ORIGINAL ARTICLE

Comparative Study Between Infragenicular and Supramalleolar Radiofrequency Ablation in the Treatment of Primary Lower Limb Varicose Veins

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Abstract

Background: ***Lower limb varicose veins are seen in people with chronic venous insufficiency and lead to both discomfort and reduced quality of life.***

Aim of the work: ***To assess and evaluate the technical and follow-up outcomes of using radiofrequency ablation (RFA) in the treatment of primary lower limb varicose veins with respect to the venous access, comparing infragenicular and supramalleolar approaches. Emphasis is placed on the impact of these different access sites on clinical outcomes, postoperative complications, and recurrence rates.***

Patients and methods: ***A prospective randomized controlled trial was conducted at the Department of Vascular Surgery, Al-Azhar University Hospitals, and Tiba Hospital. 30 patients with symptomatic primary varicose veins and duplex-confirmed reflux below the knee were randomized equally into two groups: Group A underwent infragenicular RFA, and Group B underwent supramalleolar RFA. Patients were followed for 6-month post-procedure, assessing procedural success, complications, and outcomes.***

Results: ***All participants showed full success in completing the first-day procedures. The success rate dropped to 93.3% in each group in week two, month one, and six months, with no significant change between the groups. Operating time in the infragenicular group was, on average, 20 seconds shorter than that in the supramalleolar group (p=0.019). Ecchymosis, skin burns, and paresthesia were equally common in both groups, but more people in the supramalleolar group had ecchymosis, and more people in the infragenicular group had skin burns.***

Conclusions: ***Infragenicular and supramalleolar methods of RFA are similarly effective and safe when used to treat primary lower limb varicose veins.***

Keywords: Primary Varicose Veinss; Radiofrequency Ablation; Infragenicular Access; Supramalleolar Access; Venous Insufficiency

1. Introduction

Varicose veins and chronic venous insufficiency (CVI) are a burden of morbidity to roughly 30 percent of the adult population worldwide, causing such symptoms as pain, edema, and reduced quality of life.[1] Its pathogenesis is based on venous hypertension due to valvular incompetence, most often in the great saphenous vein (GSV), which is involved in most cases. Non-invasive methods such as compression therapy and lifestyle changes are not always sufficient in late stages of the disease, which is why more invasive measures become necessary.[2]

The venous system includes superficial veins, including the GSV, which runs in the medial foot, up the tibia to the saphenofemoral junction (SFJ) in the groin, and the short saphenous vein (SSV) in the calf. Both these are separate/disconnected/isolated/insulated (from the superficial system) by one-way valves in the perforator veins (the perforator veins also have valves) , which allow no reflux.[3]

In the past, surgical high ligation and stripping (HLS) were the standard of care, but the treatment method was hardly without risk, as it could lead to nerve damage, hematoma, and a long recovery time.

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The endovenous thermal ablation, particularly radiofrequency ablation (RFA), has established a new turning point in the management of varicose veins since it presented an outpatient, less-invasive alternative with a lower complication rate and better recovery characteristics. RFA provides closure of the refluxing veins by delivering specific thermal energy and has shown high success rates and quicker recovery to normal activity than surgery techniques.[4]

Despite RFA's growing adoption, the optimal access route for GSV ablation remains a subject of ongoing debate. The anatomical complexity of the GSV, extending from the SFJ to the ankle, presents technical challenges in addressing reflux at distal segments. Current guidelines typically recommend above-knee ablation to reduce saphenous nerve injury, yet this often leaves below-knee reflux untreated, potentially contributing to symptom persistence in a substantial proportion of patients.[5]

Two distal access techniques have gained attention to address these limitations: infragenicular (below the knee) and supramalleolar (just above the medial malleolus). The infragenicular approach targets reflux in the proximal calf, while supramalleolar access focuses on incompetence near the ankle. Each method has its own anatomical and procedural implications. A common problem is still persistent below-knee reflux following incomplete ablation. It happens in over 50 percent of cases treated in a year. Blood flow studies show that untreated distal GSV segments may cause recurrence, which implies that it is essential to ensure vein closure is complete.[6] Nevertheless, it remains controversial whether the shift in the access strategy can indeed lead to better long-term outcomes or whether it only changes the morbidity profile.[7]

This study aims to tackle this clinical uncertainty by directly comparing infragenicular and supramalleolar access for RFA in treating primary lower limb varicose veins. Unlike earlier studies that compared RFA to surgery or focused primarily on above-knee procedures, this work will assess the distal access methods. By looking at occlusion rates, complications, and patient-reported outcomes, this work aims to improve procedural standards and subsequent treatment outcomes for patients with below-knee varicose vein disease.

2. Patients and methods

This prospective randomized controlled trial was carried out on 30 patients aged between 18 and 70 years with primary lower limb varicose veins involving the great saphenous vein, symptomatic venous reflux confirmed by duplex ultrasound extending below the knee. Patients suitable for endovenous RFA in the Department of Vascular Surgery, Al-Azhar University Hospitals, and Tiba Hospital, Esna, Luxor, over two years from May 2023 to May 2025. Informed written consent was obtained from the patients. The study was done after approval from the Ethics Committee of the Faculty of Medicine, Al-Azhar University.

Exclusion criteria were history of previous venous surgery or endovenous treatment in the affected limb, deep vein thrombosis or thrombophlebitis, severe peripheral arterial disease (Ankle-Brachial Index < 0.8), pregnancy or breastfeeding women, patients with coagulopathy or anticoagulant therapy contraindicating the procedure, active skin infection or ulceration at the access site and inability or unwillingness to provide informed consent or comply with study protocol.

Grouping:

The study patients underwent endovenous RFA with infragenicular access group I (n = 15) and supramalleolar access group II (n = 15).

Pre-procedure assessment: Before the intervention, all the patients were examined with a detailed clinical and duplex ultrasound examination. Assessment criteria involved recording of age, sex, history of presenting symptoms, past treatments, and findings of physical examination, especially the topography and distribution of varicosities, and the Community and Environmental Assessment Process (CEAP) clinical classification. Duplex scanning was performed to verify the venous reflux, the anatomical position and size of GSV, and the presence of incompetent perforators or other deep venous disease. Standardized inclusion and exclusion criteria were applied in selecting the patients, and after the thorough explanation of the procedure, possible risks, and anticipated results, the informed consent was fully signed.

The procedure was prepared following strict sterile preparations. The patients were put in the supine position, and the affected limb was washed and draped with an aseptic technique. Routine use of antibiotic prophylaxis was not taken, according to the current best practice, because the risk of infection is low in endovenous procedures when conducted under sterile technique. Venous access was performed via a 16 or 18 F needle at the lowest reflux point, depending on the randomized side, infragenicular or supramalleolar. A sheath was placed, and an RFA catheter was pushed and placed at least 2 cm below the saphenofemoral junction. After the appropriate catheter position had been established, tumescent anesthesia was injected in a circumferential manner along the

entire length of the target vein segment using real-time ultrasound guidance. The anesthetic solution usually contained lidocaine, epinephrine, and bicarbonate in normal saline, which acted to numb the region, compress the vein wall to maximize its contact with the catheter, and prevent the surrounding tissues from thermal injury. Application of segmental radiofrequency energy was conducted at a controlled temperature (usually 120 °C), with 20-second segments of activation, as the catheter was slowly pulled back. The aim was to achieve even and total vein ablation through the length of treatment. Procedure specifics, such as energy use, catheter function, technical challenges, and any accessory vein treatments, were carefully recorded. Manual compression was used to obtain hemostasis at the access site, and compression bandages and class II compression stockings were applied to reduce bruising and tenderness. To prevent the risk of thrombotic complications, patients were ambulated soon after the procedure to stimulate venous return. Follow-up was done at 2 weeks, 1 month, and 6 months after the procedure. During every visit, the patients were assessed regarding the resolution of symptoms, wound healing, and any complications, including paresthesia, ecchymosis, burns, or any signs of infection. Duplex ultrasound was done to verify occlusion of the veins, presence of residual or recurrent reflux, and any thrombotic phenomenon. There was also an evaluation on subjective outcomes like level of pain, aesthetic satisfaction, and quality of life, as per the protocols of similar randomized trials. These thorough assessments guarantee objective as well as patient-oriented outcomes of treatment success. Figure 1

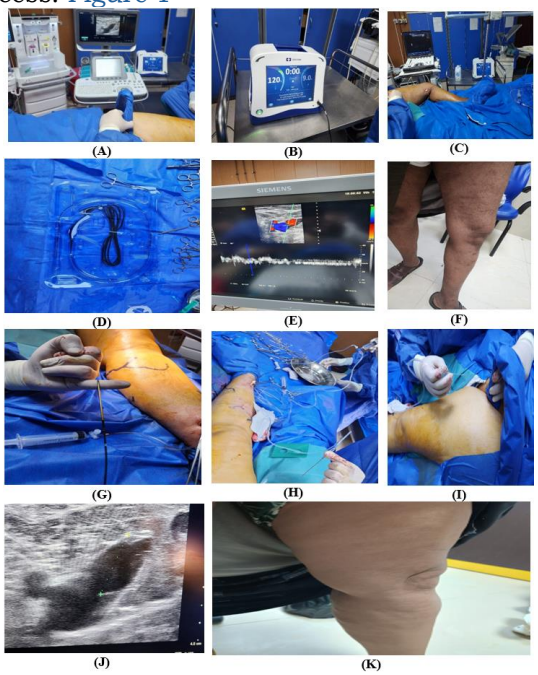

Figure 1. (A): Intraoperative ultrasound-guided localization of the saphenofemoral junction, (B): ClosureFast™ radiofrequency generator,(C): left lower limp during ablation, (D): Radio Frequency Catheter, (E): SFJ with colored duplex, (F): Clinical appearance of the lower limb preoperatively showing visible varicosities and skin changes consistent with chronic venous insufficiency,(G): catheter before introducing it in the sheath, (H): during ablation from supramalleolar approach, (I): during tumescent injection, (J): SFJ and measuring the distance from tip of the catheter and the junction and (K): Clinical appearance of the lower limb preoperatively.

Statistical analysis:

Data were analyzed using the Statistical Package for Social Sciences (SPSS) software, version 29. Qualitative variables were presented as frequencies and percentages and compared using the chi-square test. Quantitative data were expressed as means ± standard deviation (SD) and compared using the Student's t-test. Regression analysis and correlation were conducted as appropriate. A p-value of <0.05 was considered statistically significant.

3. Results

In the study, 15 patients had infrangenicular access and another 15 had supramalleolar access, all with primary lower limb varicose veins. A majority in the cohort or 66.7%, were females and slightly more females (73.3%) were found in the supramalleolar group than in the infragenicular group (60%). On average, study subjects were 42.5 years old and ranged in age from 25 to 60 with no difference among the groups. The mean BMI was the same at 28.2 for each group. Smoking status was the same, as over two-thirds of all patients in the study didn't smoke. Hypertension affected almost twice as many patients in the supramalleolar group (40%) compared to the infragenicular group (13.3%) and diabetes was more prominent in the infragenicular patients (20%). More than half of patients (60% overall) had no additional health conditions. Half of the limb losses were on the left and the other half on the right. The analysis revealed that these groups did not vary meaningfully in these demographic characteristics. Table 1

Among the 30 patients, most of them fell into the C2 and C3 categories, with 43.3% and 40% each. The C2 status was given to 40% of patients in the infragenicular group, C3 to 33.3% and C4 to 26.7%. There were more patients in the C2 and C3 groups in the supramalleolar group (46.7% each) but not as many in the C4 group (6.7%). Only a small number of patients, or 16.7%, were categorized as C4 class. Researchers did not find any significant difference in the clinical classification of CEAP

scores between the two groups. Table 2

The overall median procedure time was 32.2 minutes and was found to be statistically different between the two access groups (p = 0.019). The infragenicular access group operated for an average of 31.1 minutes (ranging from 26.8 to 38.2 minutes) and the supramalleolar access group averaged 33.3 minutes (between 29.5 and 36.6 minutes). Therefore, infragenicular procedures took an average of less time than supramalleolar procedures. Table 3

100% technical success was present in both infragenicular and supramalleolar groups on the first day post ablation. The success rate slightly decreased to 93.3% in both groups as of 2nd week and 1st month follow-ups and 6 months follow-up, the success rate remained stable in both groups with 14/15 and 14/15 patients experiencing successful closure of the vein respectively. No significant differences were found between the two access sites at any of the time points showing that both RFA methods are equally effective and durable in short term. Table 4

There was no significant difference in the frequency of complications following RFA in the infragenicular and supramalleolar groups. A new fracture occurred in one patient (6.7%) in the supramalleolar group and none in the infragenicular group. The supramalleolar group experienced more postoperative tingling (26.7%). The feeling was present in more than half of the patients and less frequently in the infragenicular group (13.3%). Burns to the skin were seen in 26.7 percent of infragenicular fractures and 13.3 percent of supramalleolar fractures. Ecchymosis occurred more in supramalleolar regions (20%) compared to infragenicular regions (13.3%). None of the control group or the treatment group had Deep vein thrombosis (DVT). Table 5

Table 1. Demographic data of the patients studied

		INFRAGENICULAR (N=15)	SUPRAMALLEOLAR (N=15)	TOTAL (N=30)	P VALUE
SEX	Female	9.0 (60.0%)	11.0 (73.3%)	20.0 (66.7%)	0.4
	Male	6.0 (40.0%)	4.0 (26.7%)	10.0 (33.3%)	4
AGE	Mean (SD)	44.5 (10.0)	40.5 (7.9)	42.5 (9.1)	0.1
	Range	25.0 - 60.0	30.0 - 59.0	25.0 - 60.0	2
BMI	Mean (SD)	28.2 (2.5)	28.2 (3.1)	28.2 (2.8)	0.7
	Range	24.4 - 32.1	22.0 - 32.7	22.0 - 32.7	5
SMOKING STATUS	No	10.0 (66.7%)	10.0 (66.7%)	20.0 (66.7%)	1.0
	Yes	5.0 (33.3%)	5.0 (33.3%)	10.0 (33.3%)	0
COMORBIDITIES	Diabetes	3.0 (20.0%)	1.0 (6.7%)	4.0 (13.3%)	0.2
	Hypertension	2.0 (13.3%)	6.0 (40.0%)	8.0 (26.7%)	0
	None	10.0 (66.7%)	8.0 (53.3%)	18.0 (60.0%)	
LIMB SIDE	Left	9.0 (60.0%)	6.0 (40.0%)	15.0 (50.0%)	0.2
	Right	6.0 (40.0%)	9.0 (60.0%)	15.0 (50.0%)	7

Data are presented as mean ± SD or range or frequency (%). BMI: body mass index.

Table 2. CEAP classification of patients of the study groups

		INFRAGENICULAR (N=15)	SUPRAMALLEOLAR (N=15)	TOTAL (N=30)	P VALUE
CEAP CLINICAL CLASS	C2	6.0 (40.0%)	7.0 (46.7%)	13.0 (43.3%)	0.331
	C3	5.0 (33.3%)	7.0 (46.7%)	12.0 (40.0%)	
	C4	4.0 (26.7%)	1.0 (6.7%)	5.0 (16.7%)	

Data are presented as frequency (%). *Significant p value.CEAP: Community and environmental assessment process.

Table 3. Average operating time for the procedure

		INFRAGENICULAR (N=15)	SUPRAMALLEOLAR (N=15)	TOTAL (N=30)	P VALUE
OPERATING TIME (MIN)	Mean (SD)	31.1 (2.8)	33.3 (2.2)	32.2 (2.7)	0.01
	Range	26.8 - 38.2	29.5 - 36.6	26.8 - 38.2	9*

Data are presented as mean ± SD or range.*Indicates significant p-value < 0.05

Table 4. Rate of success in patients studied

	INFRAGENICULAR (N=15)	SUPRAMALLEOLAR (N=15)	TOTAL (N=30)	P VALUE
SUCCESS DAY 1	15.0 (100.0%)	15.0 (100.0%)	30.0 (100.0%)	1.000
SUCCESS 2ND WEEK	14.0 (93.3%)	14.0 (93.3%)	28.0 (93.3%)	1.000
SUCCESS 1ST MONTH	14.0 (93.3%)	14.0 (93.3%)	28.0 (93.3%)	1.000
SUCCESS 6TH MONTH	14.0 (93.3%)	14.0 (93.3%)	28.0 (93.3%)	1.000

Data are presented as frequency (%).

Table 5. Complications in patients studied

	INFRAGENICULAR (N=15)	SUPRAMALLEOLAR (N=15)	TOTAL (N=30)	P VALUE
RECURRENCE	0.0 (0.0%)	1.0 (6.7%)	1.0 (3.3%)	0.309
PARESTHESIA	2.0 (13.3%)	4.0 (26.7%)	6.0 (20.0%)	0.361
SKIN BURNS	4.0 (26.7%)	2.0 (13.3%)	6.0 (20.0%)	0.361
ECCHYMOSIS	2.0 (13.3%)	3.0 (20.0%)	5.0 (16.7%)	0.624
DVT	0	0	0	

Data are presented as frequency (%). *Significant p value ≤ 0.05. DVT: Deep vein thrombosis.

4. Discussion

RFA is an established modality for the management of lower limb varicose veins; however, the current literature lacks targeted investigations comparing distal access approaches, specifically infragenicular and supramalleolar entry points. While numerous studies have examined the efficacy of RFA in comparison with endovenous laser ablation and conventional surgery, there remains a distinct deficiency in studies evaluating access site selection within RFA protocols. [3, 8, 10]

Thirty patients with primary lower limb varicose veins were included in the study. These patients were randomized into two groups (Group A was subjected to RFA with infragenicular access; Group B with supramalleolar access). The average age of the population sampled overall was about 34 years. The proportion of females in the group was 63.3 percent.

The given demographic distribution resembles the available epidemiological statistics, suggesting that chronic venous insufficiency most frequently pertains to women and manifests itself in middle adulthood. This relatively younger mean age is displayed in the current sample relative to the aged 45 years in other populations reported with similar RFA procedures, which may be related to referral patterns in the region, or unique regional demographics. [11]

Clinical severity of the varicose veins among the study population was measured using the CEAP classification system. Most patients fit into the C2 to C4 groups, which characterize diseases that are more easily or only moderately developed. Group A consisted of six C2 classified patients, four C3 patients, and five C4 patients, and Group B consisted of seven C2 patients, two C3 patients, and six C4 patients as well. These patterns of inclusion are in line with those that have been observed in prior trials that assessed the effectiveness of thermal ablation in symptomatic varicosities.[8,10] The CEAP classification is still being used as a standard and an internationally recognized grading and categorization of the severity of chronic venous disorders, and is used in directing treatment practices. This means that the demographic and clinical attributes of the participants of the present study are beneficial in making it comparable with the previous thermal ablation research and stronger in the external validity of the results.

The RFA procedures expressed a variance in the operative period between the two access groups. The average time of intra operative incision in the infragenicular group (Group A) was 30.07 minutes compared with the supramalleolar group (Group B) with a mean of 34.13 minutes. The difference proved to be significant but still represents clinically acceptable limits.

This observation is in line with the results of other literature which indicate that processes and duration are varied in relation to the point of access to the part of the body and the level of experience with the process by the operator. 3 The noted difference can probably be attributed to technological issues related to each access location, especially regarding the movement of the catheter, direction of the vein, and the comfort of placing the device.

The technical success rate was 100 percent on the first postoperative day because all the treated limbs revealed occlusion of the entire section of the targeted vein on duplex ultrasonography. By the two-week and one-month follow-up appointments, there was a small drop in occlusion rate to 93.3 percent, which was stable after six months. The results are in line with what has already been reported about radiofrequency ablation, which generally shows high early success.

A study showed a 100 percent closure rate of the veins 30 days after RFA.[11] In the same spirit, the RFA-treated patients had an early postoperative occlusion rate of 95-100 percent. These numbers justify the effectiveness of RFA in the early closure of the veins through different access points. [3]

Despite some deterioration in the success rate observed, the results remained relatively steady throughout the six-month follow-up duration and are within the acceptable efficacy spread of endovenous thermal ablation.

A one-year closure rate was 80 percent following radiofrequency ablation, and this suggests that early technical success is not necessarily a predictor of long-term vein patency.[8] Nevertheless, the ongoing percentage rate of 93.3 percent of closure at two weeks, one month, and six months assessments in the current research serves as an indicator of the efficacy of the radiofrequency ablation, regardless of the entry point. These results advocate the possibility of RFA delivering sustained short-term results like other well-developed therapies.

The total rate of complications observed in this study was low, which is reflective of the safety profile of thermal ablation treatment. Ecchymosis developed in 16.7 percent of all patients, although this was marginally more prevalent in the supramalleolar group than the infragenicular group (20.0 versus 13.3 percent, respectively). The skin burns occurrence was 10.0 percent of the cohort; the infragenicular group had a higher

percentage of 13.3 percent of patients affected by the complication, compared to the supramalleolar group with a lower percentage of 6.7 percent. Paraesthesia was observed in 10.0 percent of all patients, 13.3 percent in the supramalleolar group, and 6.7 percent in the infragenicular group. There were no incidences of deep vein thrombosis in the follow-up period. These results favor the procedure safety of RFA in both access methods.

The results are within the range of the complications reported in radiofrequency ablation. Previous research reported the rate of ecchymosis to be 13 to 30 percent, and skin burns to be 6.5 to 10 percent.[3] It has also been noted that paresthesia also occurs in 6.5 to 15.7 percent of the cases, most of them clearing themselves up within a matter of a few months. These observations are in line with results presented currently, and they underpin the potential safety profile of RFA. In addition, the incidence of skin burns, ecchymosis, and paresthesia was lower after RFA than endovenous laser ablation, as reported.[10] The safety analysis implies a better safety profile in the early postoperative period.

A study showed the low rate of complications associated with radiofrequency ablation, the absence of deep vein thrombosis, and only minor adverse outcomes.[8]

In the present research, the presence of paresthesia was slightly more common in cases in the supramalleolar group, which could be explained by the anatomical proximity of the saphenous nerve to the great saphenous vein at the ankle, which enhances the possibility of producing thermal nerve irritation. On the contrary, the greater number of skin burns in the infragenicular group can be attributed to the fact that the proximal calf has relatively thin subcutaneous tissue that provides less protection against heat transmission. The results also confirm the existing safety record of RFA and its further application as a minimally invasive and efficient procedure in treating primary varicose veins.

The recurrence rate in the total population at six months follow-up was 6.7 percent, and it was evenly distributed in both the infragenicular and supramalleolar access groups. Such a rate is towards the high end of the range normally reported for thermal ablation technologies. The result is within a clinically acceptable margin, though a bit above the rate of recurrence recorded in some studies.

The results are in line with the reported early outcomes of RFA previously.[3] Further long-term follow-up is needed to understand how long vein closure lasts and whether there is a possibility of late recurrence.

The recurrence rate observed in this study is consistent with previously published data.

They reported low recurrence rates during the early postoperative period following radiofrequency ablation.[8,11] In the study, RFA-treated limbs demonstrated satisfactory clinical outcomes at one year; however, the rate of long-term recanalization was higher compared to conventional surgery. These findings highlight the necessity of assessing recurrence not only through anatomical evidence of reflux but also in relation to the persistence or return of clinical symptoms, which may offer a more comprehensive evaluation of treatment success.[8]

A study noted that the below-knee residual reflux and above-knee proximal ablation might still occur afterward, but this does not mean that the reflux will lead to the development of clinical symptoms. The latter can be applied to the current research, as no symptom-related relapses were detected in the presence of isolated duplex findings of residual reflux. Anatomical variability and collateral circulation in the lower limb via collateral venous routes within the lower limb can explain such discrepancies by reducing the hemodynamic effects of local reflux.[12]

At this moment, it is not possible to conclude on the long-term durability of RFA because of the short-term follow-up in the current study. However, the recurrence rate observed at six months is consistent with previously reported short-term outcomes for RFA. Though they can show early efficacy very well, this cannot necessarily evolve into sustained clinical success in the long term. Consequently, long-term follow-up should be done to assess the sustainability of the vein closure even further and observe any nascent recanalization or recurrence of the symptoms.

The curative outcome of RFA has been examined greatly in contrast to both endovenous laser ablation and the traditional surgery procedures.

The most recent meta-analysis showed RFA and laser ablation have similar occlusion failure rates of the great saphenous vein at one-month and one-year follow-up, and pooled success rates of 98.35 percent and 93.13 percent for RFA, respectively.[10] Nevertheless, the same analysis has stated that RFA was linked to a much lower rate of postextraction complications, such as skin burns, ecchymosis, procedural pain, and early recurrence, especially in the studies reported after 2016. Such outcomes imply that RFA is a preferred treatment method, more than laser ablation, when it comes to patient safety and the earliest post-surgical recovery.

When RFA is compared with conventional surgery, the available evidence highlights differing advantages between the two treatment modalities.

In a randomized controlled trial, each leg of eighteen patients was randomized to undergo either RFA or surgical stripping. The study reported that aesthetic outcomes, as evaluated by physicians, significantly favored RFA.[8] However, long-term hemodynamic success was superior in the surgically treated limbs, which achieved a 100 percent occlusion rate at one year, compared to 80 percent in the RFA group. These findings suggest that while RFA offers benefits in terms of cosmesis, shorter recovery time, and minimally invasive access, surgical excision may result in greater long-term vein closure in selected anatomical scenarios.

In the context of the current trial, the performance of RFA aligns with previously reported outcomes in the literature. The technical success rate at one month was 93.3 percent and stayed constant up to six-month follow-up, which is consistent with closure rates described in earlier studies. The observed complication rates, including ecchymosis, paresthesia, and skin burns, were comparable to or lower than those associated with endovenous laser ablation and fall within the expected range for RFA. Although the six-month recurrence rate of 6.7 percent is slightly higher than the lowest values reported in some thermal ablation studies, it remains within the acceptable clinical range and reflects the variability observed across different techniques and patient populations.[8, 11]

The contribution to the extent of literature that has been synthesized on radiofrequency ablation, the current evidence provides more evidence that RFA is an effective and safe method of managing primary lower limb varicosities. Whilst there are technical differences among the various treatment modalities, the results found here have further backed the importance of RFA as an effective and minimally invasive alternative to both endovenous laser ablation and customary operation.

4. Conclusion

This randomized prospective trial shows that infragenicular and supramalleolar endovenous RFA is equally effective and safe in the treatment of primary lower limb varicose veins. With infragenicular access, there was less operative time, although it did not result in significant clinical differences. Procedural success and short-term outcomes were favorable in both groups, and postoperative complication rates were similar, including ecchymosis, paresthesia, and skin burns. There were no major incidents or complications, and the recurrence was low in both methods. These results justify the utilization of both access ways, providing the possibility to decide based on the anatomical factors and the surgeon's preferences without affecting the quality of care and the effectiveness of the treatment.

Disclosure

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References

1. Ortega MA, Fraile-Martínez O, García-Montero C, Álvarez-Mon MA, Chaowen C, Ruiz-Grande F, et al. Understanding Chronic Venous Disease: A Critical Overview of Its Pathophysiology and Medical Management. J Clin Med. 2021;10:43-56.
2. 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. 2022;63:184-267.
3. Hamed MH, Sharaby SAE, Morsy OMM. Comparative study of using Microwave Catheter by Infragenicular or Supramalleolar access in the Treatment of Primary Lower Limb Varicose Veins. AIMJ. 2024;5:34-40.
4. González Cañas E, Florit López S, Vilagut RV, Guevara-Noriega KA, Santos Espí M, Rios J, et al. A randomized controlled noninferiority trial comparing radiofrequency with stripping and conservative hemodynamic cure for venous insufficiency technique for insufficiency of the great saphenous vein. J Vasc Surg Venous Lymphat Disord. 2021;9:101-12.
5. Wittens C, Davies AH, Bækgaard N, Broholm R, Cavezzi A, Chastanet S, et al. Editor's Choice – Management of Chronic Venous Disease: Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS). Eur J Vasc Endovasc. 2015;49:678-737.
6. de Araujo WJB, Timi JRR, Nejm CSJ, Erzinger FL, Caron FC. Persistent below-knee great saphenous vein reflux after above-knee endovenous laser ablation with 1470-nm laser: a prospective study. J Vasc Bras. 2016;15:113-9.
7. Conte MS, Bradbury AW, Kolh P, White JV, Dick F, Fitridge R, et al. Global vascular guidelines on the management of chronic limb-threatening ischemia. Eur J Vasc Endovasc. 2019;58:S1-S109. e33.
8. Mendes CA, Martins AA, Fukuda JM, Parente JB, Munia MA, Fioranelli A, et al. Randomized trial of radiofrequency ablation versus conventional surgery for superficial venous insufficiency: if you don't tell, they won't know. Clinics (Sao Paulo). 2016;71:650-6.
9. Ismael A, Hafez A, Hassan M. Assessment of endovenous microwave catheter ablation in the treatment of primary lower limb varicose veins. Int JHealth Sci. 2022:4311-9.
10. Jiang W, Liang Y, Long Z, Hu M, Yang H, Qin X. Endovenous radiofrequency ablation vs laser ablation in patients with lower extremity varicose veins: A meta-analysis. J Vasc Surg Venous Lymphat Disord. 2024;12:10-8.
11. Topcu AC. Radiofrequency ablation versus high ligation and stripping for the treatment of symptomatic great saphenous vein insufficiency: Short-term patient-reported outcomes. JACC Cardiovasc Interv. 2023;10:41-8.
12. Hong KP. Prognosis of reflux of the below-knee great saphenous vein after surgical or endovenous treatment of reflux of the above-knee great saphenous vein. J Vasc Surg Venous Lymphat Disord. 2020;8:629-33.