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VLOKINTRAVENOUS LASER IRRADIATION OF BLOOD IN THE COMPLEX TREATMENT OF PATIENTS WITH DIABETIC FOOT

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Abstract

Diabetic foot syndrome ranks second after coronary complications of diabetes mellitus. Treatment of critical ischemia and the resulting purulent – necrotic lesions of the lower extremities in patients with diabetes mellitus is still one of the urgent problems of modern diabetology and surgery.

"Diabetic foot" - a symptomcomplex that includes the phenomena of neuropathy and angiopathy of the foot, changes in the bone and joint apparatus, manifested by purulent -inflammatory changes and ulcerative-necrotic lesions of the extremities.

Introduction

The risk of developing a diabetic foot increases with age, the duration of diabetes, and the degree of decompensation.

Diabetic foot syndrome manifests itself in two types::

- neuropathic diabetic foot.
- ischemic diabetic foot.

This division of diabetic foot syndrome into types is important for determining the tactics of treatment of patients.

Conventional methods of conservative therapy have low effectiveness in stopping critical ischemia in patients with diabetes mellitus. In addition, there is a sharp restriction of the category of patients with diabetic angiopathy для for standard reconstructive vascular interventions due to severe microangopathy. A number of authors indicate that most purulent-necrotic lesions of the feet end with amputation of the limb . The great social significance of diabetes mellitus is that it leads to early disability. According to the literature, the risk of developing gangrene of the lower extremities increases 20-fold in patients with diabetes mellitus. Timely initiated and adequately conducted complex treatment can reduce the frequency of high amputations of the lower extremities by more than

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60% with the help of light therapy, which consists in exposure to low-intensity laser radiation on blood cells directly in the vascular bed. The treatment is carried out on a unique device "Matrix-VLOK". intravenous laser therapy has a powerful sanogenetic effect. It allows you to systematically increase the immunity and rehabilitation capabilities of the body. Mechanism of action as you know, the human body consists of about 300 types of cells that have the same genetic code, but perform very different functions: muscle cells, epithelium of various organs, cells that produce hormones (insulin, thyroxine, adrenaline), etc. All our cells will work normally only when the conditions are created for them to generate energy. The main of these conditions is the delivery of oxygen and glucose. And if glucose is dissolved in plasma and freely penetrates everywhere, then oxygen delivery is provided by red blood cells (one red blood cell simultaneously "transports" about 1 billion oxygen molecules). Under the influence of laser radiation, the oxygen transport function of red blood cells improves, which, in turn, leads to an improvement in microcirculation in almost all organs and tissues that were damaged or experienced oxygen starvation before the start of treatment. The effectiveness of the method is particularly good in conditions of critical ischemia.

Materials and Methods

During the period from 2018 to 2020, the clinic conducted comprehensive treatment of patients with diabetic foot syndrome using the method of intravenous laser blood irradiation (ILOK) ("Matrix Lazmik" produced in Russia) - 14 men and 8 women. The patients ' age ranges from 45 to 65 years. All patients had objective and subjective signs of ischemic diabetic foot. Pain in the extremities at rest bothered all patients, and four of them took strong analgesics. Also, all patients had purulent-necrotic lesions of the feet, two patients had exarticulations of two toes for 1.5 years a month before admission.

The hospitalized patients suffered from type 2 diabetes mellitus, severe course, in the stage of decompensation. Of these, 12 patients had diabetes for more than seven years. Only one patient was diagnosed with diabetes mellitus within a year. In nine patients, the level of hyperglycemia was more than 10 mmol/ l, one patient was admitted with signs of ketoacidosis (blood sugar 30.1 mmol/l, urine acetone+++). In two patients, blood sugar was less than 10 mmol/l. The majority of patients were admitted with prolonged purulent intoxication, cardiopulmonary and renal-hepatic insufficiency.

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Of the 22 patients, only three received insulin before admission to the hospital, while the rest received tablet -based hypoglycemic drugs.

Nine patients suffered from coronary heart disease, one of themhad a previous myocardial infarction, and 13 patients suffered from arterial hypertension.

Ultrasound Dopplerography of the lower limb artery revealed occlusion of the popliteal-tibial segment in three patients and occlusion in the foot region in seven patients.

To assess the degree of microcirculation damage in the foot, according to the literature, measurement of transcutaneous oxygen tension on the foot ($TcPO2_2$) in the first interdigital space in the patient's sitting and lying position is used.(A.In, Pokrovsky etal. 1996).

Complex treatment of this category of patients included two types of treatment: conservative and operative.

Conservative treatment of patients with ischemic diabetic foot should meet the following requirements::

- transfer of patients to insulin injections;
- relief of the phenomena of critical ischemia of the lower extremities;
- antibacterial treatment with determination of the type and sensitivity of microorganisms;
- treatment of concomitant diseases and other complications of diabetes mellitus.

VLOK – 635 technique Laser therapeutic devices of the Matrix I seriesLazmik" laser emitter head KL-VLOK-635 -2 (red spectrum, wavelength 635 nm, output power of the light guide 1.5-2 MW) and laser emitter head KL-VLOK-365 -2 wavelength 365-405 nm. Exposure time is 25-30 minutes. Vsegona course of 10-12 daily procedures.

The effectiveness of treatment of patients was assessed by reducing the dose or eliminating highly active analgesics, positive dynamics from purulent-necrotic lesions or the state of the postoperative wound: clearing the necrosis zone, the presence of granulations, the appearance of epithelialization of the wound edges.

Among the instrumental methods of research, the effectiveness of treatment with intravenous laser irradiation of blood is evaluated by determining $TcPO2_2$ on the affected foot in the supine and sitting states.

Results

The phenomena of critical ischemia were stopped in 21 out of 22 patients. In the majority of patients, pis caused by the action of laser radiation energy:

- increases the consumption of oxygen by tissues,
- blood supply processes to tissues are improved,
- increases cellular immunity,
- the processes of bone tissue regeneration are enhanced,
- the blood supply to the brain is activated,
- accelerates nerve regeneration,
- improves trophic cartilage tissue,
- reduces blood clotting,
- it also stimulates the metabolism and increased cell proliferation, which promotes rapid healing and regeneration of tissues.

При проведении светотерапииNo side effects or complications were observed during light therapy with intravenous laser irradiation of blood.

Discussion

The relevance of using intravenous laser blood irradiation (IVLC) in the treatment of patients with ischemic diabeticoй footis due to the presence of critical limb ischemia and often the impossibility of reconstructive vascular operations due to the presence of severe microangiopathy in such patients

Conclusions

1. The use of intravenous laser blood irradiation (VLOK) in the complex treatment of patients with ischemic diabetic foot and critical ischemia phenomena has a high therapeutic value, especially the use of the method when it is impossible to perform vascular reconstructive surgery .
2. Intravenous laser облучение blood irradiation (VLOK) it should be taken in combination with other types of therapeutic and surgical treatment in patients with ischemic diabetic foot.
3. Intravenous laser blood irradiation (VLOK) has a wide range of actions , such as

- Painkillers.
- Soothing.
- Anti-inflammatory.
- Immunostimulating.
- Anti-allergic.
- Reduces the concentration of cholesterol and toxins in the blood.
- Eliminates vascular spasms.

As a result, the method is used for various conditions that led to the development of ischemia.

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