Comparative Analysis of Varicose Vein Recurrence after Endovenous Laser Ablation (EVLA) of the Great Saphenous Vein with and without Simultaneous Ablation of the Anterior Accessory Saphenous Vein

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Abstract

Objective:

To evaluate the impact of simultaneous endovenous laser ablation (EVLA) of the anterior accessory saphenous vein (AASV) with a diameter greater than 5 mm, in the absence of primary reflux, on the one-year recurrence rate of varicose veins following EVLA of the great saphenous vein (GSV).

Materials and Methods:

A prospective single-centre study included 100 patients (78 females, 22 males) with varicose veins classified as CEAP C2–C4, who underwent GSV EVLA between October 2023 and October 2024. Patients were divided into two groups:

Group I (n = 50) – EVLA of GSV only;

Group II (n = 50) – EVLA of GSV with simultaneous AASV EVLA (diameter > 5 mm, no initial reflux).

Laser ablation was performed using a 1470 nm diode laser with a radial fibre (IPG, Russia), power 7 W, pull-back speed 1 mm/s, linear endovenous energy density ≈ 70 J/cm, under tumescent anaesthesia (lidocaine 0.03%, 300–350 ml). Duplex ultrasound was used to confirm reflux (> 0.5 s). Follow-up was performed at 1, 6 and 12 months. The primary endpoint was clinically significant recurrence of varicose veins.

Results:

After 12 months, recurrence was detected in 10 (20%) patients in Group I and 2 (4%) in Group II (RR = 0.20; 95% CI 0.05–0.87; p = 0.028; absolute risk reduction 16 pp; NNT = 6.25).

New AASV reflux occurred in 18% vs 2% (RR = 0.11; 95% CI 0.015–0.845; p = 0.016).

Re-interventions were required in 12% vs 2%.

Patient satisfaction was 8.1 ± 1.2 vs 9.4 ± 0.6 (p < 0.001).

Complication rates did not differ significantly (8% vs 10%; p > 0.05).

Conclusion:

Simultaneous EVLA of the AASV with a diameter > 5 mm, even without pre-existing reflux, was associated with an 80% relative reduction in recurrence within one year, without increasing the complication rate and improving subjective outcomes.

This approach may be considered a preventive strategy in patients with anatomically pronounced AASV.

Keywords: Varicose veins, endovenous laser ablation, anterior accessory saphenous vein, recurrence, prevention, linear endovenous energy density.

Introduction

In recent years, endovenous laser ablation (EVLA) has firmly established itself as the first-line method for the treatment of great saphenous vein (GSV) incompetence. According to multicentre studies, when using 1470 nm diode lasers with radial fibres, the rate of primary vein occlusion exceeds 95–98% within the first 12 months after intervention and remains above 90% even after 3–5 years of follow-up [5, 15].

Despite the high anatomical success rate of GSV ablation, recurrence of varicose veins is observed in 15–25% of patients within 2–3 years after treatment [1]. One of the most frequent sources of recurrent venous reflux is the anterior accessory saphenous vein (AASV), which lies close to the saphenofemoral junction (SFJ) and may form an alternative pathway for pathological reflux after the elimination of the main GSV trunk [2].

Previous studies have shown that even in the absence of primary reflux, an AASV diameter exceeding 5 mm can be regarded as an anatomically significant risk factor for subsequent dilation and reflux formation [2, 4]. It has also been noted that the AASV may serve as a “hidden reservoir” for haemodynamic overload following GSV ablation, potentially resulting in upward reflux and clinical recurrence [3].

According to Hamel-Desnos *et al.* [1], AASV incompetence accounts for up to 40% of recurrent interventions after EVLA, supporting the need to reassess its role even when reflux is not initially present. Dyachkov [4] demonstrated that inclusion of the AASV in the ablation protocol, when its diameter exceeds 5 mm, reduced the recurrence rate from 18–22% to 3–5% within 12 months without increasing the complication rate.

At the same time, no uniform standards currently exist in clinical guidelines regarding the management of patients with dilated but haemodynamically “silent”

AASVs [12]. Most existing protocols recommend selective ablation only of tributaries with documented pathological reflux.

Thus, the question of whether prophylactic simultaneous EVLA of the AASV with a diameter greater than 5 mm, in the absence of reflux, is justified remains open and requires evidence-based comparative data.

Materials and Methods

Study Design

A prospective, single-centre, comparative study was conducted at the *VarikozOFF Phlebology Clinic* between October 2023 and October 2024. The aim was to compare the recurrence rate of varicose veins following endovenous laser ablation (EVLA) of the great saphenous vein (GSV) with preservation of the anterior accessory saphenous vein (AASV) versus simultaneous AASV ablation, in cases where the vein diameter exceeded 5 mm but no primary reflux was present.

Inclusion Criteria

Age ≥ 18 years

Clinical classification according to CEAP: C2–C4

Duplex-confirmed pathological reflux along the GSV trunk (reflux duration > 0.5 s)

AASV diameter > 5 mm without baseline reflux

Signed informed consent to participate in the study

Exclusion Criteria

* Previous deep vein thrombosis
* Active thrombophlebitis
* CEAP class C5–C6 with active venous ulcers
* Severe comorbidities precluding intervention
* Pregnancy or lactation
* Prior venous intervention on the same limb within 6 months before inclusion

Patient Allocation**

Group	Intervention	n
Group I	EVLA of GSV only (AASV preserved)	50
Group II	EVLA of GSV + simultaneous EVLA of AASV	50

Table 1. Patient allocation was performed by consecutive inclusion, ensuring comparable distribution between groups with respect to sex, age, CEAP class, and vein diameters.

A total of 100 patients (78 women, 22 men; mean age 46.2 ± 8.7 years) were enrolled and evenly divided into two groups of 50 subjects each.

Ultrasound Examination**

Duplex ultrasonography was performed using a 7–12 MHz linear transducer in an upright position.

The GSV diameter was measured at the saphenofemoral junction (SFJ) and at the upper third of the thigh. The AASV diameter was assessed 2–3 cm distal to the SFJ. Pathological reflux was defined as reverse flow lasting more than 0.5 seconds during proximal compression or the Parana manoeuvre. Flow velocity was recorded but not used as a diagnostic criterion for reflux.

EVLA Technique**

Procedures were performed on an outpatient basis under tumescent anaesthesia (lidocaine 0.03%, 300–350 ml).

A 1470 nm diode laser (IPG, Russia) with a radial fibre was used, delivering 7 W in continuous mode and a pull-back speed of 1 mm/s, corresponding to a linear endovenous energy density (LEED) of approximately 70 J/cm.

In Group II, AASV ablation was performed using the same parameters up to the level of its tributary inflow. When indicated, mini-phlebectomy of residual varicose branches was performed.

After the procedure, class II compression stockings were prescribed for 7–10 days.

Endpoints

Primary endpoint:

Clinically significant recurrence — defined as the appearance of new varicose veins on the treated limb, in combination with newly detected pathological reflux (> 0.5 s) in the AASV, GSV, or incompetent perforator veins.

Secondary endpoints:

*Development of new AASV reflux

*Need for reintervention

*Patient satisfaction (0–10 scale)

*Incidence of complications

Statistical Analysis

The analysis was conducted on an intention-to-treat (ITT) basis.

Proportional variables were compared using the χ^2 test or Fisher's exact test, while continuous variables were analysed using the Student's *t*-test.

Effectiveness was expressed as relative risk (RR), absolute risk reduction (ARR), and number needed to treat (NNT).

Freedom from recurrence was assessed descriptively using the Kaplan–Meier method.

Statistical significance was set at *p* < 0.05.

Ethical Considerations

The study protocol was approved by the Local Ethics Committee of the VarikozOFF Clinic* (protocol No. 124/89, dated 18 December 2023).

All patients provided written informed consent prior to participation.

Results

A total of 100 patients completed the 12-month follow-up period — 50 in Group I (EVLA of the GSV only) and 50 in Group II (EVLA of the GSV with simultaneous AASV ablation).

The groups were comparable in baseline characteristics (Table 1).

Baseline characteristics**

Parameter	Group I (GSV only)	Group II (GSV + AASV)	*p*-value
Number of patients	50	50	—
Women, n (%)	40 (80%)	38 (76%)	0.64
Mean age, years (± SD)	46.4 ± 8.6	45.9 ± 8.9	0.78
CEAP class (C2/C3/C4), %	52/36/12	54/34/12	0.91
GSV diameter at SFJ, mm (± SD)	8.2 ± 1.4	8.4 ± 1.5	0.68
AASV diameter, mm (± SD)	5.9 ± 0.6	6.1 ± 0.7	0.23
Reflux duration (s)	1.24 ± 0.3	1.28 ± 0.4	0.52

Table 1. Baseline clinical and duplex characteristics of patients.

No statistically significant differences were observed between the groups, indicating successful comparability at baseline.

Primary Outcome — Recurrence

At 12 months after the procedure, recurrence of varicose veins was detected in **10 (20%)** patients of Group I and **2 (4%)** patients of Group II (*p* = 0.028).

This corresponded to a **relative risk (RR)** of **0.20 (95% CI: 0.05–0.87)**, an **absolute risk reduction (ARR)** of **16 percentage points**, and a **number needed to treat (NNT)** of **6.25**.

Freedom from recurrence (Kaplan–Meier analysis) was significantly higher in the group with simultaneous AASV ablation (log-rank test, *p* = 0.018) (Figure 1).

Development of New AASV Reflux**

Newly formed reflux in the AASV was detected in **9 (18%)** patients in Group I compared to **1 (2%)** in Group II (*p* = 0.016).

The relative risk for developing new AASV reflux was **0.11 (95% CI: 0.015–0.845)**, confirming the preventive effect of simultaneous AASV ablation.

Reinterventions

During follow-up, **6 (12%)** patients in Group I required additional treatment (mini-phlebectomy or sclerotherapy for recurrent tributaries) compared with **1 (2%)** patient in Group II (*p* = 0.048*).

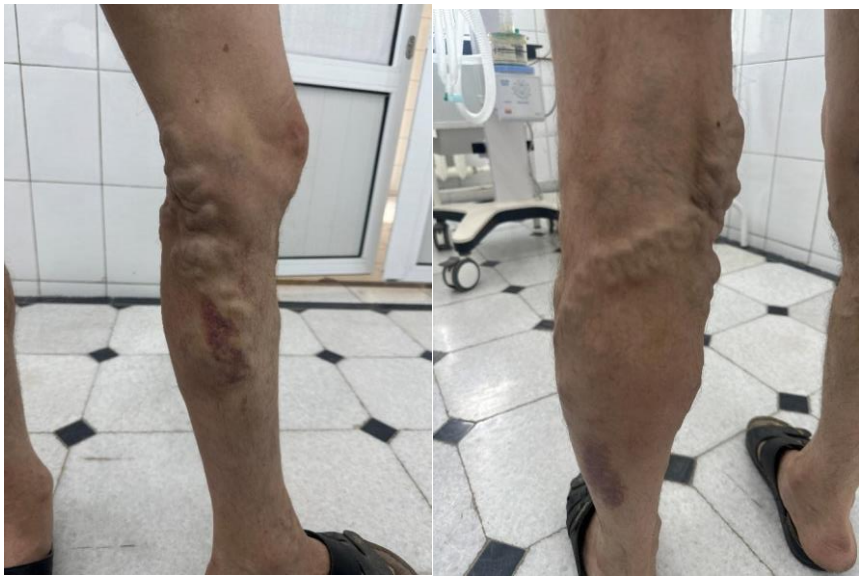
Patient Satisfaction**

Mean satisfaction scores were **8.1 ± 1.2** in Group I and **9.4 ± 0.6** in Group II (*p* < 0.001).

Patients who underwent simultaneous AASV ablation reported improved aesthetic outcomes, less residual telangiectasia, and faster symptom regression (heaviness, swelling, and fatigue).

Clinical case

Patient A., 65 years old

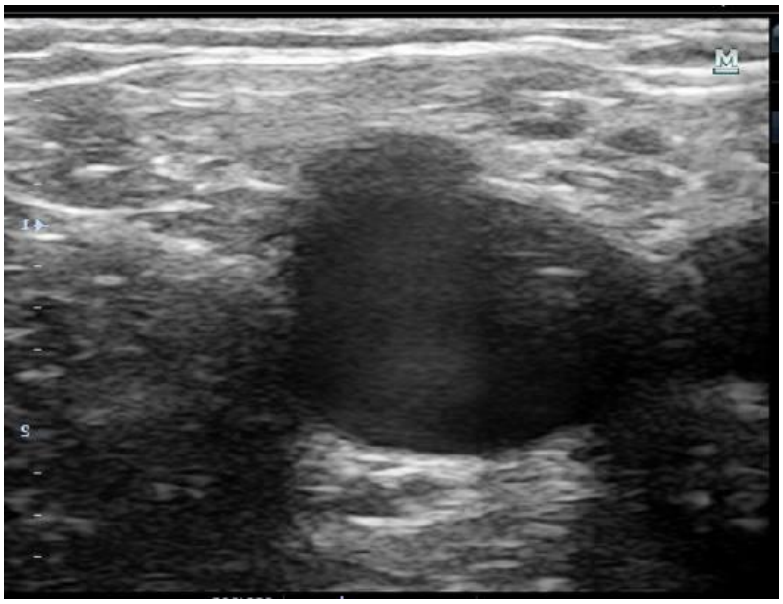


The patient was admitted with a diagnosis of varicose veins in the left lower extremity, with a history of over 10 years. Clinical examination revealed prominent varicose and tortuous subcutaneous veins in the calf and popliteal area of the left lower extremity. Signs of chronic venous insufficiency were noted, including leg swelling, skin hyperpigmentation, and areas of subcutaneous hemorrhage. The patient reported persistent leg pain, swelling, and nocturnal cramps, consistent with a long-term progressive course of the disease.

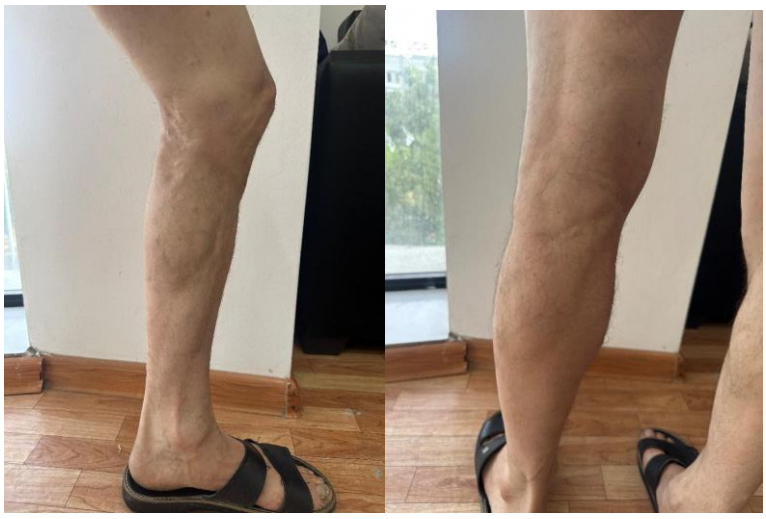
Duplex ultrasound revealed a saphenofemoral junction leak with pathological reflux along the trunk of the great saphenous vein.

Procedure of the intervention. After treating the surgical field with an antiseptic solution, a puncture of the stump of the great saphenous vein was performed under ultrasound control using an intravenous cannula Vasofix Braunule 14G × 2”. A laser light guide with a radial type of radiation (bulb diameter 14G) was introduced into the lumen of the stump of the great saphenous vein through the cannula. The light guide was passed to the level of the terminal valve and installed in such a way that its distal edge was located at the level of the valve cushion of the great saphenous vein. Tumescent anesthesia was formed with a 0.1% lidocaine solution - 50 ml. Laser treatment of the saphenofemoral junction area (endovenous laser crossectomy) was performed with a VPG diode laser generator with a wavelength of 1940 nm, a power of 5 W, and a light guide traction speed of 0.75 mm / s. The linear energy density (LEED) was 67 J / cm . Laser Coagulation was initiated on a moving light guide synchronously with the start of traction. After coagulation was complete, the light guide and peripheral catheter were removed. The puncture site was covered with an aseptic dressing. Class II compression hosiery (24–32 mmHg) was applied to the

lower extremity. Early postoperative period. Upon examination 24 hours after the procedure: the patient's condition was satisfactory, the trunk of the great saphenous vein was obliterated, and no signs of thrombotic prolapse into the deep venous system were detected. Follow-up ultrasound examination.



During ultrasound angioscanning of the left lower limb in the area of the saphenofemoral junction, the lumen of the great saphenous vein and its ostial tributaries is not visualized.



The great saphenous vein and anterior accessory saphenous vein are represented by an echogenic band and are not compressed by the ultrasound probe. Blood flow is not detectable using color and power Doppler imaging.

Conclusion. Endovenous laser crossectomy performed using a 1940 nm laser and a radial fiber optic cable ensured reliable obliteration of the saphenofemoral junction and the trunk of the great saphenous vein without signs of deep vein thrombosis. This result confirms the efficacy and safety of this technique in the treatment of varicose veins with severe pathological reflux.

Complications

No major complications were observed in either group.

Minor adverse events included:

transient paraesthesia in 2 (4%) patients of Group I and 3 (6%) in Group II (*p* > 0.05);

* mild induration along the treated vein segment (8% vs 10%, *p* > 0.05);

* ecchymosis resolving within 7–10 days (12% vs 14%, *p* > 0.05).

No cases of deep vein thrombosis (DVT), pulmonary embolism, or skin burns were registered.

Summary of Outcomes**

Parameter	Group I (GSV only)	Group II (GSV + AASV)	*p*-value
Recurrence	20% (10/50)	4% (2/50)	0.028
New AASV reflux	18% (9/50)	2% (1/50)	0.016
Reinterventions	12% (6/50)	2% (1/50)	0.048
Complications	8%	10%	> 0.05
Patient satisfaction (0–10)	8.1 ± 1.2	9.4 ± 0.6	< 0.001

Table 2. Summary of main results and statistical significance.*

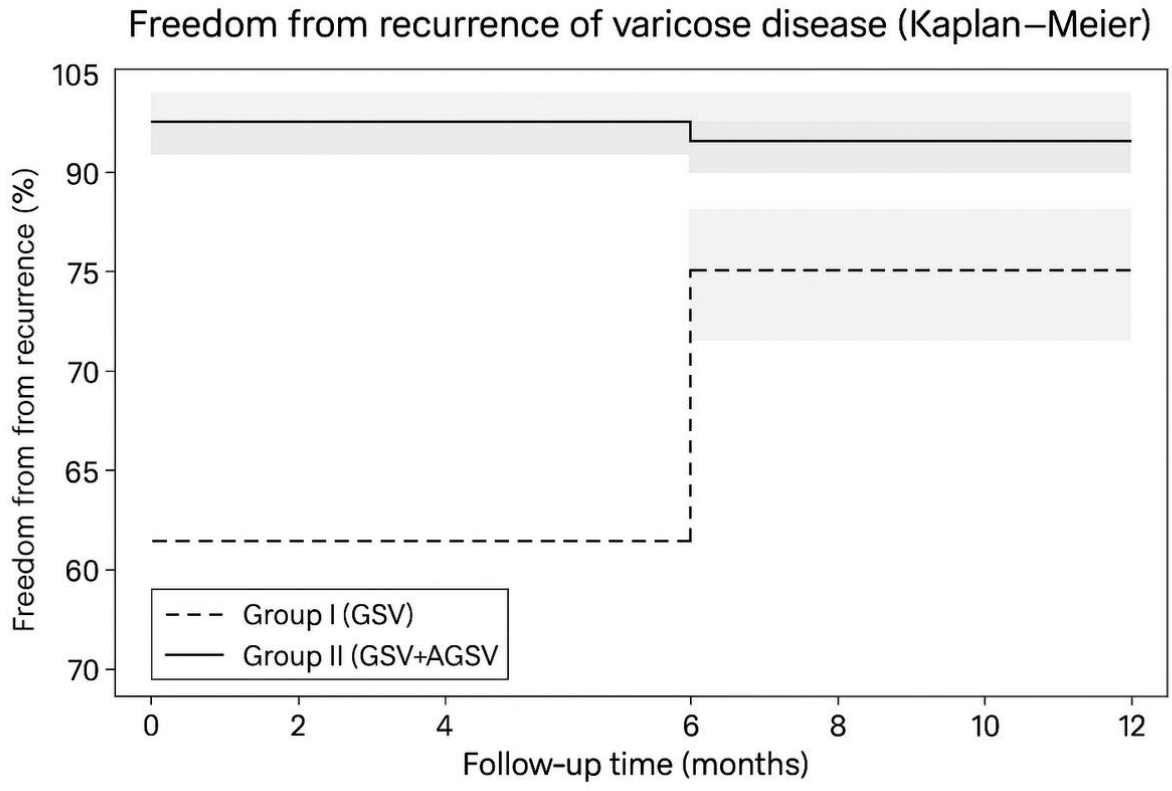


Figure 1. Kaplan–Meier analysis of freedom from recurrence after EVLA of the GSV with and without simultaneous AASV ablation (log-rank *p* = 0.018).

The curve demonstrates a statistically significant improvement in recurrence-free survival in the group with simultaneous AASV treatment.

Discussion

The findings of this study demonstrate that performing simultaneous EVLA of the anterior accessory saphenous vein (AASV) with a diameter greater than 5 mm, even in the absence of reflux, significantly reduces the one-year recurrence rate of varicose veins after great saphenous vein (GSV) ablation. The observed 80% relative risk reduction and absolute recurrence decrease of 16 percentage points indicate a clear clinical advantage of this combined approach.

Recurrence after EVLA remains a multifactorial issue. In most cases, it is associated with neovascularisation at the saphenofemoral junction, recanalisation of the treated segment, or newly formed reflux in the AASV [1, 2, 8]. The latter mechanism has gained increasing attention, as several prospective studies have shown that the AASV becomes a major pathway for reflux recurrence in up to 40% of cases following isolated GSV ablation [3, 4].

Our results are consistent with those of Hamel-Desnos *et al.* [1] and Dyachkov *et al.* [4], who reported that concomitant treatment of the AASV reduces the risk of recurrence without increasing the rate of complications. The anatomical proximity of the AASV to the saphenofemoral junction and its frequent communication with the superficial epigastric and circumflex veins make it highly susceptible to reflux when the main trunk is excluded from the circulation [7].

From a haemodynamic perspective, the AASV acts as a potential collateral channel capable of accommodating redirected flow after GSV closure. If left untreated, its enlargement under increased hydrostatic pressure may lead to subsequent valvular incompetence and reflux formation. Our findings support this hypothesis, showing that prophylactic ablation of the AASV effectively prevents this process.

Importantly, the addition of AASV ablation did not increase the incidence of adverse events. Rates of paraesthesia, ecchymosis, and induration were comparable between the two groups and correspond to those typically reported for modern 1470 nm radial-fibre EVLA [9, 10]. No major complications, such as deep vein thrombosis or skin burns, were observed.

It should also be noted that the overall level of patient satisfaction was significantly higher when the AASV was treated simultaneously. This can be explained by the lower rate of visible residual veins, faster symptom regression, and improved cosmetic results, which are highly valued by patients seeking minimally invasive treatment.

The present findings may have important implications for clinical practice. The inclusion of prophylactic AASV ablation into the treatment protocol could serve as a preventive strategy in anatomically predisposed patients, especially when the AASV diameter exceeds 5 mm and is in close proximity to the saphenofemoral junction. However, the decision should always be individualised, taking into account the absence of reflux, the anatomical configuration, and patient-specific risk factors.

The limitations of this study include its single-centre design, relatively small sample size, and short follow-up period (12 months). Further multicentre, randomised studies with longer observation periods are required to confirm the durability of the effect and to establish standardised indications for prophylactic AASV treatment.

Conclusion

Simultaneous EVLA of the anterior accessory saphenous vein with a diameter greater than 5 mm, even in the absence of reflux, significantly reduces the one-year recurrence rate of varicose veins following GSV ablation by 80% relative and 16% absolute. This combined approach improves patient satisfaction and does not increase the incidence of complications.

Given its preventive effect and safety profile, simultaneous AASV ablation may be considered a rational addition to standard EVLA protocols in patients with anatomically enlarged AASV at the saphenofemoral junction. Further randomised controlled trials are warranted to validate these findings and refine patient selection criteria.

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