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EFFECTIVENESS OF ENDOVASCULAR TREATMENT FOR OBLITERATING ATHEROSCLEROSIS ON THE BACKGROUND OF DIABETES MELLITUS

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Abstract: Classical open vascular surgery remains the optimal treatment method for obliterating atherosclerosis of the arteries of the lower extremities. However, these interventions are associated with significant risks of perioperative complications and mortality. In modern surgery, there is a trend toward an increase in the number of endovascular interventions, which can reduce surgical trauma, reduce surgical time, and avoid anesthesia, which leads to a reduction in the risk of surgical complications. The purpose of our study was to study the effectiveness of treatment of patients with obliterating atherosclerosis against the background of diabetes mellitus. In clinical practice, the method of surgical treatment using angiographic examination, taking into account the 3rd level of the size of the vessels of the foot, is to carry out endovascular intervention using minimally invasive methods of recanalization, balloon angioplasty and stenting of distal vessels.

Keywords: obliterating atherosclerosis, diabetes mellitus, angioplasty, vascular stenting.

Obliterating atherosclerosis of the arteries of the lower extremities is a progressive disease and leads to the development of critical ischemia of the lower extremities with a high risk of amputation and mortality [3,5]. Critical ischemia of the lower extremities, despite the progress achieved in diagnosis and treatment, is a pressing problem in vascular surgery and occupies one of the leading places in the structure of morbidity, permanent disability and mortality [4, 6]. In addition, diabetes mellitus, due to its high prevalence and steady upward trend, is recognized as a non-infectious epidemic, representing a serious medical and social problem, and entails high mortality, ranking third after cardiovascular diseases and cancer [8]. Currently, in the structure of morbidity in economically developed countries of the world, diabetes mellitus type II is one of the leading diseases. By 2025, it is expected that the number of people with diabetes will be 333 million people. The risk of developing atherosclerotic lesions of peripheral arteries in diabetes also increases 3-4 times, which dictates special

approaches to the diagnosis and treatment of patients with atherosclerotic lesions of the arteries of the lower extremities in the setting of diabetes mellitus. Endothelial dysfunction caused by chronic hyperglycemia is discussed as its cause. Although the relationship between diabetes mellitus and vascular pathology remains unclear, loss of endothelial regulatory capacity is believed to underlie this process [5]. Diabetes mellitus is one of the independent factors in the development of atherosclerosis [1, 5]. It is hyperglycemia that is considered the main triggering factor in the development of any vascular complication in diabetes [5]. Critical ischemia of the lower extremities is observed 5 times more often in patients with diabetes [3, 4].

Classical open vascular surgery remains the optimal treatment method for obliterating atherosclerosis of the arteries of the lower extremities. However, these interventions are associated with significant risks of perioperative complications and mortality. In modern surgery, there is a trend toward an increase in the number of endovascular interventions, which can reduce surgical trauma, reduce surgical time, and avoid anesthesia, which leads to a reduction in the risk of surgical complications [7, 8]. One of the characteristic manifestations of diabetes mellitus, both insulin-dependent and insulin-resistant, is diabetic angiopathy, which is generalized and plays a significant role in the genesis of the disease, its complications and outcome [1, 2]. Patients suffering from carbohydrate metabolism disorders often exhibit a rapidly progressive form of arteriosclerotic changes [2].

The purpose of this study was to study: the effectiveness of treatment of patients with obliterating atherosclerosis against the background of diabetes mellitus.

Material and research methods.

The work is based on examination and treatment data of 36 patients with obliterating atherosclerosis of the vessels of the lower extremities with diabetes mellitus, who received inpatient treatment at the clinical base of the Bukhara State Medical Institute, Bukhara Multidisciplinary Regional Medical Center for the period 2020 to 2023.

The patients underwent surgical treatment: taking into account angiographic examination using endovascular. Surgical tactics of patients were determined taking into account the results of angiographic studies. Based on the results of the X-ray contrast angiographic study, as well as the depth of the lesion of the purulent-necrotic process, methods of minimally invasive endovascular interventions for each individual patient were determined.

When determining purulent-necrotic lesions of the examined patients, Wagner (1979) classifications were used.

Taking into account the peculiarities of the angiographic study, the localization and degree of damage to the vessels of the lower extremities, the following types of endovascular minimally invasive placements were determined: balloon angioplasty (vascular dilatation), stenting of stenotic vessels, reconalization of occlusive vessels.

Upon admission, the phenomena of general intoxication prevailed: increased body temperature or persistent low-grade fever, pallor, low mobility, tachycardia against the background of a weak pulse, increased blood ESR, leukocytosis and a shift of the formula to the left. In parallel with the general symptoms, local manifestations of the disease were expressed; hyperemia, swelling and tissue infiltration into the affected area of the limb. During the course of treatment, these indicators of intoxication and inflammatory response to the source of infection gradually returned to normal.

The examination used generally accepted clinical, laboratory and instrumental methods. Upon admission of patients, much attention was paid to collecting anamnesis. Information about pain syndrome, duration of existence of intermittent claudication, nature and localization of pain when walking, distance without painful walking, pain at rest, its intensity, intensification or decrease of pain in a horizontal position and when lowering the leg from the bed were found out. When examining the patient, the color of the skin and the presence of visible trophic disorders were visually assessed: thinning of the skin, tuberosity and porosity of the nail plates, the presence of trophic ulcers or necrosis. Objective examination included: palpation determination of pulsation of the arteries of the lower extremities at typical points, auscultation of the aorta of the iliac and femoral arteries. Among all patients, there was multi-level damage to the arterial system of the limb with occlusive-stenotic lesions, including the femoral (general, superficial and deep), popliteal, and arteries of the leg (anterior and posterior tibial, interosseous). Based on the clinical examination, further treatment tactics were determined, depending on the vascularization.

Results and discussions.

When determining the tactics of surgical treatment of patients, endovascular X-ray contrast diagnostics of the vessels of the leg and foot was performed. Taking into account the results of angiographic diagnostics, the method of choosing endovascular minimally invasive surgical intervention to eliminate the blood flow of the affected vessel was determined. At the same time, we took into account the anatomy of the vessels of the leg and foot and their lumen at different levels of the foot. To differentiate the endovascular surgical approach based on vessel size, we divided the foot vessels into three levels.

When assessing the severity of the purulent necrotic process in this group of patients, the Wagner classification was also used.

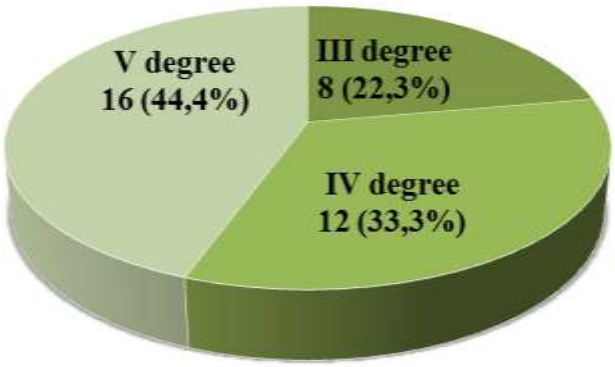

Figure 1. Distribution of patients according to the degree of damage according to Wagner (n=36) .

As can be seen from Figure 1, the majority of patients had IV-V degree of limb damage (Wagner). Treatment of patients with purulent-necrotic lesions of the limb was provided with the participation of a group of specialists: a purulent department surgeon, a vascular surgeon and angiographist, an endocrinologist, a therapist, an anesthesiologist-resuscitator.

The general condition of the patients in most cases upon admission was moderate to severe: they all complained of constant pain at rest, trophic ulcers, gangrene of the fingers or feet, numbness, general weakness, malaise, feeling of thirst, increased body temperature to 39^0C and above. All patients had pronounced signs of general intoxication of the body: high hyperthermia, increased heart rate (tachycardia) up to 100 beats per minute or higher, dry tongue and skin with signs of hypovolemia, and constipation in most patients. There was a disturbance in the sensitivity of the affected limb: in 21 (58.3%) patients with affected areas of the foot, there was a neuropathic form of diabetic foot syndrome, a complete lack of sensitivity and local hypothermia of the limb, hyperemia and swelling of the skin tissue around the ulcerative-necrotic skin defect. When assessing purulent-necrotic lesions of the limb in patients, the localization of the lesion was revealed as shown in Figure

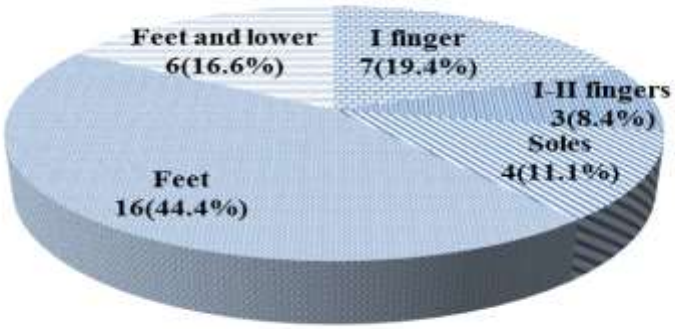

Figure 2. Distribution of patients with purulent wounds depending on the location of the purulent process (n=36)

The main diagnostic method for assessing the state of the vessels was X-ray contrast angiographic studies. Angiographic studies were performed after appropriate preparation under local anesthesia in the angiography room.

All these patients, also regardless of the type of diabetes mellitus (DM), were transferred to short-acting insulin according to the principle of "intensive insulin therapy". Intensive insulin therapy included frequent (more than 3 times a day), subcutaneous or intravenous administration of small doses (8-10 units) of short-acting insulin with careful control of glycemic levels during the day, taking into account the recommendation of an endocrinologist. In severe cases, combined administration of insulin (intravenously and subcutaneously) was carried out. Pathogenetic therapy was based on preparations of the alpha-lipoic acid group.

In the absence of contraindications, all patients were prescribed intravenously, drip heparin up to 15-20 thousand units. per day or other anticoagulants (Clexane 0.6, 0.8, Enoxiparin 0.6, 0.8, Fraxiparin 0.6, 0.8. s / c)

The use of vasodilators, symptomatic treatment and antibiotic therapy were similar to those in the control group.

The complex of conservative measures included, as in the control group, the treatment of concomitant diseases and the correction of violations of the rheological properties of the blood.

All surgical operations were performed in an urgently delayed order, after appropriate preoperative preparation.

The study of the microflora of purulent necrotic wounds of patients revealed the following points: as can be seen from figure 3, 56 strains of aerobic microflora were detected in 47 examined patients in the comparison group. Most cases were sown Staph.aureus (46.4%), Proteus spp. (25.0%). The percentage of occurrence of Streptococcus and E. coli microflora was 19.6% and 8.9%, respectively.

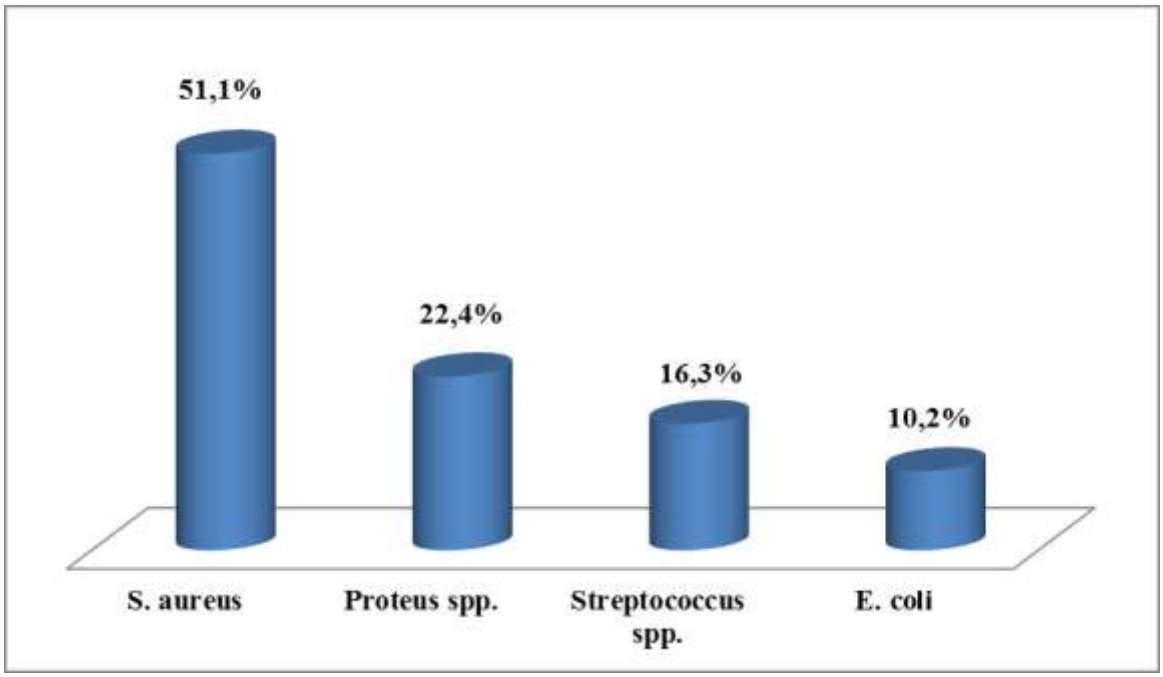

Figure 3. Species composition of the aerobic microbial association from the wound of the comparison group, patients (n=36)

A study of blood sugar levels showed that by the time of admission to the clinic, on average, it was 11.5 ± 3.2 mmol/l. Against the background of complex conservative and surgical treatment, the elimination of the purulent-necrotic lesion, carried out in the postoperative period, contributed to a decrease in the blood sugar level of patients to the upper limit of normal by the 7th day of treatment.

The study of the functional state of blood vessels was carried out using duplex angioscanning, determining the regional maximum systolic velocity and maximum diastolic velocity. Vascular examination a. Poplitea, a.tibialis posterior on the day of admission showed that the maximum systolic velocity and maximum diastolic velocity were significantly lower than normal - 29.7 ± 1.2 and 2.1 ± 0.21, respectively.

The examination of the distal arteries of the leg is carried out with the patient lying on his back with his knees slightly bent and his legs slightly apart. To visualize the posterior tibial artery, the transducer is placed along the lower third of the leg and slightly posterior to the medial malleolus. The anterior tibial artery is located along the lower third of the tibia along the anterior surface in the projection of the continuation on the tibia of an imaginary line drawn between the I and II toes of the dorsum of the foot.

In everyday practice, MBA studies are not carried out. Its examination and measurement of blood flow parameters become relevant if the patient has chronic ischemia of the lower extremities or stenosing lesions of the tibial arteries. The MBA is visualized along the medial surface in the middle third of the leg.

If ultrasound signs of lower extremity ischemia are detected in a patient, the ankle-brachial index (ABI) is measured.

Measuring the ankle-brachial index is a reliable and effective method for quantitatively assessing the blood supply to the limb. Its positive predictive value is 90%, negative predictive value is 99%, and overall accuracy is 98%. The index is calculated using the formula:

ABI = tibial artery systolic blood pressure/systolic blood pressure

brachial artery.

Systolic pressure is determined using a tonometer with a pneumatic cuff and a linear ultrasonic sensor installed at the location point of the PLA and ZBBA. In case of occlusion of the latter or the impossibility of its clear location due to the lesion, PBBA or MBA are used.

The measurement is carried out symmetrically on both arms and legs. The sensor is alternately installed at the points of location of the indicated arteries and pressure is applied to the cuff until the Doppler signal disappears in the vessel. At the moment of slow decompression of the cuff, the first stroke of the restored blood flow corresponds to the value of systolic blood pressure in the vessel.

Normally, a difference of up to 12-15 mm Hg is acceptable. If the pressure indicators on the hands differ more significantly, then a stenosing lesion of the subclavian or axillary arteries on the side with lower blood pressure values should be suspected. In this case, to calculate the ABI, the blood pressure indicator from the arm where the obtained value is greater is used.

Ankle pressure is normal at 10-15 mm Hg. higher than at the shoulder, and the value of the normal ABI systolic pressure is more than 1.0. Decrease in ABI less than 0.9 is considered as a pathology. The index correlates with the stage of the lesion and the clinical picture of lower limb ischemia:

Results of x-ray angiographic interventions.

When conducting an X-ray contrast angiographic study, lesions of the vessels under the knee artery and the first level of the vessels of the foot were revealed in 19 (52.8%) patients (Distal part of the peroneal and posterior tibial artery). In 9 (25.0%) patients, stenosis and occlusion were noted at the second level of the vessels of the foot (dorsal, medial plantar artery of the foot). 8 (22.2%) patients had vascular lesions in the form of stenosis and occlusion up to level III of the vessels of the foot.

Of the 19 patients with level I lesions of the foot vessels, 11 (57.9%) patients underwent balloon angioplasty with subsequent reversal of the affected vessels due to chronic ischemia of the lower extremities caused by occlusive-stenotic lesions of the arteries of the foot vessels . To perform the manipulation, balloon angioplasty was performed. Subsequently, stenting of the affected areas was carried out using the above method. The indication for stenting of these vessels was: the occurrence of residual vascular stenosis up to 48% and the ineffectiveness of transluminal balloon angioplasty.

As noted above, out of 36 patients, 9 (25.0%) patients had stenosis or occlusion of the second level of the vessels of the foot (dorsal, medial plantar artery of the foot). Of these, 4 (33.3%) underwent stenting of the affected vessels. In 5 (66.7%) patients, vascular recanalization with balloon angioplasty was performed as indicated. To do this, after establishing the level and extent of vascular damage, vascular recanalization was performed.

In 8 patients with level III lesions of the vessels of the foot (arcuate, dorsal, metatarsal arteries). In 3 (37.5%) patients, reconalization surgery with balloon angioplasty was performed. In 5 (32.5%) patients, due to a severe form of chronic ischemia of the lower extremities caused by occlusive-stenotic lesions of the arteries of the 3rd level of vessels, reconalization of the affected vessels was limited.

The use of angioendovascular diagnostics and a differential approach to endovascular surgery with division depending on the size of the vessels of the foot into 3 levels changed for the better the indicators after surgical complications and research results.

Conclusion. All of the above allows us to recommend a mandatory wide use in clinical practice of the method of surgical treatment using angiographic examination, taking into account the 3rd level of the size of the foot vessels, to carry out endovascular intervention using minimally invasive methods of recanalization, balloon angioplasty and stenting of distal vessels. At the same time, stenting and

balloon angioplasty should be used for damage to the first level of foot vessels up to 2.5 mm in size, which often coincides in projection with the distal part of the peroneal and posterior tibial arteries. In case of damage to the II level of foot vessels with sizes up to 2.0 mm (dorsal, medial subcutaneous artery of the foot), it is more effective to use stenting with angioplasty with reconalization. In case of occlusion of the III level of foot vessels with sizes up to 1.5 mm (arcuate, dorsal, metatarsal arteries), the use of reconalization and balloon angioplasty is more optimal.

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