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Treatment of diabetic angiopathy of the lower limb in the conditions of a specialized department

Introduction

The prevalence of diabetes mellitus has recently been so high against the background of other non-communicable diseases that it is becoming epidemic. About 5% of the world's population suffers from this pathology, and every 15 years the number of patients with diabetes mellitus (DM) doubles.

The development of gangrene or purulent process on the foot in patients with DM is the main cause of limb amputation in more than 50% of patients, and postoperative mortality is 15-20% [1,3,5,6].

In connection with the foregoing, the prevention of the development of purulent-necrotic complications on the foot in DM should be one of the important links in the complex treatment of patients with DM. Direct revascularization of the lower extremities in diabetic angiopathy, when it is necessary to reconstruct the main arteries affected by atherosclerotic plaques, is the best option for improving blood circulation in the lower extremities.

However, such an operation is possible in a very limited number of patients. This is mainly due to the defeat of the distal bed, when there are no "outflow paths". According to different authors, inoperability is found in 30-75% of cases [2,4]. As an alternative, indirect methods of revascularization are used.

Among them, the most common operations are lumbar sympathectomy and revascularizing osteotomies [6]. It should be noted that the effectiveness of lumbar sympathectomy is estimated by different authors inconsistently from obtaining good results to a complete lack of effect. This is apparently due to the fact that in diabetic microangiopathy the microvascular bed and collaterals are affected, and therefore the operation is ineffective. Given this, it is necessary to assess the state

of the peripheral channel before the operation in order to determine the expected effectiveness of this operation.

Purpose of the study

Study of the results of treatment of patients with diabetic angiopathy of the lower extremities by various methods of direct and indirect revascularization, as well as complex conservative therapy.

Materials and methods

From 2014 to 2020 326 patients with diabetic angiopathy of the lower extremities aged 28 to 80 years were treated in the Department of Surgery of the UCC AMU. Among them were 156 men (48%) and 170 women (52%). Type 1 diabetes was observed in 167 (51%) patients, type 2 — in 159 (49%). Among the surveyed 76% of patients suffered from arterial hypertension. 62% had coronary heart disease (CHD).

Patients with angina of the 2nd functional class prevailed (80%), the rest were assigned to the 1st functional class. In 19% of patients, "vascular accidents" were observed in the past — stroke in 38% of them and myocardial infarction in 62%. In addition, peptic ulcer of the stomach and duodenum occurred in 6% of patients, chronic nonspecific lung diseases — in 4%, diabetic nephropathy — in 7%. The first group consisted of patients without trophic disorders in the lower extremities — 188 people. To assess the state of regional circulation in the lower extremities, clinical data were used, as well as instrumental research methods: Doppler ultrasound, X-ray contrast angiography, rheovasography with a nitroglycerin test. As a result of a comprehensive examination, it was established that occlusion or severe stenosis in the aorto-iliac segment was observed in 34

patients, in the iliac-femoral — in 30, in the femoral-popliteal — in 53, stenosis or occlusion of the arteries of the leg in 89 (Table 1).

Table 1

Distribution of patients according to the level of occlusion

Occlusion level	Number of patients	%
Aorto-iliac segment	34	16,5
Iliac-femoral segment	30	14,6
Femoral-popliteal segment	53	25,7
Occlusion of the leg arteries	89	43,2
Total	206	100

Conservative treatment was carried out in all patients. Its main directions are compensation for diabetes, relief of ischemia of the lower extremities (trental, vasoprostan, sulodexide, berlition, vitamin therapy, anticoagulants, hyperbaric oxygenation), antibacterial therapy for purulent-inflammatory processes, taking into account the sensitivity of microorganisms, detoxification (rheopolyglucin, albumin, colloidal and saline solutions), symptomatic therapy of concomitant diseases, as well as local treatment of purulent complications on the foot (daily toilet, antiseptics, enzymes).

Direct and indirect revascularization of the lower extremities was performed according to the indications, depending on the morphological changes in the main arteries and the state of the collaterals. Table 2 shows the nature of revascularization operations in both groups of patients.

Table 2

The nature of revascularization surgery

Surgeries	1 group	2 group	Total
Number of patients	188	138	326
Aorto-femoral bypass	2	1	3
Iliac-femoral bypass	3	1	4
Femoral-popliteal bypass	6	3	9
Profundoplasty	2	4	6
Lumbar sympathectomy	14	28	42
Revascularizing osteotripanation	19	3	22
Total	46 (23%)	40 (29%)	86 (25,7%)

Results and discussion

In the second group, the largest number of revascularization surgeries were performed in patients with stage 3 ischemia (28). Patients with stage 4 underwent mainly palliative operations, since purulent-inflammatory processes were a contraindication to vascular reconstruction due to the risk of developing purulent complications in the area of reconstruction. Direct and indirect revascularization in the group of patients with purulent — ne-

crotic changes was performed after the sanitation of purulent foci on the foot, when inflammatory changes were minimized.

In the postoperative period, we did not observe complications of a purulent-inflammatory nature in the area of surgical wounds. Lumbar sympathectomy was performed in 42 patients. These are patients who had no outflow tract, diffuse changes in the iliac and femoral arteries were observed, and a positive nitroglycerin test was observed. After the operation, there was an improvement in blood circulation in the foot in all patients, which was manifested in the rapid cleansing of the purulent focus, the appearance of bright red granulations and the reduction in the regeneration of wounds. With repeated rheovasographic studies (after operations), the rheographic index increased markedly, on average from 0.2 to 0.5. Sanitation of purulent — necrotic processes on the feet was carried out daily. The nature and volume of operations are presented in Table 3.

Table 3

The nature and scope of sanitizing surgery

Surgeries	Quantity
Opening of phlegmon	22
Finger exarticulation	28
Metatarsal head resection	21
Foot resection	4
Necrectomy	20
Total	95

It should be noted that almost every patient had to perform different operations sequentially or simultaneously. It depended on the course of the purulent-necrotic process. So, upon admission, the phlegmon of the foot was immediately opened, and then, when new streaks appeared, the newly appeared abscesses were opened. Several patients simultaneously underwent resection of the metatarsal head and opening of abscesses. Sometimes, after opening the abscess, it became necessary to remove the head of the metatarsal bone. Thanks to such active rehabilitation of purulent-inflammatory foci on the foot, most patients managed to stop the purulent process, achieve good regeneration and avoid amputation of the lower limb. The results of treatment of patients are presented in table 4.

The immediate results of direct and indirect revascularization in the group of patients with stages 2a and 2b of ischemia were good in the vast majority of patients (82.6%). In the second group, after revascularization operations, the results were generally positive in 85% of patients. But in this group, due to severe intoxication and a significant disruption of regional circulation after revascularization, one lethal outcome was observed, and in 5 patients, due to the growth of gangrene, amputation of the limb at the level of the thigh and lower leg was performed. The results of conservative therapy in the first group were less effective: good results were achieved only in 59.5% of patients. The lethal outcome of one patient was associated with a sudden onset of acute myocardial infarction.

The final table of the results of treatment of patients

Treatment	Results				
	Groups	Positive		Negative	
		Good	Satisfactory	Amputation	Death
Direct and indirect revascularization	1 (n = 46)	38 (82,6%)	8 (17,4%)	-	-
	2 (n = 40)	25 (62,5%)	9 (22,5%)	5 (12,5%)	1 (2,5%)
Without revascularization	1 (n = 142)	85 (59,9%)	56 (39,4%)	-	1 (0,7%)
	2 (n = 98)	29 (29,6%)	41 (41,7%)	22 (22,5%)	6 (6,2%)

Very mediocre results were noted in the second group of patients without revascularization. Despite the active rehabilitation of purulent-necrotic processes on the foot, amputation at the level of the thigh and lower leg had to be performed in 22 patients. Lethal outcome occurred in 6 patients. The cause of death was: acute myocardial infarction in 3 patients, acute cerebrovascular accident in 2 and pulmonary embolism in 1.

As our data and literature data show, reconstructive operations on the main arteries can be performed not in all patients. Therefore, to improve regional blood flow, it is necessary to use indirect methods of revascularization. Our data showed that after these operations (lumbar sympathectomy and revascularizing osteotomies), regional blood flow and microcirculation improved in most cases. This is due to the preserved functional reserve of the microvasculature, which is determined by a pharmacological test with nitroglycerin.

Thus, the treatment of patients with diabetic angiopathy of the lower extremities is a difficult task. In many

ways, the results of treatment depend on the initial data: the severity of the underlying disease, the state of the regional circulation of the lower extremities, the presence of concomitant diseases, the functional reserves of the peripheral channel.

Conclusions

1. The use of direct and indirect methods of revascularization in patients with diabetic angiopathy of the lower extremities can improve the results of treatment and save the limb in most patients with purulent-necrotic tissue lesions.
2. Sanitation of purulent — necrotic changes in the foot should be carried out actively, including resection, disarticulation, necrectomy.
3. The outpatient stage of treatment of patients with diabetic angiopathy of the lower extremities can be carried out only in patients with the initial stages of lower limb ischemia, when there is no critical ischemia (stages 3 and 4).

Literature

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