



Original

Clinical and epidemiologic characteristics of patients with chronic venous insufficiency undergoing radiofrequency ablation of the great and small saphenous veins in Colombia

Caracterización de pacientes con insuficiencia venosa crónica llevados a ablación por radiofrecuencia de la vena safena mayor y menor en una población colombiana

Marlon Hernán Espinosa Berástegui, Giovanni García Martínez, Karen Reyes Romero

Department of General Surgery. Vascular Surgery Section. Faculty of Medicine. Universidad de Antioquía. Medellín, Colombia

Abstract

Introduction: varicose veins are a serious health problem in the adult population. They are more common in women; however, their incidence in men has increased in recent years. Their importance lies in their socioeconomic impact and impact on patient quality of life. Recently, minimally invasive techniques have been developed to shorten recovery time and reduce potential complications arising from open surgical repair. Endoluminal radiofrequency ablation has emerged as one of these alternatives.

Objectives: to describe the clinical and epidemiological characteristics of patients undergoing radiofrequency ablation of the great and small saphenous veins in healthcare institutions in the city of Medellín, Colombia.

Method: this was an observational, descriptive, cross-sectional study in patients over 18 years of age diagnosed between April 2015 and July 2020 with great and small saphenous vein insufficiency and without concurrent diagnoses of other vascular pathologies, who were treated with radiofrequency ablation.

Results: a sample of 173 patients with great and small saphenous vein insufficiency treated with radiofrequency ablation was obtained. All patients reported improvement in their previous symptoms, especially pain, at postoperative follow-up.

Conclusions: radiofrequency ablation of the saphenous veins proved to be a safe procedure, with infrequent and mild complications, and was associated with clinical improvement of symptoms; these findings support its use as a minimally invasive option for the treatment of venous insufficiency.

Keywords:

Radiofrequency ablation. Chronic venous insufficiency. Endovascular procedures. Great saphenous vein. Small saphenous vein.

Received: 04/06/2025 • Accepted: 10/19/2025

Conflicts of interest: The authors declare no conflicts of interest.

Artificial intelligence: The authors declare that no artificial intelligence (AI) or any AI-based tool was used in the preparation of this manuscript.

Espinosa Berástegui MH, García Martínez G, Reyes Romero K. Clinical and epidemiologic characteristics of patients with chronic venous insufficiency undergoing radiofrequency ablation of the great and small saphenous veins in Colombia. *Angiología* 2026;78(1):4-12

DOI: 10.20960/angiologia.00758

Correspondence:

Karen Reyes Romero. Department of General Surgery. Vascular Surgery Section. Faculty of Medicine. Universidad de Antioquía. C/ 67, 53-108. Medellín, Colombia
e-mail: karreyes.09@gmail.com

Resumen

Introducción: las varices constituyen un serio problema de salud en la población adulta. Tienen mayor incidencia en las mujeres, pero la presentación en la población masculina se ha incrementado en los últimos años. Su importancia radica en su impacto socioeconómico y en la calidad de vida del paciente. Recientemente se han diseñado técnicas mínimamente invasivas para disminuir el tiempo de recuperación y reducir las posibles complicaciones derivadas de la reparación quirúrgica abierta. La técnica endoluminal de ablación por radiofrecuencia ha surgido como una de estas alternativas.

Objetivos: describir las características clínicas y epidemiológicas de los pacientes sometidos a ablación por radiofrecuencia de las venas safena mayor y menor en instituciones de salud de la ciudad de Medellín (Colombia).

Método: estudio de tipo observacional, descriptivo y de corte transversal en pacientes mayores de 18 años diagnosticados entre abril del 2015 y julio del 2020 con insuficiencia en las venas safena mayor y menor que no han tenido diagnóstico de otros tipos de patologías vasculares al mismo tiempo y que han sido tratados mediante ablación por radiofrecuencia.

Resultados: se obtuvo una muestra de 173 pacientes con insuficiencia en las venas safena mayor y menor tratados mediante ablación por radiofrecuencia. La totalidad de los pacientes manifestó en el control posquirúrgico haber presentado mejoría con respecto a los síntomas previos, en especial del dolor.

Conclusiones: la ablación por radiofrecuencia en las venas safenas mostró ser un procedimiento seguro, con complicaciones poco frecuentes y leves. Se observó una mejoría clínica de los síntomas. Estos hallazgos respaldan su uso como una opción mínimamente invasiva en el tratamiento de la insuficiencia venosa.

Palabras clave:

Ablación por radiofrecuencia. Insuficiencia venosa crónica. Procedimientos endovasculares. Safena mayor. Safena menor.

INTRODUCTION

Chronic venous disease (CVD) of the lower limbs is highly prevalent in the general population, with reported rates of up to 60% (1,2). It is estimated that approximately 25% to 33% of women and 10% to 20% of men have varicose veins in countries in Europe and North America (3,4). The clinical presentation encompasses a broad spectrum, ranging from small asymptomatic but cosmetically concerning ectatic veins (telangiectasias or spider veins and venules or reticular varices), to truncal varicose veins or involvement of their tributaries and predominantly evening edema, to severe skin changes including pigmentation, dermatitis, lipodermatosclerosis (fibrosing panniculitis), and venous ulcer (VU) (5).

The clinical, etiologic, anatomic, and pathophysiologic (CEAP) classification, published in 1994 by an ad hoc international committee of the American Venous Forum (AVF) and endorsed by the Society for Vascular Surgery (SVS), has provided a unified language and improved communication regarding the description of the different forms of CVD (a global term). The term chronic venous disease is suggested for the initial stages without skin or soft tissue involvement (C1, C2, and C3), reserving the term chronic venous insufficiency (CVI) for stages in which such alterations are present (C4, C5, and C6) (6).

It is estimated that approximately 1 million people in North America have primary venous ulcers due to varicose disease and that up to 1 in 10 patients is functionally disabled (7,8). Between 20% and 60% of patients with superficial CVD have an associated component of deep venous system insufficiency. Varicose disease is associated with the development of complications such as ulceration, bleeding, infection, superficial thrombophlebitis (STP), and deep vein thrombosis (DVT). An incidence rate of STP ranging from 20% to 50% has been reported in patients with untreated varicose disease, as well as a 3-fold increased risk of developing DVT (7-9).

Patients with C1 CVD are generally referred for treatment with sclerotherapy and/or transdermal laser techniques. Patients with C2 to C6 varicose veins, who constitute the population included in this study, may be treated using traditional or minimally invasive techniques. The traditional surgical approach has been high ligation of the saphenofemoral junction (SFJ) followed by saphenectomy, a procedure associated with considerable morbidity, including postoperative pain, hematoma, wound infection, saphenous nerve injury, and prolonged return to work (5,10,11). Therefore, optimizing the management of CVD in the economically active population is necessary by updating surgical techniques in order to offer the best outcomes with the least possible local trauma (10). Recurrence after ligation and saphenectomy is approximately 30%

at 5 years (11). The cause is unclear and may include surgical technique or neovascularization (5,8).

To improve effectiveness and patients' quality of life, new minimally invasive techniques have been developed for the management of CVD, such as radiofrequency ablation (RFA), which has been introduced relatively recently in our setting. This technique consists of introducing an endoluminal catheter that delivers controlled thermal energy to the internal surface of the venous wall. The thermal injury initially causes destruction of the intimal layer and venous thrombosis, followed by thickening and contraction of collagen fibers in the medial and adventitial layers, with a marked reduction of the lumen and perivenous inflammation, and ultimately definitive obliteration of the vein. This prevents pathological venous reflux and secondary venous hypertension (12,13).

Clinical outcomes with this technique have shown high efficacy: approximately 90% of patients remain free of great saphenous vein reflux, nearly 95% report significant clinical improvement in symptoms such as pain, heaviness, and edema, and recanalization and reflux recurrence rates at 2 years are < 11% (14).

Although RFA is less invasive than conventional surgery and allows for shorter postoperative recovery, minimizing morbidity inherent to open surgery (pain, hematoma, neurologic injury, surgical site infection, and functional impairment), complications associated with this procedure may still occur, such as burns, edema, nerve injury, or deep vein thrombosis. The reported incidence in the literature is approximately 16%, lower than that observed with invasive techniques (7,8).

Offering surgical management methods with less invasiveness, faster recovery, and earlier return to work, and demonstrating these benefits in our setting, contributes to treating a larger population more effectively at equal or lower cost (15). The objective of this study was to describe the clinical and epidemiologic characteristics of patients undergoing RFA of the great and small saphenous veins in health care institutions in the city of Medellín.

MATERIALS AND METHODS

We conducted an observational, descriptive, cross-sectional study. The study population consisted

of all patients diagnosed with CVD and confirmed in health care institutions in the city of Medellín (Intermédica Centro de Especialistas) who underwent RFA from April 2015 through July 2020. A nonprobabilistic convenience sampling method was used, consisting of selecting patients from medical records contained in the institutions' information systems.

Inclusion criteria

Health records were included if they met the study variables and corresponded to patients aged 18 years or older, diagnosed from April 2015 through July 2020 with insufficiency of the great and/or small saphenous veins, without a simultaneous diagnosis of other vascular pathologies, who had been treated with RFA and managed in the health care institutions of the city of Medellín where the study was conducted.

Exclusion criteria

Patients who had previously undergone open saphenectomy or those who did not meet indications for RFA during intraoperative duplex examination (suprafascial saphenous vein, great saphenous vein diameter > 15 mm, or small saphenous vein diameter < 3.5 mm) were excluded.

Study variables

Demographic variables (age, sex, and body mass index), pre- and postoperative clinical signs and symptoms (pain, paresthesia, induration, and pigmentation changes), diameters of the great and small saphenous veins (millimeters), infection, recanalization, residual lesions, aesthetic outcomes, recovery time, and mortality were analyzed.

RFA

RFA was performed under ultrasound guidance, with the patient in the supine position and reverse Trendelenburg for the great saphenous vein. Map-

ping was conducted from the saphenofemoral junction to the leg, and in the prone position for the small saphenous vein, mapping from the saphenopopliteal junction to the lower third of the calf. After ultrasound-guided venous puncture and insertion of a 0.035-in metallic guidewire, a 60-cm ClosureFAST® catheter was advanced and positioned 1.8 cm from the saphenofemoral junction or 2 cm from the saphenopopliteal junction, as appropriate. Subsequently, tumescent solution (prepared with 1% lidocaine [25 mL], sodium bicarbonate [10 mEq], and saline solution or lactated Ringer [250–500 mL per limb]) was infiltrated into the perivenous and subcutaneous compartments under ultrasound guidance. Thermal energy was delivered in radiofrequency cycles: 2 20-second cycles in the proximal segment and single cycles along the remaining venous tract. At the end of the procedure, puncture sites were covered with dry dressings and elastic bandaging was applied to the limb.

Data collection process

Study variable data were obtained from secondary sources through review of health records of patients diagnosed with insufficiency of the great and small saphenous veins, provided by collaborating health care institutions. All collected information was tabulated in a database created in Microsoft Excel. Data collection was carried out over a 3-month period.

Statistical analysis

Measures of central tendency (mean or median) and dispersion (standard deviation or interquartile

range) were used for quantitative variables after assessing normality of distribution using the Kolmogorov–Smirnov test. Qualitative variables were expressed as frequencies and percentages. Contingency tables were constructed, and bivariate analysis was performed using the Pearson chi-square test.

Statistical significance was defined as a *p* value < 0.05 and 95% confidence intervals that did not cross unity. Statistical analysis was performed using SPSS software, version 23.

Ethical considerations

Because this research used personal data from human subjects, it adhered to the Declaration of Helsinki and Resolution No. 008430 of 1993 (October 4th, 1993). Since this was a secondary data study, written informed consent was deemed unnecessary.

RESULTS

From April 2015 through July 2020, a total of 173 patients who met the selection criteria were identified; of these, 162 underwent RFA of the great saphenous vein and 11 underwent ablation of the small saphenous vein.

Table I illustrates the sociodemographic characteristics of the sample. Analysis of the entire cohort showed a mean age of 56.6 years, with a SD of 13.6 years. A higher prevalence of venous disease was observed in women, who accounted for 65.9% (*n* = 114) of cases, compared with men at 34.1% (*n* = 59). A total of 25% of patients were overweight.

Table I. Sociodemographic characterization

Variables	<i>n</i> = 173		95% CI
Age (years)	Mean (SD)	56.68 years (SD, 13.6)	54.64–54.72
Sex	Men (%)	59 (34.1%)	
	Women (%)	114 (65.9%)	
BMI (kg/m ²)	Mean (SD)	25.08 (SD ,4.26)	

Source: study database.

Regarding signs and symptoms prior to surgical intervention, all 173 patients reported at least 1 symptom consistent with chronic venous disease. Symptom distribution showed that pain, induration, and pigmentation changes were the most prevalent, occurring in 98.3% ($n = 170$) of patients, followed by paresthesia in 97.7% ($n = 169$). Notably, among patients who reported pain, 59% ($n = 102$) rated it as severe (10) on the visual analog scale, followed by 23.1% ($n = 40$) who rated it as 8 and 16.2% ($n = 28$) who rated it as 6 (Table II).

For the pain variable in patients undergoing RFA, significantly lower pain levels were observed postoperatively compared with preoperatively ($p < 0.001$) (Table III). With respect to postoperative signs and symptoms,

all 173 patients reported improvement at the 1-month postoperative follow-up vs their preoperative status. Pain was classified as mild, with scores of 1 and 2, in 30.6% ($n = 53$) and 69.4% ($n = 120$) of cases, respectively.

Radiofrequency assessment showed that the mean diameter of the great saphenous vein at the thigh level at the saphenofemoral junction (SFJ) was 7.46 mm; 6.64 mm at the proximal third, 6.50 mm at the middle third, and 6.29 mm at the distal third. The mean diameter of the great saphenous vein in the upper third of the leg was 5.19 mm. Additionally, the mean diameter of the small saphenous vein at the saphenopopliteal junction (SPJ) was 4.03 mm; 4.00 mm at the upper third and 3.66 mm at the lower third (Table IV).

Table II. Pre- and postoperative signs and symptoms of RFA of the great and small saphenous veins

Variables	$n = 173$	n (%)
Preoperative signs and symptoms	Pain (VAS)	
	0	3 (1.7%)
	6	28 (16.2%)
	8	40 (23.1%)
	10	102 (59%)
	Yes (%)	No (%)
	Paresthesia	4 (2.3%)
	Induration	3 (1.7%)
Postoperative signs and symptoms	Pigmentation changes	3 (1.7%)
	Pain (VAS)	
	1	53 (30.6%)
	2	120 (69.4%)
	Yes (%)	No (%)
	Infection	0 (0%)
	Recanalization	2 (1.2%)
	Death	0 (0%)
	Residual lesions	0 (0%)

Source: study database.

Table III. Bivariate analysis of preoperative and postoperative pain

Variables	$n = 173$	p
Pain		$< 0.001^*$
Preoperative pain	Median 10 IQR, 2	
Postoperative pain	Median 2 IQR, 1	

*Statistical significance: $p < 0.05$; IQR: interquartile range. Source: study database.

Table IV. Diameters of the great and small saphenous veins most frequently found in patients treated with radiofrequency ablation

Variables		<i>n</i> = 173
Great saphenous vein Thigh	SFJ	7.46 mm (SD, 1.5)
	Upper third	6.64 mm (SD, 1.47)
	Middle third	6.5 mm (SD, 1.3)
	Lower third	6.29 mm (SD, 1.24)
Great saphenous vein Leg	Upper third	5.19 mm (SD, 1.07)
Small saphenous vein	SPJ	4.03 mm (SD, 0.5)
	Upper third	4.0 mm (SD, 0.4)
	Lower third	3.86 mm (SD, 0.3)

SFJ: saphenofemoral junction; SPJ: saphenopopliteal junction. Source: study database.

Involvement of the left great saphenous vein was observed in 49.1% (*n* = 85) of patients, the right great saphenous vein in 30.1% (*n* = 52), and bilateral saphenous involvement in 20.8% (*n* = 36).

Regarding variables reflecting the safety and efficacy of the surgical procedure, recanalization was observed in 1.15% (*n* = 2) of cases; in both, it was incomplete and patients remained asymptomatic during follow-up visits (Fig. 1). Notably, no infections, residual lesions, or postoperative deaths were recorded among the study participants.

A total of 94.8% (*n* = 164) of patients recovered in < 7 days, and 100% (*n* = 173) demonstrated satisfactory aesthetic outcomes (Fig. 2).

DISCUSSION

For many years, traditional vein stripping and high ligation have constituted the standard management of chronic venous disease. However, endovascular procedures such as RFA have increasingly gained prominence (16).

García-Madrid et al. (17) reported that thermal ablation of the great and small saphenous veins is a highly effective and durable practice that may even be considered a first-line therapeutic option for managing this condition. Similarly, García-Madrid et al. and Merchant et al. (14,16) emphasized patient satisfaction following the procedure due to favorable aesthetic outcomes and rapid return to daily activities. These findings are consistent with the results

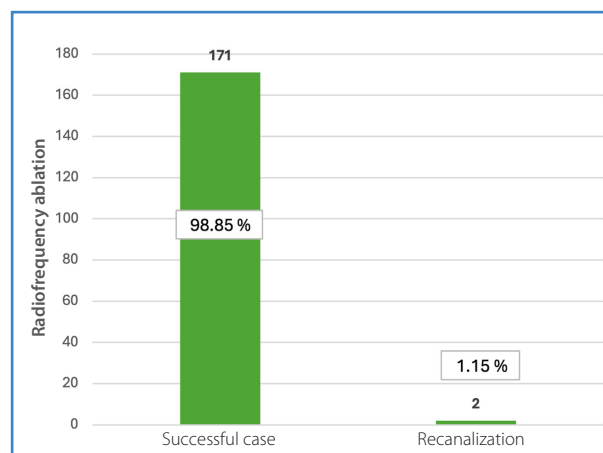


Figure 1. Recanalization in patients undergoing RFA of the great and small saphenous veins. Source: study database.

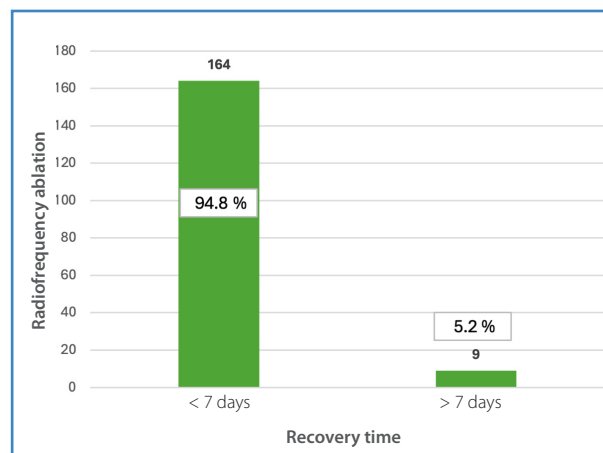


Figure 2. Recovery time in days in patients undergoing RFA of the great and small saphenous veins. Source: study database.

of the present study, as improvement in postoperative signs and symptoms was observed in all 173 patients. A statistically significant improvement was found for pain, which was rated as mild (scores of 1 or 2) in 30.6% ($n = 53$) and 69.4% ($n = 120$) of patients, respectively. Furthermore, 100% of patients reported satisfaction with aesthetic outcomes, and 94.8% recovered in < 7 days.

Lurie et al. (18,19) conducted a prospective, randomized, multicenter study evaluating complications associated with this endovascular intervention. They reported the absence of significant complications such as deep vein thrombosis, pulmonary embolism, severe neuritic sequelae, and skin burns. These findings are consistent with those of the present study, in which recanalization occurred in only 1.2% of cases, was incomplete and asymptomatic, and no infections, residual lesions, or postoperative deaths were observed.

Body mass index (BMI) is considered a determining factor in the development of anatomic insufficiency due to the interaction of hemodynamic factors in disease progression and recurrence. Future analytical studies would be useful to provide stronger evidence regarding the association between BMI and the risk of recanalization. The present study does not allow causal inferences to be made regarding this relationship (20-22).

The retrospective and descriptive design of the study represents a limitation, as does the absence of a control group and variables assessing quality of life or costs. Future prospective, comparative studies with longer follow-up periods are needed to strengthen local evidence and contribute to the standardization of protocols for managing venous insufficiency using endovascular techniques.

CONCLUSIONS

In our cohort RFA of the saphenous veins proved to be a safe and effective procedure, as reflected by significant clinical improvement in symptoms, reduced postoperative pain, and high aesthetic satisfaction reported by patients. Complications were infrequent and mild, with no recorded infections, residual lesions, or mortality, and only a minimal number of cases showing incomplete and asymptomatic

recanalization. These findings confirm that RFA is a minimally invasive technique with appropriate applicability in our setting.

REFERENCES

1. Robertson L, Evans C, Fowkes FGR. Epidemiology of chronic venous disease. *Phlebology* 2008;23(3):103-11. DOI: 10.1258/feb.2007.007061
2. Brand FN, Dannenberg AL, Abbott RD, Kannel WB. The epidemiology of varicose veins: the Framingham Study. *Am J Prev Med* 1988;4(2):96-101.
3. Rabe E, Guex JJ, Puskas A, Scuderi A, Fernández Quesada F; VCP Coordinators. Epidemiology of chronic venous disorders in geographically diverse populations: results from the Vein Consult Program. *Int Angiol J Int Union Angiol* 2012;31(2):105-15.
4. Cornu-Thenard A, Boivin P, Baud JM, De Vincenzi I, Carpentier PH. Importance of the familial factor in varicose disease. Clinical study of 134 families. *J Dermatol Surg Oncol* 1994;20(5):318-26. DOI: 10.1111/j.1524-4725.1994.tb01631.x
5. 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
6. Lurie F, Passman M, Meisner M, Dalsing M, Masuda E, Welch H, et al. The 2020 update of the CEAP classification system and reporting standards. *J Vasc Surg Venous Lymphat Disord* 2020;8(3):342-52. DOI: 10.1016/j.jvsv.2019.12.075
7. Lévy E, Lévy P. Management of venous leg ulcer by French physicians, diversity and related costs: a prospective medicoeconomic observational study. *J Mal Vasc* 2001;26(1):39-44.
8. Onida S, Davies AH. Predicted burden of venous disease. *Phlebology* 2016;31 Suppl.1):74-9. DOI: 10.1177/0268355516628359
9. Courtois MC, Zambon J. Várices e insuficiencia venosa crónica. *Tratado Med* 2019;23(1):1-11. DOI: 10.1016/S1636-5410(18)41693-5
10. Miquel Abbad C, Rial Horcajo R, Ballesteros Ortega MD, García Madrid C. Guía de práctica clínica en enfermedad venosa crónica del Capítulo de Flebología y Linfología de la Sociedad Española de Angiología y Cirugía Vascular. *Angiología* 2015;68(1):55-62. DOI: 10.1016/j.angio.2015.09.011
11. Van den Bos R, Arends L, Kockaert M, Neumann M, Nijsten T. Endovenous therapies of lower extremity varicosities: a meta-analysis. *J Vasc Surg* 2009;49(1):230-9. DOI: 10.1016/j.jvs.2008.06.030

12. Harlander-Locke M, Jiménez JC, Lawrence PF, Derubertis BG, Rigberg DA, Gelabert HA. Endovenous ablation with concomitant phlebectomy is a safe and effective method of treatment for symptomatic patients with axial reflux and large incompetent tributaries. *J Vasc Surg* 2013;58(1):166-72. DOI: 10.1016/j.jvs.2012.12.054
13. Gao RD, Qian SY, Wang HH, Liu YS, Ren SY. Strategies and challenges in treatment of varicose veins and venous insufficiency. *World J Clin Cases* 2022;10(18):5946-56. DOI: 10.12998/wjcc.v10.i18.5946
14. Merchant RF, DePalma RG, Kabnick LS. Endovascular obliteration of saphenous reflux: a multicenter study. *J Vasc Surg* 2002;35(6):1190-6. DOI: 10.1067/mva.2002.124231
15. Epstein D, Bootun R, Diop M, Ortega-Ortega M, Lane TRA, Davies AH. Cost-effectiveness analysis of current varicose veins treatments. *J Vasc Surg Venous Lymphat Disord* 2022;10(2):504-513.e7. DOI: 10.1016/j.jvsv.2021.05.014
16. Merchant RF, Pichot O; Closure Study Group. Long-term outcomes of endovenous radiofrequency obliteration of saphenous reflux as a treatment for superficial venous insufficiency. *J Vasc Surg* 2005;42(3):502-9;discussion 509. DOI: 10.1016/j.jvs.2005.05.007
17. García-Madrid C, Pastor Manrique JÓ, Gómez Blasco F, Sala Planell E. Nuevos avances en el tratamiento de las varices: radiofrecuencia endovenosa VNUS Closure®. *Cir Esp Organo Of Asoc Esp Cir* 2011;89(7):420-6. DOI: 10.1016/j.ciresp.2011.04.010
18. Lurie F, Creton D, Eklof B, Kabnick LS, Kistner RL, Pichot O, et al. Prospective randomized study of endovenous radiofrequency obliteration (closure procedure) versus ligation and stripping in a selected patient population (EVOLVEs Study). *J Vasc Surg* 2003;38(2):207-14. DOI: 10.1016/s0741-5214(03)00228-3
19. Lurie F, Creton D, Eklof B, Kabnick LS, Kistner RL, Pichot O, et al. Prospective randomised study of endovenous radiofrequency obliteration (closure) versus ligation and vein stripping (EVOLVEs): two-year follow-up. *Eur J Vasc Endovasc Surg* 2005;29(1):67-73. DOI: 10.1016/j.ejvs.2004.09.019
20. Lawaetz M, Serup J, Lawaetz B, Bjoern L, Blemings A, Eklof B, et al. Comparison of endovenous ablation techniques, foam sclerotherapy and surgical stripping for great saphenous varicose veins. Extended 5-year follow-up of a RCT. *Int Angiol J Int Union Angiol* 2017;36(3):281-8. DOI: 10.23736/S0392-9590.17.03827-5
21. Pannier F, Noppeney T, Alm J, Breu FX, Bruning G, Flessenkämper I, et al. S2k guidelines: diagnosis and treatment of varicose veins. *Hautarzt Z Dermatol Venerol Verwandte Geb* 2022;73(Suppl 1):1-44. DOI: 10.1007/s00105-022-04977-8
22. Whing J, Nandhra S, Nesbitt C, Stansby G. Interventions for great saphenous vein incompetence. *Cochrane Database Syst Rev* 2021;8(8):CD005624. DOI: 10.1002/14651858.CD005624.pub4