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OPTIMIZATION METHODS OF LOCAL TREATMENT OF PURULENT-NECROTIC LESIONS OF THE FOOT IN DIABETES MELLITUS

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✓ ***Resume***

Analyzed the results of complex treatment of 145 patients with purulent-necrotic lesions of the foot in diabetes mellitus. Application of local laser vacuum therapy in the complex treatment allowed a short time to achieve the cleansing of the wound surfaces from pathogenic organisms, to ensure the normalization of the signs of intoxication in a shorter time compared with the traditional treatment, reduction of the numbers of the progression of the pathological process in the foot from 27,1% to 6,6%, and reduced the number of deaths from 10,0% to 2.6%.

Keywords: diabetes mellitus, lower extremities, local vacuum therapy, antibacterial therapy, apoptosis.

ОПТИМИЗАЦИЯ МЕТОДОВ МЕСТНОГО ЛЕЧЕНИЯ ГНОЙНО-НЕКРОТИЧЕСКИХ ПОРАЖЕНИЙ СТОПЫ ПРИ САХАРНОМ ДИАБЕТЕ

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✓ ***Резюме***

Проанализированы результаты комплексного лечения 145 больных с гнойно-некротическими поражениями стопы при сахарном диабете. Применение местной лазерной вакуум терапии в комплексном лечении позволило в короткие сроки добиться очищения раневых поверхностей от патогенной микрофлоры, обеспечению нормализации признаков интоксикации в более короткие сроки по сравнению с традиционным лечением, уменьшению чисел прогрессирования патологического процесса на стопе с 27,1% до 6,6%, а также снижению количества летальных исходов с 10,0% до 2,6%.

Ключевые слова: сахарный диабет, нижних конечностей, вакуум терапия, антибактериальная терапия, апоптоз.

QANDLI DIABETDA TOVONNING YIRINGLI NEKROTIK ZARARLANISHINI MAHALLIY DAVO TAKTIKASINI TAKOMILLASHTIRISH

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✓ ***Rezume***

Qandli diabet fonidada tovonning yiringli nekrotik zararlanishi kuzatilgan bo'lgan 145 nafar bemorni kompleks davolash natijalari tahlil qilindi. Vakuum bilan davolashdan foydalanish,patogen mikroflora hosil qilgan yara yuzalarining bitishi an'anaviy davolash bilan solishtirganda qisqa vaqt ichida samarali natija berdi, oyoqdagi patologik jarayonlarning progressiyasining sonini kamaytirish 27,1% dan 6,6% gacha, shuningdek, o'lim sonini 10,0% dan 2,6% gacha kamaytirishga erishildi.

Kalit so'zlar: qandli diabet, pastki muchalar, mahalliy vakuum terapiya, antibakterial terapiya, apaptoz.

Relevance

The beginning of the development of the doctrine of wounds is lost in the depths of centuries, and during all this time, an incalculable number of methods of treating wounds were proposed. Despite the successes achieved by medical science, the issues of treatment of patients with purulent-septic pathology of the lower extremities in diabetes mellitus do not lose

their relevance. The problem of rational standardized surgical tactics for purulent-necrotic foot lesions is also not solved, due to the lack of identical criteria for assessing the localization and prevalence of local lesions, the severity of local and general manifestations of inflammation and infection. Bacterial contamination of the wound supports inflammation and significantly slows down the course of reparative processes. The resistance of pathogenic microorganisms to antibacterial therapy and the problems of hospital infection remain an unsolved problem [1,2,7]. In this regard, the development of alternative technologies and methods of local treatment of wound infection continues. Local treatment of purulent processes aims to: stop or significantly reduce pain, create unfavorable conditions for the development of microbes, limit the spread of necrotic processes, prevent resorption of bacterial and tissue decay products, ensure regular outflow of inflammatory exudate from the purulent focus, and thereby reduce purulent intoxication, stimulate the processes of reparative regeneration [3,4,5]. Every year, many publications are published on the treatment of purulent wounds. At the same time, neither experimental data nor numerous clinical and special studies have allowed us to find a method that would bring us closer to solving the problem of treating wound infection. Vacuum therapy (LVT) is one of the most promising methods of treating patients with purulent-necrotic diseases. According to a number of authors, this direction is the leading one, which requires careful and further development. [3,6,8,10]. The essence of the method is that many biological objects (tumor cells, microbes, etc.) accumulate certain dyes-photosensitizers, as a result of which they become sensitive to the effects of light energy, as well as low-intensity laser radiation of the appropriate wavelength. In sensitized tissues and cells, a photochemical reaction develops with the release of singlent oxygen, free radicals, and highly active biological objects that have a detrimental effect, in particular, on tumor cells, microorganisms, etc. In recent years, there have been scientific publications devoted to the use of LVT for the treatment of purulent wounds, which note the advantages of LVT compared to traditional therapy, in particular, a pronounced antibacterial and anti-inflammatory effect [1,5,9]. It should be emphasized that the effectiveness of LVT does not depend on the spectrum of sensitivity of microorganisms to antibiotics, it is harmful even for antibiotic-resistant strains of microorganisms. Pathogenic microorganisms do not develop resistance to LVT, while photodynamic damage is local in nature, and the bactericidal effect is limited to the zone of laser irradiation of sensitized tissues, which avoids the side effects observed when using traditional methods of treating surgical infection.Despite the large number of proposed methods of LVT application, it should be carried out according to a two-step protocol: the first is the delivery of the photosensitizer to the target cells, as well as the creation of conditions for the penetration of the photosensitizer into the cells, the second is the irradiation of the target tissue location area with light of the appropriate wavelength. All subsequent reactions lead to the formation of reactive oxygen species (ROS). This, in turn, leads to the death of the cells that have accumulated the sensitizer. The uniqueness of LVT is that after exposure, both methods of death in target cells can be triggered: apoptosis, and necrosis. Necrosis, or passive cell death, is an irreversible process that is mainly accompanied by a loss of membrane integrity and metabolic homeostasis due to uncontrolled cellular disintegration. Apoptosis or "active cell death" is a regulated cellular suicide. The process of apoptosis is controlled by both intracellular and extracellular factors. Regardless of the factor that triggers the process, it always ends with a characteristic sequence of morphological, biochemical, and energy changes [1,6,7]. The process of apoptosis prevents the uncontrolled release of intracellular material into the surrounding space and prevents damage to neighboring cells and tissue inflammation.A number of authors have experimentally proved that the use of photodynamic therapy for purulent wounds of soft tissues is a promising development that increases the success in the treatment of purulent processes of soft tissues, is pathogenetically and economically justified, and reduces the patient's stay in the hospital [1,6,7,8]. Another undeniable advantage of this method is its ease of use and the absence of significant material and physical effort.

Objective: To improve the results of complex treatment of purulent-necrotic foot lesions in diabetes mellitus by using local vacuum therapy.

Material and methods

We analyzed the results of a comprehensive examination and treatment of 145 patients with purulent-necrotic lesions of the lower extremities in diabetes mellitus who were inpatient treatment in the department of purulent surgery of the clinic of the Regional Multidisciplinary Medical Center, Department of Purulent Surgeryfrom

2015 to 2020. Among the examined patients, men were 80 (55.17%), women – 65 (44.83%), the age of patients varied from 35 to 75 years. The revealed changes of the foot were represented by the following morphological forms: focal tissue necrosis-12; purulent-necrotic ulcers of the toes-19; purulent-necrotic phlegmon of the foot-25; Osteoarthropathy in combination with destructive osteomyelitis of the foot bones – 17; gangrene of the toes (dry and wet) – 37; gangrene of the distal parts of the foot (dry and wet) – 35. The time from the onset of the disease and before treatment and hospitalization in the hospital averaged 7.5±1.5 days. 95.4% of the patients had one or more concomitant diseases, with IHD, PIX, and arterial hypertension prevailing, and 10.5% of them had a history of acute cerebrovascular accident. Complications such as diabetic retinopathy and nephropathy were detected in 27.5% of patients. The examination of patients included general clinical methods, laboratory methods, instrumental methods of studying the arterial bed of the lower extremities, microbiological studies of wound exudate. Depending on the methods of complex treatment, all patients were divided into 2 groups. The first control group consisted of 70 patients with purulent-necrotic lesions of the lower extremities, who underwent a complex of therapeutic measures, including surgical accommodation, antibacterial therapy, infusion, detoxification therapy, drugs that improve microcirculation, correction of glycemia levels, and symptomatic treatment of concomitant diseases. Local treatment was carried out in the traditional way. The second group consisted of 75 patients who, in addition to the above-mentioned complex therapeutic measures, after surgical treatment of a purulent focus, local treatment was supplemented by laser vacuum therapy (LVT). Local laser LVT was performed as follows: after washing with antiseptic solutions and drying, a photosensitizer was applied to the wound – a 0.05% solution of mytilene blue belonging to the group of phenothiazines (cationic azines) with a maximum absorption of λ Max (nm) – 620-660 nm. with an exposure of 15-20 minutes. Then, after washing off the wound surface of the photosensitizer, the wound surface was illuminated with laser radiation using the ALT-Vostok 03 device. The distance from the end of the light guide to the wound surface was 0.5-3.0 cm in the absence of thermal discomfort in the patient. The total exposure time depended on the area of the wound surface and ranged from 15 to 20 minutes. For a large area of the wound, polypositional irradiation of the wound surfaces was used.

Results and discussion

The analysis of the results of the studies showed that at admission to the hospital, all patients had signs of intoxication of varying severity, as evidenced by changes in the leukocyte formula and an increase in the leukocyte intoxication index (LII) to 5.5±0.3 standard units. During bacteriological studies, it was found that the main microorganisms that made up the microbial landscape of the wounds were: Staphylococcus aureus, epidermal C., Ps. Pseudomonas aeruginosa, as well as representatives of the family of enterobacteria – Klebsiella, proteus, Enterobacter cloaceae and the family Bacillaceae. It should be noted that in most cases, the flora of purulent wounds were represented by microbial associations. When studying the antibiotic sensitivity of the isolated strains, it was revealed that all of them had polyvalent resistance to many antibacterial drugs. High levels of bacterial contamination of wounds (107 -109 CFU/ml) were detected in both study groups of patients prior to treatment. An analysis of the results obtained in patients of the first-control group who were locally applied after surgical placement with ointments on a water-soluble basis showed that the normalization of the temperature curve occurred on 4.5±0.5 days, a decrease in perifocal inflammation and hyperemia of the tissues surrounding the wound was observed on 5.0±0.5 days, a decrease in local edema was noted on average on 3-4 days, and infiltration in the area of the wound edges on 5-6 days. The leukocyte intoxication index in patients of the control group had the following values: on day 4-5, 3.5±0.2 usl. units, on day 7, 1.7±0.10 usl. units, and only on day 9-10 of treatment, there was a tendency to normalize LII indicators with the following values: 1.1±0.11 usl. units. The indicators of microbial contamination of wounds during complex treatment in patients of the control group were as follows: on the 3rd day of treatment, microbial contamination of wounds averaged 106 -107 CFU / ml, on the 5th day 105 -106 CFU/ml, on the 7th day 103 -104 CFU/ml, on the 9th-10th day of treatment 102-103 CFU / ml. The reduction in the area of the wound surface by 3-5 days averaged 4.5±0.3%, by 6-7 days it reached 5.5±0.5% per day, by 9-10 days 7.0±0.5%. Of the 70 patients treated in the control group, 19 (27.1%) showed a progression of the pathological process on the foot against the background of a complex of traditional methods of treatment, who, according to vital indications, were forced to perform high amputations of the lower extremities (12 patients at the level of the middle third of the thigh, 7 patients underwent an

improved method of myoplastic amputation at the level of the upper third of the lower leg). 9 (12.8%) patients developed septic shock with signs of multiple organ failure, which was fatal in 7 (10.0%) cases. As mentioned above, the second main group consisted of 75 patients who, in addition to the above complex therapeutic measures, after surgical treatment of a purulent focus, local treatment was supplemented by laser vacuum therapy (VT). Analysis of the results of complex treatment in patients of the main group showed that the normalization of the temperature curve occurred on 2.5±0.5 days, a decrease in perifocal inflammation and hyperemia of the tissues surrounding the wound was observed on 3.0±0.5 days, a decrease in local edema was observed on average on 2-3 days, and infiltration in the area of the wound edges on 3-4 days. The leukocyte intoxication index in patients of the main group had the following values: on the 3rd day, 2.5±0.3 usl. units, 4-5 days, 1.7±0.2 usl. units, on the 7th day, 1.0±0.10 usl. units, that is, normalized. The indicators of microbial contamination of wounds during complex treatment in patients of the main group were as follows: on the 3rd day of treatment, microbial contamination of wounds averaged 103 -104 CFU/ml, on the 5th day 102 -103 CFU/ml, on the 6th –7th day of treatment, the cultures of wound exudate did not give microbial growth. The reduction in the area of the wound surface by 3 days averaged 5.5±0.5%, by 5 days it reached 9.5±0.5% per day, by 7 days 12.0±0.5%. Against the background of laser photodynamic therapy in patients of the second-main group of lisch, in 5 (6.6%) patients, the progression of the pathological process of the foot was observed, the cause of the progression was critical ischemia of the lower extremities due to atherosclerotic multilevel lesions of the arteries of the limb. 3 (4.0%) patients underwent myoplastic amputation at the level of the upper third of the lower leg for vital indications. In 2 (2.6%) patients with progressive signs of multiple organ failure, cardiac arrest was observed leading to a fatal outcome.A comparative analysis of the results of complex treatment of purulent-necrotic lesions of the foot in diabetes mellitus showed that the use of laser photodynamic therapy reduces the time of cleaning wounds from infection by 1.5-2 times, accelerates the normalization of signs of intoxication of the body, as well as rapid relief of local edema, infiltration in the area of the edges of wounds.

Thus, the use of local vacuum therapy in the complex treatment of purulent-necrotic pathology of the foot in diabetes mellitus helps to reduce the time of cleaning wounds from infection by 1.5-2 times.The use of laser vacuum therapy is a promising development that increases the success in the treatment of purulent-necrotic lesions of the foot, being pathogenetically and economically justified, and reduces the patient's stay in the hospital. The method of vacuum therapy is simple, pathogenetically justified, and highly effective, which is one of the advantages compared to traditional treatment that does not require significant material and physical effort.

LIST AND REFERENCES:

1. Altavilla D, Saitta A, Kuchinotta D, etc. Inhibition of lipid peroxidation restores impaired expression of vascular endothelial growth factor and stimulates wound healing and angiogenesis in a genetically diabetic mouse. Diabetes 2001;50(3):667-74.
2. Azimshoev A.M. Laser photodynamic therapy of purulent wounds with a chlorin-type photosensitizer //Autoreferat diss. For the degree of Candidate of Medical Sciences – Moscow - 2010-22 p.
3. Askarov T. A. Correction of violations of oxygen saturation of tissues in the treatment of purulent-necrotic lesions of the lower extremities. // International scientific and practical conference "Surgical infections of the skin and soft tissues" Simferopol 15-16 May 2017. p. 10-11.
4. Baibekov I. M., Baibekov A. I. Morphological justification of the effectiveness of complex intravascular and local laser therapy / / Laser Medicine.-2011. - volume 15. Issue 2 – - p. 107.
5. Derbenev V. A. Extremely high-frequency and laser therapy in the treatment of patients with purulent wounds of soft tissues / / Laser medicine. -2014. - Volume 14. Issue 3. - p. 8-11.
6. Dougherty TJ: An update on photodynamic therapy applications. J. Clin Laser Med Surg 20: 3-7 (2002).
7. Jori G., Roncucci G., Phthalocyanines as PDT agents for the treatment of infectious diseases / / 9th World Congress of the International Photodynamic Association-May 20-23, 2003-Miyazaki.- Japan.- p. 27.
8. Murodov A. S., Sadykov P. P. Evaluation of the effectiveness of photodynamic therapy in the treatment of erysipelas. Eastern Europe.- Minsk, 2012. - No. 3. - p. 265-266.
9. Svetukhin A.M., Amiraslanov Yu. A. Purulent surgery: the current state of the problem / / 50 lectures on surgery.- Moscow, 2003. - p. 337-340.
10. Tolstykh P. I. Theoretical and practical aspects of laser photochemistry for the treatment of purulent wounds // Russian Biotherapeutic Journal. -2008. - Vol. 7. - No. 7. - p. 20-25.

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