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Research Article

A Clinical Study on Patients of Varicose Veins of Lower Limb in South Central Railway Hospital

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ABSTRACT

Background: Varicose veins of the lower limbs are a common vascular disorder associated with venous insufficiency, occupational risk factors, and chronic morbidity.
Objectives: To study the clinical profile, CEAP classification, and management outcomes of patients with varicose veins in a tertiary care setting.
Methods: A prospective observational study was conducted on 100 patients with clinically and Doppler-confirmed varicose veins. Demographic data, risk factors, clinical features, venous system involvement, CEAP classification, treatment modalities, and outcomes were analyzed.
Results: Varicose veins were most prevalent in middle-aged females, with prolonged standing as the leading risk factor. The long saphenous vein was most frequently involved. Swelling and venous dilatation were the commonest symptoms. CEAP classification revealed cases across all stages, with some presenting with skin changes and ulceration. Endovenous laser ablation was the most frequently performed intervention, showing favorable postoperative outcomes with minimal complications and low recurrence.
Conclusion: Varicose veins remain a significant health issue linked to occupational and lifestyle factors. Duplex ultrasonography is vital for diagnosis, and endovenous procedures offer effective, safe, and minimally invasive management with improved recovery.

Keywords*: Varicose veins, CEAP classification, Endovenous laser ablation, Venous insufficiency, Duplex ultrasonography.*

INTRODUCTION

Varicose veins are a common manifestation of chronic venous disease (CVD), characterized by dilated, elongated, and tortuous superficial veins, most frequently involving the lower limbs. They occur due to venous valve incompetence, leading to reflux and venous hypertension, which progressively cause venous dilatation, edema, skin changes, and in advanced cases, ulceration [1]. The condition not only leads to cosmetic concerns but also contributes significantly to morbidity, affecting the patient's quality of life and productivity [2].

Globally, the prevalence of varicose veins varies widely, ranging from 10% to 30% in men and 25% to 60% in women, depending on geographic, occupational, and genetic factors [3]. In India, community-based studies have reported prevalence rates of approximately 20% in the adult population, with higher rates among those engaged in occupations requiring prolonged standing, such as industrial workers, shopkeepers, and healthcare professionals [4,5]. Female gender, multiparity, obesity, advancing age, and family history have been consistently recognized as important risk factors [6].

The clinical presentation of varicose veins is diverse, ranging from asymptomatic visible varicosities to symptoms such as pain, heaviness, swelling, itching, and cramps. In more advanced stages, chronic venous insufficiency may lead to

lipodermatosclerosis, skin pigmentation, and venous ulcers [7]. The CEAP (Clinical, Etiological, Anatomical, Pathophysiological) classification system provides a standardized approach for categorizing disease severity and guiding management [8].

With advances in diagnostic imaging, duplex ultrasonography has become the gold standard for evaluating venous reflux and mapping the venous anatomy, replacing older bedside tests [9]. Management strategies for varicose veins have evolved from conventional surgical ligation and stripping to minimally invasive procedures such as endovenous laser ablation (EVLA), radiofrequency ablation (RFA), foam sclerotherapy, and subfascial endoscopic perforator surgery (SEPS), which offer reduced morbidity and faster recovery [10,11].

Despite these advancements, recurrence and postoperative complications remain challenges, necessitating proper patient selection, accurate preoperative evaluation, and individualized treatment planning [12]. Understanding the demographic characteristics, risk factors, clinical presentation, and outcomes in different settings is crucial for tailoring management strategies.

The present study was undertaken to evaluate the clinico-demographic profile, risk factors, clinical presentation, venous system involvement, management modalities, and postoperative outcomes in patients with varicose veins of the lower limbs presenting to a tertiary care referral hospital in South Central India.

MATERIALS AND METHODS

Study Setting and Design

This cross-sectional study was conducted in the Department of Surgery at South Central Railway Hospital, Lallaguda, a tertiary care referral center.

Study Duration

The study was conducted over 18 months, from May 2023 to October 2024.

Sample Size

The sample size was calculated using the formula:
N=4pqd2N = \frac{4pq}{d^2}N=d24pq
where p = prevalence of bilateral varicose veins (37.1%), $q = 100 - p$ (62.9%), and d = absolute precision (10%).
N=4×37.1×62.9102≈90N = \frac{4 \times 37.1 \times 62.9}{10^2} \approx 90N=1024×37.1×62.9≈90
Considering non-response, the final sample size was rounded to 100.

Study Population

The study population consisted of men and women aged 18 years or older who presented with varicose veins of the lower limbs to the Department of Surgery during the study period.

Inclusion Criteria

- Patients with engorgement of veins (defined as swollen, blue or purple blood vessels that bulge just under the skin's surface, usually in the legs, feet, or ankles, which may be painful or itchy).
- Age ≥ 18 years.

Exclusion Criteria

- Patients unwilling to provide informed consent.
- Patients with secondary varicose veins due to deep vein thrombosis or other causes of venous obstruction.
- Pregnant women.
- Bedridden patients.

Recruitment and Data Collection

Patients fulfilling the eligibility criteria and providing written informed consent were recruited consecutively.

History Taking

A structured proforma was used to obtain a detailed history, including duration of symptoms, occupational history, family history of varicose veins, risk factors (e.g., prolonged standing, pregnancy), and history of venous ulcers or previous treatments.

Clinical Examination

A comprehensive physical examination was conducted, which included:

- Inspection and palpation for varicosities.
- Assessment of venous patterns, including sources and pathways of varicose veins.
- Evaluation of venotensive changes and complications such as edema, skin changes, and ulceration.

Investigations

- **Doppler Study:** Performed to assess venous flow, reflux, and obstruction.
- **Duplex Ultrasound:** Used to identify the source of venous insufficiency and to map the venous system.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS). Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages.

RESULTS & ANALYSIS

Table 1: DISTRIBUTION OF AGE AMONG THE STUDY PATIENTS(N=100)

Age	No. of Cases	Percent
21-30 years	5	5
31-40 years	10	10
41-50 years	20	20
51-60 years	40	40
61 and above	25	25
Total	100	100

The table presents the distribution of cases across different age groups. The highest proportion of cases (40%) is observed in the 51-60 years age group, followed by 61 years and above (25%) and 41-50 years (20%). The 31-40 years and 21-30 years age groups account for 10% and 5% of the cases, respectively. This indicates that the majority of cases are concentrated in older age groups, particularly among individuals aged 51 years and above, who collectively constitute 65% of the total cases. This trend suggests a higher burden of the condition being studied among middle-aged and elderly individuals, which could be attributed to age-related risk factors.

Table 2: DISTRIBUTION OF GENDER AMONG THE PATIENTS(N=100)

Gender	Frequency	Percent
Male	42	42
Female	58	58
Total	100	100

The table presents the gender-wise distribution of cases. Out of the total 100 cases, 58% are female, while 42% are male. This indicates a higher prevalence of the condition among females compared to males.

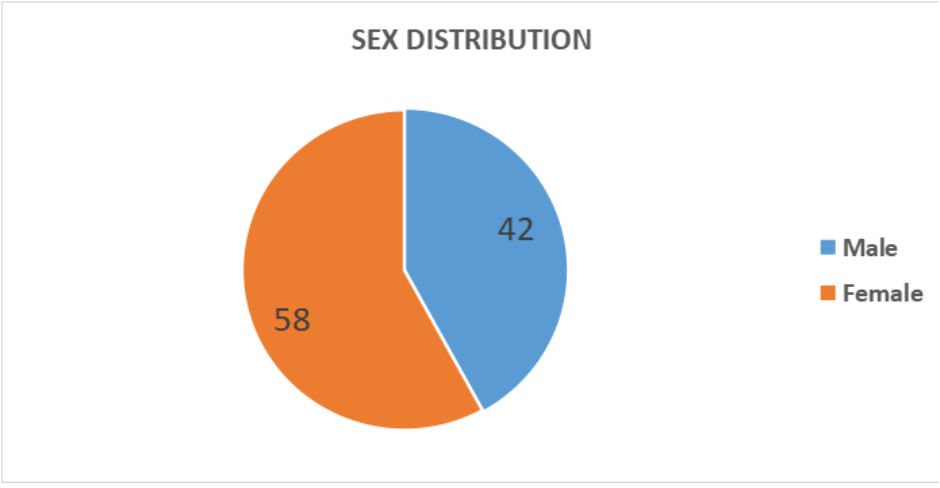


Figure 1 shows the gender distribution among participants

Table 3: DISTRIBUTION OF OCCUPATION AMONG THE STUDY PATIENTS(N=100)

Occupation	No. of Cases	Percent
Prolonged standing	85	85
Sedentary job	10	10
Housewife	5	5
Total	100	100

The table illustrates the distribution of cases based on occupational categories. The majority of cases (85%) are observed among individuals engaged in prolonged standing jobs. Sedentary jobs account for 10% of cases, while housewives constitute the remaining 5%.

Table 4: SIDE AFFECTED

Side Affected	No. of Cases	Percent
Right	40	40
Left	50	50
Both Limbs	10	10
Total	100	100.00

The table represents the distribution of cases based on the side affected. The majority of cases involve unilateral limb involvement, with 50% of cases affecting the left limb and 40% affecting the right limb. A smaller proportion (10%) experiences bilateral limb involvement.

Table 5: VENOUS SYSTEM INVOLVED based on COLOUR DOPPLER(N=100)

Venous system involved	No. of Cases	Percent
LSS (Long saphenous system)	72	72
SSS (Short saphenous system)	18	18
Both	10	10
Total	100	100

The table presents the distribution of venous system involvement among the study patients. The long saphenous system (LSS) is the most commonly affected, observed in 72% of cases. This suggests that varicose veins predominantly involve the long saphenous vein, which is a major superficial vein of the lower limb.

The short saphenous system (SSS) is involved in 18% of cases, indicating that it is less commonly affected compared to LSS. Additionally, 10% of patients exhibit involvement of both venous systems, suggesting more extensive venous insufficiency in a subset of individuals.

TABLE 6: DISTRIBUTION OF SYMPTOMS AMONG THE PATIENTS AT PRESENTATION (N=100)

Symptom	No	Percentage
Swelling/venous enlargement	45	45
Discomfort / pain	25	25
Skin changes	10	10
Discoloration	8	8
Ulceration	5	5
Swollen leg	3	3
Itching	3	3
Hemorrhage	1	1

Table 6 indicates swelling/venous enlargement (45%) was the most common symptom, followed by discomfort/pain (25%). Skin changes (10%) and discoloration (8%) indicate disease progression. Ulceration (5%), swollen leg (3%), itching (3%), and hemorrhage (1%) were less frequent but suggest advanced disease. The findings emphasize the need for early diagnosis and intervention to prevent complications.

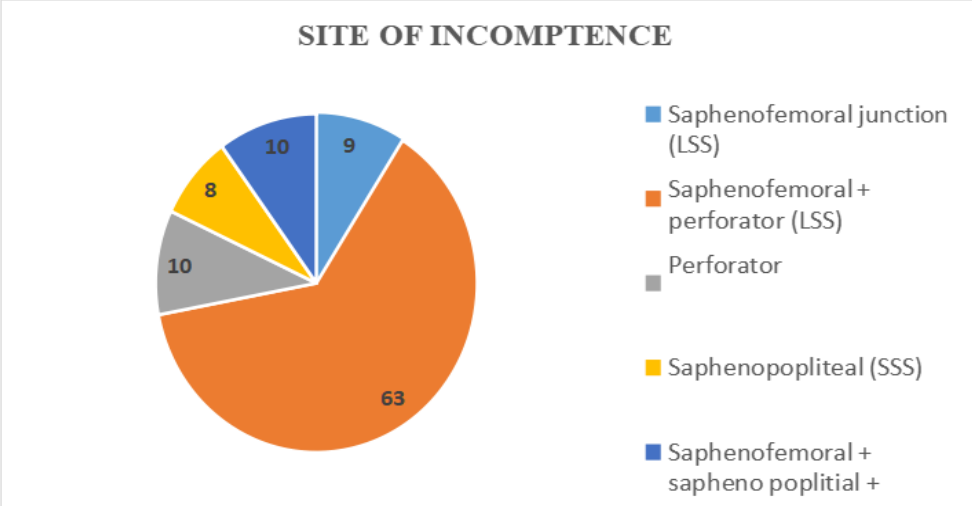
TABLE 7 – MEAN DURATION OF THE PRESENTATION(N=100)

PRESENTATION	NO OF PATIENTS	PERCENTAGE
< 6 MONTHS	19	19
6 MONTHS- 2 YRS	36	36
2 YRS – 5 YRS	34	34
5YRS – 8 YRS	4	4
8 YRS – 10 YRS	4	4
> 10 YRS	3	3
TOTAL	100	100

Table 8: CEAP CLASS AMONG THE PATIENTS(N=100)

Class	Limbs	Percent
2	45	45
3	27	27

4	12	12
5	7	7
6	9	9
Total	100	100.00



Figure; 2 shows the distribution of venous incompetence sites

TABLE 9 – TREATMENT PERFORMED(N=100)

Treatment	Frequency	Percentage
Surgical	81	81
Medical	19	19
Total	100	100

Table 10- TREATMENT PROCEDURES(N=100)

Treatment	Cases	Percent
SFFL +Stripping	4	4
SFFL+ SEPS	12	12
SPJL	4	4
SEPS	8	8
EVLA+MSA	4	4
RFA	12	12
Foam sclerotherapy	11	11
EVLA	26	26
Surgical	81	81
Medical	19	19
Total	100	100
Notes: SFFL: Saphenofemoral Flush Ligation Seps-Subfascial endoscopic perforator surgery MSA: Multiple Stab Avulsion RFA-Radiofrequency ablation SPJL: Saphenopopliteal Junction Ligation STR: Stripping EVLA – Endovascular laser ablation		

The table 10 presents the distribution of various surgical procedures performed among the 81 patients who underwent surgical intervention. The most commonly performed procedure is Endovascular Laser Ablation (EVLA) (26%), highlighting its prevalence as a minimally invasive and effective treatment for venous incompetence. Radiofrequency Ablation (RFA) (12%) and Saphenofemoral Flush Ligation (SFFL) + SEPS (12%) are also frequently performed, indicating that thermal ablation techniques and combined surgical approaches are preferred in many cases. Other procedures include Foam Sclerotherapy (11%), SEPS (8%), and SFFL + Stripping (4%), suggesting that both minimally invasive and traditional surgical approaches are used based on patient needs. Saphenopopliteal Junction Ligation (SPJL) (4%) and EVLA + Multiple Stab Avulsion (MSA) (4%) are performed in fewer cases, likely reserved for specific clinical indications.

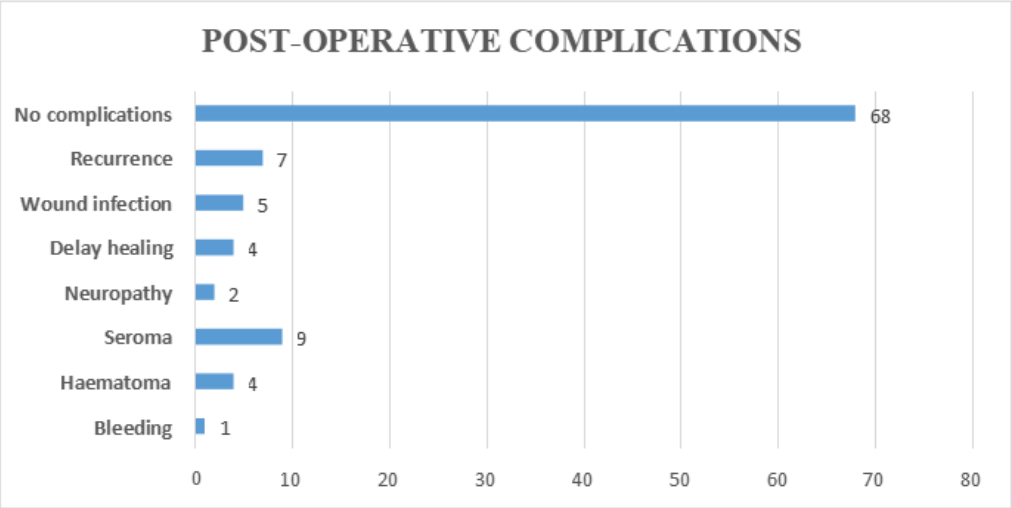
Table 11: POST-OPERATIVE COMPLICATION(N=100)

Post-operative complications	Frequency	Percent
Bleeding	1	1
Hematoma	4	4

Seroma	9	9
Neuropathy	2	2
Delay healing	4	4
Wound infection	5	5
Recurrence	7	7
No complications	68	68
Total	100	100.00

Table 11 presents the distribution of postoperative complications among the patients. A majority of patients (68%) experienced no complications, indicating that surgical interventions were generally safe and well-tolerated.

Among those who developed complications, the most common were seroma formation (9%) and recurrence (7%), suggesting that fluid accumulation and disease persistence remain notable concerns post-surgery. Wound infection (5%), delayed healing (4%), and haematoma (4%) were also observe.



Figure;3 : Post-Operative Complication(n=100)

DISCUSSION

Varicose veins of the lower limbs represent a major component of chronic venous disease (CVD) and are an important cause of morbidity worldwide. The present study analyzed 100 patients with varicose veins at a tertiary care referral center, focusing on demographic distribution, risk factors, venous involvement, clinical presentation, treatment, and outcomes.

Age and Gender Distribution

In this study, the peak incidence was noted in the 51–60 years age group (40%), followed by patients above 60 years (25%). This pattern highlights the association between advancing age and venous valve degeneration, venous wall weakness, and prolonged cumulative exposure to occupational and lifestyle-related risk factors. Similar age-related peaks have been reported in both Western and Indian studies [1,2].

A female predominance (58%) was observed, consistent with global and Indian reports [3,4]. Hormonal influences, pregnancy, and multiparity have been proposed as important contributing factors to higher prevalence among women [5].

Occupational Risk Factors

The overwhelming majority of patients (85%) in our study were engaged in occupations requiring prolonged standing, supporting the well-documented association between orthostatic work posture and varicose vein development [6]. Malhotra's study on Indian railway workers also emphasized this occupational risk [7]. Preventive workplace modifications such as scheduled breaks, use of compression stockings, and ergonomic interventions may help reduce incidence in high-risk groups.

Laterality and Venous System Involvement

Unilateral disease was more common (90%) compared to bilateral involvement (10%), with a slight predominance on the left side (50%). This aligns with previous literature, where the left-sided preference has been attributed to anatomical factors such as iliac vein compression (May–Thurner syndrome) [8].

Duplex ultrasound identified the long saphenous vein as the most frequently affected venous system (72%), followed by the short saphenous vein (18%), and both systems in 10%. These findings are consistent with Labropoulos et al., who demonstrated that reflux in the long saphenous vein predominates in patients with primary varicose veins [9].

Clinical Presentation and CEAP Classification

The most common presenting symptom was swelling/venous enlargement (45%), followed by pain or discomfort (25%). Advanced manifestations such as skin changes (10%), ulceration (5%), and hemorrhage (1%) were relatively uncommon, but clinically significant. This pattern suggests that most patients sought medical care before progression to severe chronic venous insufficiency. Comparable distributions were reported in population-based studies from Europe and India [10,11].

On CEAP classification, nearly half the patients belonged to C2 (45%), while 9% presented with venous ulcers (C6). The relatively high proportion of early-stage disease reflects improved health awareness and availability of diagnostic facilities.

Management and Outcomes

The majority of patients (81%) underwent surgical or minimally invasive interventions, while 19% were managed conservatively. Endovenous laser ablation (EVLA) was the most common procedure (26%), followed by radiofrequency ablation (12%), foam sclerotherapy (11%), and SEPS (8%). The growing preference for minimally invasive, endovenous thermal ablation reflects international trends, supported by meta-analyses and randomized trials demonstrating their safety, efficacy, and faster recovery compared to conventional surgery [12,13].

Postoperative outcomes were favorable, with 68% of patients experiencing no complications. The most frequent complications were seroma (9%) and recurrence (7%), comparable to previously reported recurrence rates ranging from 5–20% [14]. Wound infections (5%), hematomas (4%), and neuropathy (2%) were infrequent, further highlighting the safety of current surgical and endovenous approaches.

Clinical Implications

The findings emphasize the importance of occupational risk modification, early diagnosis, and individualized treatment planning. Duplex ultrasound remains the cornerstone of evaluation, guiding the choice of intervention. Endovenous techniques should be encouraged where resources permit, as they provide durable results with fewer complications.

CONCLUSION

Varicose veins were most common in middle-aged females and associated with prolonged standing, with the long saphenous vein most frequently affected. CEAP classification showed both early and advanced presentations. Endovenous laser ablation proved to be an effective and safe treatment with favorable outcomes. Early diagnosis, occupational risk modification, and duplex ultrasonography are essential for optimal management.

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