كلية الطب
جامعة النهرين
تأسست عام ١٩٨٧

Research title

Varicose vein Treatment

A THESIS
Submitted to the department of surgery in
Al-Nahrain University - College of Medicine as partial Fulfillment
of the requirements for graduation

By:
Simaa Jamal Mohammed Jawad
Medical student

Supervised By:

Dr. Yaser Aamer Al-Haibi
M.B.Ch.B FICMS(CVT)
Lecturer cardiothoracic surgery
-Al-Nahrain University - College of Medicine

Acknowledgement

I take this opportunity to express my gratitude to my supervisor **Dr. Yaser Aamer Al-Haibi** for his scientific guidance, great help and advices. I would like to thank every member of my family, for their endless support. Special thanks go for my patients who willingly accept to be part of this, also I thank staff members who supported me through this venture.

Dedication

To my beloved parents, who were there for me
With their support and encouragement,
I dedicate this work to all their loving tears and beautiful smiles.

To all my respectable teachers,
Who enlightened me with their knowledge and understanding

To all my fellow students, friends, and colleagues
For their unconditional Support and love.

To all patients out there, hoping this little work will do something to help them more in their sufferings.

Table of Contents

Acknowledgement II
Dedication III
Table of Contents IV
Abstract 1
Introduction 3
Aim 8
Patients and methods 10
Results 12
Discussion 16
Conclusion 18
Recommendation 20
References 22

Abstract

Background: varicose veins are dilated branches of the great saphenous vein and small saphenous vein; the incidence of varicose veins varies from 10% to 30%, veins vary in their presentation, with different Modalities for Management of Varicose Veins including conventional surgical stripping and non-surgical interventions in form of radiofrequency, sclerotherapy and phlebectomy.

Aim of the study: to prove the benefits of non-surgical methods of varicose vein treatment in term of efficacy, cost and time

Patients and methods: descriptive cross-sectional study was performed on 132 patients, in Baghdad from November 2018 to March 2019, with direct interview with the participants via the questionnaire regarding involved site of varicose veins, type of therapeutic intervention that the patient underwent, and the time-consumed by each intervention, follow-up improvements, and costs of these interventions.

Results: 32 patients had varicose veins, with male: female ratio of 1:1.2 and bilateral venous side involvement were the most common (39.3%), followed by right side venous involvement (38%) Intervention used to treat the varicose vein in this study, showed that sclerotherapy was the most common (47%) intervention used in our practice, followed by radio-frequency (22.7%). radio-frequency and sclerotherapy were the most cost-effective and time-saving intervention compared to conventional surgical intervention in this study

Conclusion: The efficacy of non-surgical intervention in treatment of varicose vein, sclerotherapy and radiofrequency, was similar to surgical interventions, with less time consuming and more cost-effective.

Key words: Varicose vein, sclerotherapy, radiofrequency, surgery

Chapter One

Introduction

Introduction

Varicose veins are dilated branches of the great saphenous vein and small saphenous vein; the incidence of varicose veins varies from 10% to 30%.[1]Risk factors of varicose veins include family history, age, and pregnancy; a possible risk factor is standing for a long period of time.[1–3] High ligation and stripping is the traditional approach for varicose veins, yet a variety of alternative options have been used in recent decades, such as endovenous laser ablation (EVLA), endovenous radiofrequency ablation (RFA), foam sclerotherapy (FS), or using Trans-illuminated Powered Phlebectomy System (TriVex).[4–7]

Patients with varicose veins vary in their presentation symptoms from asymptomatic to significant symptoms, including discomfort, aching, pain, itching or eczema, and deep vein thrombosis (DVT).[8] The diagnosis of varicose veins is based on clinical manifestation and ultrasound. Duplex ultrasound is considered the gold standard for diagnosis of superficial venous incompetence. The CEAP (clinical, etiology, anatomy, pathophysiology) classification is used to describe the degree of varicose veins.

Table (1): CEAP Classification

<table>
<tr><th colspan="2">CEAP Classification</th></tr>
<tr><th>Clinical</th><th>Etiological</th></tr>
<tr><td>C0: no signs of venous disease
C1: telangiectasia or reticular veins
C2: varicose veins
C3: oedema
C4a: pigmentation or eczema
C4b: lipodermatosclerosis or atrophied blanche
C5: healed venous ulcer
C6: active venous ulcer</td><td rowspan="2">Ec: congenital
Ep: primary
Es: secondary (post-thrombotic)
En: no venous cause identified</td></tr>
<tr><td>*Each clinical class is further characterized by a subscript depending upon whether the patient is symptomatic (S) or asymptomatic (A) e.g. C2S</td></tr>
</table>

Anatomical	Pathophysiological
• **As**: superficial veins	• **Pr**: reflux
• **Ap**: perforator veins	• **Po**: obstruction
• **Ad**: deep veins	• **Pr,o**: reflux and obstruction
• **An**: no venous location identified	• **Pn**: no pathophysiology identifiable

The ‘‘C’’ part of CEAP classification is more useful and practical in rating the severity of varicose veins (Table 1).[9] Venous clinical severity scoring has been used to measure clinical improvement after treatment of varicose veins.[9,10] Preoperative venous duplex ultrasound is used to evaluate patients for venous insufficiency symptoms or suspected DVT; it can provide a road map of vein anatomy similar to contrast venography, as well as essential hemodynamic information about the presence of proximal obstruction, vein valve function, and venous reflux.

The purpose of treatment is to relieve symptoms and prevent the progression of varicose veins.[4,8] Symptomatic patients with C2 to C6 diseases are indicated for management, especially those who have signs of chronic venous insufficiency, superficial thrombophlebitis, and bleeding. Asymptomatic patients can be observed and do not need treatment or prophylactic intervention.[11] However, cosmesis is a common reason for treatment of asymptomatic patients, especially for young female patients. It is controversial to perform surgery on patients who have recovered from the superficial phlebitis,[11] because the dilated varicose veins usually disappeared without further surgical treatment. It is not indicated to perform thrombectomy for superficial thrombosis in great saphenous veins. The patients should be educated prior to surgery that varicose vein surgery is not curative, and early surgery in uncomplicated veins will not prevent the development of future varicosities. The contraindications for surgical management of varicose veins are occlusion of the deep venous system, such as acute DVT,[11] pregnancy, the superficial veins as collaterals for occluded deep veins, and arterial insufficiency; however, one should proceed with caution in performing surgery on patients with post-thrombotic syndrome, venous refluxing combined with arterial venous fistula, or venous malformation - further imaging to assess the patency of the deep veins is critical before surgery. Emergent management is usually reserved for bleeding varicosities or suspected DVT.

Modalities for Management of Varicose Veins

Conventional surgical stripping

All management modalities for varicose veins are safe and effective at short-term and midterm followup.[11] The methods to manage great saphenous veins traditionally include ligation and division of the sapheno-femoral junction and its tributaries in the groin, stripping the great saphenous veins from groin to knee level. The incompetent small saphenous veins are ligated and divided, rather than stripped, close to the popliteal vein in the knee pit, because stripping small saphenous veins may potentially damage the sural nerve.[11] It is not rare for recurrence, hematoma, and skin infection to occur after surgical procedure (Table 2). And massive bleeding due to injury to femoral veins, or even to femoral artery during surgery, and mortality from pulmonary embolism and DVT can happen, even though these are rarely reported.

Table (2) Complications after different modalities for varicose veins

Postoperative complications	Incidence
CS	
○ 5-y recurrence after CS in GSV	13%–29%[24]
○ >30-y recurrence after CS in GSV	60%[25]
○ 5-y recurrence after CS in SSV	30%[5]
○ Saphenous nerve damage after stripping (groin-knee level)	8%2[6]
○ Saphenous nerve damage after stripping (groin-ankle level)	40%[20]
○ Sural nerve injury / paraesthesia after CS in SSV	1.7%–34%[5]
○ DVT after CS in GSV 5.3%15	
EVLA	1%[5]
○ DVT in GSV	1.3%–5.7%[16]
○ DVT in LSV	
FS	0.40%[27]
○ Thromboembolic complication	0.40%[2]
○ Visual disturbance	
CS, conventional surgery; GSV, great saphenous vein; LSV, less saphenous vein; SSV, small saphenous vein	

Endovenous thermo ablation

Endovenous thermoablation approaches include EVLA and radiofrequency ablation; these belong to the category of minimally invasive catheter-based procedures.[3] In this procedure, a catheter is inserted and positioned at 2 cm below the sapheno-femoral or sapheno-popliteal junction. Local anesthesia is used with peri-venous tumescent technique to prevent neural damage and skin burn. Alternatively, venous sedation can be used. The thermal energy is delivered onto the diseased venous wall and induces inflammation response and subsequent fibrosis and closure of the vein.[7] Faster recovery from EVLA, no need for hospital admission, no surgical incision, and early resumption of daily activity or work are advantages of this procedure. However, like other surgeries, EVLA still can cause operative or postoperative complications, such as hematoma, infection, skin burn, bruising, and catheter stabbing by laser fiber, or the broken catheter can be left in the body.[3,12,13] Many clinical studies and randomized controlled trials of high quality compared EVLA and conventional surgical procedures and showed no differences in postoperative pain, recurrence rates, or returning to work or normal activity.[7,14]

Clinical experience shows that the pain after laser ablation contributes to the skin contusion caused between skin and uneven bandages used after the procedure, blisters induced by skin burn, and endovenous thermal–induced thrombosis and thrombophlebitis[7]; all of these problems can be prevented with careful manipulation during the procedure. Using proper compression stocking rather than bandage may reduce the risk of skin contusion. In addition, early ambulation is always critical to preventing DVT.[11,15]

Radiofrequency ablation

The technique of endovenous RFA has been available since 1998; it delivers thermal energy from a bipolar catheter to the insufficient veins. RFA is an effective and safe treatment modality for incompetent veins, and it can be performed in-office as a minimally invasive procedure. The advantages of RFA include low complication rate, reduced pain, high vein occlusion rates, and early return to work and normal activities. Currently available clinical trial evidence suggests RFA and EVLA are at least as effective as surgery in the treatment of great saphenous varicose veins.[7,11,16]

Foam sclerotherapy

Sclerosing foam is injected through a cannula in the vein under duplex ultrasound guidance; it can be undertaken in the outpatient clinic, and a compression stocking should be used immediately after FS.[17] Observational studies found that success rates vary from 82% to 100%,5 and the recovery was faster following FS than following conventional surgical stripping. It takes approximately 1 hour to perform FS, patients do not need to take medicine or stay in the hospital, and patients can go home or continue to work immediately after the procedure. The efficacy of FS is obvious in comparison with conventional surgical stripping (Fig. 1). Complications after FS are rare, including bruising, thrombophlebitis, skin pigmentation, and visual disturbance.[18]

Ambulatory phlebectomy

Ambulatory phlebectomy is an outpatient procedure that removes superficial veins through small 2- to 3-mm incisions in the skin overlying the varicose veins and is performed under local anesthesia. The accepted indications for this technique are side branch varicose veins, and varicose veins of the foot, around the ankle, and the knee pit. The most important instrument for this technique is the vein retractor or phlebectomy hook. There are two ways by which the veins can be grasped. The phlebectomy hook is inserted through an incision and the varicose vein is hooked, extracted, and subsequently fixed with a clamp; the vein is finally pulled out by turning the exteriorized part of the vein. Graded compression stockings or compression bandages are usually used for 1 to 2 weeks after the procedure. This procedure is often used as an adjunct to EVLA or RFA, either concomitantly or in the sequential management of tributaries for symptomatic varicose veins. The complications are uncommon but include paresthesia, bruising, hemorrhage, and hematoma. EVLA with with both treatments achieves excellent results at 5 years. Concomitant treatment of varicosities is associated with optimal improvement in both clinical disease severity and quality of life.[19,20]

Aim

To prove the benefits of non-surgical methods of varicose vein treatment in term of efficacy, cost and time.

Chapter Two

Patients and method

Patients and methods

This descriptive cross-sectional study was performed on 132 patients visitng the private clinic in Baghdad from November 2018 to March 2019.

Selection criteria

Patients of both sexes were included in the study on the basis of diagnosis of varicose veins confirmed clinically and by investigations, who were underwent a reparative process, weather in surgical or non-surgical methods.

Base line assessment

Data was collected through a direct interview with the participants. A verbal consent was taken. Thorough information concerning the patient's condition was obtained, via the questionnaire, from the history, physical examination and biochemical investigations, and followed-up after therapeutic interventions.

Exclusion criteria

All patients without address and call number and non-complete consent form excluded from the study.

Data collection

Involved site of varicose veins, type of therapeutic intervention that the patient underwent, and the time-consumed by each intervention, follow-up improvements, and costs of these interventions.

Caution had been considered to avoid repetition of the interview with the same patient by looking only for newly registered patients and marking their files during the time of the study.

Statistical analysis

Data were encoded and filled using Microsoft excel spread sheet (window) then analysis was performed using SPSS.

Chapter Three

Results

Results

During the study period, 132 patients had varicose veins, they were 60 (45.4) males and 72 (54.5%) females with male: female ratio of 1:1.2 as shown in fig.1.

Table (1) Gender Distribution

Gender	Male (N)	Female (N)	Total
Frequency	60 (45.4%)	72 (54.5%)	132 (100%)
Female: Male Ratio	1:1.2		

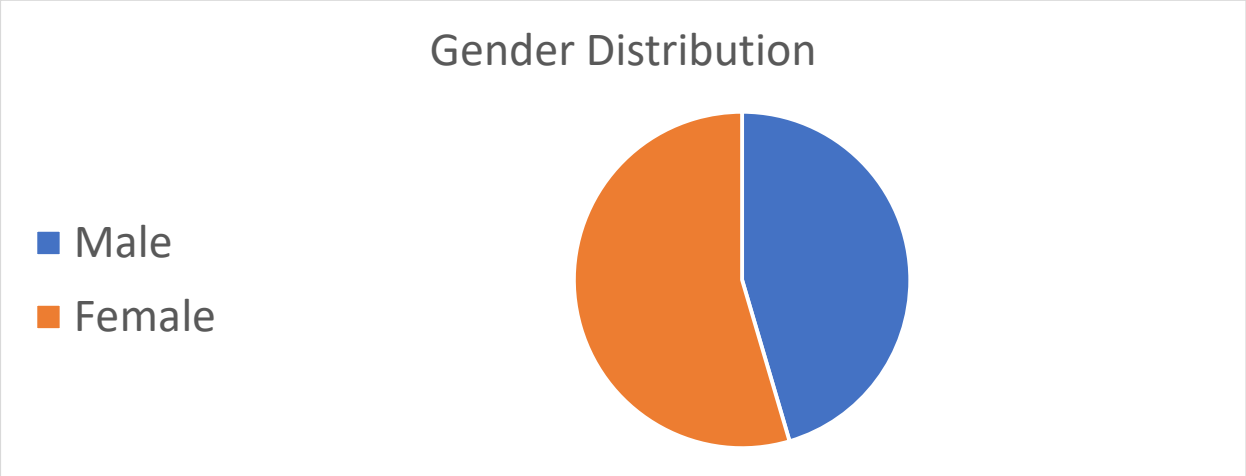

Figure (1) Gender Distribution

Sides of vein involvement in this study showed that bilateral involvements were the most common (39.3%), followed by right side venous involvement (38%) and the left side was the least involved (22.7%) as shown in fig. 2

Table (2): Sides of vein involvement

Site	N	Percentage
Left side	30	22.7%
Right side	50	38%
Both side	52	39.3%
Total	132	100%

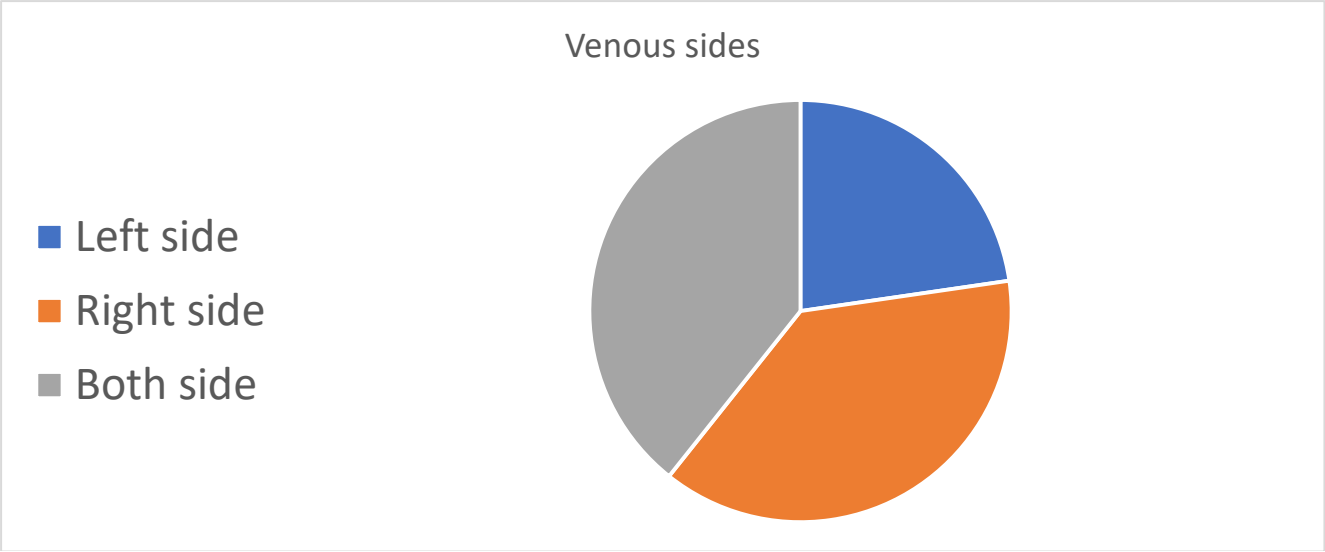

Figure (2) **Sides of vein involvement**

Intervention used to treat the varicose vein in this study, showed that sclerotherapy was the most common (47%) intervention used in our practice, followed by radiofrequency (22.7%), and venesection was the least one used (3.8%) as shown in fig. 3.

Table (3) Frequency of surgical and non-surgical intervention in patients' sample

Interventions	**Radiofrequency**	**Venesection**	**Sclerotherapy**	**Conservative**
N	30 (22.7%)	5 (3.8%)	62 (47%)	35 (26.5%)

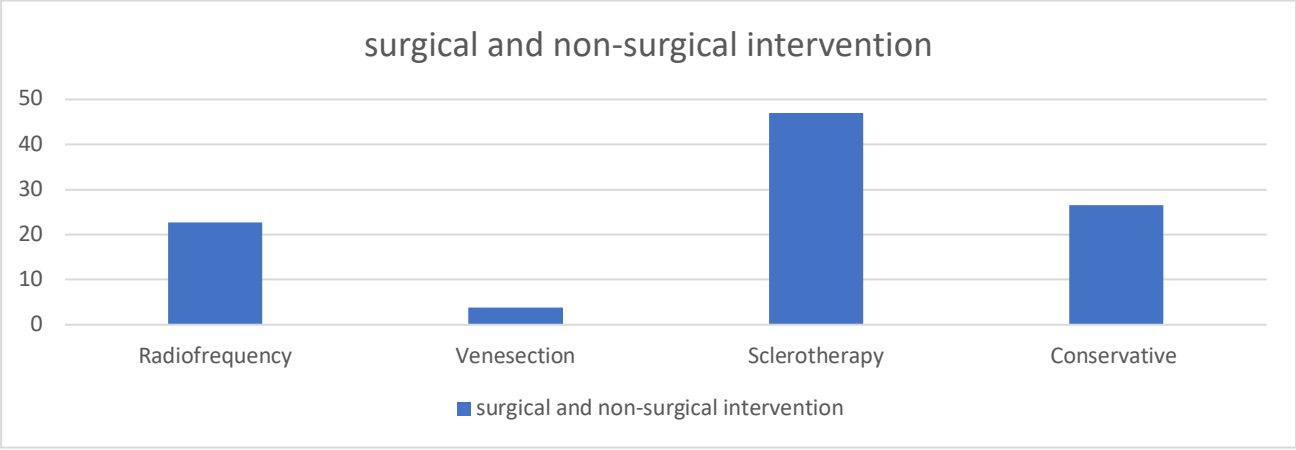

Figure (3) Frequency of surgical and non-surgical intervention in patients' sample

Time required for intervention was taken in this study and showed that sclerotherapy was the fastest intervention with 15 min duration, followed by radiofrequency with 20 min, and surgical intervention takes up to 2 hours of duration as shown in table (4).

Table (4) Duration of interventions

Type of Intervention	Time required for intervention (Time)
Radiofrequency	20 min
Sclerotherapy	15 min
Surgery	2 Hour

Cost requirement for each intervention according to hospital admissions showed that surgery need up to 7 days of hospitalization as shown in table (5).

Table (5) Costs of each intervention according to days required for admission

Type of Intervention	Admission required to recovery post-intervention (cost)
Radiofrequency	Not required
Sclerotherapy	Not required
Surgery	Up to 7 days admission required

Efficacy of intervention depending on duration required for relieving symptoms showed that both radiofrequency and sclerotherapy was the most efficient interventions with immediate symptoms relieve as shown in table (6).

Table (6) Efficacy of interventions

Type of Intervention	Time required for relieving symptoms (Efficacy)
Radiofrequency	Immediately
Sclerotherapy	Immediately
Surgery	10 days post-intervention

Chapter Four

Discussion

Discussion

Out of the total 132 patients with varicose veins, majority were females 72 (54.5%), While males were 60 (45.4%) with, and these were different from those reported by N. Joseph et al [21] which might be attributed to factors related to different risk factors.

According to lower limb side distribution, we found that the Both sides involvement was the most common type encountered (39.3%), followed by right side involvement (38%), and left side was the least involved (22.7%). These findings were different from those reported by N. Joseph et al [21] which might be attributed to factors related to different risk factors causes.

In this study, in radiofrequency as non-surgical method of varicose vein treatment compared with conventional vein surgery was associated with faster return to work (on the second day), shorter time to return to normal activity (1 vs 7 days), lower pain scores, better short-term quality of life scores in form of symptoms recovery, and higher patient satisfaction. This study was similar to those reported by Murad et al [22]

For sclerotherapy, it was showed that sclerotherapy was as effective as surgery, in addition, they gave better initial results and was less likely to require additional treatment or hospital admissions, with less time-consuming technique in comparing to conventional surgeries, and these findings was similar to those reported by Murad et al [22] and Beale et al [23]

While surgical methods of treatment have the lowest cost-effectiveness in this study and these findings was similar to those reported by Epstein et al. [24]

Chapter Five

Conclusion

Conclusion

The efficacy of non-surgical intervention in treatment of varicose vein, sclerotherapy and radiofrequency, was similar to surgical interventions, with less time consuming and more cost-effective.

Recommendation

Recommendation

- Extending the study period to include more patients and expand the study
- Further studies regarding the preference of choice in these two methods

References

References

1. Evans CJ, Fowkes FG, Ruckley CV, Lee AJ. Prevalence of varicose veins and chronic venous insufficiency in men and women in the general population: Edinburgh Vein Study. J Epidemiol Community Health 1999;53(3):149–153
2. Ren S, Liu P, Zou N, Tan X. Better outcomes of varicose veins with EVLT alone than in combination with Trivex by GRA. J Grey Syst 2008;20(3):195–204
3. Liu P, Ren S, Yang Y, Liu J, Ye Z, Lin F. Intravenous catheterguided laser ablation: a novel alternative for branch varicose veins. Int Surg 2011;96(4):331–336
4. Biemans AA, Kockaert M, Akkersdijk GP, van den Bos RR, de Maeseneer MG, Cuypers P et al. Comparing endovenous laser ablation, foam sclerotherapy, and conventional surgery for great saphenous varicose veins. J Vasc Surg 2013;58(3):727–734.e1
5. Tellings SS, Ceulen RP, Sommer A. Surgery and endovenous techniques for the treatment of small saphenous varicose veins: a review of the literature. Phlebology 2011;26(5):179–184
6. Bush RG, Hammond K.Treatment of incompetent vein of Giacomini (thigh extension branch). Ann Vasc Surg 2007;21(2): 245–248
7. Rasmussen LH, Lawaetz M, Bjoern L, Vennits B, Blemings A, Eklof B. Randomized clinical trial comparing endovenous laser ablation, radiofrequency ablation, foam sclerotherapy and surgical stripping for great saphenous varicose veins. Br J Surg 2011;98(8):1079–1087
8. Ren S, Liu P. Initial clinical experiences in treating 27 cases of varicose veins with EVLT plus TRIVEX. J US China Med Sci 2005;2(1):4–8
9. Vasquez MA, Munschauer CE. Venous Clinical Severity Score and quality-of-life assessment tools: application to vein practice. Phlebology 2008;23(6):259–275
10. Lattimer CR, Kalodiki E, Azzam M, Geroulakos G. The Aberdeen varicose vein questionnaire may be the preferred method of rationing patients for varicose vein surgery. Angiology 2014;65(3):205–209
11. van den Boezem PB, Klem TM, le Cocq d'Armandville E, Wittens CH. The management of superficial venous incompetence. BMJ 2011;343:d4489
12. Ren S, Liu P, Wang W, Yang Y. Retained foreign body after laser ablation. Int Surg 2012;97(4):293–295
13. van den Bos RR, Neumann M, Nijsten T. Laser fibre stabs the catheter: a serious complication of endovenous laser ablation. Phlebology 2011;26(3):119–120

14. Bountouroglou DG, Azzam M, Kakkos SK, Pathmarajah M, Young P, Geroulakos G. Ultrasound-guided foam sclerotherapy combined with sapheno-femoral ligation compared to surgical treatment of varicose veins: early results of a randomised controlled trial. Eur J Vasc Endovasc Surg 2006; 31(1):93–100
15. van Rij AM, Chai J, Hill GB, Christie RA. Incidence of deep vein thrombosis after varicose vein surgery. Br J Surg 2004; 91(12):1582–1585
16. Almeida JI, Raines JK. Radiofrequency ablation and laser ablation in the treatment of varicose veins. Ann Vasc Surg 2006; 20(4):547–552
17. Gloviczki P, Gloviczki ML. Guidelines for the management of varicose veins. Phlebology 2012;27(suppl 1):2–9
18. Willenberg T, Smith PC, Shepherd A, Davies AH. Visual disturbance following sclerotherapy for varicose veins, reticular veins and telangiectasias: a systematic literature review. Phlebology 2013;28(3):123–131
19. Harlander-Locke M, Jimenez 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):166–172
20. Carroll C, Hummel S, Leaviss J. Systematic review, network meta-analysis and exploratory cost-effectiveness model of randomized trials of minimally invasive techniques versus surgery for varicose veins. Br J Surg 2014;101(9):1040–1052
21. Joseph N, B A, Faizan Thouseef M, Devi M U, Abna A, Juneja I. A multicenter review of epidemiology and management of varicose veins for national guidance. Annals of Medicine and Surgery. 2016;8:21-27.
22. Murad M, Coto-Yglesias F, Zumaeta-Garcia M, Elamin M, Duggirala M, Erwin P et al. A systematic review and meta-analysis of the treatments of varicose veins. Journal of Vascular Surgery. 2011;53(5):49S-65S.
23. Beale R, Gough M. Treatment Options for Primary Varicose Veins—A Review. European Journal of Vascular and Endovascular Surgery. 2005;30(1):83-95.
24. Epstein D, Onida S, Bootun R, Ortega-Ortega M, Davies A. Cost-Effectiveness of Current and Emerging Treatments of Varicose Veins. Value in Health. 2018;21(8):911-920.