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# EFFECTIVENESS OF ENDOVENOUS LASER ABLATION IN THE MANAGEMENT OF RECURRENT VARICOSE VEINS OF THE LOWER EXTREMITIES

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**Abstract**

**Objective** To evaluate the clinical effectiveness, safety, and long-term outcomes of endovenous laser ablation (EVLT) in patients with recurrent varicose veins of the lower extremities involving the great saphenous vein (GSV) basin.

**Methods** A retrospective observational study included 32 patients treated for recurrent varicose veins between 2024 and 2025. All patients presented with recurrence in the GSV territory. EVLT under tumescent anesthesia was performed on the GSV stump (n = 3), recanalized, residual, or preserved GSV trunks (n = 13), and incompetent perforating veins of the thigh and lower leg (n = 16). Outcomes assessed included operative duration, perioperative complications, postoperative pain (VAS), quality of life (CIVIQ-2), cosmetic satisfaction, and recurrence rate during follow-up.

**Results** Technical success was achieved in all cases. Mean operative time was 31.0 ± 0.6 minutes. Early postoperative complications occurred in 1 patient (1.8%). Transient adverse effects (hyperpigmentation and paresthesia) were observed in 4 patients (7.4%). Postoperative pain peaked on day 3 (3.4 ± 0.4 VAS points) and resolved completely by day 8. After 12 months, significant improvement was observed across all CIVIQ-2 domains (29.2–40%). Mean cosmetic satisfaction score was 7.8 ± 0.6. One case (1.8%) of recurrent disease due to perforator vein recanalization was detected during long-term follow-up.

**Conclusion** EVLT is a safe and effective reintervention strategy for recurrent varicose veins, enabling avoidance of surgery in scarred tissues, reducing procedural invasiveness and operative time, improving quality of life, and achieving favorable cosmetic outcomes with a low recurrence rate.

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**Keywords:** Recurrent varicose veins, endovenous laser ablation, perforator veins, duplex ultrasound, quality of life.

## Introduction

The progressive shift toward minimally invasive techniques has significantly transformed the management of varicose veins of the lower extremities. Endovenous laser ablation has become a cornerstone of modern venous surgery due to its favorable safety profile, high occlusion rates, and excellent cosmetic outcomes. Advances in laser technology, including the use of longer wavelengths, radial fibers, and controlled pullback systems, have further enhanced treatment efficacy and durability.

Despite these advances, recurrence of varicose veins remains a clinically relevant problem. Reported recurrence rates after surgical treatment range widely, from 8% to 64%, depending on follow-up duration, surgical technique, and definition of recurrence. Recurrent disease may result from disease progression, neovascularization, incomplete elimination of reflux sources, or recanalization of previously treated veins.

Reoperative open surgery in patients with recurrent varicose veins is technically demanding and associated with increased tissue trauma, higher complication rates, and inferior cosmetic results due to extensive scar formation. Consequently, minimally invasive approaches, including EVLT, have gained increasing attention as reintervention strategies.

However, the role of EVLT in the treatment of recurrent varicose veins has not been fully standardized. Uncertainty persists regarding patient selection criteria, anatomical limitations, optimal energy delivery, and long-term durability, particularly in cases involving GSV stumps, recanalized trunks, and incompetent perforating veins. This study aims to contribute to the growing body of evidence by evaluating the outcomes of EVLT used as a reoperative modality in recurrent varicose disease.

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## Materials and Methods

### Study Design and Patients

This retrospective study analyzed 32 consecutive patients with recurrent varicose veins treated at the Varikoz OFF clinic, Tashkent Sate Medical University, between 2024 and 205. Inclusion criteria were recurrent varicose veins involving the GSV basin and CEAP clinical class C2–C4. Patients with acute deep vein thrombosis or severe arterial insufficiency were excluded.

The study population consisted of 20 women (68.5%) and 12 men (31.5%), with a mean age of 46.5 ± 1.2 years. Prior interventions included combined phlebectomy (n = 18), EVLT (n = 6), radiofrequency ablation (n = 2), and isolated cases of mechanochemical obliteration, intraoperative sclerotherapy, and ASVAL surgery.

### Preoperative Assessment

All patients underwent comprehensive duplex ultrasound examination of the lower extremity veins preoperatively and during follow-up. Ultrasound evaluation focused on:

- length and diameter of the GSV stump
- extent and pattern of recanalization (segmental, ostial, complete)
- presence and competence of perforating veins
- tortuosity of recurrent venous segments

Based on ultrasound findings, sources of recurrence were classified, with incompetent perforating veins being the most common.

### Surgical Technique

EVLT was performed under tumescent anesthesia in a short-stay hospital setting using a 1470-nm diode laser system (INTERmedic Arfran S.A., Spain) and radial fibers (ELVeS Radial Fiber, Germany). Laser parameters were calculated according to linear endovenous energy density (LEED), which ranged from 75 to 125 J/cm (mean 98 J/cm) at a power of 7 W.

Compression therapy with class II medical stockings and phlebotonic therapy were prescribed postoperatively.

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**Outcome Measures**

Primary outcomes included technical success, complication rate, and recurrence during follow-up. Secondary outcomes included operative duration, postoperative pain assessed by VAS, quality of life assessed using the CIVIQ-2 questionnaire, and cosmetic satisfaction evaluated on a 10-point scale.

**Results**

Technical success was achieved in all patients, with no intraoperative complications. Mean operative duration was 31.0 ± 0.6 minutes. Early postoperative complications occurred in one patient (1.8%) in the form of sural vein thrombosis, successfully managed conservatively.

Transient adverse effects were observed in four patients (7.4%), including hyperpigmentation and sensory disturbances, all of which resolved spontaneously within 1–10 months.

Postoperative pain was mild to moderate, peaking on postoperative day 3 and resolving completely by day 8. Analgesics were required in 25.9% of patients.

At 12-month follow-up, all domains of the CIVIQ-2 questionnaire demonstrated significant improvement. Mean cosmetic satisfaction score was 7.8 ± 0.6. One patient (1.8%) developed recurrent disease due to perforator vein recanalization and underwent successful secondary surgical correction.

**Discussion**

The findings of this study support the use of EVLT as an effective reintervention strategy for recurrent varicose veins. The low complication rate, minimal postoperative pain, and favorable cosmetic outcomes observed are consistent with previously published data. Importantly, EVLT allows avoidance of dissection in scar-altered tissues, which is a major limitation of conventional reoperative surgery.

The low recurrence rate observed in this cohort may be attributed to careful patient selection based on detailed duplex ultrasound assessment and adherence to optimized laser energy parameters. These findings underscore the importance of individualized treatment planning in recurrent venous disease.

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## Conclusion

Endovenous laser ablation represents a reliable and minimally invasive option for the treatment of recurrent varicose veins of the lower extremities. When applied selectively, EVLT provides durable clinical improvement, high patient satisfaction, and a low rate of recurrent disease, making it a valuable alternative to open reoperative surgery.