Section: General Surgery

Original Research Article

A CLINICAL STUDY OF POST OPERATIVE COMPLICATIONS OF ENDOVENOUS LASER ABLATION OF VARICOSE VEINS

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ABSTRACT

Background: Aims: To study and analyse the post operative complications in the patients who have undergone Endovenous laser therapy for the treatment of varicose veins. To study the duration of the procedure and the length of stay in the hospital. To analyse early post operative complications.
Materials and Methods: After institutional ethics committee approval and informed consent from participants, a prospective study was conducted in General surgery department of Rajarajeswari Medical College and Hospital over a period of 18 months on 30 patients s who have undergone Endovenous Laser Ablation for varicose veins. Results were analysed and compared.
Results: The majority of patients were in the 31–40 years age group, accounting for 46.7% of the study population. Around 60% of the study population were males. Smoking was the most common riskfactor. The great saphenous vein was most commonly involved, seen in 83.3% patients. Most patients belonged to CEAP class 6 followed by CEAP class 5. The most common complication was pain, bruising, and tightness, reported by 26.7% patients. Follow-up findings in our study showed progressive ulcer healing.
Conclusion: The present study highlights the demographic, clinical, and postoperative outcomes of patients undergoing treatment for chronic venous insufficiency, primarily through endovenous interventions. The majority of the affected population was middle-aged, with a male predominance. Diabetes mellitus and cardiovascular disease were the most frequent comorbidities, with smoking as major risk factor suggesting a link between systemic health conditions and venous pathology. Surgical intervention was associated with a relatively short operative duration and hospital stay, reflecting procedural efficiency and early recovery. Postoperative complications, though present, were generally mild and self-limiting.
Keywords: Varicose veins, Endovenous laser ablation, Venous ulcer, Radiofrequency ablation, CEAP Classification, Telangiectasia, Lipodermatosclerosis.

INTRODUCTION

Varicose veins are clearly visible, dilated, tortuous and possibly prominent subcutaneous veins of lower extremities, according to Arnoldi. They are seen in 10 percent of the general population.[1] Occupational prolonged standing is the most common cause.
Patients can present with asymptomatic visible veins (telangiectasia) in the initial phase and as the disease progresses, they complaint of pain in the legs, cramping, heaviness, itching, swelling, hyperpigmentation, specific skin changes (lipodermatosclerosis), ulceration and bleeding from the same wound.[2]
Duplex Ultrasound is the gold standard diagnostic mode for varicose veins as it is easily available, sensitive, non-invasive and relatively cost effective.[2,3]
The conventionally practiced modality of treatment for varicose veins is of surgical. High ligation at

Saphenofemoral junction, followed by stripping is done in case of Great saphenous vein varicosities. Ligation at Saphenopopliteal junction, often without stripping is done for Small saphenous vein(SSV).[4]
However, these surgical procedures are done under General anaesthesia or Spinal anaesthesia and can cause scarring, seroma and hematoma formation, neuropathy, post-operative pain, wound infection and recurrence. Morbid complications like Deep vein thrombosis and pulmonary embolism can also occur.[2,4,5]
The less morbid mode of treatment for varicose veins could be the procedures done under ultrasound guidance, which includes, Foam sclerotherapy and Endovascular laser ablation therapy (EVLT).
These are OPD based, easy, effective, less invasive, safe, quick in relieving symptoms and are cosmetically better with less post procedural complications like bleeding, hematomas, post-op pain and inflammation, numbness. Patients can have early mobilization with returning to routine work at the earliest.[3,6]
EVLT uses diode technology whereby near-infrared wavelengths penetrate deeper into tissues. The energy from the laser generates heat, causing the formation of steam bubbles at the tip of the laser fiber causing thermal injury to the venous endothelium and thrombotic occlusion of the vessel. It utilises small flexible glass fibre of various types such as 1) focusing energy in a small area 2) divergent forward firing 3) spreading energy over larger area 4) divergent side 5) radial firing.
Complications – Deep vein thrombosis, skin burns, saphenous nerve injury, ecchymosis, hyperpigmentation, phlebitis, and recurrence.
Tumescent anaesthesia – use of diluted local anaesthesia which include Lidocaine, Epinephrine, Sodium bicarbonate and RL/NS.

MATERIALS AND METHODS

Source of data the study is conducted on patients who have undergone Endovenous Laser Ablation for varicose veins in General surgery department of Rajarajeswari Medical College and Hospital
Method of data collection: This prospective study has done from January 2023 to July 2024 for he duration of 18 months with the 30 sample size in Rajarajeswari Medical College and Hospital.

Inclusion Criteria

1. Varicose veins of classification C2 or more undergone EVLA procedure.
2. Patients with failure of conservative treatment of varicose veins.
3. Patients with incompetent GSV and SSV.
4. Patients with no significant comorbidities.

Exclusion Criteria

1. Acute deep vein thrombosis
2. Acute skin disease at the site of entry
3. Pregnant women
4. Obstruction in target vein due to collaterals.
5. Patient undergoing open surgeries.
6. Patient not suitable for laser surgeries.

Methodology

The baseline demographic data and history will be taken. The patient will be thoroughly examined clinically and all required investigations were done (venous Doppler, preoperative workup). Endovenous Laser Ablation will be done after ruling out exclusion criteria. Following surgery patient will be explained to look for the complications. Patients will be followed after 1 week, 6 weeks, 3 months and 6 months.

Statistical Analysis

Data will be analysed using MS Excel and SPSS 23 version software. Categorical data will be represented in the form of frequencies and proportions. Sample size will be calculated using the following equation.
(YAMANE Equation)
n = N / 1 + Ne2 Where n is sample size
N is population size e is margin of error

RESULTS

Table 1: Distribution of the study population based on Age in years

	Frequency	Percentage
21 – 30	1	3.3%
31 – 40	14	46.7%
41 – 50	9	30%
51 – 60	6	20%
Total	30	100%

This table presents the age-wise distribution of the 30 patients included in the study. The majority of patients, 14 in number, were in the 31–40 years age group, accounting for 46.7% of the study population. The next most common age group was 41–50 years, with 9 patients representing 30% of the total. Six patients (20%) belonged to the 51–60 years category. Only one patient (3.3%) was between 21 and 30 years old.

Table 2: Distribution of the study population based on Gender

	Frequency	Percentage
Male	18	60%

Female	12	40%
Total	30	100%

This table outlines the gender-wise distribution of the 30 study participants. A total of 18 patients were male, constituting 60% of the population, while 12 were female, making up the remaining 40%.

Table 3: Distribution of the study population based on comorbidities/risk factor

	Frequency	Percentage
Cardiovascular disease	7	23.3%
Smoking	9	30.0%
Diabetes mellitus	8	26.6%

This table displays the various comorbid conditions observed among the study population. Diabetes mellitus was the most common comorbidity, present in 8 patients (26.6%).
Cardiovascular disease was noted in 7 patients (23.3%). Smoking history was reported in 9 patients, comprising 30.0% of the total.

Table 4: Distribution of the study population based on venous involvement

	Frequency	Percentage
Great saphenous vein	25	83.3%
Small saphenous vein	5	16.6%

This table categorizes patients based on the venous system affected. The great saphenous vein was the most commonly involved, seen in 25 patients (83.3%). The small saphenous vein was affected in 5 patients (16.6%).

Table 5: Distribution of the study population based on CEAP Clinical class

	Frequency	Percentage
CEAP 2	3	10.0%
CEAP 3	4	13.3%
CEAP 4	6	20.0%
CEAP 5	7	23.3%
CEAP 6	10	33.3%
Total	30	100%

This table provides data on the CEAP (Clinical-Etiological-Anatomical-Pathophysiological) clinical classification of the patients. Most patients belonged to CEAP class 6 (10 patients, 33.3%), followed by CEAP class 5 with 7 patients (23.3%). Six patients (20.0%) were in
CEAP class 4, 4 patients (13.3%) in class 3, and 3 patients (10.0%) in class 2.

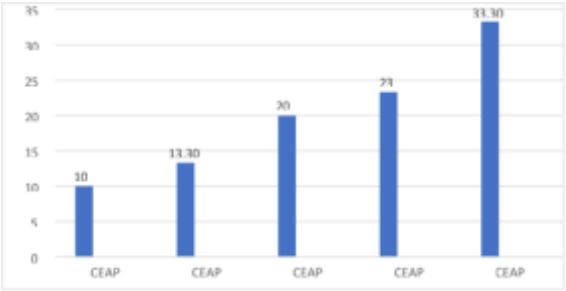


Figure 1: Distribution of the study population based on CEAP Clinical class

Table 6: Mean operative time

	Minimum	Maximum	Mean ± SD
Operative time in minutes	60	90	75.3 ± 11.36

This table presents data on the duration of surgical procedures among the study participants. The operative time ranged from a minimum of 60 minutes to a maximum of 90 minutes. The average operative time was 75.3 minutes with a standard deviation of 11.36 minutes.

Table 7: Duration of hospital stay in days

	Minimum	Maximum	Mean ± SD
Duration of hospital stay in days	1	3	1.93 ± 0.78

This table shows the postoperative hospital stay duration. The shortest recorded stay was 1 day and the longest was 3 days. The mean duration of hospital stay was 1.93 days with a standard deviation of 0.78 days.

Table 8: Distribution of the study population based on Post operative complications

	Frequency	Percentage
Pain, bruising and Tightness	8	26.7%
Paraesthesia	2	6.6%
Induration	3	10.0%
Superficial vein thrombophlebitis	2	6.6%

Hematoma	1	3.3%
Puncture site infection	0	0%

This table details the various postoperative complications experienced by the patients. The most common complication was pain, bruising, and tightness, reported by 8 patients (26.7%). Paraesthesia occurred in 2 patients (6.6%), while induration was observed in 3 patients (10%). Two patients (6.6%) developed superficial vein thrombophlebitis. Hematoma was noted in patient (3.3%). No patients developed puncture site infection postoperatively. No patients developed puncture site infection postoperatively.

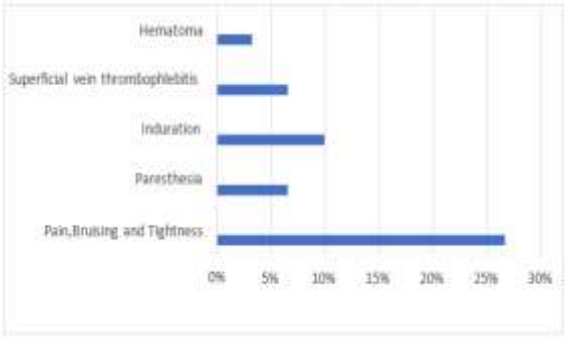


Figure 2: Distribution of the study population based on Post operative complications

Table 9: Distribution of the study population based on follow-up findings

	1 week	6 weeks	3 months	6 months
Healed	0	4	7	8
Reduced ulcer area	2	2	1	0
Unchanged ulcer	8	4	2	2
Recurrence	0	0	0	1

This table summarizes clinical follow-up findings at intervals of 1 week, 6 weeks, 3 months, and 6 months. At 1 week, two patients showed reduced ulcer area, and no patients were completely healed. By 6 weeks, 4 patients had achieved healing, and 2 showed a reduced ulcer area; 4 remained unchanged. At 3 months, 7 patients had healed, 1 had reduced ulcer areas, and 2 remained unchanged. At 6 months, 8 patients had healed and 2 remained unchanged. Recurrence was seen in one patient.

DISCUSSION

Age distribution

In the present study, the age distribution revealed a predominance of middle-aged patients undergoing EVLA for varicose veins, with the majority (46.7%) aged between 31–40 years, followed by 30% in the 41–50 years group, and 20% in the 51–60 years range. Only 3.3% were between 21–30 years. This skew toward a middle aged population differs substantially from the findings of SA Gauw et al,[7] where the mean age was 57.3 ± 13.7 years indicating an older demographic.

Borsuk et al,[8] reported a mean age of 48.6 ± 13.2 years, while L Yang et al,[9] reported a mean of 52 years with a range of 28–78 years.

The findings of Elzefzaf N et al,[10] where the mean age was 37.31 ± 8.25 years and the range was from 20 to 60 years, most closely align with the present study.

Gender distribution

Gender distribution in the current study showed a male predominance, with 60% male and 40% female participants. This is consistent with Elzefzaf N et al,[10] (63% male, 37% female) and Borsuk et al,[8] (65.6% male, 34.4% female).

However, L Yang et al,[9] reported a female predominance, with 56.6% females and 43.4% males, suggesting potential geographical or demographic differences in health-seeking behaviour or disease burden.

SA Gauw et al,[7] also showed a slight male preponderance at 56%, supporting the gender trend observed in our cohort.

Comorbidities

The analysis of comorbidities in our study found that smoking was most common (30%), followed by diabetes mellitus (26.6%) and cardiovascular disease (23.3%).

Borsuk et al,[8] showed similar trends with diabetes in 29.2%, hypertension in 25%, and DVT history in 7.3%, while L Yang et al[9] reported diabetes in 24.3%, hypertension in 33.5%, coronary artery disease in 11%, and smoking in 21.4%.

SA Gauw et al,[7] found diabetes in 27%, hypertension in 38%, and DVT history in 17%, closely paralleling our findings. These results highlight that patients undergoing EVLA often present with multiple risk factors, particularly in advanced disease stages.

Venous involvement

The great saphenous vein (GSV) was the most frequently involved vessel in our study, seen in 83.3% of patients. The small saphenous vein was involved in 16.7%.

Elzefzaf N et al,[10] found 100% of limbs showed GSV reflux and incompetence, with 84.3% involving the full length.

Similarly, Borsuk et al,[26] and L Yang et al,[9] primarily targeted the GSV, reflecting its central role in chronic venous insufficiency.

The consistency of GSV involvement across studies underscores its pathophysiological importance and

justifies its frequent selection for endovenous intervention.

CEAP Clinical Class

In terms of CEAP clinical class, our study population had more advanced venous disease: 33.3% in class C6 and 23.3% in class C5, with lower representation in earlier classes.

Elzefzaf N et al,[10] observed the majority (62.5%) in class C2 and only 6.25% in C5, with no C6 cases. Borsuk et al,[8] reported 31.2% in C5 and 21.9% in C6, while L Yang et al,[9] noted 12.1% in C5 and 8.7% in C6.

SA Gauw et al,[7] exclusively studied patients in advanced stages, with 42% of limbs in C5 and 58% in C6.

Thus, the CEAP profile in our study is more similar to Borsuk and Stefanaie's populations, reflecting a more advanced clinical presentation requiring more intensive intervention.

Mean Operative Time

The mean operative time in our cohort was 75.3 ± 11.36 minutes, longer than Borsuk et al[8] (52.4 ± 12.1 min) and L Yang et al,[9] (61.4 ± 13.2 min). The increased duration may reflect more extensive disease, additional procedures, or differences in technique.

SA Gauw et al.[7] did not report operative time, but the complexity of treating C5–C6 disease may explain the longer durations observed in advanced cohorts like ours.

The mean hospital stay in our study was 1.93 ± 0.78 days, ranging from 1 to 3 days. This contrasts with Borsuk et al,[8] Lin Yang et al., and Elzefzaf N et al,[10] where nearly all procedures were performed as day-care surgeries with no overnight stays. The longer stay in our patients may reflect institutional protocols, comorbidity monitoring, or slower recovery in more advanced cases.

Postoperative Complications

Postoperative complications were relatively frequent in our study. The most common was pain/bruising/tightness (26.7%), followed by paraesthesia (6.6%), induration (10%), and superficial thrombophlebitis (6.6%). Hematoma and infection occurred in 3.3%.

Elzefzaf N et al,[10] similarly reported pain in 66%, bruising in 33.3%, and superficial thrombophlebitis in 16.6%, but no DVT or skin burns.

Borsuk et al,[8] found pain (25%), ecchymosis (20.8%), and induration (15.6%), while L Yang et al[9] reported ecchymosis (28.3%), pain (24.3%), and paraesthesia (6.9%), with a low DVT rate (1.2%). These findings affirm that minor complications are common post-EVLA, but serious events like DVT remain rare.

Follow-up Findings

Follow-up findings in our study showed progressive ulcer healing, with only 2 patients showing reduced ulcer size at 1 week and no full healing. By 6 weeks, 4 patients healed (40%), and 2 showed improvement. At 3 months, 70% (7 patients) healed, and at 6 months, 8 patients (80%) were fully healed, with 2 experiencing recurrence. These results are in line with Borsuk et al,[8] who reported 86.4% ulcer healing and 2.1% recurrence at 3 months.

L Yang et al,[9] also reported 86.7% healing of C6 ulcers by 3 months. Nonetheless, the gradual improvement mirrors global EVLA outcomes in managing chronic venous ulcers.

CONCLUSION

The present study highlights the demographic, clinical, and postoperative outcomes of patients undergoing treatment for chronic venous insufficiency, primarily through endovenous interventions. The majority of the affected population was middle-aged, with a male predominance. Diabetes mellitus and cardiovascular disease were the most frequent comorbidities, with smoking as major risk factor suggesting a link between systemic health conditions and venous pathology. The great saphenous vein was most commonly involved, and a significant proportion of patients presented in advanced CEAP clinical classes (5 and 6), indicating chronicity and severity at presentation.

Surgical intervention was associated with a relatively short operative duration and hospital stay, reflecting procedural efficiency and early recovery. Postoperative complications, though present, were generally mild and self-limiting. Importantly, follow-up data revealed progressive and sustained ulcer healing in most patients, with minimal recurrence. These findings suggest that endovenous procedures are effective and safe for managing chronic venous disease, even in patients with comorbid conditions, and they contribute to favorable long-term clinical outcomes.

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