

P5

The role of laser osteoperforation in complex management of patients with diabetic foot syndrome

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Purpose : The development and introduction of new minimally invasive technique high-power infrared diode laser in clinical practice of diabetic foot syndrome management.

Objectives of study: to assess the clinical effectiveness and the lower extremity haemocirculation in patients with diabetic foot syndrome within different periods of time after laser osteoperforation..

Materials and methods: The study of treatment outcomes of 72 patients was carried out. 40 patients enrolled into the study group were treated by means of new developed laser osteoperforation technique (L.O.P). In control group 32 patients were treated with the conventional approaches (necrosequetrectomy, finger and foot amputation). The correlation of patients with different forms of diabetic foot syndrome was the following: neuropathic – 20 %, ischemic -25%, heterogeneous -55%. The age group was from 50 to 82 years. The morbidity duration was from 2 to 10 years. To perform laser osteoperforation infrared diode lasers with the wave length 805 and 980nm and peak power up to 30 watt in impulse-period mode were used. To assess the efficacy laser flowmeter BLF-21. The study was performed before treatment, on 2-3 and 10-14 days after laser osteoperforation or any of the conventional treatment approaches.

Outcome and discussion: As it was determined clinical improvement became apparent on the following day after laser osteoperforation. Noticeable warming of lower extremities, cyanosis diminution were revealed. Patients noted the pain to abate on 2-3 days. In 14-18 days the painless walking distance was significantly longer. From the 2-3 day ulcerative wounds cleared from necrotic tissues, fibrin and pus. By 7-10 days epithelization of islets and edges was noticed. Analyzing the data of laser flowmetry in both groups it was noted that on 2-3 day after laser osteoperforation the perfusion indices raised by 1.7 times comparing with initial data ($p < 0.05$). During 10-15 days there was insignificant decrease of these indices (8%) and kept stable for a long time (follow-up 6-8 months). In control group the indices of tissue perfusion didn't change significantly.

Conclusion: Laser revascularization osteoperforation may be used in patients with heterogeneous and ischemic types of diabetic foot syndrome to improve the collateral blood flow. In neuropathic type after laser osteoperforation ulcerative wound healing is achieved more quickly. Complex laser exposure decreases the purulent complication risk caused by osteoperforation in diabetics with infected foot. It is recommended to readminister treatment in 6-8 months before stable clinical effect develops. This approach is palliative, with minimal invasion, accessible for elderly patients if other interventions are restricted.