

ORIGINAL RESEARCH

Analyzing Varicose Vein Treatment Methods: A Comparative Exploration of Open Surgery with Venous Stripping vs. Radiofrequency Ablation (RFA)

Dr. Sumit Sachan

Assistant Professor, Department of General Surgery, Rajshree Medical Research Institute, Bareilly, Uttar Pradesh, India

Corresponding author

Dr. Sumit Sachan

Assistant Professor, Department of General Surgery, Rajshree Medical Research Institute, Bareilly, Uttar Pradesh, India

Received: 20 June, 2023

Accepted: 23 July, 2023

ABSTRACT

Background: This research conducted a comparative analysis between traditional open surgery involving venous stripping and a modern approach using radiofrequency ablation (RFA) for the treatment of varicose veins. **Methods:** The investigation involved a cohort of 136 patients, distributed evenly into two groups of 68 individuals each. In Group I, patients underwent open surgery with venous stripping, while in Group II, patients underwent radiofrequency ablation (RFA). **Results:** In Group I, comprising 40 males and 28 females, the mean duration of surgery was 50.4 minutes, and the hospital stay averaged 5 days. In contrast, Group II, with 36 males and 32 females, had a significantly shorter mean surgery duration of 10.2 minutes and a reduced hospital stay of 2 days ($P < 0.05$). Common complications, such as bleeding (16 in Group I, 2 in Group II), hematoma (10 in Group I, 2 in Group II), and inflammation (64 in Group I, 4 in Group II), exhibited significant differences between the two groups ($P < 0.05$). **Conclusion:** The authors concluded that conservative management utilizing radiofrequency ablation (RFA) was determined to be more effective when compared to open surgery with venous stripping.

Keywords: Ablation, venous stripping, varicose.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

INTRODUCTION

Varicose veins, as a chronic vascular condition, are characterized by the abnormal enlargement and twisting of veins, often occurring in the lower limbs. This condition results from the weakening of vein walls and valves, which normally help blood flow in one direction.¹ The term "varicosity" is applied to veins that have lost their elasticity, becoming prolonged, expanded, and convoluted. While varicose veins themselves may not be life-threatening, the associated symptoms and potential complications can significantly impact an individual's well-being. Symptoms of varicose veins include pain, aching, heaviness, and swelling in the affected limbs. Complications can arise, including bleeding, superficial thrombophlebitis (inflammation of a vein), and the development of chronic venous insufficiency. Chronic venous insufficiency can lead to skin changes, such as discoloration and ulceration, further compromising the quality of life for individuals with varicose veins. Treatment options for varicose veins

range from conservative measures to surgical interventions, and the choice of treatment depends on the severity of symptoms and the overall health of the patient.² Conservative management may involve lifestyle modifications, compression stockings, and leg elevation to alleviate symptoms. Surgical interventions, such as venous stripping (traditional open surgery) or more modern approaches like radiofrequency ablation (RFA), aim to remove or close off the affected veins, redirecting blood flow to healthier vessels. In the context of the venous system, perforators serve as channels that connect the superficial and deep venous systems, ensuring efficient blood circulation. Valves within veins prevent the backward flow of blood, maintaining unidirectional flow and preventing the pooling of blood in the veins. An individualized approach to treatment, considering both the symptoms and the overall health of the patient, is crucial in managing varicose veins effectively. Healthcare professionals play a key role in educating patients about lifestyle

modifications, discussing treatment options, and providing comprehensive care to improve the overall well-being of individuals affected by this common vascular condition.³

Varicose veins, affecting approximately a quarter of Western adults, present a common vascular issue often linked to the reflux of the great saphenous vein (GSV). Traditionally, the go-to treatment for varicose veins involved surgical procedures characterized by high ligation and stripping of the GSV, extended to knee level, along with phlebectomies. While this approach effectively mitigates symptoms and enhances the quality of life for patients, it is not without its drawbacks.⁴ Postoperative complications, including bleeding, groin infections, thrombophlebitis, and potential damage to the saphenous nerve, though rare, underscore the need for alternative interventions. Conventional surgery, typically performed in a hospital setting and requiring general or regional anesthesia, can pose challenges and escalate costs. In response to these limitations, alternative treatments have emerged as viable options over the last decade. Endovenous ablation techniques, such as laser (EVLA) and radiofrequency ablation (RFA), as well as ultrasound-guided foam sclerotherapy (UGFS), have gained favor. A notable shift from hospital-based procedures, these minimally invasive techniques are performed in an office setting using tumescent local anesthesia. Numerous studies have underscored the efficacy and safety of these newer, less invasive interventions, particularly in eliminating the GSV from circulation. Patients undergoing these procedures often experience reduced postoperative morbidity, and the convenience of office-based treatments represents a positive trend in improving the patient experience.⁵ Additionally, the potential for lower overall costs further supports the growing popularity of these alternative approaches. The adoption of endovenous ablation techniques and foam sclerotherapy represents a significant stride forward in varicose vein management, providing patients with choices that not only match the effectiveness of traditional surgery but also offer advantages in terms of safety, convenience, and potentially more cost-effective care. This paradigm shift reflects a commitment to improving the overall outcomes and experiences of individuals grappling with varicose veins.

The genesis of varicose veins can be traced to various pathological conditions that disrupt the normal functioning of valves within the veins. In Mauritius, a prevailing notion among the population is that unless varicose veins produce significant symptoms, there is no urgency for treatment.⁶ The general consensus tends to favor a conservative approach, with the belief that as long as varicose veins are not causing noticeable discomfort or complications, medical intervention may not be necessary. This perception, however, stands in contrast to the progressive nature of varicose veins. Left untreated, the condition can

advance, leading to complications and necessitating medical attention. The shift from conservative management to more invasive procedures becomes apparent as the disease progresses. Invasive interventions may include sclerotherapy, surgical procedures such as Trendelenburg's method, ligation of the saphenopopliteal junction (SPJ), stripping of the great saphenous vein (GSV), ligation of perforators, cut separation, and subfacial endoscopic perforator surgery. In recent times, there has been a notable shift toward endovenous thermal ablation procedures, presenting an attractive alternative to traditional surgery. These minimally invasive techniques offer comparable efficacy to surgical interventions but with significantly reduced postoperative discomfort and a quicker recovery period.⁷ Procedures like radiofrequency ablation (RFA) have gained prominence due to their ability to achieve effective outcomes while minimizing patient inconvenience. The study referred to directly addresses the comparison between open surgery with venous stripping and radiofrequency ablation for the treatment of varicose veins. This research reflects a broader trend within the medical community, where there is a growing interest in exploring and adopting less invasive options. Such studies contribute valuable insights into the effectiveness and safety of alternative treatments, helping guide healthcare providers and patients in making informed decisions about the most suitable interventions for managing varicose veins.⁸ Overall, this evolving landscape in the treatment of varicose veins signifies a paradigm shift towards patient-centric, minimally invasive approaches that prioritize both efficacy and patient comfort. The ongoing research and comparisons of different treatment modalities contribute to refining and advancing the field, offering improved options for individuals grappling with this common vascular condition.

MATERIALS AND METHODS

This prospective study involved a cohort of 136 patients and was conducted within the Department of General Surgery, encompassing individuals of both genders. The aim of the study was likely to investigate and analyze specific aspects related to the conditions or treatments under consideration within the realm of general surgery. The term "prospective study" suggests that the researchers followed and observed these patients over time, collecting data as events unfolded rather than relying on historical information. This design is often employed to assess the cause-and-effect relationship between variables or to monitor the progression of a particular condition or the effectiveness of a treatment strategy in real-time.

The study adhered to ethical guidelines with clearance obtained from the institutional ethical committee, emphasizing the importance of ethical considerations in medical research. Informed consent was diligently obtained from all participants after providing

comprehensive information about the study. Standard demographic details such as name, age, and gender were systematically recorded to ensure a comprehensive understanding of the patient population under investigation. The patient cohort of 136 individuals was then methodically divided into two groups, each comprising 68 patients. Group I underwent open surgery with venous stripping, while Group II underwent radiofrequency ablation (RFA). Various parameters, including bleeding, hematoma formation, blood transfusion requirements, postoperative inflammation, and duration of hospital stay, were meticulously documented for both groups. The study incorporated a robust follow-up mechanism, tracking all patients for a duration of one year post-intervention. This extended follow-up period allows for the observation of both short-term

and potential long-term outcomes, contributing to a more comprehensive understanding of the efficacy and safety of the chosen treatment modalities. The collected data underwent thorough statistical analysis, with a key focus on identifying any significant differences between the two groups. The statistical significance was set at a P value less than 0.05, ensuring a stringent criterion for the determination of meaningful variations in the outcomes. This meticulous approach in study design, ethical considerations, and data analysis enhances the credibility and reliability of the study findings, providing valuable insights into the comparative effectiveness of open surgery with venous stripping and radiofrequency ablation in the context of varicose vein treatment.

RESULTS

Table 1: Distribution of patients

| Groups | Group I (68) | Group II(68) |
|--------------|------------------------------------|------------------------------|
| Method | Open surgery with venous stripping | Radiofrequency ablation (RA) |
| Male: Female | 40:28 | 36:32 |

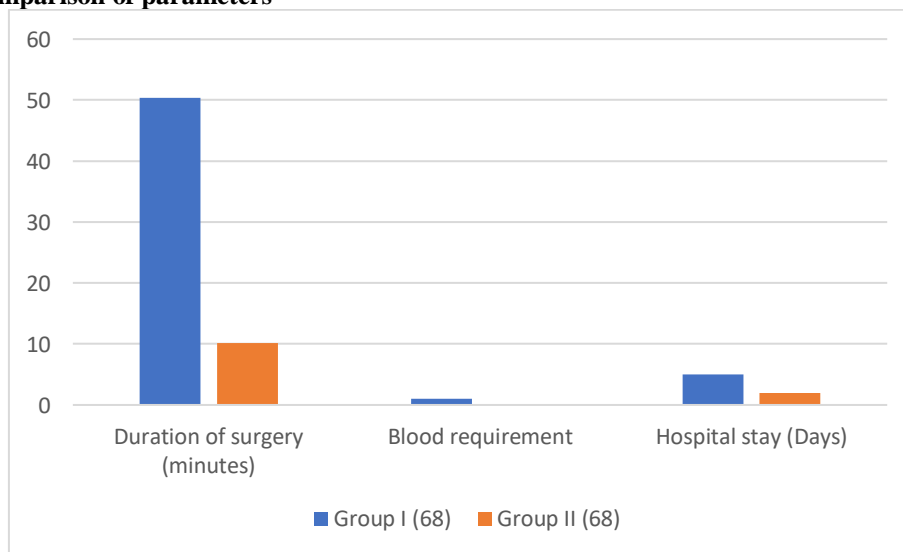
This information provides a clear snapshot of the patient distribution in terms of treatment methods and gender composition within each group. In Group I, which underwent open surgery with venous stripping, there were 40 male and 28 female patients. Group II, treated with radiofrequency ablation (RA), consisted

of 36 male and 32 female patients. Analyzing these demographics is crucial for researchers and healthcare professionals to understand the characteristics of the patient cohorts undergoing different treatment modalities, aiding in the interpretation of outcomes and the development of targeted interventions.

Table 2: Comparison of parameters

| Groups | Group I (68) | Group II (68) | P value |
|-------------------------------|--------------|---------------|---------|
| Duration of surgery (minutes) | 50.4 | 10.2 | 0.01 |
| Blood requirement | 1 | 0 | 0.02 |
| Hospital stay (Days) | 5 | 2 | 0.05 |

Figure1: Comparison of parameters



These data highlight notable differences between the two treatment groups. Group II, which underwent radiofrequency ablation (RA), exhibited a

significantly shorter duration of surgery, required no blood transfusions, and had a shorter hospital stay compared to Group I, where open surgery with venous

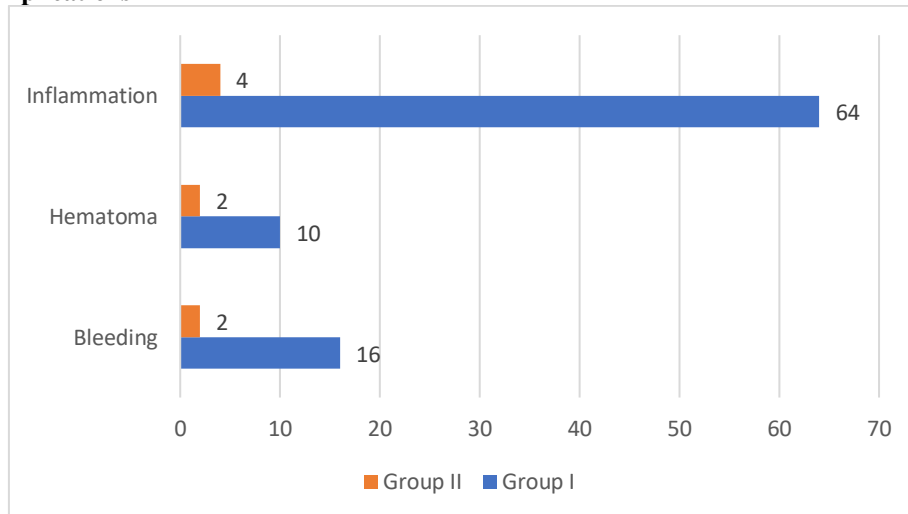
stripping was performed. These parameters provide valuable insights into the procedural efficiency, resource utilization, and postoperative recovery associated with each treatment modality. Such

information is crucial for healthcare professionals and researchers in evaluating the effectiveness and feasibility of different interventions for specific medical conditions.

Table 3: Complications

| Complications | Group I | Group II | P value |
|---------------|---------|----------|---------|
| Bleeding | 16 | 2 | 0.02 |
| Hematoma | 10 | 2 | 0.05 |
| Inflammation | 64 | 4 | 0.001 |

Figure2: Complications



The presented data on complications in Group I and Group II sheds light on the distinct outcomes associated with two different treatment modalities. In Group I, where open surgery with venous stripping was performed, a relatively higher incidence of complications was observed. Notably, 16 cases of bleeding, 10 cases of hematoma, and 64 cases of inflammation were reported. In contrast, Group II, which underwent radiofrequency ablation (RA), exhibited notably lower complication rates with only 2 cases each of bleeding and hematoma, and 4 cases of inflammation. These findings suggest a potential advantage for Group II in terms of a reduced risk of complications, particularly in the aspects of bleeding and hematoma formation. The shorter duration of surgery, minimal blood requirement, and shorter hospital stay in Group II, as previously mentioned, align with this trend of lower complications. The data underscores the importance of considering not only the efficacy of treatment but also the associated risks and complications when evaluating different therapeutic approaches. This nuanced understanding aids healthcare professionals in making informed decisions, optimizing patient outcomes, and providing tailored care based on the specific characteristics of each treatment modality.

DISCUSSION

Varicose veins, lacking a universally agreed-upon definition, find their origins in the Latin term "varix,"

which broadly refers to an enlarged vein, artery, or lymphatic vessel. In everyday language, "varix" is specifically associated with veins, and "varicosity" describes a condition where veins become enlarged in diameter and exhibit a tortuous or twisted appearance. Varicose veins typically manifest as superficial veins in the lower limbs that have experienced a loss of valvular function. This valvular insufficiency leads to venous hypertension, causing the affected veins to dilate, thicken, and adopt a twisted or tortuous course.⁹ Despite the absence of conclusive evidence supporting a hereditary component, some studies suggest that individuals with both parents affected by varicose veins have an increased likelihood of developing the condition. The incidence of varicose veins tends to rise with age, with females exhibiting a higher predisposition to varicosities compared to males. The pathophysiology of varicose veins involves the obstruction of deep veins, redirecting blood into the superficial venous system. This redirection results in a gradual dilation, elongation, and damage to the valves, culminating in the formation of varicosities. Various factors contribute to the development of varicose veins, including prolonged periods of standing, height, race, occupation, bowel habits, abdominal masses compressing veins, inherent weaknesses in vessel walls, and the congenital absence of valves. Against this backdrop, the study in question aimed to compare the outcomes of two distinct treatment modalities for varicose veins: open

surgery with venous stripping and radiofrequency ablation (RFA). By undertaking such a comparative analysis, the researchers sought to provide valuable insights into the effectiveness and safety profiles of these interventions. Studies of this nature contribute significantly to advancing our understanding of the underlying pathophysiology of varicose veins and play a pivotal role in optimizing treatment strategies for individuals grappling with this common vascular condition.¹⁰

The increasing popularity of minimally invasive methods for the ablation of the great saphenous vein (GSV) marks a significant paradigm shift in the treatment landscape for varicose veins. This transformation is not confined to the United States but extends globally, where endovenous techniques have gradually become the preferred choice, supplanting conventional surgical procedures. Among the leading minimally invasive approaches are endovenous laser ablation (EVLA), radiofrequency ablation (RFA), and ultrasound-guided foam sclerotherapy (UGFS), all of which have gained prominence for their effectiveness, reduced invasiveness, and favorable patient outcomes. While no long-term randomized trials have directly compared these minimally invasive methods with conventional surgery, an increasing body of evidence has emerged from individual trials that have pitted these techniques against each other or against traditional surgical approaches. These studies, often featuring short- to medium-term follow-up periods, offer valuable insights into the comparative efficacy and safety profiles of different treatment modalities.¹¹ It is important to note that, as of now, there hasn't been a single comprehensive trial that simultaneously investigates all these minimally invasive methods. Existing literature predominantly consists of studies that have compared one or more of these techniques individually against each other or against conventional surgery. For instance, there are notable short-term studies that specifically delve into the comparison between the ClosureFAST™ device and EVLA, shedding light on the relative outcomes and advantages of these specific interventions. The overarching trend toward minimally invasive treatments for varicose veins underscores a commitment to improving patient experiences, minimizing postoperative complications, and enhancing overall treatment outcomes. As the field continues to evolve, ongoing research endeavors and comparative studies contribute to a nuanced understanding of these techniques, offering valuable guidance to healthcare practitioners in selecting the most appropriate interventions tailored to the unique needs of their patients.

In this comprehensive study involving 136 patients, the research design incorporated a meticulous division into two distinct groups, each consisting of 68 individuals. The treatment protocols for these groups were distinctly defined: Group I participants underwent the conventional approach of open surgery

entailing venous stripping, while Group II subjects were subjected to the contemporary method of radiofrequency ablation (RFA).¹² The RFA procedure in this study utilized a sophisticated device featuring a bipolar RFA probe. Notably, this probe incorporated two electrodes within the same unit, separated by an insulator, and was intricately connected to a radiofrequency generator unit. Understanding the intricacies of the RFA device is crucial for contextualizing the therapeutic process. In the case of bipolar RFA, the generator delivers energy to the vein wall, initiating conductive heating. This thermal energy induces the contraction of the vein wall, resulting in the shortening of collagen fibrils, destruction of the endothelium (the inner lining of the vein), and the fibrotic shrinkage of the venous lumen. This multifaceted mechanism contributes to the reduction in the overall diameter of the vein, a key aspect of the therapeutic effect sought in treating varicose veins. Drawing parallels with related studies, such as the investigation led by Brittenden et al., offers valuable insights into the broader context of these findings. In the Brittenden study, similar categorization into two groups was implemented, where Group I underwent traditional open surgery with venous stripping, and Group II received radiofrequency ablation (RFA). The demographic details of the current study reveal that a significant portion of the participants fell within the age range of 20-40 years, with an average age of 35 years observed in both groups. Furthermore, the study population exhibited a notable male predominance, with a male-to-female ratio of 4:1.^{13,14} These demographic nuances, combined with the technical intricacies of the interventions and the specificities of the RFA device, collectively form the foundation for a comprehensive analysis of the study outcomes. By scrutinizing this wealth of data alongside the clinical results, researchers gain a holistic understanding of the relative efficacy and demographic considerations associated with open surgery involving venous stripping and radiofrequency ablation in the treatment of varicose veins.

In comparing the surgically managed group with the conservatively managed patients in this study, it was observed that complications arising from the surgical line of treatment were relatively minor in nature. These complications did not necessitate any additional interventions or treatments and did not impose significant discomfort on the patients. The implication is that the surgical approach demonstrated a favorable safety profile, with complications being manageable within the scope of the treatment and recovery process. However, it is important to note and acknowledge certain limitations within the study. One notable limitation is the relatively small sample size, which may impact the generalizability and statistical power of the findings.¹⁵ A larger sample size could potentially provide more robust and reliable insights into the outcomes and complications associated with

the surgical and conservative management approaches. Additionally, the study's short follow-up duration is another limitation. A more extended follow-up period would offer a more comprehensive understanding of the long-term outcomes, potential complications, and the durability of the chosen interventions over time. Despite these limitations, the study contributes valuable information about the nature of complications associated with the surgical treatment modality, highlighting that these complications were minor and did not pose substantial challenges to the patients. Addressing these limitations in future research endeavors could further enhance the understanding of the comparative effectiveness and safety profiles of surgical and conservative approaches in the management of the studied condition.

CONCLUSION

The findings of the study suggest that conservative management, particularly employing radiofrequency ablation (RFA), was identified as a superior approach compared to open surgery with venous stripping. This conclusion implies that patients who underwent RFA as part of a conservative management strategy experienced better outcomes or fewer complications when compared to those who underwent the more traditional open surgery involving venous stripping. The preference for conservative management, especially RFA, over open surgery with venous stripping might be attributed to various factors. These could include the minimally invasive nature of RFA, reduced postoperative discomfort, quicker recovery times, and potentially lower complication rates. Additionally, conservative management approaches often aim to preserve the natural anatomical structure and function of the treated area, contributing to improved patient satisfaction and overall well-being. It is crucial to note that the choice between conservative management and surgical interventions is often influenced by factors such as the severity of the condition, patient preferences, and the overall health status of the individual. The study's conclusion underscores the importance of considering less invasive options, like RFA, in the management of varicose veins, suggesting that these approaches can provide effective and favorable outcomes compared to traditional open surgery with venous stripping.

REFERENCES

1. Callum MJ. Epidemiology of varicose veins. *BJS*. 1994;81(2):167-73.
2. Durkin MT, Turton EP, Wijesinghe LD, Scott DJ, Berridge DC. Long saphenous vein stripping and

- quality of life – a randomised trial. *Eur J VascEndovasc Surg* 2001; 21: 545 – 549.
3. MacKenzie RK, Paisley A, Allan PL, Lee AJ, Ruckley CV, Bradbury AW. The effect of long saphenous vein stripping on quality of life. *J Vasc Surg* 2002; 35: 1197 – 1203.
4. Vasquez MA, Wang J, Mahathanaruk M, Buczkowski G, Sprehe E, Dosluoglu HH. The utility of the Venous Clinical Severity Score in 682 limbs treated by radiofrequency saphenous vein ablation. *J Vasc Surg* 2007; 45:1008 – 1014.
5. Garratt AM, Macdonald LM, Ruta DA, Russell IT, Buckingham JK, Krukowski ZH. Towards measurement of outcome for patients with varicose veins. *Qual Health Care* 1993; 2: 5 – 10.
6. Smith JJ, Garratt AM, Guest M, Greenhalgh RM, Davies AH. Evaluating and improving health-related quality of life in patients with varicose veins. *J Vasc Surg* 1999; 30: 710 – 719.
7. Nisar A, Shabbir J, Tubassam MA, Shah AR, Khawaja N, Kavanagh EG et al. Local anaesthetic flush reduces postoperative pain and haematoma formation after great saphenous vein stripping – a randomised controlled trial. *Eur J VascEndovasc Surg* 2006; 31: 325 – 331.
8. Wright et al. The prevalence of venous disease in a west London population. In: Davy A, Stemmer R. (Ed), *Phlebology*. 1989:176-8.
9. Widmer LK. *Peripheral venous disorders prevalence and socio-medical importance*. Bern: Hans Huber. 1978:1-90.
10. Critchley G et al. Complications of varicose vein surgery. *Ann Roy Col Surg*. 1997;79(2): 105-10.
11. Katsamouris AN, et al. Recurrent Varicose veins after surgery: A new appraisal of a common and complex problem in vascular surgery. *European journal of vascular and Endovascular surgery*. 2004;27(3):275-82.
12. Meissner MH, Gloviczki P, Gergan J, Kistner RL, Morrison N, Pannier F et al. Primary chronic venous disorders. *J Vasc Surg*. 2007;46:54-67.
13. Kistner RL, Ferris E. The evolving management of varicose veins. *Straub clinic experience*. *Postgrad Med*. 1986;80:56-9.
14. Van den Bos R, Arends L, Kockaert M, Neumann M, Nijsten T. Endovenous therapies of lower extremity varicosities: a meta-analysis. *J Vas Surg*. 2009;49:230-9.
15. Wright AP, Berridge DC, Scott DJ. Return to work following varicose vein surgery: influence of type of operation, employment and social status. *Eur J vascEndovas Surg*. 2006;31:553-7.
16. Meissner M. Lower extremity venous anatomy, *Semin. InterventRadiol*. 2005;22:147-56.
17. Brittenden J, Cotton SC, Elders A, Ramsay CR, Norrie J, Burr J et al. A randomized trial comparing treatments for varicose veins. *N Engl J Med*. 2012; 371(13):1218-27.
18. Michaels JA, et al. Randomized clinical trial comparing surgery with conservative treatment for uncomplicated varicose veins. *BJS*. 2000; 175-81