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# Current approaches to the treatment of purulent-necrotic soft tissue complications in diabetic foot

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**Abstract**---One of the frequent complications of diabetes mellitus is the lesion of human blood vessels, leading to the development of diabetic foot. Literature and daily practical observation show an increase of the rate of diabetic foot (30-70%), which raises the actuality of the problem of diabetic foot treatment. This article contains data concerning the results of surgical treatment of 151 patients with diabetes mellitus complicated by diabetic foot and purulent-necrotic soft tissue inflammation. Our work presents the basic principles of treatment of purulent-necrotic complications of diabetes mellitus. The effectiveness of local application of Acerbin solution and two-stage surgical tactics in the complex surgical

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treatment of purulent-necrotic complications of diabetes mellitus has been proved.

Keywords---diabetic foot, purulent-necrotic complications, Acerbine.

# Introduction

One of the most common complications of diabetes mellitus (DM) is damage to the human blood vessels. High blood sugar levels lead to vasoconstriction. Reduced vascular caliber is one of the main causes of the decreased blood flow, most often to the tissues of the lower extremities [1].

One of the serious complications of diabetes mellitus is diabetic foot. Diabetic foot is caused by vascular and nerve damage in the extremities [2]. In recent years, literature data and daily practical observation show an increase in the frequency of diabetic foot due to smoking, the annual increase in the number of patients with obesity and arterial hypertension [3, 4].

A mechanical factor (high pressure on the foot while walking, rubbing against shoes, various blunt traumas) plays a major role in the formation of diabetic foot ulcers. Due to the neuropathy of walking, a deformity of the foot develops, resulting in increased pressure at a certain point in the foot [5]. When walking for a long time under the influence of a mechanical factor, an ulcer develops and can easily become infected.

# Aim of the research

To improve complex, local and surgical treatment of diabetic foot using new technologies.

# **Materials and Methods**

151 patients with diabetes mellitus complicated by diabetic foot and purulentnecrotic inflammation of soft tissues were observed in the septic department of Samarkand City Medical Association. Among the patients examined, 87 were male and 64 were female. The age of diabetic patients ranged from 30 to 78 years. The age of the majority of them was between 30 and 60 years old. The duration of diabetic anamnesis of the examined patients ranged from 8 to 22 years. Comorbid cardiovascular diseases were detected in 76% of patients, renal diseases - in 55%, hepatic, gallbladder and biliary tract diseases - in 51% of patients. Type I diabetes mellitus (DM) was detected in 12 (7.9%) and type II DM - in 139 (92.1%) patients. Severe form of this disease was registered in 48.3% of patients, moderate - in 41% and mild - in 10.6% of patients.



Figure 1. Distribution of patients according to the severity of tissue damage in diabetic foot syndrome according to Wagner F.M. (1981).

During surgical treatment, we used the classification of Wagner F.M. (1981), used to assess the severity of tissue lesions in diabetic foot syndrome [6]. According to this classification, grade II lesions were found in 19 (12.5%) patients, grade III - in 108 (71.5%) patients and grade IV - in 24 (16%) patients among the observed ones (fig. 1). Wet necrosis of soft tissue of toes was detected in 101 (66.9%) patients and dry necrosis in 50 (33.1%) patients. Ischemic ulceration of the heel area occurred in 37 (24.5%) patients.

Ischemic blisters in the foot area were found in 40 (26.5%) patients, gangrene of one toe was detected in 38 (25.1%) patients, gangrene of two toes - in 24 (15.9%), gangrene of three toes - in 27 (17.9%) and gangrene of all toes - in 22 (14.6%) patients.

During their stay in the hospital patients underwent blood and urine tests, biochemical tests to determine blood and urine sugar content, ECG, fluoroscopy and chest X-rays, ultrasound, doppler sonography of the lower extremities, foot bone X-rays, computed tomography and angiography of the lower extremities.

# **Results and Discussions**

Our observations showed that the clinical manifestation of the diseases developed according to the degrees of soft tissue lesions with purulent-necrotic complications. Muscle atrophy develops, followed by toe deformities in patients with neuropathy. Calluses and, gradually, trophic ulcers appear due to the development of deformities of the toes. Purulent-necrotic phlegmon occurs in the tissues of the foot after the development of ischemia.

Purulent-necrotic phlegmon in diabetic foot syndrome often leads to sepsis, which makes treatment much more difficult. This condition in diabetes is based not only on disorders of carbohydrate metabolism, but also disorders of protein and fat metabolism. Profound changes contribute to disorders of liver, kidney, cardiovascular and nervous system function.

Purulent infection negatively affects the metabolism, acidosis develops, the organism's defense function weakens, and the infection spreads throughout the body. In this condition, we often observed the development of purulent-necrotic fasciitis in patients.

Our tactics in the treatment of purulent-necrotic complications of diabetic foot syndrome were based on the following basic principles: dynamic monitoring of blood sugar content and its correction, antibiotic therapy and control of its action, treatment of comorbidities, accurate determination of the form of diabetic foot and its severity, the use of local treatment.

Our primary goal was to remove the foot from a state of critical ischemia; in addition, we paid special attention to traditional treatment, i.e., immunocorrection and infusion-transfusion treatment. Surgical treatment of diabetic foot according to the modern requirements demands early diagnosis and wide dissection of phlegmon. After evacuation of pus it is necessary to make a thorough revision, if necessary, fasciotomy and necrectomy.

It should be noted that even in the infiltrate stage diabetic foot phlegmonas should be opened with wide skin incisions and fasciotomy, which significantly reduces the pressure in the soft tissues, preventing their ischemia. The main task of surgical treatment of purulent-necrotic complications of diabetic foot is to save the extremity from high proximal amputations. Therefore, in recent years we have introduced a two-stage surgical treatment.

At the first stage, depending on the size of purulent-necrotic phlegmon we made relaxing long incisions, wound revision, fasciotomy and necrectomy. Wound sanation and adequate drainage were performed thoroughly. In recent years we started using Acerbin solution, which has a keratolytic, antiseptic, analgesic and accelerating wound healing effect. At the second stage, we performed radical surgery - staged necrectomy three to eight times, according to the indication.

During the interstage period we managed to stabilize the general condition of the patients, to remove the affected extremities from critical ischemia. Of 151 patients, 37 (24.5%) underwent transmetatarsal resection of the foot, exarticulation of one toe was done in 23 (15.2%) patients, two toes - in 24 (15.9%), three toes - in 27 (17.9%), all toes - in 22 (14.6%) patients. Amputation at the level of the femur was performed in 4 (2.6%) patients, amputation at the level of the shin - in 4 (2.6%). When determining the level of limb amputation, in addition to objective data, we used the results of Doppler and angiography. Using the aforementioned surgical treatment tactics, we achieved a decrease in the number of proximal surgeries from 20% to 7.5%.



Figure 2: The patient's foot before surgery



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Figure 3. Patient's foot on the 4th day after surgery.

Figure 4. Angiogram after surgery procedure

Patient M., 39 years old. Suffers from diabetes mellitus type II for 12 years. Complication - diabetic foot on the right side. Purulent-necrotic phlegmon of soft tissues of the right foot (fig. 2). The patient underwent duplex scanning of the lower extremities. The main blood flow was intact. The patient underwent transmetatarsal resection (Sharp surgery) (fig. 3). Postoperative angiography confirmed the correctness of this tactic (fig. 4).

# Conclusions

We think that local application of Acerbin solution and two-stage surgical tactics is the optimal way of complex surgical treatment of purulent-necrotic complications and diabetic foot in diabetes mellitus.

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