EVALUATION OF THE EFFECTIVENESS OF A COMBINED APPROACH OF ENDOVASCULAR REVASCULARIZATION AND PHYSICO-CHEMICAL THERAPY IN CRITICAL ISCHEMIA IN PATIENTS WITH DIABETIC FOOT SYNDROME

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According to research data, the risk of developing diabetic foot syndrome (DFS) increases with age and the duration of diabetes. The frequency of occlusive lesions of the main arteries of the lower extremities in patients with diabetes ranges from 29% to 81% of all cases. The rate of amputations due to diabetic gangrene reaches 83.1%; moreover, 50–70% of all non-traumatic amputations occur in diabetic patients, with persistently high hospital mortality rates of up to 40% (Malakhov Yu.S., et al., 2019).

According to foreign authors, mortality in patients with diabetes and critical limb ischemia reaches 30% within 5 years. The number of patients with critical limb ischemia and unreconstructable peripheral vasculature may reach 80%, according to various reports. In such cases, limb amputations are performed as a life-saving measure (Bokeria L.A., et al., 2016).

The choice of optimal treatment for purulent-necrotic complications in DFS combined with severe critical ischemia remains unresolved. Furthermore, clinical practice still lacks sufficient data regarding the role and effectiveness of an abacterial medium using electroactivated solutions (EAS) in the prevention and treatment of purulent-necrotic lesions of the lower extremities in DFS complicated by critical ischemia.

Aim of the study: To improve treatment outcomes in patients with DFS complicated by critical limb ischemia through the application of endovascular interventions and an advanced method of ultrasonic wound debridement (UWD).

Materials and methods: The study was based on the clinical examination and treatment of 123 patients with DFS and severe critical ischemia complicated by purulent wounds (Wagner grade III–V, 1979), who were hospitalized and treated at the Bukhara State Medical Institute from 2021 to 2024.

Patients were divided into two major groups:

- Group I (comparison group): 46 patients (37.4%) received traditional local treatment, which included angiographic examination, endovascular intervention, and local surgical treatment combined with ultrasonic wound debridement (UWD) using physiological saline.

- Group II (study group): 77 patients (66.2%) underwent UWD with a 25% dimethyl sulfoxide (DMSO) solution combined with electroactivated solution (EAS). Group II was further subdivided: Group IIA (n = 37; 48.1%): DFS with critical ischemia and purulent wounds, treated with UWD using a 25% DMSO solution; Group IIB (n = 40; 51.9%): DFS with critical ischemia and purulent wounds, treated with UWD using a combination of 25% DMSO and EAS-A.

All patients underwent urgent surgical incision and drainage of purulent foci with irrigation using a 3% hydrogen peroxide solution. Wound treatment was subsequently performed with UWD depending on the study group. In the second wound healing phase, UWD was discontinued, and wound care included EAS-K irrigation, topical levomekol ointment, and dressings with EAS-anolyte combined with 25% DMSO solution. Dressings were changed once daily.

Results: In Group I (n = 46), diagnostic protocols included angiography and UWD with physiological saline. Most patients presented with moderate to severe conditions, intoxication, and multiple organ dysfunction. Duplex scanning revealed significant stenosis and occlusions in the tibial and pedal arteries. Intensive therapy included insulin, infusion therapy, antibiotics, and symptomatic management. Surgical interventions (necrectomy, toe/foot amputations, atypical resections) were performed when indicated, accompanied by endovascular procedures (balloon angioplasty, stenting), mainly at levels I and II (according to foot vascular classification).

Angiographic analysis showed that 52.2% of patients had femoropopliteal lesions, while 21.7% had pedal artery involvement. Ischemia severity correlated with amputation rates, necrotic tissue volume, and timing of hospital admission. Combined treatment reduced intoxication, improved glycemic control, and enhanced inflammatory marker dynamics. However, 4 patients (8.7%) required below-knee amputations due to late presentation and irreversible necrosis. Mortality was 6.5%, associated with delayed hospitalization and severe comorbidities.

In Group IIA (n = 37), treatment included UWD with 25% DMSO in addition to endovascular interventions and standard therapy. Results showed significant improvement: by day 7, body temperature, leukocyte count, leukocyte intoxication index (LII), and ESR decreased. Microcirculatory improvement was confirmed by duplex scanning. Amputation rates were 18.9%, mortality 2.7%, lower than in Group I, although not sufficient for all patients.

In Group IIB (n = 40), UWD was performed with combined 25% DMSO and EAS-A. This approach achieved earlier (days 3–7) reduction in intoxication, faster

glycemic normalization, and improved biochemical parameters. ESR, circulating immune complexes (CIC), and LII decreased significantly, while overall patient condition improved. Angiography confirmed synchronous multilevel lesions (levels I–III). Endovascular interventions (stenting, balloon angioplasty, recanalization) with improved UWD reduced the number of high-level amputations.

Conclusion: A combined approach—including early diagnosis, angiographic vascular imaging, minimally invasive revascularization, and active surgical wound management—improves therapeutic outcomes in patients with DFS and critical limb ischemia, reducing the rates of major amputations and mortality.

The inclusion of electroactivated solution in UWD significantly enhanced clinical outcomes by accelerating wound debridement, lowering complication rates, and improving survival. This combined strategy may represent a promising direction in the treatment of purulent-necrotic complications of diabetic foot syndrome.