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STUDY ON OUTCOMES OF VARIOUS MODALITIES IN THE TREATMENT OF VARICOSE VEINS

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ABSTRACT:

Background: Varicose veins, a prevalent venous disorder characterized by dilated, tortuous veins primarily in the lower limbs, pose both aesthetic issues and serious vascular consequences. Despite various treatment modalities available, including conservative approaches and minimally invasive techniques like sclerotherapy, endovenous laser therapy (EVLT), and radiofrequency ablation (RFA), there remains a lack of consensus on the most effective management strategies. This study aims to methodically compare the efficacy of these diverse treatments in addressing varicose veins, with a focus on long-term effectiveness, recurrence, patient satisfaction, and quality of life.

Methods: This study included 64 patients from the Department of General Surgery with superficial venous reflux, aged 20 to 60 years, excluding those with large circumferential ulcers or deep venous reflux. Treatment modalities assessed were the Trendelenburg operation, Trendelenburg and stripping, microphlebectomy, endovenous laser ablation, endovenous radiofrequency ablation, and foam sclerotherapy. Comprehensive evaluations were conducted, including medical history, clinical examination, and various imaging techniques. Follow-up was performed at 2 years and 6 months post-treatment to assess recurrence, with further assessments for disappearance of varicosities, prevention of complications, ulcer healing, and wound cosmesis.

Results: The majority of patients experienced disappearance of varicosities (82.8%), with a low recurrence rate (10.94%). Preventive outcomes for complications were positive (75%), and significant ulcer healing was noted (68.75%). Cosmetic outcomes were also favorable, with 82.8% satisfaction in wound appearance. The most common procedures were Trendelenburg with stripping and Trendelenburg alone, followed by less invasive methods like microphlebectomy and endovenous treatments. Additional foam sclerotherapy was used in over half of the cases, indicating its prevalence as a supplementary treatment option.

Conclusion: The study confirms that various surgical and minimally invasive treatments for varicose veins are effective in managing this condition, with strong outcomes in clinical efficacy and cosmetic satisfaction. These findings support the continued use and development of these treatments in clinical practice, advocating for a tailored approach based on individual patient needs and the specific characteristics of their condition. Future research should aim to refine these treatment protocols further, optimizing patient-specific treatment strategies.

INTRODUCTION:

Varicose veins are a prevalent venous condition that affects a substantial number of adults. They are characterized by the enlargement, twisting, and lengthening of veins, mainly in the lower limbs [1]. This disorder not only causes aesthetic issues but is also frequently linked to discomfort, pain, and other severe vascular consequences [2]. Although varicose veins are common and have a significant impact, the most effective ways to control them are still being studied and discussed [3]. The objective of this study is to assess the efficacy and results of different treatment methods for varicose veins, offering a comparative examination to assist in making informed therapeutic choices [4].

Varicose veins occur as a result of venous insufficiency, which is frequently caused by valve malfunctions that result in the accumulation of blood in the veins, causing them to swell and leading to high blood pressure in the veins [5]. Age, gender, weight, pregnancy, and prolonged standing are all risk factors. Historically, the available treatment choices varied from conservative approaches, such as using compression stockings and making lifestyle changes, to surgical procedures like vein stripping. In the past few decades, minimally invasive procedures such as sclerotherapy, endovenous laser therapy (EVLT), and radiofrequency ablation (RFA) have become increasingly prevalent.

Despite the progress made, there is still a lack of agreement on the most efficient method of therapy. Various considerations, including the disease's severity, patient preferences, probable side effects, and resource availability, often influence the selection of treatment.

The motivation for performing this study arises from the necessity to methodically compare the results of these varied treatment methods. Although there are numerous reports on the success of various treatments in the available literature, there is a lack of comprehensive comparative studies that specifically examine long-term effectiveness, recurrence rates, patient satisfaction, and quality of life [6]. Furthermore, in light of the ever-changing healthcare environment, it is crucial to have up-to-date evidence to support the development of practice guidelines and patient care protocols [7].

This study seeks to address these deficiencies by evaluating not only the immediate clinical results but also investigating the long-term advantages and disadvantages of each treatment alternative. By doing this, it aims to provide a comprehensive structure for physicians to customize treatment regimens to suit the specific needs of each patient, so maximizing both health results and the efficient use of resources.

AIM&OBJECTIVES:

- To evaluate the effectiveness of different treatment modalities in achieving the disappearance of varicosities
- To investigate the recurrence rate of varicosities after treatment with each modality
- To assess the effectiveness of each treatment modality in preventing and managing venous ulcers
- To examine the role of various treatments in preventing secondary complications associated with varicose veins
- To compare the cosmetic outcomes of wounds post-treatment across different modalities

METHODOLOGY:

This study encompassed patients presenting with varicosities at the Department of General Surgery. The treatment modalities evaluated included

- Trendelenburg operation
- Trendelenburg and stripping
- Microphlebectomy
- Endovenous laser ablation
- Endovenous radiofrequency ablation
- Foam sclerotherapy.

Patients eligible for inclusion were aged 20 to 60 years with superficial venous reflux. The study excluded patients with large circumferential ulcers or deep venous reflux. For each participant, a comprehensive evaluation was conducted, which included a detailed medical history, clinical examination, basic blood tests, chest X-ray, electrocardiogram (ECG), and venous Doppler imaging of the affected limb.

After detailing the procedure and obtaining informed consent, patients underwent various surgical treatments. Following each procedure, hemostasis was achieved, wounds were closed, a crepe bandage was applied, and the affected limb was elevated. Postoperative follow-up was conducted at 2 and 6 months to monitor for recurrence of varicose veins, both clinically and sonographically.

- Recurrence of Varicose Veins: Patients were assessed for recurrence at 2 years and 6 months post-surgery through clinical examinations and ultrasound imaging.
- Disappearance of Varicose Veins: Observations for residual veins were made postoperatively on day 7 and again at 2 months.
- Prevention of Complications: Over 6 months, patients were monitored for the development of skin changes such as pigmentation and lipodermatosclerosis.
- Ulcer Healing: The progress of ulcer healing was observed postoperatively, from a reduction in ulcer size to complete healing within one year of surgery.
- Wound Cosmesis: The healing of surgical or injection sites was closely monitored postoperatively to assess wound cosmesis.

This comprehensive follow-up schedule ensured thorough monitoring and evaluation of the treatment outcomes, including the effectiveness of procedures in managing and resolving varicose veins and related complications.

Statistical analysis:

Descriptive statistics will summarize patient demographics and baseline characteristics, while comparative analyses will utilize Chi-square tests, Kaplan-Meier survival analysis, and ANOVA or Kruskal-Wallis tests to evaluate the disappearance and recurrence of varicosities, the management of venous ulcers, the incidence of secondary complications, and the cosmetic outcomes of treatments. Multivariable regression models will be employed to identify factors independently predicting treatment success and complications, adjusting for potential confounders. Sensitivity analyses will ensure the robustness of the findings. All analyses will be performed using statistical software like SPSS version 26.0, with a significance level set at $p < 0.05$.

RESULTS:

Table 1 presents the baseline characteristics of the study participants. There were a total of 64 participants. The mean age of the participants was approximately 40.72 years with a standard deviation of 10.08. Regarding gender distribution, 67.2% of the participants (43 individuals) were male, while 32.8% (21 individuals) were female.

Table 1: Baseline characteristics of study participants

Parameter	**Total no of participants n=64 (%)**
Age in years (mean ± SD)	40.72 ± 10.08
Gender	

Male	43 (67.2)
Female	21 (32.8)
Leg involved	
Right	(39.07)
Left	(60.93)

Table 2 details the types of surgical treatments performed on the 64 study participants. The most common procedure was Trendelenburg with stripping, performed on 28 participants (43.75%). This was followed by the Trendelenburg procedure alone, used in 23 cases (35.93%). Less frequently used treatments included microphlebectomy in 5 (7.8%) patients. Rarely used techniques, each performed wasendovenous laser ablation and endovenous radiofrequency ablation, each administered to 4 participants (6.25%). Among these patients, 38 (59.37) patients underwent additional foam sclerotherapy

Table 2: Type of Surgery performed on the study participants

Treatment Modality	**Number of Patients n=64 (%)**
Trendelenburg with stripping	28 (43.75)
Trendelenburg	23 (35.93)
Microphlebectomy	5 (7.8)
Endovenous laser ablation	4 (6.25)
Endovenous radiofrequency ablation	4 (6.25)
Additional foam sclerotherapy	**38 (59.37)**

Figure 1: Type of Surgery performed on the study participants

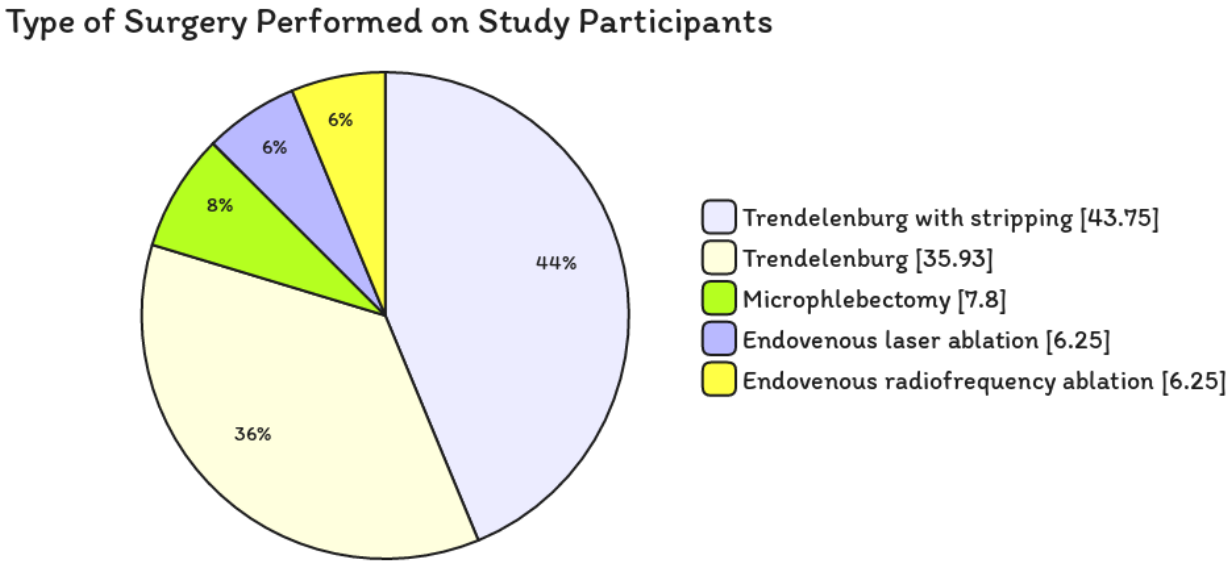


Table 3 summarizes the outcome measurements of the study participants following various treatments for varicose veins. The outcomes measured include recurrence, disappearance of veins, prevention of complications, ulcer healing, and wound cosmesis. Of the 64 participants, 7 (10.94%) experienced a recurrence of varicose veins, while the majority, 57 (89.06%), did not. The disappearance of varicose veins was observed in 53 participants (82.8%), with only 11 (17.2%) reporting no disappearance. In terms of preventing complications, 48 participants (75%) had positive outcomes, and 16 (25%) did not. Ulcer healing was successful in 44 participants (68.75%), with 20 (31.25%) not achieving healing. Similarly, good wound cosmesis was achieved by 53 participants (82.8%), with the remaining 11 (17.2%) not reporting satisfactory cosmetic outcomes.

Table 3: Outcome measurements of the study participants

Outcome	**Yes n (%)**	**No n (%)**
Recurrence of varicose veins	7 (10.94)	57 (89.06)
Disappearance of varicose veins	53 (82.8)	11 (17.2)
Prevention of Complications	48 (75)	16 (25)
Ulcer Healing	44 (68.75)	20 (31.25)
Wound Cosmesis	53 (82.8)	11 (17.2)

Figure 2: Outcome measurements of the study participants

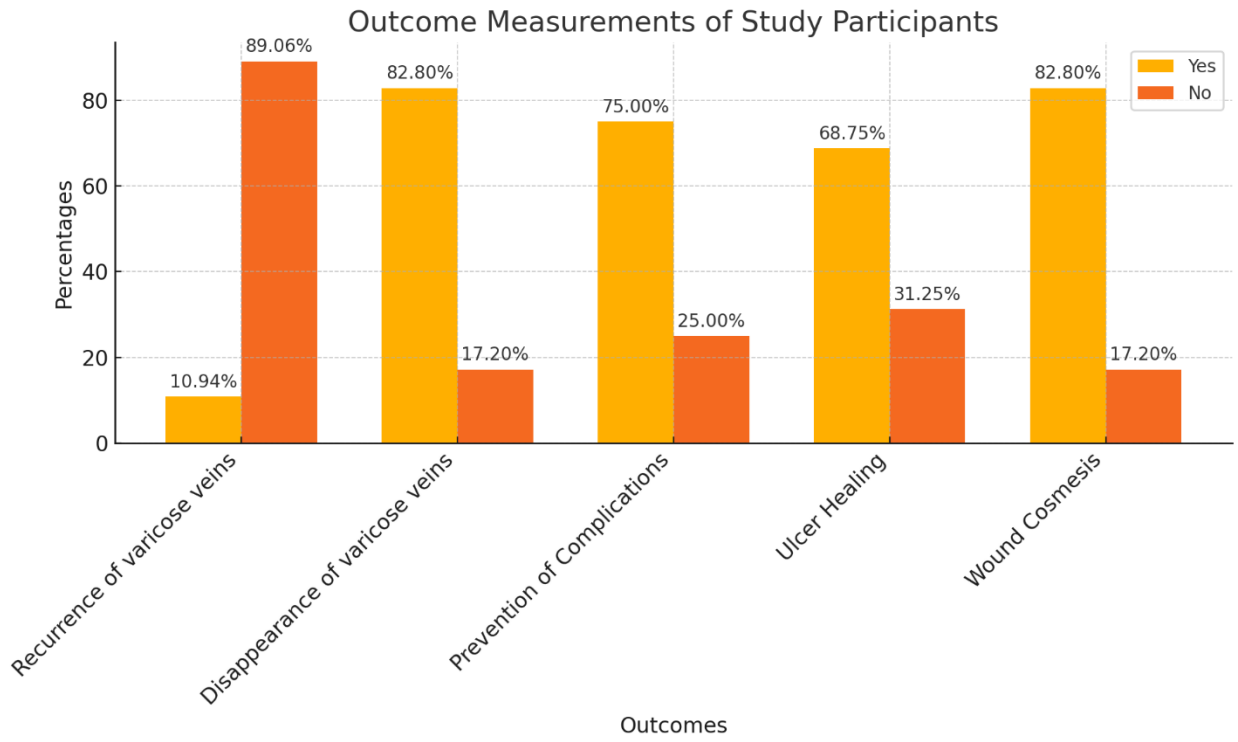


Table 4 details the distribution of complications among the 64 study participants. The complications reported include hematoma, ulcer formation, and infection. Hematomas and infections were observed in 3 participants each, accounting for 4.7% of the total study population for each type of complication. Ulcer formation was slightly less frequent, affecting 2 participants, which represents 3.1% of the participants.

Table 4: Complication distribution in the study participants

Complication	**Total no of participants n=8 (%)**
Hematoma	3 (37.5)
Ulcer formation	2 (25)
Infection	3 (37.5)

Figure 3: Complication distribution in the study participants

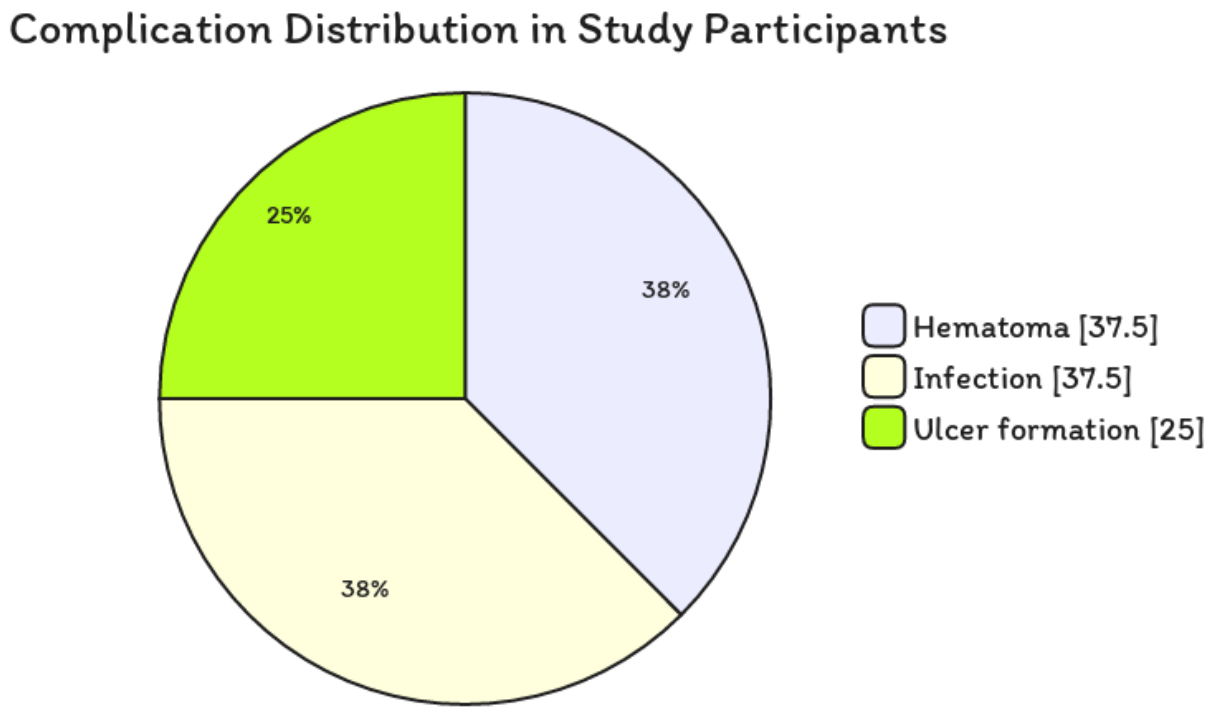


Table 5 compares the effectiveness of an additional surgical procedure on patients with varicose veins across various outcomes, highlighting significant differences in four out of five measures. Patients undergoing the additional procedure exhibited notably lower recurrence rates of varicose veins (14.3%) compared to those who did not (85.7%), with this result being statistically significant (p-value = 0.030). Similarly, significant improvements were seen in the disappearance of varicose veins, with 66.1% of patients experiencing this outcome versus 33.9% without the procedure (p-value = 0.040). The additional procedure also showed effectiveness in the prevention of complications, achieving a success rate of 68.75% compared to 31.25% in the non-procedure group (p-value = 0.018). Wound cosmesis was another area of improvement, showing a similar pattern with 66.1% improvement versus 33.9% (p-value = 0.040). However, the differences in ulcer healing did not reach statistical significance, with 68.2% of patients healing in the procedure group compared to 31.8% without it (p-value = 0.063). These results show the potential benefits of additional procedures in treating varicose veins, particularly in reducing recurrence and improving cosmetic outcomes.

Table 5: Comparison of Outcome measurements in patients with and without additional procedure

Outcome	**Without Additional procedure n=26**	**With Additional procedure n=38**	**p-value**
Recurrence of varicose veins n=7 (%)	6 (85.7)	1 (14.3)	**0.030**
Disappearance of varicose veins n=53 (%)	18 (33.9)	35 (66.1)	**0.040**
Prevention of Complications n=48 (%)	15 (31.25)	33 (68.75)	**0.018**
Ulcer Healing n=44 (%)	14 (31.8)	30 (68.2)	0.063
Wound Cosmesis n=53 (%)	18 (33.9)	35 (66.1)	**0.040**

Figure 4: Comparison of Outcome measurements in patients with and without additional procedure

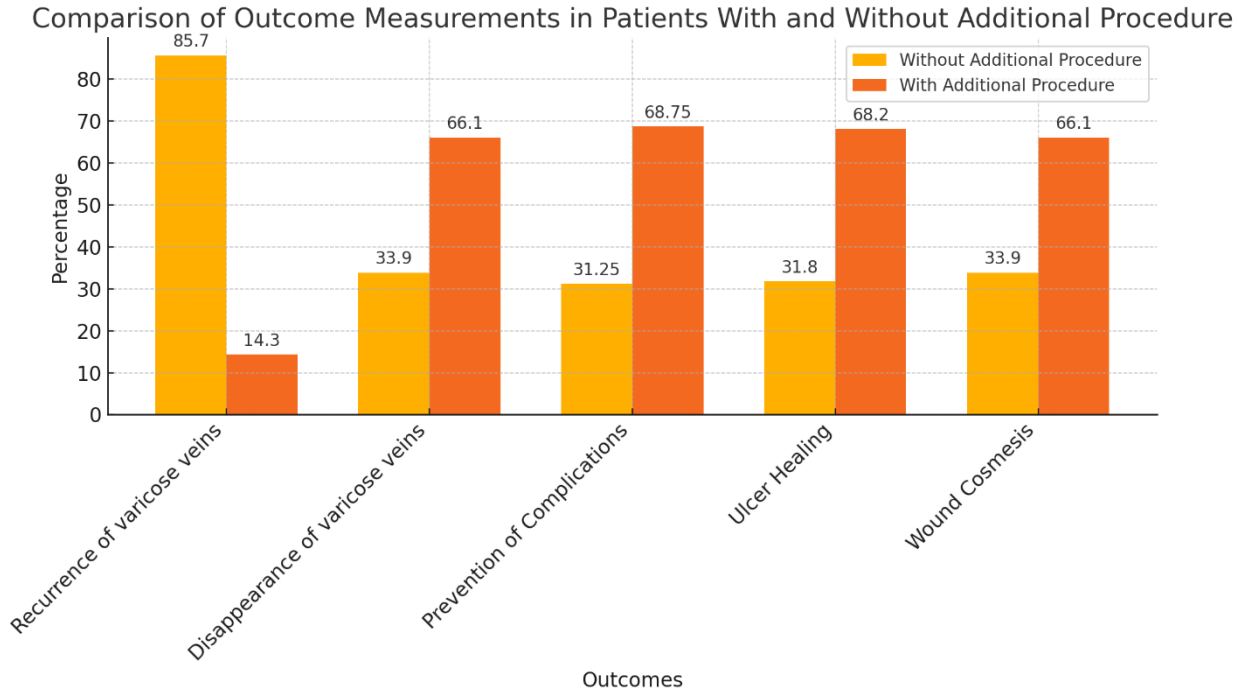
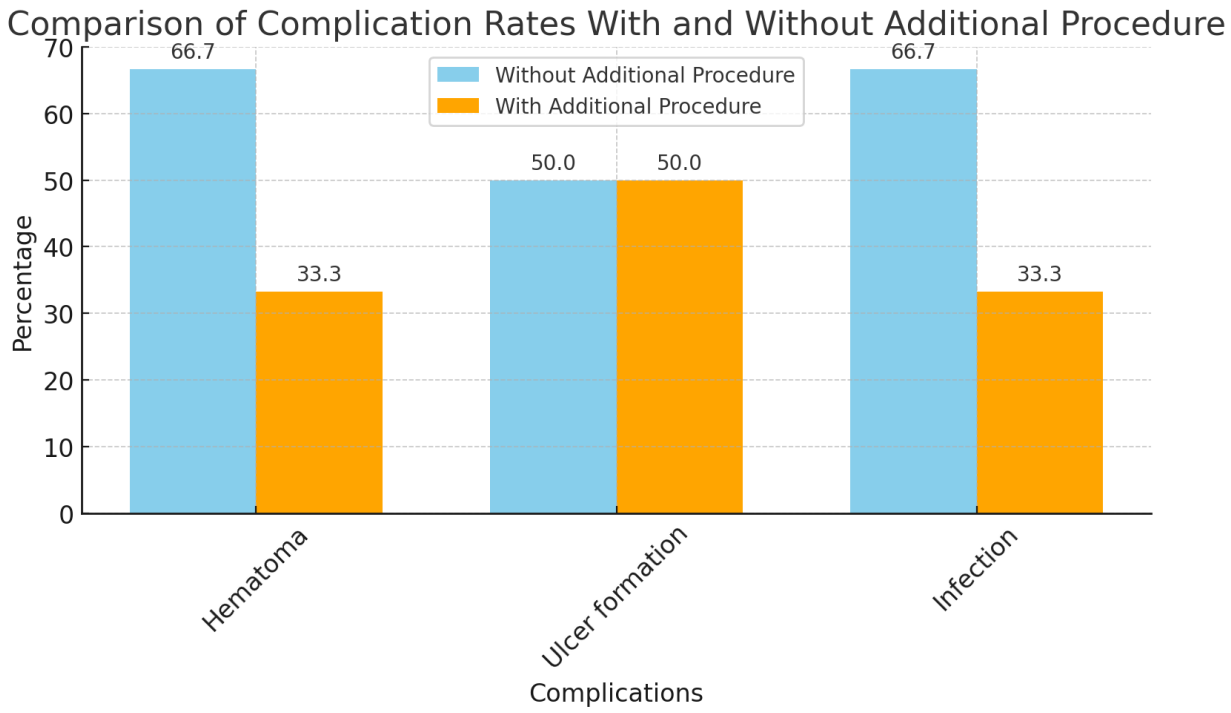


Table 6 examines the incidence of complications among patients undergoing treatment for varicose veins, specifically comparing those who had an additional procedure to those who did not. The complications analyzed were hematoma, ulcer formation, and infection. In the case of hematoma and infection, the majority of cases occurred in patients without the additional procedure (66.7%), with only one case (33.3%) occurring in patients with the additional procedure. However, these differences were not statistically significant, with p-values of 0.734 for both hematoma and infection. Ulcer formation was equally likely in both groups, with one case (50%) in each, leading to a p-value of 1.0.

Table 6: Comparison of complications in patients with and without additional procedure

Complication	**Without Additional procedure n=26**	**With Additional procedure n=38**	**p-value**
Hematoma n=3 (%)	2 (66.7)	1 (33.3)	0.734
Ulcer formation n =2 (%)	1 (50)	1 (50)	1.0
Infection n=3 (%)	2 (66.7)	1 (33.3)	0.734

Figure 5: Comparison of complications in patients with and without additional procedure



DISCUSSION:

The study presents a thorough summary of the clinical results of different therapies for varicose veins in a group of 64 patients over a two-year period. The baseline statistics reveal that the average age is 40.72 years, with a higher proportion of males (67.2%). The most commonly used therapies were the Trendelenburg with stripping and Trendelenburg procedures, which accounted for around 80% of the patients. Less invasive approaches such as microphlebectomy were also used, whereas endovenous laser and radiofrequency ablation were rarely employed.

The results shown in Table 3 demonstrate a favorable 82.8% reduction in varicosities after treatment, along with a low recurrence rate of 10.94%. The data highlights the effectiveness of the surgical procedures used, especially the widespread use of extra foam sclerotherapy, which was given to more than half of the patients, demonstrating its common use as an additional treatment method.

The treatments have proven to be beneficial, with complications prevented in 75% of patients and successful ulcer healing achieved in 68.75% of instances. Significantly, the results for wound cosmesis were also remarkably positive, as 82.8% of patients reported being satisfied with the outcomes. This highlights the advantageous combination of functional and cosmetic benefits achieved with the selected surgical methods.

Table 4 displays a comparatively low occurrence of post-operative complications, including hematomas, ulcer formation, and infections, all of which were less than 5% in each group. This indicates that although the surgical therapies are successful, they also uphold a commendable level of safety.

The additional analyses in Table 5 present compelling evidence that supplementary procedures have significant benefits, especially in reducing the recurrence of varicose veins and improving the disappearance of the condition. These outcomes show statistically significant differences.

The study conducted by Murad et al. (2011) examined different treatments for varicose veins and revealed that no particular treatment method demonstrated superior performance in all aspects, such as recurrence and patient satisfaction. However, certain treatments showed better results in specific areas [8].

The study conducted by Brittenden et al. (2019) examined the long-term effects of laser ablation, foam sclerotherapy, and surgery as treatments for varicose veins. The study revealed that laser ablation yielded marginally superior results in terms of recurrence and patient satisfaction when compared to foam sclerotherapy and traditional surgery, suggesting that less intrusive treatments may provide advantageous long-term outcomes [9].

The study conducted by Mallick et al. (2016), examined the effectiveness of traditional surgery in comparison to more recent techniques such as sclerotherapy. The study found that modern techniques frequently led to faster recovery times and fewer complications, although traditional surgery remained extremely efficient for severe instances [10].

The study titled "Surgery versus Sclerotherapy for the Treatment of Varicose Veins" published in the Cochrane Database in 1996 investigated the long-term efficacy and rates of complications associated with surgery compared to sclerotherapy. The findings indicated that although surgery may provide a more conclusive solution, sclerotherapy presents fewer risks and a faster resumption of daily activities, albeit with greater rates of recurrence [11].

The study conducted by Brittenden et al. (2014), included a total of 798 individuals from 11 different centers in the United Kingdom. This study conducted a comparison of foam, laser, and surgical treatments for primary varicose veins. The results revealed clear disparities in outcomes, including pain levels, time taken to resume work, and complications during the procedure, at the 6-month mark after treatment, highlighting the need to take into account the patient's lifestyle and preferences when selecting the treatment strategy [12].

This study demonstrates the significant efficacy of different surgical interventions for varicose veins, with Trendelenburg and related techniques achieving high rates of symptom relief and minimal recurrence. The supplementary application of foam sclerotherapy proves to be quite advantageous, improving results across various metrics. Subsequent studies could more precisely define the particular conditions in which each therapy method is most advantageous, thus enhancing personalized treatment approaches for patients.

CONCLUSION:

The primary purpose of this study was to thoroughly assess and compare the efficacy of different treatment methods for varicose veins. The objectives were carefully crafted to evaluate both the clinical effectiveness of various therapies in terms of the disappearance and reappearance of varicose veins, as well as their involvement in managing related disorders such as venous ulcers and other consequences. In addition, the aesthetic results of the procedures were carefully examined to assess patient satisfaction in terms of cosmetic appearance. The study's findings demonstrated the considerable efficacy of the evaluated treatment methods in successfully eliminating varicose veins, with a majority of patients seeing positive results. The treatments were effective in both avoiding and controlling venous ulcers, indicating a strong potential for these methods to address a significant consequence of varicose veins. The treatments showed a preventive ability in terms of avoiding secondary problems including pigmentation and lipodermatosclerosis, highlighting their overall therapeutic efficacy. Aesthetically, the results after the treatment were mostly favorable, with a considerable number of patients content with the look of their treated areas. This facet of treatment is especially crucial since it directly impacts patient contentment and has the potential to shape the perceived efficacy of the treatment.

Concerning the reappearance of varicose veins, the study observed a generally low rate of recurrence. However, it emphasized the importance of ongoing surveillance and the potential necessity for additional treatments, thereby emphasizing the persistent and recurring characteristics of varicose veins.

To summarize, the several treatment methods examined in this study offer successful remedies for the control of varicose veins, yielding positive results in terms of both clinical effectiveness and aesthetic contentment. These findings endorse the ongoing utilization and advancement of these therapies in clinical settings, promoting a customized strategy that considers the unique requirements of each patient and the distinct attributes of their illness. This study provides useful insights that contribute to the continuous efforts to optimize the treatment of varicose veins, providing favorable outcomes for both the functionality and appearance of the patient.

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