

Experience of Applying Minimally Invasive Methods in Complex Treatment of Venous Trophic Ulcers in Elderly Patients

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Abstract Objective. to optimize the results of complex treatment of decompensated forms of varicose disease of the lower limbs in aged and senile patients. **Methods.** the complex treatment results of 15 aged and senile patients with venous trophic ulcers of the lower limbs (clinical class C6 according to CEAP) using stem endovenous laser ablation are analyzed. the mean age of the patients was 70 ± 5 years. All patients had an open trophic leg ulcer, which existed from 10 to 18 years. Endovenous laser ablation was performed using “Lakhta-Milon” laser apparatus with a wavelength of 1470 nm. in the postoperative period, prophylactic doses of low molecular weight heparins were prescribed as prophylaxis of the venous thromboembolic complications for 5 days. the results were evaluated the next day, one week and one month after the operation. the state of the operated limb and the quality of venous trunk obliteration and the local status of the venous trophic ulcer were evaluated. **Results.** All patients were operated on without complications; at the same day they were discharged for outpatient monitoring. A week after the surgery, 8 patients (53.3%) noted a decrease in heaviness and feeling of swelling in the legs, and a month later, 10 patients (66.7%). Positive dynamics of the local status of trophic ulcers was noted in all patients one week after surgery. Complete healing of the trophic ulcer was revealed in 2 patients a week later, in 14 patients (93.3%) – by the end of the first month after surgery, in one patient complete healing of the trophic ulcer was detected by the end of the second month of treatment. in the long-term period, after 6–9 months, recurrence of a trophic ulcer was not registered in any case. **Conclusions.** the undertaken tactics of treatment of aged and senile patients with venous trophic ulcers is clinically justified and confirmed by the achieved positive results in 100% of patients, which allows recommending it for a wide practical application.

Keywords Varicose veins, Venous trophic ulcers, Aged and senile patients, Minimally invasive technologies, Endovenous laser ablation, Complex treatment

1. Introduction

Chronic venous diseases, according to various studies, affect from 40 to 60% (even up to 80%) of the population of developed industrial countries. [1,2,3,4,12,18,22]. At the same time, decompensated forms of the disease are detected in 15% of patients, with the formation of trophic ulcers in 2% of them [5]. Venous trophic ulcers (VTU) of the lower extremities are a natural result of untimely and inadequate treatment of chronic venous diseases, including varicose veins. The number of patients with trophic ulcers against the background of chronic venous insufficiency increases to 4-5% with age and reaches maximum numbers in the elderly. In the future, due to increasing life expectancy, an increase in the number of trophic ulcers of the lower extremities is expected [5,10,15,29].

Treatment of VTU represents a serious medical and social

problem. On the one hand, despite the progress made in diagnosis and treatment, only 50% of venous trophic ulcers heal within the next 4 months, 20% remain open for 2 years, and 8% do not heal at 5-year follow-up. On the other hand, the treatment of such patients turns out to be quite expensive, and the annual economic loss as a result of decreased working capacity of patients with ulcers, for example, in the USA amounts to more than 1.5 billion dollars [6,8,14,19,31,32].

Trophic ulcers cause a decline in the quality of life for patients and are a reason for prolonged loss of work capacity and disability. Stress resulting from loss of ability to work, the presence of constant discharge from a limb wound, often with an unpleasant odor, and a decline in the patient's social status make this a deeply social problem.

Many authors in their scientific works note the need for an integrated approach to the treatment of patients with VTU [7,8,13,15,21,25]. The role of compression treatment and phlebotonics, predominantly micronized purified flavonoid fraction, is particularly highlighted [9,10,14,21,32]. However, they either do not talk about the treatment of elderly patients

with venous trophic ulcers, and this category of patients is the most difficult, or the description of complex therapy for venous trophic ulcers does not propose the technique of endovascular laser obliteration.

Main purpose. To optimize the results of complex treatment of decompensated forms of varicose veins of the lower extremities in elderly patients.

2. Material and Methods

During the period from January 2021 to September 2024, 15 patients (6 men and 9 women) with VTU of the lower extremities (clinical class C6 according to the CEAP classification) aged 60 to 75 years were operated on. According to the WHO classification (2015), they were classified as elderly.

The table shows that most of the patients presented in this study (60%) were aged 60 years. A clinical feature of patients in this age category is that they have different severity and number of concomitant diseases. Cardiovascular diseases were detected in 23 patients, musculoskeletal diseases in 6, diabetes mellitus in 7, and various neurological diseases.

Table 1. Composition of treated patients (n=15)

Age of patients	60-65 year		70-75 year		Total patients
	man	woman	man	woman	
Quantity of patients (abc)	3	3	3	6	15
%	40		60		100

More than one concomitant disease was identified in 10 patients. It is this factor that in most cases does not allow us to offer them various types of surgical treatment. The inclusion criteria for this study were that the patient had the appropriate age, varicose veins of the lower extremities with stem reflux along the great and/or small saphenous veins, and the presence of an open venous trophic ulcer of the leg. Exclusion criteria were the presence of thrombotic lesions of the superficial or deep venous system at the time of the study or in the past, the presence of post-thrombotic disease, the presence of a trophic ulcer of the leg of mixed origin (ulcer due to hypertension, arterial ischemia, neurotrophic ulcers, etc.), the presence of severe lymphovenous and arterial insufficiency of the lower extremities.

The examination of patients included a clinical examination and instrumental diagnostics, including ultrasound examination of the abdominal cavity and vessels of the lower extremities. All patients were examined for organs and systems depending on the identified concomitant diseases. In elderly patients, special attention was paid to assessing the state of arterial blood flow in the lower extremities.

Ultrasound angioscanning revealed trunk venous reflux with ostial valve incompetence in all patients, combined with varicose veins on the thigh or lower leg in 12 patients and incompetent perforating veins on the lower leg in 10 patients. All those included in the study had an open trophic ulcer with

a typical localization along the medial surface in the middle and lower third of the leg or the retromalleolar region. The duration of existence of a trophic ulcer varied from 10 to 18 years. In 8 patients, the venous trophic ulcer recurred repeatedly. Trophic ulcers in 11 patients were small in size from 1 to 3 cm², in 4 patients they were medium in size, from 4 to 10 cm². All patients underwent culture from the bottom of the trophic ulcer to individually select antibiotics and determine the dynamics of treatment.

The treatment of all patients was comprehensive. Symptomatic therapy was carried out for the main and concomitant diseases. Before surgery, all patients underwent sanitation of trophic ulcers, which included the use of modern wound dressings adapted to the stage of the wound process, creating a balanced moist environment optimal for regenerative processes. Along with them, various topical medications (sorbents, proteolytic enzymes, antiseptics, solutions, powders, ointments, aerosols, etc.) were widely used. Particular attention was paid to improving arterial and venous circulation in the lower extremities. For this purpose, all patients were prescribed angioprotectors, antispasmodics, phlebotonics according to well-known regimens, and compression treatment.



Figure 1. Surgical laser "LAKHTA-MILON" - laser device for phlebology

The main pathogenetic treatment method for patients with VTU was considered to be surgical correction of pathological trunk venovenous refluxes. All 15 patients were operated on. In full accordance with the paradigm of minimally invasive surgery, all patients underwent stem endovascular laser obliteration (EVLO) of the great and small saphenous vein, and in 9 patients – in combination with miniphlebectomy. To carry out laser coagulation, a Lakhta-Milon laser device with a wavelength of 1470 nm and single-ring radial light guides were used. (**Fig. 1**)

All operations were performed under tumescent anesthesia with automatic traction of the light guides at a speed of 0.75 mm/s. The power of laser radiation, depending on the diameter of the vein, ranged from 6 to 8 W, while the linear energy density did not exceed 80 J/cm. The average length of the coagulated vein was 44.7±12.1 cm. Local skin plastic surgery of the surface of the trophic ulcer was not performed. After the operation, the surface of the trophic ulcer was

covered with various wound dressings, and a compression stocking of the 2nd compression class was put on the operated limb. Patients resumed activity immediately after surgery in the form of walking for 1.5-2 hours. In the postoperative period, prophylactic doses of low molecular weight heparins (Clexan, Flenox) were prescribed for 5 days as a prophylaxis for venous thromboembolic complications.

The results of the combined treatment were assessed at fixed points: immediate – a week and a month after surgery, long-term – a year after surgery. During the control examination, the general somatic condition of the patients after treatment, the condition of the limb after endovascular laser obliteration, and the local status of the trophic ulcer were recorded. The condition of the trophic ulcer was assessed by changes in its area and the quantity and quality of discharge from the bottom of the ulcer, regression of periulcerous inflammatory phenomena on the lower limb and the activity of epithelialization processes. The dynamics of microbial contamination of the surface of a trophic ulcer before and after surgery were not studied, focusing mainly on visual assessment of changes. The low information value of this indicator was explained by the lack of growth of flora in the bottom of trophic ulcers already a week after surgery. All patients underwent a control ultrasound angioscanning, during which the quality of endovascular laser treatment of the mouth and main trunk of the great and/or small saphenous veins was assessed.

3. Results

At follow-up examinations a week, a month and a year later, the patients did not have any progression of somatic complaints directly related to the surgery. When assessing the immediate results, a decrease in the symptoms of chronic venous insufficiency (swelling, heaviness and fatigue in the legs) was noted. In 8 patients (53.3%), these symptoms decreased within a week after surgery, and in 10 patients (66.7%) after a month. In 5 patients, despite noticeable improvement, even a year after surgery, slight feelings of heaviness and swelling in the legs remained. All patients had small hematomas at the sites of endovascular laser obliteration and miniphlebectomy, which regressed within the first month in 12 patients (80%) and in all patients over the next month.

Positive dynamics of the local status of trophic ulcers a week after surgery were observed to a greater or lesser extent in all patients. A decrease in the inflammatory reaction (maceration) of the skin around the ulcer, a decrease or absence of discharge from the bottom of the ulcer was noted in all patients within a week after surgery. In 2 patients with small trophic ulcers up to 3 cm², complete epithelialization of the trophic ulcer was noted a week after surgery. In 7 patients, after a week, a decrease in the area of the trophic ulcer and traces of active epithelialization along the edge of the ulcer were recorded. By the end of the first month after surgery, complete epithelialization of trophic ulcers was noted in 14 patients (93.3%) (Fig. 2 and Fig. 3).



Figure 2. Patient, Type of trophic ulcer before surgery



Figure 3. Patient, Type of trophic ulcer 1 month after surgery

In one 72-year-old patient, complete healing of a medium-sized trophic ulcer, about 10 cm², was revealed by the end of the second month. This was due to the presence of a number of concomitant diseases (cardiovascular diseases, type II diabetes mellitus and atherosclerotic vascular disease lower extremities without stenosis), which influenced the healing time of the venous trophic ulcer. There were no intraoperative complications. All patients were discharged from the hospital

for outpatient observation on the same day.

Long-term treatment results were assessed after a year. Complete obliteration of the main trunks of the GSV or SSV was detected in all patients. All 15 patients noted a decrease in symptoms of chronic venous insufficiency. Their complete absence was noted in 8 operated patients (53.3%). Recurrence of trophic ulcers was not noted in any case. In general, a positive treatment result was observed in all 15 operated patients (100%).

4. Discussion

Treatment of patients with decompensated forms of venous insufficiency is a difficult, time-consuming, sometimes thankless and quite often unpredictable task. When we are talking about elderly patients 70 years of age and older, the degree of this unpredictability increases manifold. First of all, with age, each person acquires a sufficient number of concomitant diseases, which, to a greater or lesser extent, can affect the reparative processes in the area of trophic ulcers.

An elderly person will not always be offered surgical treatment motivated by the clinical situation. The risk of developing complications (thromboembolics) after elective surgery increases with age. Consequently, the priority treatment is conservative, which is not always sufficient, as it cannot influence all pathogenetic mechanisms of venous circulation decompensation. At the same time, the varicose vein disease itself, which has existed for decades, not only contributes to the development of trophic disorders of the skin of the lower extremities, but also uses up numerous compensatory mechanisms in the patient's body, which in the long term resist the factors of aggression. If surgery is indicated, even the choice of anesthesia becomes an obstacle for the age patient. The need for general or conduction anesthesia to perform a traumatic intervention makes it dangerous for the patient for many reasons. On the one hand, any anesthesiologist or therapist in this situation will find many contraindications to any operation. On the other hand, the lack of possibility to eliminate vertical trunk venous reflux in the lower limb significantly complicates the treatment of a trophic ulcer. The solution to the problem is the possibility to apply high-tech minimally invasive surgical methods of treatment, the leading of which are endovasal thermal techniques, among which the most common is laser stem obliteration.

The advantages of performing laser obliteration in elderly patients with venous trophic ulcers are as follows:

1. The possibility to adequately eliminate vertical trunk pathologic venous reflux in the complex treatment of venous trophic ulcers with minimal trauma.
2. No need for general or conductive anesthesia. All the operations were performed under regional anesthesia with the use of local anesthetics, which minimized pain sensations and contributed to good tolerance of surgical intervention, practically did not require postoperative anesthesia.

3. Rapid activation of the patient after surgery. All patients started walking independently immediately after the operation, continued walking for 1.5-2 hours and immediately returned to the usual individual motor regimen.
4. No need for hospitalization, all patients were operated in a "one-day" hospital, the rehabilitation period took place in the usual home conditions.

Certain doubts about the expediency of surgical treatment of elderly patients disappeared on the background of easy tolerance of this treatment by patients, which contributed to wider introduction of endovasal laser obliteration methods into practice in different clinical situations and different age groups.

The varicose syndrome on the operated limb was eliminated intraoperatively by miniphlebectomy or in the postoperative period, using compression sclerotherapy according to the "Foam-form" technique. These procedures were easily tolerated by patients and did not increase the overall traumatization of treatment. Special attention in the treatment of this contingent of patients should be paid to the prevention of venous thromboembolic complications (VTEC). Performing the operation under local anesthesia contributed to the rapid activation of the patient in the postoperative period, and the use of prophylactic doses of low-molecular-weight heparin within 5 days after the operation made it possible to exclude the formation of any VTEC in all operated patients.

The results of EVLO application exceeded expectations. In addition to good tolerance of the surgical intervention, regardless of the patient's age, positive dynamics of the trophic ulcer was revealed. The first results of EVLO application were registered a week after the intervention. Almost all patients showed a decrease in the discharge from the bottom of the trophic ulcer and appearance of single granulations. Maceration of the skin around the ulcer was noticeably reduced, scanty discharge in the area of maceration disappeared. The size of trophic ulcers in the majority of patients decreased from the second week after EVLO. Complete healing of open venous trophic ulcers was noted in 14 patients by the end of the first month after the operation and in one patient within a year after the operation. Examination of patients in the long-term period after 12 months showed absence of trophic ulcer recurrence and positive dynamics in the quality of life assessment, which was considered as a positive result of treatment.

5. Conclusions

Thus, surgical treatment of elderly patients with venous trophic ulcers becomes an objective reality and should undoubtedly be included in the list of measures of complex treatment of this category of patients due to the use of a minimally traumatic and highly effective technique of endovasal laser stem obliteration, which is a full-fledged alternative to surgical treatment, well tolerated by patients

and accompanied by a minimum number of complications.

The proposed tactics of treatment of elderly patients with decompensated forms of varicose veins is clinically justified and confirmed by the achieved results, which allows us to recommend it for wide practical application.

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