Section: Radiodiagnosis

Original Research Article

A PROSPECTIVE STUDY TO EVALUATE THE OUTCOMES OF HIGH LIGATION SURGERY VERSUS RADIOFREQUENCY ABLATION IN PATIENTS WITH VARICOSE VEINS

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ABSTRACT

Background: Varicose veins result from venous valve incompetence, causing blood pooling and increased pressure, with approximately 20-25% of women and 10-15% of men affected. This study compares the outcomes of managing varicose veins through radiofrequency ablation (RFA) and surgical vein stripping.

Materials and Methods: This one-year prospective study at SVS Medical College and Hospital compared complications and recovery between high ligation and stripping versus radiofrequency ablation (RFA) for treating GSV varicosities in 100 patients.

Results: The study included 100 patients with varicose veins, 60 of whom underwent high ligation and stripping (HL/S), while 40 received radiofrequency ablation (RFA). Complications were more frequent in the HL/S group, with a higher incidence of bruising, wound infections, and lymphocele, while RFA patients experienced more "pulling" sensations and skin burns but had significantly shorter hospital stays and lower pain scores. Both procedures had a 100% success rate in vein closure and symptom resolution, with ulcers healing in an average of 8.67 weeks.

Conclusion: Radiofrequency ablation is the preferred option for varicose veins owing to its short duration of hospital stay, lower rate of complications and thereby having lower morbidity.

Keywords: Varicose veins, radio-frequency ablation, High ligation surgery, complications.

INTRODUCTION

Varicose veins are dilated, tortuous veins of lower extremities arising due to venous valve incompetence, which leads to venous stasis and increased intraluminal pressure, allowing blood to pool rather than being efficiently returned to the heart. Epidemiological data suggest that approximately 20-25% of women and 10-15% of men are affected by visible varicosities, with prevalence rising with advancing age and influenced by factors such as gender, pregnancy, and geographical location. Though varicose veins are largely considered benign, potential complications include venous ulcers, thrombophlebitis, and hemorrhage from ruptured veins, albeit these sequelae are relatively uncommon.[1,2]

Management of varicose veins encompasses a spectrum of interventions, from conservative approaches like lifestyle modifications and compression therapy to more interventional techniques. Among the most commonly employed procedures are radiofrequency ablation (RFA) and surgical vein stripping.[3]

RFA is a minimally invasive endovenous procedure utilizing thermal energy from radiofrequency waves to induce vein closure, thereby promoting venous return and alleviating symptoms. It is associated with reduced postoperative pain, shorter recovery

periods, and fewer complications compared to traditional open surgery.[3,4]

In contrast, surgical vein stripping entails the excision of the affected venous segments through incisions. While this technique may be necessary for advanced or severe cases, it is linked with higher risks of postoperative complications, including scarring and wound infections.[1,4]

Although both RFA and surgical interventions have demonstrated efficacy, there remains a critical need for long-term, comparative studies to assess their effectiveness across diverse patient populations. This study aims to assess and evaluate the outcomes of management lines of varicose veins, i.e., via radiofrequency ablation or by open surgery.

MATERIALS AND METHODS

This prospective study was conducted in the Department of Radiology, SVS Medical college and Hospital over a period of 1 year, i.e. from April 2023 to March 2024. Patients aged between 20 to 80 years, with GSV varicosity exhibiting grade II reflux or higher at the sapheno-femoral junction, and those with venous ulcers classified as CEAP C2 to C6 were included in the study. Patients with secondary varicose veins from previous deep vein thrombosis (DVT), recurrent varicose veins, perforator incompetence, segmental reflux, pregnancy, congenital anomalies (e.g., Klippel-Trenaunay Syndrome), GSV diameter exceeding 1.2 cm, ABI below 0.9, and significant comorbid conditions were excluded from the study.

Each patient underwent clinical evaluation, including history, examination, and duplex ultrasound. The Venous Clinical Severity Score (VCSS) evaluated disease severity. Duplex ultrasound assessed reflux duration and GSV diameter, while baseline investigations identified risk factors.

The study aimed to compare procedure-related complications and patient recovery between two surgical techniques for treating varicose veins: conventional high flush ligation of the sapheno-femoral junction (Trendelenburg procedure) with great saphenous vein (GSV) stripping, and GSV obliteration through endovenous thermal ablation (Radio Frequency Ablation (RFA).

Both techniques were performed under regional anesthesia. The Trendelenburg procedure involved a 4-6 cm groin incision for ligation and stripping, while RFA was guided by duplex imaging with tumescent anesthesia. Postoperatively, patients were advised to wear elastic compression bandages and class II stockings for 12 weeks.

Patients were advised to come to follow-ups occurred at 1 week after discharge, one month, six months, and one year, documenting CEAP staging and VCSS. Success was defined as GSV obliteration for RFA. Complications were classified based on treatment needs, and pain was assessed using a Visual Analogue Scale.

Ethical committee approval was taken prior to the beginning of the study. A written informed consent was taken from all the patients before including them in the study. Data was analyzed using Microsoft excel.

RESULTS

100 patients with varicose veins were included in the study. Out of 100 patients, 60 patients underwent high ligation and stripping of vein and the rest 40 patients underwent radiofrequency ablation. The males to females ratio was 3:1 (75% males and 25% females. Most common age group affected was between 40-50 years of age (35%), followed by 30-40 years (30%). The mean age of the study population is 39.45 years with range of 21-64 years.

All 100 patients had unilateral lower limb involvement. 65% had left side involvement and rest of the 35% had right side involvement.

Patients were categorized according to CEAP (Clinical, etiological, anatomical and pathophysiological) classification. Most of the patients belonged to CEAP class C2 (67%).

In a study of patients treated for varicose veins, 75% presented with symptomatic varicose veins, including complaints such as restless legs, heaviness, leg aches, and evening ankle edema. 7% had venous ulcers, who were treated using RFA (3 patients) or high ligation and stripping of vein (4 cases). Average size of ulcer was 3.4 cm. [Table 1]

Complications were more frequent in the HL/S group. In the RFA group, 10% reported a "pulling" sensation. Wound infections were noted in 4% of HL/S patients and 1% of RFA patients. Lymphocele occurred in 8% of HL/S patients. Skin burns were observed in 6% of RFA cases but none in HL/S patients.

Hospital stays averaged 21.2 days for HL/S patients and 11.4 days for radiofrequency ablation procedures. Pain scores which were calculated using visual analogue scale (VAS) were compared between the two groups. Patients who underwent RFA had significantly lower pain scores after operation and during post-operative period.

Both treatment groups had a 100% success rate in vein closure and symptom resolution. The ulcer healing rates were 100% at 6 months across all groups. The mean time for healing was 8.67 weeks. [Table 2]

Table 1: CEAP classification

CEAP class	%. of patients	%. of patients who underwent High ligation and stripping	%. of patients who underwent radiofrequency ablation.
C2	67%	42%	25%
C2+C4a	10	6%	4%
C2+C5	12	7%	5%
C2+C6	11	5%	6%
Total	100	60	40

Table 2: complications and average duration of hospital stay

Complications	Total % of patients	High venous ligation and stripping	Radiofrequency ablation	P value (<0.05 is significant)
None	75%	34%	31%	0.3464
Bruising	14%	13%	1%	0.03923
Parasthesias	10%	8%	2%	0.06154
Burns	3%	0	3%	0.02134
Woundinfection.	5%	4%	1%	0.6923
Lymphocele	8%	8%	0	-
Tenderness	3%	3%	0	-
“Pulling”sensation	10%	0	10%	0.03077
Hospital stay range	2 – 8 weeks	2-8 weeks	2-5 weeks	0.0475

DISCUSSION

Management options for varicose veins include conservative measures, sclerotherapy, and surgical interventions. Among surgical techniques, high ligation and stripping of the great saphenous vein is a traditional approach that involves tying off the vein and removing it, which can effectively alleviate symptoms and prevent complications like ulcers. On the other hand, radiofrequency ablation (RFA) is a minimally invasive technique that uses thermal energy to close off the affected vein, offering benefits such as reduced pain and quicker recovery times compared to conventional surgery. Studies have shown that radiofrequency ablation (RFA) is associated with lesser need for spinal anesthesia, which makes open surgery a less attractive management option.[6,7]

This study assessed efficacy of high ligation surgery versus radiofrequency ablation in 100 patients with varicose veins of which 60 patients underwent high ligation surgery and the rest 40 patients underwent radiofrequency ablation procedures. All 60 patients who underwent high ligation surgery had complete stripping of the great saphenous vein as observed on post-operative ultrasound Doppler study (100%). The results are in concordance with previous literature.[8-10]

All the 40 patients (100%) who had underwent RFA had complete occlusion of the GSV as observed in ultrasound examination. This is in accordance with previous studies.[11,12]

In present study, males were the most common ones to be affected, which is similar to studies done by Beebee et al,[13] and Robertson et al.[14]

Most common age group to be involved as observed in present study is between 40-50 years. The mean age of study population being 39.45 years. This is in concordance with studies done by Evan et al,[15] and Sandhya et al.[16]

Most of the patients who presented with varicose veins had class C2 varicosities (according to CEAP classification). However in study by Sandhya et al, most of the patients presented with CEAP class 4-5 type of varicosities.

There were no major complications reported in present study. most common minor complication observed in present study was bruising, which was significantly higher in the surgical group than in the RFA group. Majority of the minor complications were higher in the surgical group, which is in concordance with studies done by Sandhya et al,[16] Badri et al,[17] and Lurie et al.[18]

Most common complication observed in patients who underwent RFA was paraesthesias or “pulling sensation” which is similar to study by Sandhya et al.[16] Patients who had undergone RFA have shorter hospital stay which was significant.

CONCLUSION

In conclusion, this study demonstrated that both high ligation surgery and radiofrequency ablation (RFA) are effective in treating varicose veins, with complete occlusion of the great saphenous vein achieved in all cases. However, RFA was associated with fewer minor complications, shorter hospital stays, and quicker recovery times compared to the surgical approach. These findings highlight RFA as a preferable, minimally invasive alternative to traditional surgery.

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