of various methods of treating purulent wounds in patients with diabetes.

A quantitative test for determining the microbe content in 1 g of wound tissue is an objective indicator of the severity of a wound infection and, in combination with other clinical and laboratory data, can be successfully used as a diagnostic and prognostic indicator in assessing the activity of the infectious process, in particular, in the diagnosis of wound sepsis and the effectiveness of treatment.

Conclusions. 1. ES with polyphedan in combination with application sorption with polyphedan is an effective measure in the complex treatment of purulent-septic diseases in patients with DM and complement each other, synchronously acting on various links of a complex multiphase wound process.

2. The inclusion of efferent therapies in a complex of therapeutic measures leads to rapid relief of the purulent-inflammatory process, reduces the frequency of gangrene, reduces it to a dry form, reduces the level and number of amputations, reduces the duration of treatment and the risk of death.

3. The use of efferent methods of therapy for extensive purulent-necrotic processes, severe microcirculation disorders and severe violations of the function of neutralization and elimination is pathogenetically justified and improves the results of treatment of the disease.

4. Due to their effectiveness and technical simplicity, ES and AS polyphedan can be recommended for use in the practice of treating purulent diseases in patients with diabetes both in the hospital and in outpatient settings.

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