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Serhii P. Shchukin, Candidate of Medical Sciences (equivalent to PhD); Doctoral student, Department of Surgery, Anesthesiology and Intensive Care, Postgraduate Faculty. Medical Director, Vascular Surgeon, Ultrasound Diagnostics Physician, https://orcid.org/0009-0005-3232-2340

Bogomolets National Medical University, Kyiv, Ukraine

LTD "Medical Center of Phlebology and aesthetic medicine "Phlebos", Kyiv, Ukraine

Minimally Invasive Treatment of Recurrent Varicose Veins with Thrombotic Complications

Abstract

Background. Recurrent varicose vein disease (RVVD) remains a frequent problem after surgery or endovenous ablation (≈13-65 %). Mechanisms include residual reflux, de novo varicosities, and neovascularization. When RVVD is complicated by superficial vein thrombosis (SVT), treatment becomes challenging because current guidelines focus mainly on anticoagulation and rarely address reflux correction.

Aim. To evaluate the feasibility, safety, and effectiveness of combined minimally invasive therapy for RVVD complicated by SVT.

Materials and Methods. This single-center cohort included 31 patients (24 women, 7 men; mean age 55±13 years) with duplex-verified SVT and RVVD (CEAP C2r–C6r) treated between 2013 and 2025. Interventions comprised endovenous laser or radiofrequency ablation (EVLA/RFA), ultrasound-guided foam sclerotherapy (UGFS), and miniphlebectomy (MF), individually or in combination. Short-term rivaroxaban (15-20 mg/day for 20-45 days) was prescribed for SVT. Primary endpoints: segment occlusion, reflux elimination, thrombus regression, recurrence, and complications (EHIT/DVT/PE). Secondary endpoints: changes in VCSS, CIVIQ-14, VDS, and VDSS.

Results. Great saphenous vein (GSV) reflux occurred in 20 (65 %) patients, small saphenous vein (SSV) reflux in 15 (48 %) patients, and perforator incompetence in 23 (74 %). Neovascularization at the SFJ/SPJ was detected in 10 (32 %), confirming true recurrence. EVLA was performed in 29/31 patients, usually with UGFS ± MF. Clinical improvement was significant: mean VCSS decreased from 5.5 to 2.1, and CIVIQ-14 from 35.2 to 22.2 ($p<0.001$). No EHIT ≥ II, DVT, or PE occurred. Duplex confirmed thrombus regression in 94 % of cases.

Conclusions. Combined minimally invasive treatment (EVLA/RFA + UGF±MF) is a feasible, safe, and effective option for RVVD complicated by SVT. This reflux-directed, office-based approach ensures durable anatomic success, rapid recovery, and meaningful quality-of-life improvement.

Keywords: *saphenous vein insufficiency, anterior accessory saphenous vein (AASV), superficial vein thrombosis, endovenous thermal ablation, ultrasound-guided foam sclerotherapy, radiofrequency catheter ablation, perforator vein incompetence, quality-of-life outcomes.*

Introduction. Recurrent varicose vein disease (RVVD) of the lower extremities persistently ranks among the most pressing challenges in contemporary phlebology. The incidence of recurrence following interventions remains notably substantial, ranging from 13 % to as high as 65 % [1]. Traditional surgical interventions, such as saphenofemoral junction (SFJ) ligation or great saphenous vein (GSV) stripping, often yielded only temporary symptomatic relief; however, recurrence is observed in approximately half of patients within a 5- to 10-year postoperative period [2]. This consequently imposes not only a clinical but also a significant socioeconomic burden on healthcare systems [3].

According to the international REVAS (Recurrent Varices After Surgery) consensus, three primary mechanisms of recurrence are delineated: true recurrence (associated with neoangiogenesis in the SFJ or saphenopopliteal junction (SPJ) region), residual reflux, and newly formed lesions [4]. The most frequent etiologies include neoangiogenesis, the progression of varicose vein disease, the persistence of pathological perforating veins, and pelvic venous reflux, predominantly observed in female patients [5,6]. In accordance with the ESVS 2022 guidelines, endovenous methods are recommended as primary tools for the elimination of pathological reflux [7]. Nevertheless, contemporary guidelines offer scant coverage regarding the management of patients presenting with recurrent forms complicated by thrombosis [8]. Superficial venous thrombosis (SVT) represents the most prevalent complication of varicose vein disease, carrying

an associated risk of propagation into the deep venous system or the development of pulmonary embolism [9]. The incidence of concomitant deep vein thrombosis (DVT) can reach up to 30 % of cases [10]. Key risk factors include age, obesity, pregnancy, thrombophilia, and venous stasis [11,12]. In patients experiencing recurrences after previous interventions, the combination of venous hypertension and localized endothelial trauma increases the probability of varicothrombophlebitis [13].

In accordance with the CHEST 2024 and ESVS 2021 guidelines, the management of SVT primarily focuses on the prevention of venous thromboembolism (VTE) and involves a short course of anticoagulation, specifically fondaparinux 2.5 mg or rivaroxaban 10 mg daily for approximately 45 days [14,15]. However, these guidelines do not provide a clear algorithm for the definitive elimination of superficial reflux following stabilization of the acute phase. This represents a significant clinical gap, especially pertinent for patients presenting with recurrent forms of the disease, where persistent pathological reflux demonstrably perpetuates thrombogenesis [7,15,16].

Isolated studies demonstrate the potential utility of endovenous laser ablation (EVLA) in the management of SVT within the context of varicose vein disease. However, such case series are often limited by small patient cohorts and typically do not encompass individuals experiencing recurrent disease. Specifically, the INSIGHTS-SVT study demonstrated that the risk of VTE following acute SVT remains elevated for 12 months, and surgical interventions (including endovenous procedures) were performed in less than 10 % of cases, highlighting the insufficient integration of endovenous approaches into current SVT treatment protocols [17].

From a pathophysiological perspective, persistent reflux in varicose veins maintains venous hypertension and stasis, thereby creating conditions conducive to thrombus formation. Consequently, therapeutic strategies solely limited to anticoagulation fail to address this key pathogenic mechanism. The combined application of endovenous technologies subsequent to the stabilization of acute SVT may therefore represent a more physiologically sound and effective approach [18].

Aim. The objective of this study was to evaluate the effectiveness of combined minimally invasive interventions (EVLA)/ Radiofrequency ablation (RFA) in combination with Ultrasound-guided foam sclerotherapy (UGFS) and/ or miniphlebectomy (MF) in the treatment of recurrent varicose veins of the lower extremities complicated by SVT.

Materials and Methods

Study Design and Population

This was a single-center cohort study with both retrospective and prospective components. The retrospective cohort included 29 patients who underwent secondary interventions for recurrent varicose veins complicated by SVT between 2019 and 2024. The prospective component included two additional patients treated in 2025. In total, 31 patients were analyzed (24 women and 7 men; mean age 55±13 years) (Table 1).

Table 1

Distribution of patients by CEAP clinical class (C2-C6) and age groups, presented separately for men (n=7), women (n=24), and in total (n=31)

Characteristic	Men (n=7)	Women (n=24)	Total (n=31)
CEAP stage	(n=7)	(n=24)	(n=31)
C2	2 (28.6 %)	6 (25.0 %)	8 (25.8 %)
C3	5 (71.4 %)	15 (62.5 %)	20 (64.5 %)
C4	0 (0.0 %)	1 (4.2 %)	1 (3.2 %)
C6	0 (0.0 %)	2 (8.3 %)	2 (6.5 %)
Age (years)	(n=7)	(n=24)	(n=31)
⩽30	0 (0.0 %)	1 (4.2 %)	1 (3.2 %)
31–45	2 (28.6 %)	7 (29.2 %)	9 (29.0 %)
46–60	3 (42.9 %)	7 (29.2 %)	10 (32.3 %)

The mean body mass index (BMI) was 28±6 kg/m^2, corresponding to overweight.

Inclusion and Exclusion Criteria

Eligible participants were adults with symptomatic recurrent varicose veins (clinical classes C2r–C6r according to CEAP 2020) and documented SVT confirmed by duplex ultrasound. Exclusion criteria were acute DVT, active infection, pregnancy, severe cardiopulmonary insufficiency, or inability to ensure follow-up.

The study was conducted in accordance with the Declaration of Helsinki and national regulatory requirements. The protocol was approved by the Bioethics Committee of Bogomolets National Medical University (Protocol No. 186, 24.06.2024). All patients provided written informed consent.

Duplex Ultrasound Examination

All patients underwent standardized ultrasound duplex scanning of the lower extremities in an upright position with minimal transducer pressure, utilizing a high-frequency linear array transducer. Reflux was evaluated using recommended provocative maneuvers (Valsalva/ cough, compression-decompression) with thresholds of >0.5 s for superficial segments/junctions, >0.35-0.5 s for perforating veins, and >1.0 s for deep veins, in accordance with current ultrasound duplex scanning standards [19].

Previous Interventions

In 22 (71 %) of cases, patients had a history of open surgery/stripping; 7 (22.5 %) had prior EVLA or RFA; the remainder underwent local miniphlebectomy or combined operations. The median interval between the initial procedure and the development of recurrence or SVT was 15 years (IQR 6-30). On average, patients underwent 1-2 procedures on the same limb before inclusion in this study.

Characteristics of Thrombosis

SVT was diagnosed by duplex ultrasound in all patients before intervention. The median interval between symptom onset and treatment was 18 days (IQR 10–32).

Venous puncture was performed immediately proximal to the thrombotic segment. The laser fiber was not

pushed through the thrombus. Thermal ablation was applied only to refluxing segments free of thrombotic material, whereas veins with partial mural recanalization were treated using ultrasound-guided foam sclerotherapy.

Interventions

All patients were treated using minimally invasive or combined approaches, tailored to the anatomical distribution of reflux and individual risk profile. The therapeutic arsenal included:

EVLA: performed with a diode laser (Biolitec Ceralas) using a 2-ring radial fiber, power 6-7 W, automated fiber pullback at 0.7 mm/s; linear endovenous energy density (LEED) 70-90 J/cm.

RFA: Closure Fast catheter, heating cycle 20 s at 120 °C.

UGFS: 1-3% polidocanol foam, 1-3 mL per injection, prepared using the Tessari method – double-syringe technique (1 mL sclerosant + 2-3 mL air, agitated 20-30 times).

MF: removal of tributaries through micro-incisions according to Varady technique.

Phlebocentesis: evacuation of thrombotic material through 2-3 mm punctures under tumescent anesthesia.

Most patients underwent combined procedures (e.g., EVLA/RFA + UGFS + MF). All patients received rivaroxaban 15-20 mg/day for 20-45 days. The choice of a 20-45-day course of rivaroxaban (15-20 mg/day) was based on evidence from the INSIGHTS-SVT study [17], which demonstrated that the risk of venous thromboembolism remains elevated for up to 12 months after an acute SVT event, supporting the rationale for extended anticoagulation beyond 45 days in high-risk patients. Immediately after surgical treatment, class II compression stockings and early ambulation were prescribed.

The rationale for using intermediate-dose anticoagulation was based on evidence that standard prophylactic regimens may not provide sufficient protection against thrombus extension or recurrence in high-risk superficial vein thrombosis. Intermediate dosing ensures sustained anticoagulant activity while maintaining an acceptable safety profile, as supported by recent clinical reviews emphasizing the need for individualized, risk-adjusted therapy intensity in this population [20]. All procedures were performed in an office-based surgical setting.

Classifications and Endpoints

Clinical, etiological, anatomical, and pathophysiological characteristics were described using the CEAP 2020 classification, with subclass C4c and modifier "r" for recurrence. The REVAS classification was applied to characterize recurrence mechanisms [1].

Primary endpoints:

1. Occlusion or absence of reflux in the treated vein segment;
2. Thrombus regression;
3. Disease recurrence;
4. Serious complications (EHIT ≥ II, DVT, PE, burns, neuropathy).

Secondary endpoints included changes in VCSS, CIVIQ-14, VDS, and VDSS before and after treatment.

Clinical Assessment Tools

- Venous Clinical Severity Score (VCSS): physician-assessed score evaluating venous disease severity (pain, varicosities, edema, skin changes), each attribute 0-3, higher scores = more severe disease [21].
- Venous Disability Score (VDS): simple 0-3 scale classifying patient's ability to perform daily activities, higher = greater disability [21].
- Venous Disease Severity Score (VDSS): disease-specific measure, with higher values indicating more severe disease.
- CIVIQ-14: a validated 14-item questionnaire assessing health-related quality of life in chronic venous disease; lower scores indicate better quality of life [22].

VCSS and VDS were originally introduced by the American Venous Forum to standardize assessment of chronic venous insufficiency severity and disability [21].

Follow-up and Statistical Analysis

Follow-up visits were performed on day 7, at 1, 6, and 12 months, and annually thereafter for up to 5 years. Statistical analysis was conducted using R (R Foundation) and SPSS (IBM). Continuous variables were expressed as mean ±SD or median (IQR); categorical variables as n (%). Group comparisons were performed using t-tests or Mann–Whitney U tests, and χ^2 or Fisher's exact tests. Time-to-event analyses (recurrence, loss of occlusion) were conducted using Kaplan–Meier survival curves with log-rank test. Risk factors were assessed using multivariate logistic regression with Firth correction and Cox proportional hazards models, adjusting for age, sex, BMI, type of intervention, and CEAP/REVAS classification. Missing data were imputed using multiple imputation by chained equations (MICE). Statistical significance was set at $p<0.05$.

Results

Anatomical Characteristics of Recurrence

Duplex ultrasound revealed a heterogeneous pattern of reflux pathways. The total number of reflux sources exceeded the number of patients because 24 of 31 (77 %) had more than one reflux source (median 2 sources per patient; mean 2.52, range 0-5).

The main sources of reflux and thrombosis identified by duplex ultrasound, with detailed localization of the thrombotic lesion (distance from junctions or perforators) and the corresponding minimally invasive treatments, including endovenous laser ablation (EVLA), radiofrequency ablation (RFA), and ultrasound-guided sclerotherapy (UGST), are summarized in Table 2. These findings indicate that, in the majority of patients with recurrent varicose vein disease complicated by superficial thrombophlebitis, multiple reflux sources contributed to venous hypertension and guided the choice of a tailored minimally invasive treatment strategy.

Thrombotic masses exhibited varying degrees of recanalization depending on the time elapsed since SVT onset. Patients in whom the reflux source was occluded by thrombotic material initially received therapeutic-dose anticoagulation with NOACs. Upon achieving complete or

Table 2

Causes of recurrence, localization of thrombotic masses, and types of minimally invasive interventions in patients with recurrent varicose vein disease complicated by superficial thrombophlebitis (n=31).

Causes of recurrence	Number of patients 31(100 %)	Localization of thrombotic masses	Types of interventions
Calf (1-st of them with AASV and 2-nd with Varicoangiomatosis (VAM) SFJ)	4 (13 %)	thrombophlebitis of varicose veins of the calf more than 2 centimeters distal to the perforator	EVLA of the Thiery perforator (AASV) UGST VAM, phlebocentesis, MF
AASV (Anterior Accessory Saphenous Vein) → Thigh (involved calf perforators)	4 (13 %)	thrombophlebitis of the trunk and tributaries of the AASV distal to 5 cm from the SFJ	EVLA of the AASV, UGST partially recanalized tributaries of the AASV and varicose veins on the calf
VAM SFJ → GSV (calf) → Calf (involved calf perforators)	1 (3,2 %)	Thrombophlebitis of tributaries GSV on the calf	EVLA of the GSV, UGST VAM SFJ and calf perforators
AASV → Calf	1 (3.2 %)	Thrombophlebitis of the varicose veins on the calf	EVLA of the AASV, MF
VAM SFJ → GSV (thigh) → Thigh	2 (6.4 %)	thrombophlebitis of the trunk (part or whole) and tributaries of the GSV	EVLA of the GSV, UGST VAM SFJ
SSV intact → Calf (1 of them with GSV)	4 (13 %)	thrombophlebitis of the trunk and tributaries of the SSV distal to 5 cm from the SPJ	EVLA of the SSV, UGST partially recanalized tributaries of the AASV
VAM SFJ → GSV (with Dodd involved) → Thigh	4 (13 %)	thrombophlebitis of tributaries of the GSV on the thigh	EVLA of the GSV, UGST VAM SFJ
VAM SFJ → AASV → Thigh	4 (13 %)	thrombophlebitis of the trunk (part or whole) and tributaries of the AASV	EVLA of the AASV, UGST VAM SFJ
GSV not removed (thigh) → Thigh (1 of them with SSV)	2 (6.4 %)	thrombophlebitis of the trunk and tributaries of the GSV distal to 5 cm from the SFJ	RFA of the GSV, EVLA of the SSV, phlebocentesis
GSV not removed (calf) → Calf (involved calf perforators)	2 (6.4 %)	thrombophlebitis of tributaries of the GSV on the calf	EVLA of the GSV, UGST calf perforators, phlebocentesis
Dodd perforator → GSV Thigh & Calf (involved calf perforators)	2 (6.4 %)	thrombophlebitis of the trunk and tributaries of the GSV distal to 3 cm from the Dodd perforator	EVLA of the Dodd perforator, UGST calf perforators
SSV stump → Calf	1 (3.2 %)	Thrombophlebitis of the varicose veins on the calf	UGST of the SSV stump, MF

partial recanalization, they underwent thermal and/or chemical ablation. Conversely, patients with patent reflux sources were operated on promptly, followed by postoperative anticoagulant therapy. Given the relatively small sample size (n = 31), detailed statistical stratification of these subgroups was not performed.

These findings correspond to true recurrence per REVAS, whereas residual reflux or newly affected segments predominated in the remaining cases [1].

Timing of Recurrence

The median interval from index surgery to recurrence/SVT was 11.5 years (IQR 6-26), with the main peak at 5-9 years (39 %), followed by 10-14 years (29 %), >15 years (23 %), and 1-4 years (6 %).

Combination of Procedures

Each patient's treatment was categorized according to the combination of procedures performed. Nearly all patients (29 out of 31) underwent EVLA as part of their treatment for recurrent varicose veins, often combined with adjunct procedures such as UGFS and MF. RFA was used in two cases (one of them in combination with EVLA), and a few patients received phlebocentesis as an additional procedure. This indicates a preference for EVLA in managing recurrent varicose disease, frequently supplemented by foam sclerotherapy to obliterate residual varices and MF to remove varicose tributaries. These combinations reflect tailored treatment plans, with the triple combination EVLA + UGFS + MF being the most prevalent approach in this cohort. The full summary is illustrated in Fig. 1.

Recurrence-Free Survival

Kaplan–Meier analysis was performed for time to re-recurrence or thrombotic event in all 31 patients. Within the first two years after treatment, no recurrences were observed. A single recurrence occurred in year five in a patient with combined GSV and SSV reflux; this case did not require repeat intervention. No significant differences were detected by sex (Fig. 2).

The curves demonstrate recurrence-free survival probability over time, showing a longer recurrence-free interval in men compared with women.

No significant differences were observed by presence or absence of baseline GSV reflux ($p>0.05$) (Fig. 3).

The survival curves compare recurrence-free probability in patients with GSV insufficiency versus those

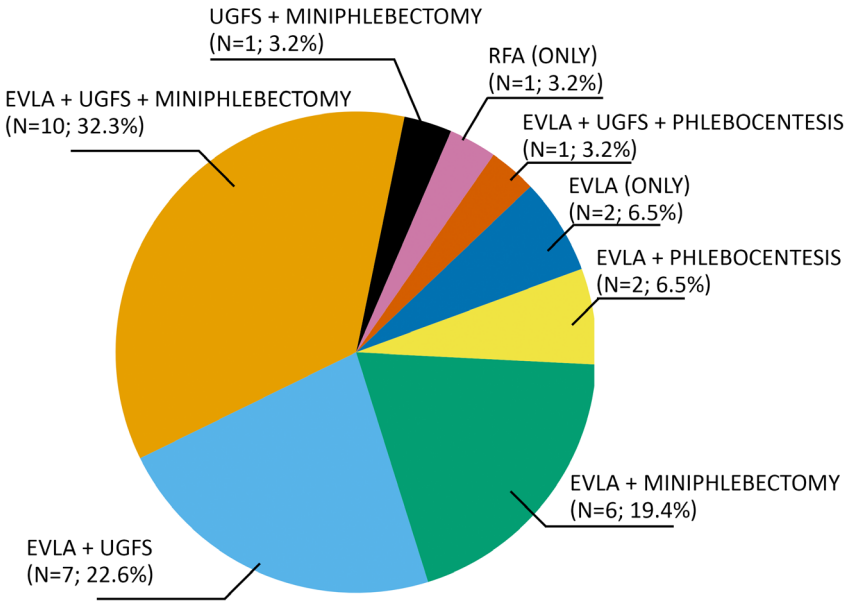

Figure 1. *Distribution of individual procedures (n=31 patients)*

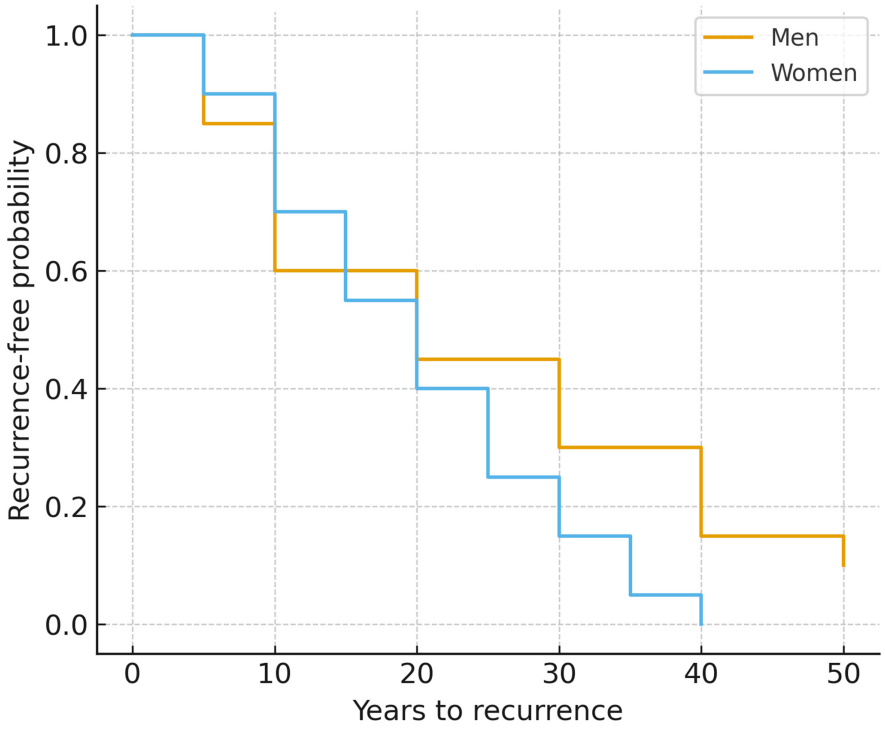

Figure 2. *Kaplan–Meier curves of time to recurrence by sex (n=31)*

without insufficiency. Patients with preserved GSV competence demonstrated a longer recurrence-free interval.

Thus, the combined minimally invasive strategy ensured long-term occlusion and stability without clinically significant recurrence.

Pre- and Post-Treatment Clinical Outcomes

All four measures improved significantly after treatment: VCSS decreased from 5.5±2.9 to 2.1±2.3, CIVIQ-14 from 35.2±11.1 to 22.2±9.5, VDS from 1.9±0.5 to 0.8±0.7, and VDSS from 3.7±2.7 to 1.5±2.6 (all $p<0.001$); see Fig. 4. Standardized effect sizes were large (Cohen's d: VCSS 1.6; CIVIQ-14 1.9; VDS 2.0; VDSS 0.8), confirming both statistical and clinical significance. Mean scores of VCSS, CIVIQ-14, VDS, and VDSS are shown before and after the intervention, indicating significant clinical and quality-of-life improvement.

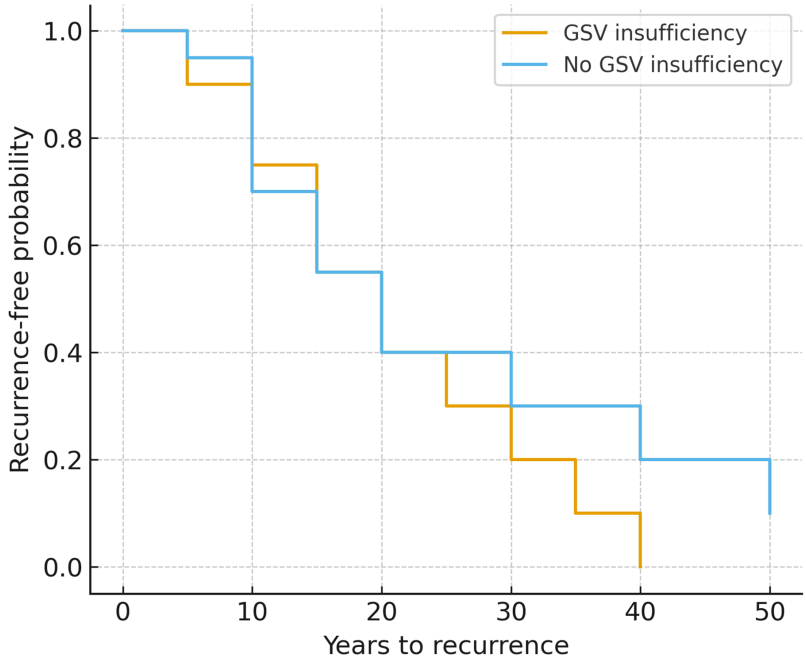

Figure 3. *Kaplan–Meier curves of time to recurrence by great saphenous vein (GSV) status (n=31)*

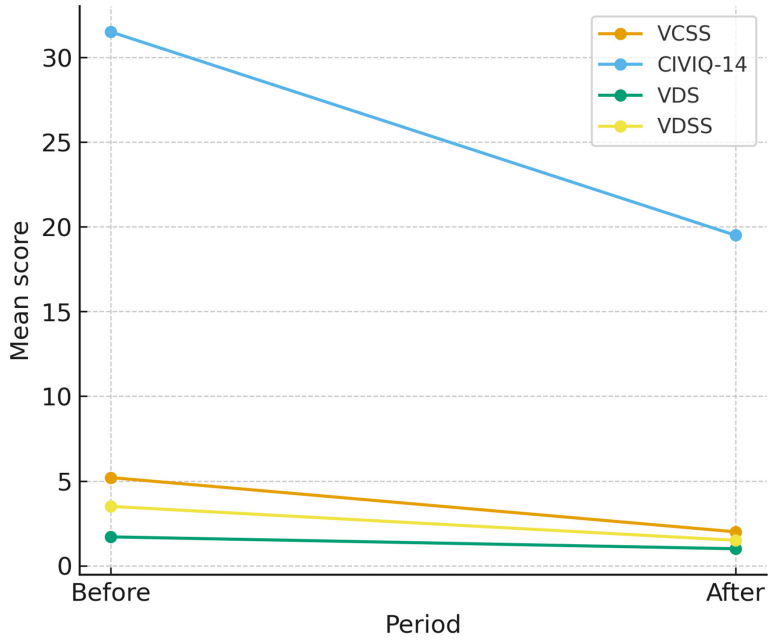

Figure 4. *Clinical and functional results before and after treatment (n=31)*

Forest plot analysis of standardized effect sizes (Cohen's d) demonstrated large post-treatment benefits across all scores: d=1.6 for VCSS, d=1.9 for CIVIQ-14, d=2.0 for VDS, and d=0.8 for VDSS, all with 95 % confidence intervals above zero, confirming both statistical and clinical significance. These results are illustrated graphically (Fig. 5).

The forest plot illustrates odds ratios (OR) with 95 % confidence intervals for predictors of VCSS improvement. Both univariable and multivariable analyses are presented for BMI and age.

Discussion. Recurrent varicose veins remain a complex problem owing to anatomical variability and heterogeneous recurrence mechanisms. In our cohort, combined reflux in the great and small saphenous systems with varicoangiomatosis at the SFJ/SPJ was common, indicating a multifactorial process rather than a mere technical failure of the index procedure.

According to REVAS, recurrence comprises three categories: true recurrence from neovascularization, residual recurrence from incompletely treated reflux, and newly affected segments, while combining REVAS with

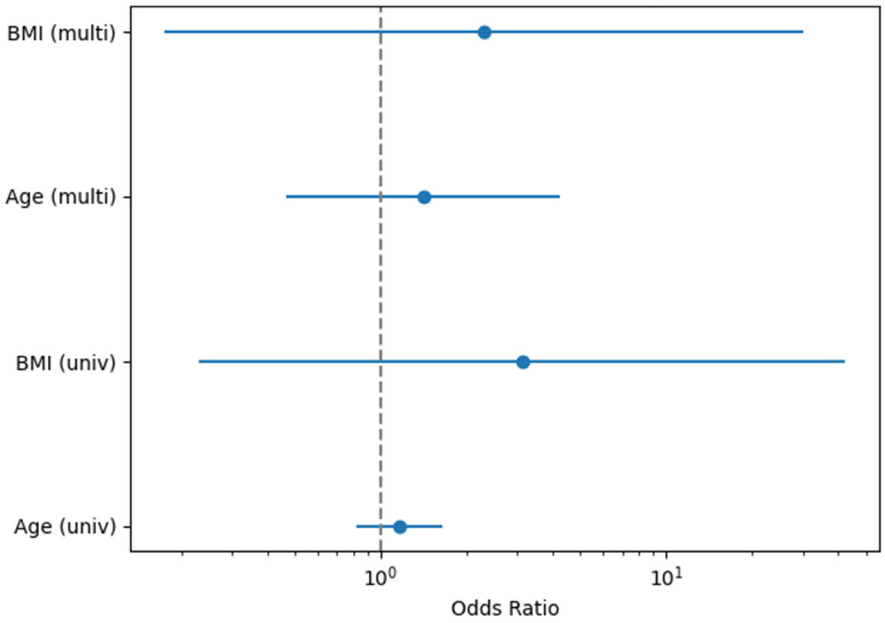

Figure 5. *Forest plot for predictors of VCSS improvement*

CEAP improves consistency of postoperative assessment and treatment planning [1,23].

Historically, redo open operations at the SFJ/SPJ carried higher risks of lymphorrhea, infection, and prolonged recovery; contemporary guidelines therefore advise avoiding open reoperations when effective endovenous options are available [7,24].

In this series, we used outpatient, minimally invasive management even in the presence of thrombotic complications. Integrating EVLA/RFA with UGFS and MF enabled elimination of truncal reflux and neovascular collaterals with rapid recovery and without major complications.

Contemporary data also support minimally invasive strategies: UGFS provides a three-year recurrence-free rate comparable to open surgery (~89 % vs ~88 %), yet with shorter rehabilitation [25]. A multimodal algorithm is practical – EVLA/RFA for truncal reflux, UGFS for neovascular channels, and MF for tributaries – allowing correction of the full spectrum of recurrence mechanisms.

The main limitations are the small sample (n=31) and limited follow-up, underscoring the need for larger prospective studies to validate durability and refine selection criteria.

Conclusions

1. Recurrent varicose vein disease is characterized by multifactorial pathogenesis, including combined reflux in the great and small saphenous veins, residual reflux, de novo varicose segments, and neovascularization (varicoangiomatosis). The use of the REVAS classification alongside CEAP provides a more comprehensive assessment of recurrence 2.
2. Minimally invasive combined interventions (EVLA/RFA + UGFS ± MF) demonstrated safety and efficacy even in complex clinical scenarios, including recurrences with thrombotic complications and even true recurrence due to neovascularization. This approach provides comprehensive control of recurrence mechanisms, minimizes invasiveness, and ensures rapid recovery.
3. To our knowledge, this study is among the first to demonstrate the feasibility of exclusively minimally invasive techniques performed in an office-based surgical setting for recurrent varicose veins with thrombotic complications. This underscores the novelty and originality of the results obtained.
4. The main limitation of this study is the relatively small cohort size and limited follow-up period. Future research should focus on larger, prospective, multicenter studies to confirm long-term effectiveness and to establish minimally invasive combined strategies as a new standard of care for recurrent varicose disease.

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Prospects for Further Research. Further multicenter prospective studies with larger patient cohorts and extended follow-up are needed to confirm the long-term efficacy and safety of combined minimally invasive

approaches in patients with recurrent varicose vein disease complicated by superficial vein thrombosis. Future work should also address hemodynamic modeling and cost-effectiveness analysis.

Compliance with Ethical Standards. The authors confirm that this study is based on their own clinical data and analyses. Primary data include summarized patient characteristics, laboratory findings, operative protocols, and quantitative parameters obtained during the study. All materials are stored in the research archive of the research group and can be provided upon reasonable request to the corresponding author, in accordance with confidentiality and ethical requirements. The research protocol was approved by the Bioethics Committee of Bogomolets National Medical University (Protocol No. 186, 24 June 2024) and complies with the principles of the Declaration of Helsinki.

Use of Artificial Intelligence. No artificial intelligence tools were used in any stage of this study, including data collection, analysis, interpretation, or manuscript preparation. All research procedures and documentation were carried out exclusively by the author.

Primary Data and Materials. The anonymized clinical dataset and supplementary documentation supporting the findings of this study are available from the corresponding author upon reasonable request. Access will be provided in compliance with institutional data-protection policy and ethical standards.

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Мініінвазивна терапія рецидивів варикозної хвороби з тромботичними ускладненнями

Щукін С. П.

Національний медичний університет імені О.О. Богомольця, м. Київ, Україна

ТОВ Медичний центр флебології та естетичної медицини «Флебос», Київ, Україна

Резюме

Вступ. Рецидивна варикозна хвороба (РВХ) залишається поширеною проблемою після відкритих або ендовенозних втручань (≈13-65 %). Механізми рецидиву включають залишковий рефлюкс, de novo варикозні зміни та неоваскуляризацію. При ускладненні тромбозом поверхневих вен (ТПВ) лікування є складним, оскільки чинні настанови зосереджені переважно на антикоагуляції й рідко передбачають усунення рефлюксу.

Мета. Оцінити здійсненність, безпечність і клінічну ефективність комбінованого мінімально інвазивного лікування РВХ, ускладненої ТПВ.

Матеріали та методи. До одноцентрового когортного дослідження включено 31 пацієнта (24 жінки, 7 чоловіків; середній вік 55±13 років) з РВХ (CEAP C2r–C6r) і підтвердженим за УЗДС ТПВ, пролікованих у 2013-2025 рр. Застосовано ендовенозну лазерну або радіочастотну абляцію (ЕВЛА/РЧА), пінну склеротерапію під контролем ультразвуку (ЕхоСТ) та мініфлебектомію (МФ) окремо або в комбінації. Призначали короткий курс ривароксабану (15-20 мг/добу протягом 20-45 днів). Первинні кінцеві точки: оклюзія сегмента, елімінація рефлюксу, регрес тромбозу, рецидив, ускладнення (ЕНІТ, ТГВ, ТЕЛА). Вторинні – зміни показників VCSS, CIVIQ-14, VDS і VDSS.

Результати. Рефлюкс ВПВ виявлено у 20 (65 %) пацієнтів, МПВ – у 15 (48 %) пацієнтів, некомпетентні перфоранти – у 23 (74 %) пацієнтів. Неоваскуляризацію в ділянках SFJ/SPJ зафіксовано у 10 (32 %) пацієнтів, що підтверджувало істинний рецидив. ЕВЛА виконано у 29 із 31 пацієнта, зазвичай у комбінації з ЕхоСТ ± МФ. Після лікування VCSS знизився з 5,5 до 2,1 бала, CIVIQ-14 – з 35,2 до 22,2 ($p<0,001$). Випадків ЕНІТ ≥ II, ТГВ або ТЕЛА не зареєстровано. Регрес тромбозу за УЗДС підтверджено у 94 % пацієнтів.

Висновки. Комбіноване мінімально інвазивне лікування (ЕВЛА/РЧА + ЕхоСТ ± МФ) є безпечним, ефективним і здійсненним варіантом терапії РВХ, ускладненої ТПВ. Цей підхід забезпечує стійкий анатомічний результат, швидке відновлення та суттєве покращення якості життя пацієнтів.

Ключові слова: *недостатність підшкірних вен, передня додаткова підшкірна вена (ПДПВ), тромбоз поверхневих вен, ендовенозна термічна абляція, пінна склеротерапія під контролем ультразвуку, радіочастотна катетерна абляція, некомпетентність перфорантних вен, показники якості життя.*

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