

Concept of venous thromboembolism prophylaxis following endovenous thermal procedures for chronic venous disease of the lower limbs

O. Yu. Atamaniuk^{1,A,B,C,D,F}, V. D. Skrypko^{1,E,F}, S. V. Fedorov^{1,E,F}, V. M. Atamaniuk^{2,C,D}

¹Ivano-Frankivsk National Medical University, Ivano-Frankivsk, Ukraine, ²Royal Jubilee Hospital, Victoria, British Columbia, Canada

A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of the article

Keywords:

chronic venous disease, thermal treatment methods, radiofrequency ablation, endovenous laser coagulation, venous thromboembolism, EHIT, prophylaxis.

Zaporozhye Medical Journal. 2026;28(3):194-199

Aim. To enhance the safety and efficacy of thermal ablation procedures in patients with chronic venous disease (CVD) of the lower limbs by developing a strategy for venous thromboembolism (VTE) prevention.

Materials and methods. This single-center, prospective, open-label study included 420 consecutive patients with CVD (C2–C6). Participants underwent radiofrequency ablation (RFA, n = 206) or endovenous laser ablation (EVLA, n = 214). At the first stage, VTE risk stratification was conducted using the Caprini scale; at the second stage, the optimal thromboprophylaxis algorithm was selected. Patients were divided into two homogeneous groups. Group 1 (208 patients) received VTE prevention with standard elastic compression only, while Group 2 (212 patients) received prophylaxis based on the proposed algorithm. The incidence of postoperative VTE and bleeding complications was assessed.

Results. According to VTE risk stratification, 23.6 % of patients were classified as low risk, 63.1 % as moderate risk, 9.0 % as high risk, 3.1 % as very high risk, and 1.2 % as the highest risk. Based on the second phase analysis, 12 patients (2.9 %) of Group 1 developed thrombotic complications during the early postoperative period: EHIT class II was diagnosed in 3 cases (0.7 %) after EVLA and in 2 cases (0.5 %) after RFA. Additionally, distal deep vein thrombosis (DVT) was detected in 7 patients (1.7 %) with high VTE risk on postoperative day 7: 3 after EVLA and 4 after RFA. Implementation of the proposed thromboprophylaxis strategy significantly reduced the total incidence of thrombotic complications compared to Group 1 (0.4 % vs. 2.9 %; p = 0.031). In Group 2, only one patient (0.4 %) with moderate VTE risk was diagnosed with distal DVT. Among 39 patients (18.3 %) who received prophylactic acetylsalicylic acid or rivaroxaban, a statistically significant increase in ecchymosis occurrence was observed (p = 0.018).

Conclusions. Implementing a differentiated, risk-oriented thromboprophylaxis strategy significantly (p = 0.031) reduced the incidence of VTE from 2.9 % to 0.4 %, p = 0.031, without increasing the risk of clinically significant bleeding.

Ключові слова:

хронічні захворювання вен, термічні методи лікування, радіочастотна абляція, ендовенозна лазерна коагуляція, венонний тромбоемболізм, ЕНІТ, профілактика.

Запорізький медичний журнал. 2026. Т. 28, № 3(156). С. 194-199

Концепція профілактики венозного тромбоемболізму після застосування ендовенозних термічних методів лікування хронічних захворювань вен нижніх кінцівок

О. Ю. Атаманюк, В. Д. Скрипко, С. В. Федоров, В. М. Атаманюк

Мета роботи – покращити безпечність та ефективність термічної абляції у пацієнтів з хронічними захворюваннями вен (ХЗВ) нижніх кінцівок шляхом розроблення стратегії профілактики венозного тромбоемболізму (ВТЕ).

Матеріали і методи. Здійснили одноцентрове, відкрите, проспективне дослідження, до якого залучено 420 послідовних пацієнтів із ХЗВ С2–С6. У 206 випадках виконано радіочастотну абляцію (РЧА), у 214 – ендовенозну лазерну коагуляцію (ЕВЛК). На першому етапі здійснили стратифікацію ризику ВТЕ за шкалою Капріні, на другому етапі визначено оптимальний алгоритм тромбпрофілактики. Пацієнтів поділили на дві зіставні групи дослідження. До першої групи залучено 208 пацієнтів, профілактика ВТЕ у яких передбачала тільки застосування еластичних виробів. До другої групи залучено 212 обстежених, у котрих профілактику ВТЕ здійснили відповідно до запропонованого алгоритму. Оцінювали розвиток післяопераційного ВТЕ та частоту кровотеч.

Результати. За ступенем ризику ВТЕ розподіл пацієнтів такий: 23,6 % – низького ризику, 63,1 % – середнього, 9,0 % – високого, 3,1 % – дуже високого, 1,2 % найвищого ризику. За результатами аналізу другого етапу дослідження встановлено, що у 12 (2,9 %) пацієнтів першої групи у ранньому післяопераційному періоді виникли тромботичні ускладнення: у 3 (0,7 %) – після ЕВЛК, у 2 (0,5 %) – після РЧА діагностовано ЕНІТ II класу. Крім того, у 7 (1,7 %) пацієнтів із високим ризиком ВТЕ на сьому добу виявлено дистальний тромбоз глибоких вен: у 3 випадках – після ЕВЛК, у 4 – після РЧА. Застосування запропонованої стратегії тромбпрофілактики асоційоване з вірогідним зниженням загальної частоти тромботичних ускладнень порівняно з першою групою (0,4 % проти 2,9 %; p = 0,031). У другій групі лише в одного пацієнта (0,4 %) із помірним ризиком ВТЕ діагностовано дистальний тромбоз глибоких вен. У 39 (18,3 %) пацієнтів, які з профілактичною метою отримували ацетилсаліцилову кислоту або ривароксабан, визначено вірогідне збільшення частоти розвитку екхімозів (p = 0,018).

Висновки. Запровадження диференційованої, ризик-орієнтованої стратегії тромбпрофілактики сприяло вірогідному (p = 0,031) зниженню частоти ВТЕ з 2,9 % до 0,4 % без підвищення ризику клінічно значущих кровотеч.

Technological advancements in medicine have led to significant changes in the treatment of chronic venous disease (CVD) of the lower limbs. Minimally invasive treatment methods have largely replaced open surgery in many phlebology centers and have become the gold standard in the management of this condition [1,2]. However, despite these advances, minimally invasive phlebological procedures remain associated with the risk of venous thromboembolism (VTE).

According to retrospective studies, the prevalence of symptomatic deep vein thrombosis (DVT) appears relatively low, under 1 %, with pulmonary embolism occurring in approximately 0.063 % of cases [3]. In contrast, prospective observational studies have reported a 5- to 10-fold increase in VTE incidence with DVT rates ranging between 3.5 % and 7.3 %, resulting in significant disability and broader socioeconomic consequences [4]. Thermal ablation presents a unique VTE risk compared with other short-term surgical procedures, showing a VTE incidence comparable to that observed after major joint surgeries. Conversely, comparable day-case procedures such as inguinal hernia repair and laparoscopic cholecystectomy demonstrate substantially lower VTE rates. Even major abdominal surgeries such as colectomy are associated with a lower incidence of VTE compared to thermal ablation procedures [5,6].

The literature highlights substantial uncertainty regarding the utility of risk assessment for guiding thromboprophylaxis in patients undergoing superficial venous interventions [7]. Current protocols applied in phlebology centers are primarily based on individualized risk stratification, adapted or extrapolated from general surgical VTE prevention guidelines [8]. Efforts to mitigate VTE risk have resulted in various clinical approaches in the United Kingdom: 52 % of clinicians routinely administer a single dose of low-molecular-weight heparin, 15 % prescribe extended pharmacological thromboprophylaxis with low-molecular-weight heparin or direct oral anticoagulants, and 33 % do not use any pharmacological thromboprophylaxis entirely [9].

The lack of strong evidence has led to considerable heterogeneity in clinical practice, which often differs across countries. For example, Emily Boyle et al. reported that 73.3 % of Irish vascular surgeons routinely use postoperative chemothromboprophylaxis following CVD surgery [10], whereas Alcides Ribeiro et al. reported anticoagulant use in only 28 % of open and 34 % of endovenous procedures in Brazil [11]. Moreover, both the quantity and methodological quality of studies on antithrombotic prophylaxis following open or minimally invasive CVD interventions remain exceedingly limited.

International guidelines highlight the scarcity of high-quality evidence in this domain. The European Society for Vascular Surgery (ESVS) guidelines provide a class IIa, level B recommendation for considering individualized thromboprophylaxis strategies [1]. In contrast, NICE clinical guidance advises against routine thromboprophylaxis for patients undergoing CVD interventions when their VTE risk is low [12]. Meanwhile, American consensus statements recommend pharmacological thromboprophylaxis for high-risk patients undergoing endovenous ablation, albeit as class 2C recommendations [2].

Beyond the uncertain value of routine thromboprophylaxis, there is no consensus regarding the optimal pharma-

cological approach. Evidence remains limited concerning the most suitable agents, dosages, or duration of thromboprophylaxis when applied.

Aim

To enhance the safety and efficacy of thermal ablation procedures in patients with chronic venous disease of the lower limbs by developing a strategy for venous thromboembolism prevention.

Materials and methods

According to the study design, a single-center, open-label, prospective study was conducted between 2019 and 2024 and enrolled 420 consecutive patients with clinically evident CVD classified as C2–C6 based on the CEAP classification [13].

Inclusion criteria were age over 18 years, pathological reflux in the great or small saphenous veins, and provision of written informed consent to participate in the study. Exclusion criteria encompassed indications for therapeutic anticoagulation (such as atrial fibrillation or thrombophilia), a history of deep or superficial vein thrombosis, congenital vascular malformations, obliterating arterial disease of the lower limbs, severe systemic diseases, known allergy to aspirin or direct oral anticoagulants, pregnancy or lactation, and inability to provide informed consent.

Eligible patients underwent treatment in a day-surgery setting. In 206 cases, radiofrequency ablation (RFA) of the affected venous trunks was performed using the Closure RFG generator and ClosureFast™ Catheter (Medtronic, San Jose, CA, USA) with a 7 cm heating element for the great saphenous vein (GSV) and a 3 cm element for the small saphenous vein (SSV), following the established technique [14]. Endovenous laser ablation was performed in 214 cases using an 80 W, 940 nm Dornier Medilas D MultiBeam system (Dornier MedTech, Germany) and bare-tip fibers. All interventions employed tumescent local anesthesia with concomitant miniphlebectomy.

The mean age of the enrolled patients was 49.8 ± 9.4 years. Females represented the majority of the study population (286 patients, 68.1 %). Mean body mass index (BMI) was 26.9 ± 1.4 kg/m².

In the first phase, VTE risk was stratified using the Caprini score. Each individual risk factor was assigned a defined point value ranging from 1 to 5 based on thrombotic potential, followed by calculation of the patient's total individual risk score. The degree of VTE risk was categorized using the online tool developed by Professor Joseph Caprini [15]. Consistent with the total score, risk levels were classified as follows: low risk – 0–2 points, moderate risk – 3–4 points, high risk – 5–6 points, very high risk – 7–8 points, highest risk – ≥ 9 points.

The second phase aimed to validate an optimized thromboprophylaxis algorithm. For this purpose, patients were randomized into two matched cohorts by CEAP class, age, and treatment modality. Group 1 included 208 patients who received VTE prevention with class II elastic compression garments alone, while Group 2 comprised 212 patients who underwent VTE prophylaxis following the proposed algorithm (Fig. 1).

1

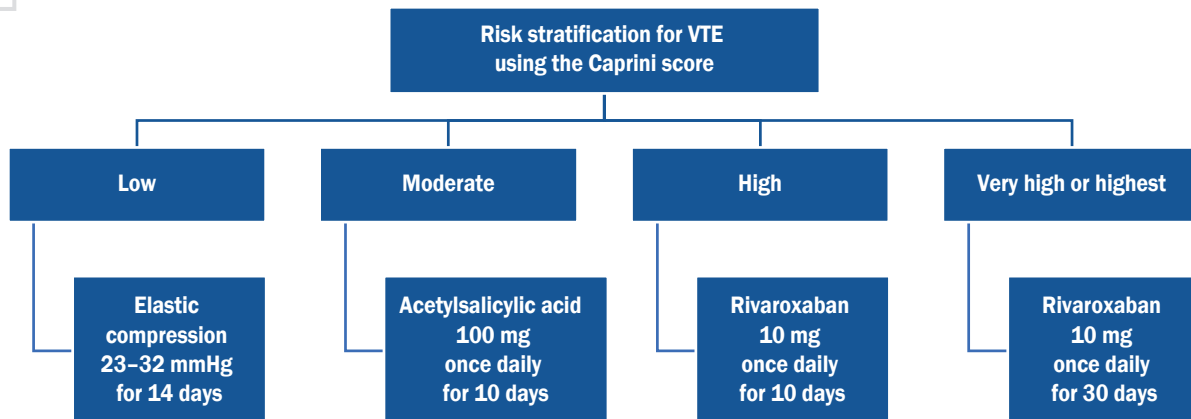


Fig. 1. VTE prevention algorithm in patients after thermal ablation procedures.

Table 1. Baseline clinical characteristics of study participants

Characteristics	n	%	
Clinical class (CEAP)	C2	162	38.6
	C3	170	40.5
	C4a	47	11.2
	C4b	22	5.2
	C5	14	3.3
	C6	5	1.2
Affected limb	Right	216	51.4
	Left	204	48.6
Affected vein	GSV	389	92.6
	SSV	31	7.4

In the postoperative period, sonographic monitoring was conducted using a LogiqE ultrasound system (GE Healthcare, USA) equipped with a 7.5 MHz linear transducer. Assessments were performed within 48 hours and subsequently at 7 days, 1 month, and 1 year post-procedure. Postoperative VTE events were defined as EHIT classes I–IV, DVT, and pulmonary embolism. Procedural safety was evaluated by documenting bleeding complications.

Statistical analyses were conducted using descriptive and comparative methods with the StatPlus software (AnalystSoft, USA, version 2021; license No. 2-2405609903). Quantitative variables were reported as absolute frequencies and percentages. Between-group comparisons of thrombotic and hemorrhagic complication rates employed the Pearson χ^2 test; Fisher's exact test was applied when expected frequencies were <5 . Differences were considered statistically significant at $p < 0.05$.

Results

During the initial phase of the study, patients were stratified into VTE risk categories based on cumulative Caprini scores. The distribution of these risk levels is illustrated in Fig. 2.

The findings demonstrated that the majority of patients, 265 (63.1 %), were classified as having a moderate risk of thrombotic complications. A total of 56 patients (13.4 %)

represented the cohort with the highest overall VTE risk: 38 (9.0 %) were in the high-risk group, 13 (3.1 %) in the very high-risk group, and 5 (1.2 %) in the highest-risk category.

An analysis of contributing risk factors showed that, beyond the primary diagnosis of CVD, the most prevalent additional risk factor was a procedural duration exceeding 45 minutes, which was observed in 272 patients (65.0 %). The duration of the surgical procedure was primarily contingent upon the length of the involved venous trunk (GSV or SSV) and the extent of concurrent miniphlebectomy. Based on our data, the mean ablation length was 357 ± 94 mm for the GSV and 168 ± 42 mm for the SSV, both of which exerted an objective influence on total operative time.

Another significant risk factor identified was lower limb edema, which was diagnosed in 170 patients (40.5 %). Furthermore, 88 participants (20.9 %) presented with more advanced CVD manifestations, including hyperpigmentation, lipodermatosclerosis, and active or healed venous ulcers. Although these clinical markers are not explicitly incorporated into the Caprini scoring system, they may be regarded as additional pathophysiologically relevant VTE risk factors with clinical significance comparable to that of edema.

A total of 165 patients (39.3 %) had a BMI >25 kg/m², which is regarded as an independent VTE risk factor. Notably, a small subgroup of 5 patients (1.2 %) presented with a BMI >40 kg/m², contributing an additional point to their cumulative Caprini score. While this subgroup was small, global trends in obesity prevalence suggest that its impact on VTE risk profiles will likely increase in the future.

Age distribution analysis revealed that 160 patients (38.1 %) were aged 41–60 years, adding 1 point to the Caprini risk assessment. Additionally, 90 patients (21.4 %) in the 60–74 age bracket received 2 points, while 5 patients (1.2 %) aged ≥ 75 years were assigned 3 points, markedly elevating their VTE probability.

Since prior deep or superficial vein thrombosis and known thrombophilia were established as exclusion criteria for this study, family history of thrombotic events among first- to third-degree relatives was evaluated as an additional factor. This was identified in 5 patients (1.2 %), resulting in

a 3-point increase in their cumulative risk score. A history of malignant neoplasms was reported in 6 patients (1.4 %), adding 2 points to their total VTE risk assessment.

Finally, the second-stage analysis demonstrated that 12 patients (2.9 %) from Group 1 developed thrombotic complications during the early postoperative period. Specifically, 3 patients (0.7 %) with moderate VTE risk developed EHIT class II on postoperative day 2 after endovenous laser ablation, and 2 patients (0.5 %) after radiofrequency ablation (Fig. 3).

All of the abovementioned patients received anticoagulant therapy with 10 mg of rivaroxaban once daily, which was associated with a favorable sonographic response confirmed at the 7-day follow-up ultrasound examination. In addition, 7 patients (1.7 %) with a high VTE risk were found to have distal DVT during routine sonographic follow-up on postoperative day 7 (3 cases following endovenous laser ablation and 4 following radiofrequency ablation). The incidence of distal DVT was statistically significantly higher in high-risk VTE patients compared to those in low- and moderate-risk categories ($p = 0.008$, Fisher's exact test). Only one patient presented with symptomatic medial gastrocnemius vein thrombosis, while the remaining cases were asymptomatic and detected solely via ultrasound examination. Therapeutic anticoagulation with rivaroxaban (15 mg twice daily for 21 days, followed by 20 mg once daily up to 45 days) resulted in positive clinical and sonographic outcomes in all patients at the 1-month follow-up.

The implementation of the proposed differentiated risk-based thromboprophylaxis strategy in Group 2 was associated with a significant reduction in the overall incidence of thrombotic complications compared to Group 1 (0.4 % vs. 2.9 %; $p = 0.031$). In Group 2, only one patient (0.4 %) with moderate VTE risk developed distal DVT, which was detected by ultrasound on day 7 and remained clinically silent. No cases of pulmonary embolism were recorded in either study group throughout the entire follow-up period.

No clinically significant bleeding occurred in Group 2. However, 39 (18.3 %) patients who received prophylactic acetylsalicylic acid or rivaroxaban showed a statistically significant increase in the incidence of ecchymosis compared to Group 1 ($p = 0.018$), regardless of the endovenous ablation method employed. Both the frequency and extent of ecchymosis were significantly higher in patients treated with acetylsalicylic acid than in those receiving rivaroxaban ($p = 0.041$). Nevertheless, all cases followed a benign course, required no specific treatment, and resolved spontaneously within one month of surgery.

Discussion

VTE risk stratification constitutes the foundational step in the selection of an optimized thromboprophylaxis algorithm. Current international clinical guidelines recommend VTE risk assessment for patients with superficial venous insufficiency undergoing surgical intervention [1,2].

Nevertheless, there is currently no formally endorsed risk assessment tool or scale specifically tailored for this patient population. The findings of the present study confirm that patients with CVD exhibit a heterogeneous VTE risk profile that cannot be accurately evaluated without systematic stratification using validated scoring systems. Despite

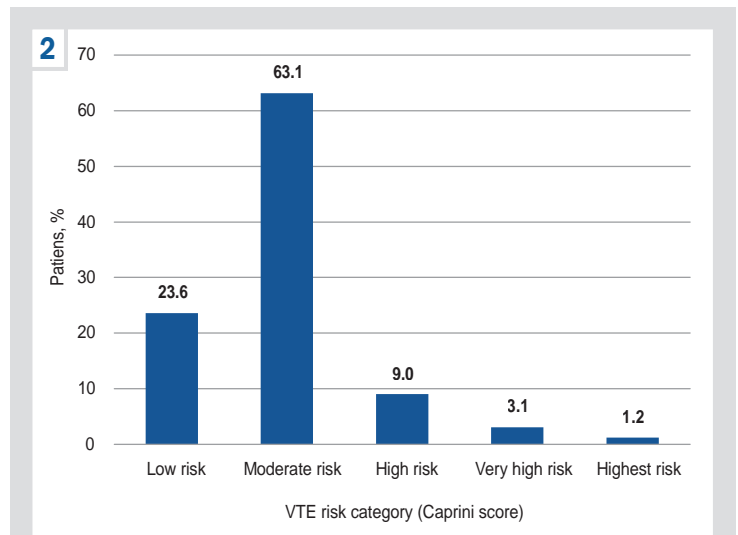


Fig. 2. Distribution of patients by VTE risk levels ($n = 420$) across the study population according to the Caprini score.

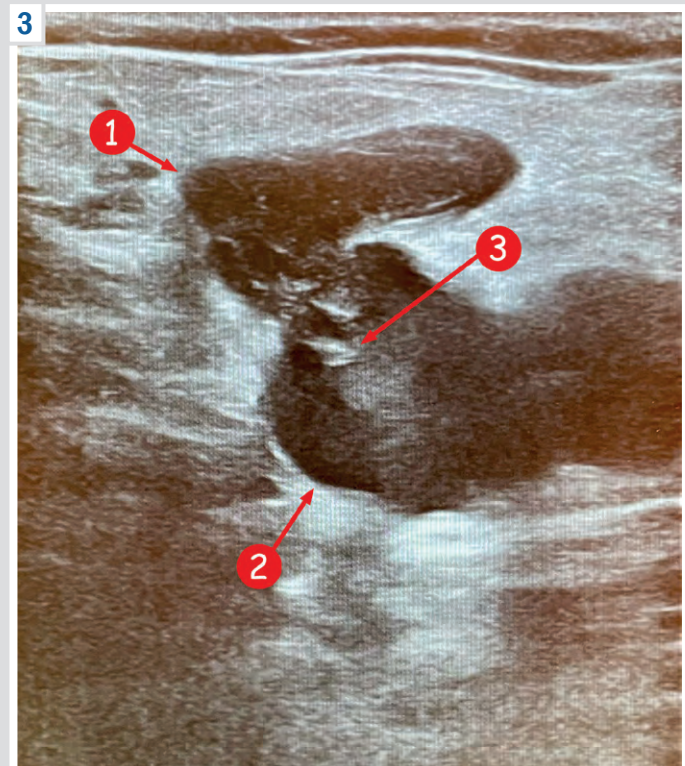


Fig. 3. Sonographic image of EHIT class II in patient K. Diagnosis: C2,3,E₁A₁P₁IGSVa,NSV; Caprini score – 4 points. 1: great saphenous vein; 2: EHIT class II; 3: common femoral vein.

the proven effectiveness of the Caprini risk assessment model in fields such as general surgery, otolaryngology, plastic surgery, and intensive care, its predictive accuracy in patients with CVD remains under-investigated due to disease-specific pathophysiological and clinical features [16].

Contemporary evidence suggests that endovenous thermal techniques are generally associated with a low incidence of clinically significant thrombotic complications; however, EHIT class II–IV is diagnosed in approximately 1.2–1.4 % of patients in the postoperative period even

when standard endovenous ablation protocols are followed. Furthermore, the reported incidence of DVT ranges from 3.5 % to 7.3 %. The incidence of thrombotic events increases particularly in patients with a cumulative burden of predisposing risk factors, ensuring that VTE remains a critical clinical challenge [1,2,4,16].

Within our study cohort, 13.4 % of patients were classified as being at the highest VTE risk. These data align with contemporary evidence suggesting that although endovenous thermal techniques generally carry a low risk of major thrombotic complications, they do not entirely eliminate VTE potential, particularly among high-risk individuals with multiple predispositions [16]. Consequently, VTE management remains a paramount clinical concern. A substantial proportion of detected DVT cases were asymptomatic, being detected exclusively through protocol-based ultrasound follow-up. These findings contrast with the updated American consensus guidelines, which, with a grade 1B recommendation, suggest avoiding routine early postoperative duplex ultrasound examination in asymptomatic patients after endovenous thermal ablation for the detection of ablation-related thrombus extension or DVT [2].

However, our results are consistent with the observations by K. Wolkowski et al., who reported that active postoperative sonographic surveillance leads to improved detection of subclinical EHIT and distal DVT, frequently underreported in registries focusing solely on clinically manifest events [4].

The ESVS clinical practice guidelines emphasize the need to tailor management strategies to individual thrombotic risk and peri-procedural factors in patients with CVD. At the same time, these recommendations acknowledge the absence of a universal thromboprophylaxis protocol following endovenous procedures, thereby highlighting the necessity for further research aimed at optimizing risk-adapted strategies [1]. Currently, no single thromboprophylactic regimen can fully eliminate thrombotic risk. Nevertheless, most published studies confirm that pharmacological thromboprophylaxis substantially reduces the incidence or clinical impact of postoperative VTE. However, consensus is lacking regarding the optimal agents, dosages, and duration of prophylactic treatment [17].

In this context, the results of our study demonstrate that implementing a differentiated, risk-based thromboprophylaxis strategy, guided by individual risk assessment and an evidence-based anticoagulation protocol, significantly decreases the incidence of VTE (0.4 % vs. 2.9 %) compared with the standard approach. These findings are consistent with recent systematic reviews, including that by Moreira et al., showing a similar trend toward a lower incidence of VTE among patients who received anticoagulant therapy after varicose vein surgery [18].

Conclusions

1. Patients presenting with chronic venous disease of the lower limbs demonstrate a heterogeneous VTE risk profile, with 13.4 % of subjects categorized within the highest-risk category.

2. The most prevalent additional VTE risk factors identified were a procedural duration exceeding 45 minutes, lower

limb edema, overweight status, and advanced age. These factors collectively contribute to risk score accumulation, even in patients without a prior history of thrombotic events.

3. Among the cohort receiving exclusively elastic compression for thromboprophylaxis, the incidence of thrombotic complications during the early postoperative period was 2.9 %. The majority of these events occurred in high-risk patients and followed an asymptomatic clinical course.

4. The implementation of a stratified, risk-oriented thromboprophylaxis strategy resulted in a significant reduction in VTE incidence to 0.4 % ($p = 0.031$) without an associated increase in the risk of clinically significant hemorrhagic complications.

5. While pharmacological thromboprophylaxis was associated with a higher frequency of ecchymosis, these events consistently followed a benign, self-limiting course and required no clinical intervention. Rivaroxaban demonstrated a statistically superior local safety profile regarding bleeding compared to acetylsalicylic acid ($p = 0.041$).

6. The data obtained substantiate the feasibility and clinical efficacy of a personalized approach to VTE prevention following endovenous interventions, based on Caprini score-guided risk stratification and the individualized selection of prophylactic regimens.

Perspectives for further research. Future research should focus on conducting multicenter randomized controlled trials to evaluate the effectiveness of the proposed thromboprophylaxis strategy following thermal ablation methods for the treatment of CVD of the lower limbs.

Ethical approval

The study was approved by the Ethics Committee of Ivano-Frankivsk National Medical University, which reviewed the materials provided in the article and found no violations of the ethical standards set forth in applicable regulatory documents, including the Declaration of Helsinki, the Council of Europe Convention on Human Rights and Biomedicine, and other legal acts (Protocol No. 155/25 dated 03.12.2025). All patients included in the study provided written informed consent.

Funding

This study was conducted as part of the research project of Ivano-Frankivsk National Medical University titled "Strategy of accelerated recovery in the postoperative period of minimally invasive operations on the abdominal cavity, anterior abdominal wall and veins of the lower extremities", state registration No. 0121U109258 (2020–2023).

Conflicts of interest: authors have no conflict of interest to declare.
Конфлікт інтересів: відсутній.

Надійшла до редакції / Received: 04.11.2025

Після доопрацювання / Revised: 25.02.2026

Схвалено до друку / Accepted: 02.03.2026

Information about the authors:

Atamaniuk O. Yu., MD, PhD, Associate Professor of the Department of Surgery of Postgraduate Education and Urology, Ivano-Frankivsk National Medical University, Ukraine.

ORCID ID: 0000-0002-6400-6896

Скряпко V. D., MD, PhD, DSc, Professor of the Department of Surgery of Postgraduate Education and Urology, Ivano-Frankivsk National Medical University, Ukraine.

ORCID ID: 0000-0002-1555-2030

Fedorov S. V., MD, PhD, DSc, Professor, Head of Therapy, Family and Emergency Medicine Department of Postgraduate Education, Ivano-Frankivsk National Medical University, Ukraine.

ORCID ID: 0000-0002-2202-4279

Atamaniuk V. M., MD, PhD, Patient Care Quality Office, Royal Jubilee Hospital, Victoria, British Columbia, Canada.

ORCID ID: 0000-0003-0229-0374

Відомості про авторів:

Атаманюк О. Ю., канд. мед. наук, доцент каф. хірургії післядипломної освіти та урології, Івано-Франківський національний медичний університет, Україна.

Скрипко В. Д., д-р мед. наук, професор каф. хірургії післядипломної освіти та урології, Івано-Франківський національний медичний університет, Україна.

Федоров С. В., д-р мед. наук, професор, зав. каф. терапії, сімейної і невідкладної медицини, Івано-Франківський національний медичний університет, Україна.

Атаманюк В. М., канд. мед. наук, відділ якості догляду за пацієнтами, Royal Jubilee Hospital, м. Вікторія, провінція Британська Колумбія, Канада.



Oleh Atamaniuk (Олег Атаманюк)
atamaniuk.oleg5@gmail.com

References

- De Maeseneer MG, Kakkos SK, Aherne T, Baekgaard N, Black S, Blomgren L, et al. Editor's Choice – European Society for Vascular Surgery (ESVS) 2022 Clinical Practice Guidelines on the Management of Chronic Venous Disease of the Lower Limbs. *Eur J Vasc Endovasc Surg.* 2022;63(2):184-267. doi: 10.1016/j.ejvs.2021.12.024
- Gloviczki P, Lawrence PF, Wasan SM, Meissner MH, Almeida J, Brown KR, et al. The 2023 Society for Vascular Surgery, American Venous Forum, and American Vein and Lymphatic Society clinical practice guidelines for the management of varicose veins of the lower extremities. Part II: Endorsed by the Society of Interventional Radiology and the Society for Vascular Medicine. *J Vasc Surg Venous Lymphat Disord.* 2024;12(1):101670. doi: 10.1016/j.jvsv.2023.08.011
- Dattani N, Shalhoub J, Nandhra S, Lane T, Abu-Own A, Elbastay A, et al. Reducing the risk of venous thromboembolism following superficial endovenous treatment: A UK and Republic of Ireland consensus study. *Phlebology.* 2020 Oct;35(9):706-714. doi: 10.1177/0268355520936420. Epub 2020 Jul 1. Erratum in: *Phlebology.* 2020;35(10):844. doi: 10.1177/0268355520944366
- Wolkowski K, Wolkowski M, Urbanek T. Venous Thromboembolism Prophylaxis and Thrombotic Risk Stratification in the Varicose Veins Surgery-Prospective Observational Study. *J Clin Med.* 2020;9(12):3970. doi: 10.3390/jcm9123970
- Balachandran R, Jensen KK, Burcharth J, Ekeloef S, Schack AE, Gögenur I. Incidence of Venous Thromboembolism Following Major Emergency Abdominal Surgery. *World J Surg.* 2020;44(3):704-10. doi: 10.1007/s00268-019-05246-x
- Henry ML, Abdul-Sultan A, Walker AJ, West J, Humes DJ. Duration and Magnitude of Postoperative Risk of Venous Thromboembolism after Cholecystectomy: A Population-Based Cohort Study. *Dig Surg.* 2020;37(1):32-8. doi: 10.1159/000496435
- Turner B, Machin M, Jasionowska S, Salim S, Onida S, Shalhoub J, et al. Systematic Review and Meta-analysis of the Additional Benefit of Pharmacological Thromboprophylaxis for Endovenous Varicose Vein Interventions. *Ann Surg.* 2023;278(2):166-71. doi: 10.1097/SLA.0000000000005709
- Samama CM, Afshari A; ESA VTE Guidelines Task Force. European guidelines on perioperative venous thromboembolism prophylaxis. *Eur J Anaesthesiol.* 2018;35(2):73-76. doi: 10.1097/EJA.0000000000000702
- Whittle S, Machin M, Burgess L, Onida S, Carradice D, Davies AH. Thromboprophylaxis strategies in patients undergoing endovenous thermal ablation: a UK survey. *JVSGBI.* 2023;3:26-31. doi: 10.54522/jvsgbi.2023.096
- Boyle E, Reid J, O'Donnell M, Harkin D, Badger S. Thromboprophylaxis for varicose vein procedures – A national survey. *Phlebology.* 2019;34(9):598-603. doi: 10.1177/0268355519828931
- Ribeiro AJ, Mendes-Pinto D, Erzinger FL, Fiorelli R, Fiorelli S, Ribeiro A, Marques MA. Thromboprophylaxis in lower limb varicose vein surgery in Brazil. *J Vasc Bras.* 2022;21:e20210172. doi: 10.1590/1677-5449.202101721
- Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism [Internet]. NICE. [cited 2025 Feb 9]. Available from: <https://www.nice.org.uk/guidance/ng89/chapter/Recommendations>
- Eklöf B, Rutherford RB, Bergan JJ, Carpentier PH, Gloviczki P, Kistner RL, et al. Revision of the CEAP classification for chronic venous disorders: consensus statement. *J Vasc Surg.* 2004;40(6):1248-52. doi: 10.1016/j.jvs.2004.09.027
- Atamaniuk OY, Skrypko VD, Atamaniuk VM. Radiofrequency ablation as a method of choice for the treatment of lower extremity varicose veins disease. *Modern Medical Technology.* 2023;(2):27-33. doi: 10.34287/mmt.2(57).2023.5
- How to assess DVT risk [Internet]. Caprini Rsk Score – Venous Resource Center. 2025 [cited 2026 Feb 4]. Available from: <https://capriniriskscore.org/>
- Grill MH, Caffaro RA, Grill TA, Júnior VC, Kikuchi R, Ribeiro CM, et al. A Prospective Study Evaluating Patterns of Responses to the Caprini Score to Prevent Venous Thromboembolism After Interventional Treatment for Varicose Veins. *Clin Appl Thromb Hemost.* 2022;28:10760296221112081. doi: 10.1177/10760296221112081
- Toth S, Flohr TR, Schubart J, Knehans A, Castello MC, Aziz F. A meta-analysis and systematic review of venous thromboembolism prophylaxis in patients undergoing vascular surgery procedures. *J Vasc Surg Venous Lymphat Disord.* 2020;8(5):869-881.e2. doi: 10.1016/j.jvsv.2020.03.017
- Moreira H, Sousa J, Mansilha A. Chemothromboprophylaxis in varicose vein surgery: a systematic review. *Int Angiol.* 2022;41(4):346-55. doi: 10.23736/S0392-9590.22.04908-2