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HIRUDOTHERAPY IN THE COMPLEX TREATMENT OF DIABETIC FOOT SYNDROME

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Introduction: The most widespread use of medical leeches was in the XVII—XVIII centuries in Europe for bloodletting in connection with the concept of "bad blood", which then prevailed in medicine. In order to release bad blood, doctors sometimes put up to 40 leeches to one patient at a time. Preference over vein bloodletting was given to them in case of need for bloodletting from hard-to-reach or tender places (for example, gums). In the period from 1829 to 1836, 33 million leeches were used for treatment in France per year, in London — up to 7 million with a population of 2.3 million inhabitants. Russia supplied Europe with about 70 million leeches a year. In the middle of the XIX century, bloodletting was abandoned, and the use of leeches in Europe and America practically ceased. Scientific research on the mechanisms of action of leeches on humans began in the late XIX — early XX century with the work of John Haycraft, who discovered the anticoagulant effect of leech extract. In 1884, he discovered an enzyme from leech saliva — girudin, and in 1902 preparations from girudin were obtained. These studies marked the beginning of the scientific application of anticoagulants in medicine.

Keywords: Hirudotherapy, traditional medicine, diabetic foot.

Hirudotherapy in the complex treatment of diabetic ulcers. The paper presents comparative data on the results of treatment of 82 patients with diabetic foot complicated by the formation of diabetic ulcers. The patients were divided into two groups. The first group included 30 patients who received "standard treatment" – a complex of medicines and therapeutic measures determined by the standards of treatment of patients with diabetic ulcers. The second group included 52 patients who had hirudotherapy included in the "standard treatment" complex. An analysis of the results of treatment of both groups of patients showed that the inclusion of hirudotherapy in the complex of "standard treatment" significantly accelerates the healing process of an ulcer defect and saves the city budget spent on the course of each treated patient.

The great social significance of the disease of diabetic foot syndrome is that diabetic foot syndrome leads to early disability. The risk of developing gangrene of the lower extremities increases by 20 times. A comparative analysis of the frequency of amputations showed that amputations of the lower extremities in patients with diabetic foot syndrome are performed 17-45 times more often than in people without diabetes. However, the frequency of peripheral artery lesions in patients with diabetic foot syndrome is only 4 times more common. The development of a purulent-necrotic process against the background of diabetic foot in more than 50-75% of cases leads to

non-traumatic amputations. Epidemiological studies have shown that 6-30% of patients with diabetes mellitus) after the first amputation undergo amputation of the second limb within 1-3 years, after 5 years – 28-51%. The cause of neurotrophic foot ulcers is a lesion of the peripheral nervous system of the lower extremities. Neurotrophic foot ulcers occur as a result of the development of dystrophic changes in the tissues of the peripheral nerves of the lower extremities, caused by the inflammatory process. The joining vascular changes lead to a violation of the trophic tissues, including the

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peripheral nerves themselves. Most often, with an undeformed foot, neurotrophic ulcers are located on the plantar surface in the projection of bone protrusions due to the maximum pressure in this area the area, as well as minor skin damage. Peripheral distal polyneuropathy, which is characterized by an imperceptible onset, a tendency to progression and irreversible changes, is the most common neurological complication of diabetes mellitus. Along with damage to the retina and kidneys, it forms the most significant group of complications of diabetes mellitus. These complications develop in parallel, mutually aggravating each other. Despite recent successes in the treatment of diabetic foot syndrome, to achieve. It is not possible to solve the problem of neurotrophic ulcers, and they continue to remain a serious obstacle to the social readaptation of patients. The duration of treatment remains long, the result is not always successful, healing occurs with the formation of coarse scar tissue, and relapses are often noted. All these data indicate that this problem is unresolved and it is advisable to further develop new tactical approaches to the treatment of this category of patients. For the successful treatment of diabetic foot syndrome, it is not enough to influence any one pathogenetic mechanism. A comprehensive approach is needed. At the same time, the appointment of a large number of medicines often leads to polypragmasia. In this regard, it is relevant to search for new effective methods that allow, without significant drug load, to affect as many pathogenetic links in the formation of diabetic foot syndrome as possible.

There is reason to believe that such methods include hirudotherapy. Its biological effects are pathogenetically adequate for almost all mechanisms of development of diabetic foot syndrome. The anti-inflammatory effect of the salivary gland secretion of leeches is due to its ability to block the amidolytic and kinogenase activity of human plasma kallecrein, when this inhibits the formation of kinins, which are inflammatory mediators. The bactericidal and bacteriostatic effect of salivary gland secretion is due to the presence of a symbiont bacterium (Bacillus Hirudensie). The mechanism of the analgesic effect of hirudotherapy is that the kinases found in the secret reduce the activity of bradykinin, which stimulates pain. It has been proven that hirudotherapy has an immunostimulating effect, in particular, it normalizes the function of phagocytosis. Girudin slows down the reaction of thrombin activation of blood clotting factors V, VIII, XIII. Girudin it prevents the platelet release and aggregation reaction by inhibiting platelet binding of thrombin and dissociation of the thrombin complex with specific platelet receptor proteins. Destabilase is an enzyme that performs fibrinolytic activity by hydrolysis of isopeptide bonds formed during stabilization of fibrin in the presence of factor XS. The destabilase complex includes a prostaglandin-like fraction (prostacyclin), girudin and a plasma kallikrein inhibitor. Bdellins – trypsin and plasmin inhibitors. Eglins are inhibitors of chymotrypsin, subtilisin and neutral proteases of human granulocytes. In some diseases with an immunological component, activation of cathepsins in living tissues, eglins, forming persistent complexes with granulocyte enzymes, block them and prevent tissue degradation. Hyaluronidase is an enzyme that destroys the main substance of connective tissue (hyaluronic acid). After being bitten by a leech, lymph with an admixture of capillary blood oozes out of the wound for a long time. This is due to the effects of saliva injections hirudin and destabilase. Prolonged lymph discharge (from 5 to 24 hours) It promotes mechanical irritation of the lymph nodes, stimulates their production of natural protective cells – lymphocytes, which helps to increase local and

general immunity. The secret, getting into the skin wound, has a humoral effect on the microcirculatory system, microlimph circulation, mast cells and other systems with the participation of signaling receptor mechanisms. Salivary gland secretions block hemostasis microcirculatory bed. Prolonged bleeding occurs. This increases the blood flow to the damaged tissues. Bloodletting helps to reduce local inflammatory edema, venous congestion in the affected areas, which improves

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microcirculation. In addition, the components of the secret have local anti-inflammatory, bactericidal, and analgesic effects. Blood flow is accelerated, lymph circulation and venous outflow are improved, tissue edema is removed, and full oxygen delivery to the underlying tissues is ensured. A medical leech is prescribed for the area the surgical field after reconstructive surgery. A special place belongs to the ability of the secret to suppress the protective functions of the skin, which are largely provided by the mast cells of the subcutaneous tissue. Due to the neurotrophic effect, hirudotherapy is effective in treating the consequences of stroke, multiple sclerosis, parkinsonism, and the consequences of severe injuries.

Based on these assumptions, we examined 82 patients with diabetic foot syndrome with clinical manifestations of symmetrical sensory diabetic polyneuropathy, the stages of which were distinguished according to the provisions of the St. Vincent Declaration and WHO recommendations. The average age of the subjects was 59.8±1.47 years, ranging from 23 to 79 years; 5 people were under the age of 40 years. The average duration of the disease was 12.91 ± 0.86 years. All patients had trophic disorders in the form of a recurrent diabetic ulcer more than 2 centimeters in diameter with purulent separable (the duration of the ulcer is more than 3 months) and symmetrical sensorimotor diabetic polyneuropathy. The cause of the development of diabetic ulcers in all cases were external factors (foot injury when walking, temperature or chemical burn, etc.).

There were no clinical signs of active wound infection. According to the volume of therapy, the patients were divided into two groups, representative by gender, age, type, average duration and severity of DM. There were no significant differences in the nature of concomitant diseases between the groups. In the first group (30 people), a standard set of therapeutic measures was carried out, including normalization of carbohydrate metabolism (diet, insulin or oral hypoglycemic drugs), the appointment of vitamins, disaggregants, drugs that improve microcirculation. If necessary, concomitant diseases were treated. In the second group, the standard treatment was supplemented with hirudotherapy.

In this work, the drug "Leech" produced by the company "Girudin" was used. The biological activity of "Leech" is associated with the secret of the salivary glands of medical leeches contained in it. Treatment with "Leech" was carried out for 3 weeks. 300 mg 2 times a day. "Leech" (3% ointment) is applied to the wound surface 2-3 times a day with a layer about 1 mm thick. The duration of use of the drug until the wound is healed or completely cleansed, followed by autodermoplasty. A split flap was used, containing the epidermis and part of the underlying dermis, having the thickness is 0.25–0.38 mm. After skin transplantation, 1% ointment based on "Leech" was introduced into the composition of therapeutic dressings.

The effectiveness of hirudotherapy was assessed subjectively and objectively. The subjective assessment was given by patients on a three-point scale, taking into account the severity of the irritative pain syndrome. As an objective assessment, we used vibration thermal testing, conjunctival biomicroscopy, dynamics of ulcer surface cleansing, reduction of shin circumference and a number of biochemical indicators reflecting the state of hemostasis, carbohydrate, lipid and purine metabolism in dynamics. We also conducted a study of the blood coagulation system in our patients.

It has been shown that the use of hirudotherapy increases the effectiveness of complex treatment of diabetic polyneuropathy. In the group of patients receiving traditional treatment, no significant regression of symptoms of polyneuropathy was noted by any patient. 60% of patients regarded their condition as a slight improvement, and 40% did not notice any dynamics. However, 94% of patients

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who received hirudotherapy in addition to the traditional therapeutic complex of treatment noted a significant improvement in their subjective state. Subjective improvements. They were confirmed objectively. The most significant improvement was observed in subgroups with type II diabetic polyneuropathy (40%). In diabetic polyneuropathy of the III st. normalization of the values of thermal reception occurred only in 6.6% of patients, although the average values improved against the background of the use of hirudotherapy (from 42.1±0.90 From up to 39.4 ± 0.90 S). In the group of patients who underwent traditional treatment, normalization of heat perception parameters was noted in 3% of patients with stage II polyneuropathy. After a course of complex therapy using hirudotherapy, positive changes in the microcirculatory bed were noted, documented during biomicroscopy of the conjunctiva performed in dynamics. It was revealed that hirudotherapy is able to reduce the aggregation of erythrocytes in all parts of the microcirculatory bed, normalize the direction and increasing the speed of blood flow in them. On the 3rd day of application of the "Piavita" emulsion, 10 people had partial cleansing of ulcers from purulent contents, complete cleansing occurred after 8 days of treatment. In 7 patients, the ulcers were completely cleared of pus after 12 days. Skin hyperemia in all patients decreased from bright red to pink in 10 days, signs of peripheral epithelialization appeared on the 14th day. During treatment with "Leech" in 48 (71%) patients, ulcers completely healed: in 17 – in 15-19 days, in 23 – in 20-29, in 4 – in 30-37 days. Against the background of the therapy, a positive dynamics of the histological picture was observed: areas of necrosis, dystrophy of the epidermis and connective tissue decreased, inflammatory infiltration decreased, hyperkeratosis disappeared, acanthosis decreased.

In patients whose treatment complex included hirudotherapy, cleansing of the surface of the ulcerative defect from necrotic tissues, filling it with granulation tissue and the appearance of marginal epithelialization occurred more than twice as soon as in patients receiving only standard treatment. A comparative analysis of the dynamics of a decrease in the circumference of the lower leg in its upper and lower (ankle) thirds during treatmentrevealed a significantly faster decrease in the circumference of the lower leg at both measured levels in individuals who received hirudotherapy in addition to standard treatment.

When comparing the dynamics of changes in the average blood clotting time according to Sukharev, it was found that the blood clotting time in the studied groups of patients increases slightly, however, the inclusion of hirudotherapy in the complex of standard treatment of diabetic foot syndrome does not have a significant effect on blood clotting time. The indicator of the average value of the prothrombin index in both groups of patients in During treatment, there was a slight decrease, but this decrease was almost the same in both groups. With standard therapy, no significant changes in the lipidogram were detected during the follow-up period. Along with this, it is noteworthy, that when using a therapeutic complex with hirudotherapeutic effects in patients with diabetic polyneuropathy of the second art. a significant improvement in lipidogram parameters was recorded after one course. Patients with diabetic polyneuropathy of the III st. are resistant to the hypocholesterolemic effect of hirudotherapy. The inclusion of hirudotherapy radiation in complex treatment did not significantly change the indicators of carbohydrate metabolism: in both groups there was a decrease in Hs, daily glucosuria and a number of other parameters indicating compensation for diabetes.

To increase the effectiveness of therapy, it is possible to strengthen the standard therapeutic complex of hirudotherapy-exposure. Hirudotherapy has a positive effect on the functional state of afferent nerve fibers, slows down the progression of diabetic polyneuropathy. Therefore, the use of hirudotherapy is justified at any stage of diabetic foot syndrome.

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