



Outcomes of Surgical Management of Varicose Veins with and Without Venous Stripping: A Comparative Study

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Abstract: Varicose veins are tortuous, widened veins in the subcutaneous tissues of the legs and are often visible. Invasive management methods include sclerotherapy, Trendelenburg operation, GSV stripping, perforator ligation, sub-fascial endoscopic perforator surgery (SEPS), and stab avulsion. The present study aimed to compare outcomes of surgical management of varicose veins with and without venous stripping at Siddhartha Medical College, Vijayawada, Andhra Pradesh, India. The study's objectives include comparing early ambulation of the patient, healing of wounds, postoperative hospital stay, postoperative pain relief, and recurrence between the two groups. It is an interventional, randomized, single-blinded study. 100 patients admitted with varicose veins at the tertiary care center Siddhartha Medical College, Vijayawada, Andhra Pradesh, from March 2021 to September 2022, were taken as the study sample. 100 patients were randomized in groups I and II, each containing 50. Group I included patients who underwent saphenofemoral flush ligation(SFL) by stripping the great saphenous vein up to the knee. Group II included patients who underwent SFL and subfascial ligation of the incompetent perforators in the thigh and leg. Patients were followed up for six months. Results showed no significant difference in the mean age of patients in both groups. 72% of patients were males. Early ambulation was significantly good among patients without venous stripping (Group II). The two groups have no significant difference in wound healing and duration of postoperative hospital stay, pain relief, and recurrence rate. 8% of patients had recurrence during the follow-up period in group I. Sapheno femoral junction (SFJ) flush ligation with incompetent perforators ligation without venous stripping is better than SFJ flush ligation with incompetent perforators ligation with venous stripping.

Keywords: Comparative study, Outcome, Surgical management, Varicose veins, Venous stripping.

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1. INTRODUCTION

Varicose veins are tortuous, widened veins in the subcutaneous tissues of the legs and are often visible.¹⁻² They are dilated branches of the great saphenous vein (GSV) and small saphenous vein (SSV). Risk factors of varicose veins include positive family history, increasing age, pregnancy, and standing for a prolonged duration.³⁻⁴ Under normal circumstances, around 90% of venous return occurs through the deep system and flows in perforators from superficial to deep. In a standing position, resting venous pressure is the sum of residual kinetic energy without resistance in arterioles and precapillary sphincters. The pressure gradient in the right atrium is around 10 to 12 mm Hg. But in an erect posture, the resting pressure of the foot is hydrostatic pressure from the upright column of blood extending from the right atrium to the foot.⁵⁻⁶ Varicose veins are a progressive disease seen more commonly in females than males.⁷ The symptoms depend on the stage of the disease. Early disease is usually asymptomatic, except for visible small veins. As the disease progresses, it manifests as leg pain, cramping, hyperpigmentation, edema, skin changes, ulceration, and bleeding. Management options include conservative, surgical, and endovenous therapies.⁸ Surgical managements is required for symptomatic varicose veins. It helps reduce symptoms and prevent chronic complications like eczema, venous ulceration, lipodermatosclerosis, and venous ulceration. Various surgical management options can be used, but the most preferred modality is saphenofemoral flush ligation and ligation of incompetent perforators.⁹ High ligation and stripping is the conventional method for managing varicose veins. Still, a variety of alternative treatment strategies have been used in the recent period, like endovenous laser ablation (EVLA), radiofrequency ablation (RFA), and foam sclerotherapy (FS).¹⁰⁻¹³ The motive of treatment is to provide symptomatic relief and prevent disease progression.¹⁴ Symptomatic patients with C2 to C6 disease are the main indication for management, especially patients with signs of chronic venous insufficiency, thrombophlebitis, and bleeding.¹⁵ Observation is sufficient for most asymptomatic patients, or prophylactic intervention can be given. But the cosmetic purpose is a common cause of treating asymptomatic patients, mainly young female patients. It is controversial to do surgical management on patients who have recovered from superficial phlebitis, as dilated varicose veins usually disappear without further surgical treatment. Contraindications for surgical management of varicose veins include deep venous occlusions, like acute deep vein thrombosis (DVT), pregnancy, and arterial insufficiency. But extreme care is needed to perform surgery on subjects with post-thrombotic syndrome, venous malformation, venous reflux, and arteriovenous fistula. In these cases, further imaging is required to assess the patency of deep veins. Emergent management is only for patients with bleeding varicosities or suspected DVT. Early cases can be managed using limb elevation and compressive bandages. Invasive methods include sclerotherapy, and surgical procedures include Trendelenburg operation, GSV stripping, perforator ligation, SEPS, and stab avulsion. The incidence of varicose veins ranges from 10% to 30%. The incidence was 0.1% among women living in rural New Guinea to 68% among female chemical workers in Switzerland.¹⁶ Given the high incidence, the current study was undertaken. So, the present study compared the outcome of surgical management of varicose veins with and without venous

stripping at a tertiary care center named Siddhartha Medical College, Vijayawada, Andhra Pradesh, India.

1.1. Objectives

The two modalities of surgical management are compared concerning:

- Early ambulation of the patient.
- Healing of the wounds.
- Post-Operative hospital stay.
- Post-Operative pain relief.
- Recurrence

2. MATERIALS AND METHODS

It is an interventional, randomized, single-blinded study. The study is interventional; as surgical management was provided to all study patients as part of the study. Patients presenting with symptomatic varicose veins to our tertiary care center seeking surgical treatment from March 2021 to September 2022 were taken as study samples. The study was single-blinded, as only the investigator knows what surgical procedure the patient is undergoing. Blinding helps to eliminate bias.

2.1. Sample size calculation

As per Mishra et al.¹⁷, the incidence of varicose veins in India was 5%. Using Epi Info Software, the sample size was calculated as per the population survey model: $N = Z^2 PQ / E^2$, where N=sample size, Population proportion: 5%, Q=1-P, E-Error: 2%, Confidence level:95%. After calculation, the minimum sample size came to 73. Hence 100 patients were included. The data of all 100 patients was complete. Patients were divided randomly into two groups. Randomization was done using computer-generated software.

Group I: 50 patients who underwent saphenofemoral flush ligation with the stripping of the great saphenous vein up to the knee were included. The incompetent perforators in the thigh and leg were ligated subfascial

Group II: 50 patients who underwent sapheno femoral flush ligation and subfascial ligation of the incompetent perforators in the thigh and leg were included. (Without venous stripping)

2.2. Inclusion criteria

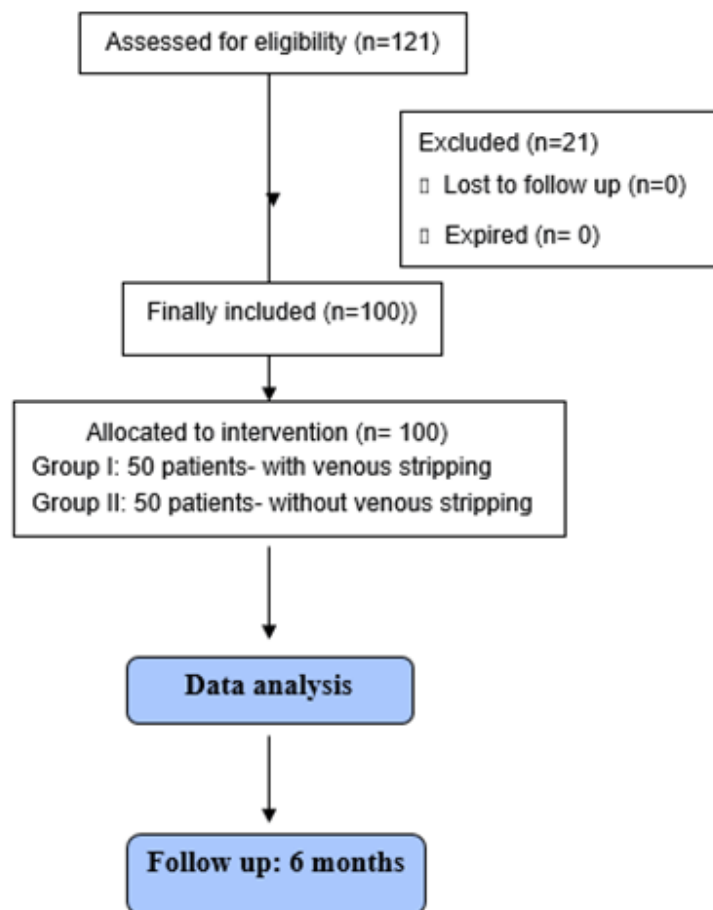
Patients above 18 years of either gender presented with varicosities of saphenofemoral valve incompetence and perforator incompetence. Patients with skin changes and venous ulcers were included.

2.3. Exclusion criteria

Pregnant and lactating women, patients with recurrent varicosities, patients with short saphenous vein varicosity, and patients with associated DVT were excluded.

2.4. Study procedure

A detailed history, clinical examination, basic blood investigations, chest x-ray, venous doppler of the affected limb, and ECG were taken for all the patients. Comorbidities, if present, are not considered during the assessment of the patients during this study. After the patients have been explained the procedures and the informed consent, the patients are divided into two groups based on the surgical treatment.



Flow Chart: Consort flow diagram

2.5. Investigational protocol

The investigation protocol included taking a detailed history, performing a complete physical examination, and allocation to proper clinical staging. Lower limb venous duplex assessment using ultrasound was undertaken. On assessment, no patient was found to have any proof of peripheral arterial disease. The assessment also included screening the superficial venous system of the lower limb using continuous-wave Doppler ultrasound. Duplex scanning was done by the same operator fitted with a 4–8 MHz transducer.

2.6. Parameters assessed

1. Early ambulation of the patient: All the patients were ambulated on postoperative day 1. The patients who could walk comfortably on the first postoperative day with minimal pain were recorded in the two groups.
2. Healing of the wounds: The time taken for the wounds at the surgery site and ligation of incompetent perforators were recorded. The wounds which took more than 6 days to heal were considered delayed. At the end of 6 days, the dry wounds, without any serous or pus discharge, were considered properly healed.
3. Postoperative hospital stay: Patients were generally discharged on the 3rd postoperative day. Patients in the hospital more than 6 days postoperatively were recorded.
4. Postoperative pain relief: The pain in the involved limb was recorded preoperatively using the visual analog scale. The patients were again inquired about the pain in the affected limb postoperatively after a week and again after a month and recorded using the visual analog scale. Improvement of

more than 5 was considered good relief of pain. Visual analog scale¹⁸ is quoted on a 10 cm scale, which represents "no pain" (0 cm) and "worst pain" on the right end. (10 cm).

5. Recurrence: All the patients were followed postoperatively for 6 months, and recurrence of pain or varicosities was observed and recorded. Doppler study was done at the 6th-month follow-up to look for recurrence.

2.7. Operative procedure

The surgery for GSV can be in the form of saphenofemoral flush ligation with or without vein stripping. Flush ligation of GSV is done under regional anesthesia while keeping the patient in a prone position. After making an oblique incision of 3cms, 1 cm above and parallel to the groin crease, subcutaneous fat, and fascia are dissected until GSV is identified. Then tributaries of GSV were identified and ligated as SFJ should be identified. The dissection was continued 2 cm above and below the femoral vein confluence. The external pudendal artery lies at the angle of the confluence of GSV, and it was ligated. Care was taken not to injure the femoral vein. Double ligation is preferred to single ligation. Stripping of GSV: The vein was opened transversely, and the stripper was passed through the vein from above downwards. A small 1-2 cm incision was made below the knee joint, and the stripper was removed. An acorn was attached to the tripper, and the vein was stripped from above downwards by pulling the stripper downwards. A long trailing silk suture was attached at the head of the stripper and drawn through a tunnel through the vein. The vein and the stripper were drawn back up to the groin incision, reducing the distal incision size.

2.8. Ethical considerations

Permission was obtained from the Institutional ethical committee (Registration no: ECR/633/Inst/AP/2014/RR-17 and Reference no: IEC/2019/040/SMC) attached to Siddhartha Medical College, Vijayawada, India, before conducting the study. Informed consent was taken from every patient participating in the study.

4. RESULTS

4.1. Age

There is no significant difference in the mean age between groups I and II.

Table 1: Mean age of patients	
Groups	Mean age
I	45.3±3.2 years
II	45.7±4.1 years
P value	0.58

Table I shows the mean age of patients in both groups. The mean age of patients in Group I was 45.3±3.2 years, and the mean age in Group II was 45.7±4.1 years. There is no significant difference in the mean age between groups I and II, as per the T-test (P=0.58).

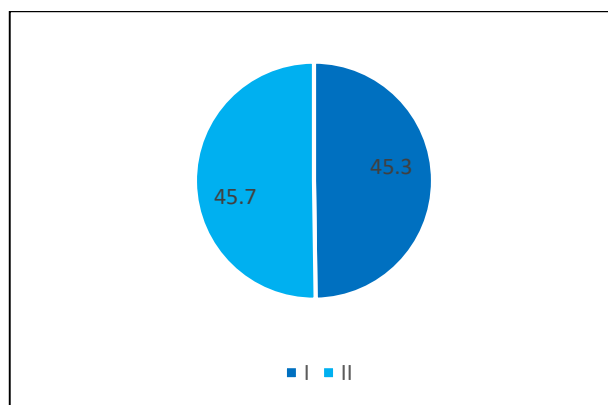


Fig 1: Mean age of patients

Figure I shows the mean age of patients in both groups. The mean age of patients in Group I was 45.3 years, and the mean age in Group II was 45.7 years.

4.2. Gender

Overall 72% of patients were males.

Table 2: Gender distribution of patients			
Gender	Group I	Group II	Total
Males	38	34	72
Females	12	16	28
Total	50	50	100

Table 2 shows the gender distribution of patients in groups I and II. Group I have 35 females and 15 males, and Group II has 33 females and 17 males in the study. Overall, 68% of patients were females.

4.3. Early ambulation

All patients were encouraged to walk on the first postoperative day. Among the 50 patients in whom the GSV was stripped, 23 (46%) ambulated comfortably on the first postoperative day without discomfort; 27 (54%) complained of pain during ambulation. Among the 50 patients in whom saphenofemoral flush ligation was done, 39 patients (78%) were ambulated comfortably on the first postoperative day without any discomfort; 11 patients (22%) reported some pain and discomfort during walking on the first postoperative day.

Table 3: Early ambulation in both groups			
Early Ambulation	Group I(N=50)	Group II(N=50)	Total
Good	23	39	62
Painful	27	11	38
Total	50	50	100
Chi-Square	10.86		
P Value	0.0009		

Table 3 shows an early ambulation comparison between the two groups. There is a significant difference in the early ambulation between the two groups. Early ambulation is better in patients without venous stripping than those who underwent venous stripping of the leg.

4.4. Healing of wounds

The wounds which took more than 6 days to heal were considered delayed. Among the patients who underwent venous stripping, wound healing was good in 38 patients (76%) and delayed in 12 (24%). Among the patients who underwent saphenofemoral flush ligation; wound healing was good in 42 patients (84%), delayed in 8 patients (16%)

Table 4: Healing of wounds in both groups			
Healing of wounds	Group I(N=50)	Group II (N=50)	Total
Good	38	42	80
Delayed	12	8	20
Total	50	50	100
Chi-square	1		
P value	0.317		

Table 4 shows the healing of wounds in both groups. Wound healing was good in 80% of patients. There is no significant difference in wound healing between the two groups($p=0.317$).

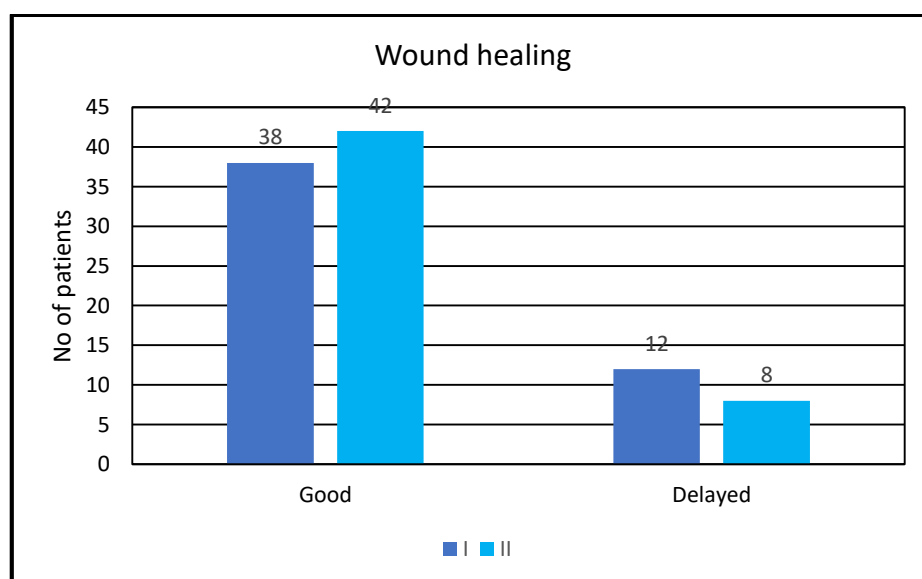


Fig 2: Status of wound healing in both groups of patients

Figure 2 shows a wound healing comparison between group I and II patients. Healing was good among 38 patients of Group I and 42 patients of Group II.

4.5. Laterality

For 54% of patients, the left side was involved. Bilateral involvement was seen in 6% of patients. Among 40% of patients, right-sided varicose veins were seen.

4.6. Duration of postoperative hospital stay

Among the patients who underwent stripping, 40 (80%) were discharged within 6 days postoperatively; 10 (20%) were discharged after 6 days. There is no significant difference in the mean duration of hospital stay between the two groups (chi-square value=0.23 and P value=0.629).

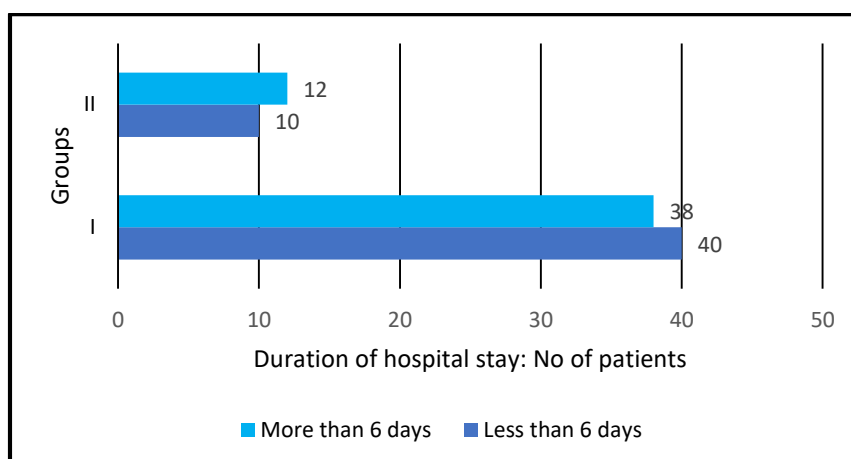


Fig 3: Duration of hospital stay

Figure 3 shows the duration of hospital stay among two groups of patients. Among the patients who underwent saphenofemoral flush ligation, 38 (76%) were discharged within 6 days post-operatively; 12 (24%) were discharged after 2 days.

4.7. Post-operative pain relief

Among patients who underwent venous stripping, 33 (66%) reported good pain relief after one week; 44 (88%) reported good pain relief after one month.

Table 5: Postoperative pain relief after 1 week and 1 month			
Postoperative pain relief	Group I(n=50)	Group ii(n=50)	P value
After 1 week			
Relieved	33	36	0.516
Not Relieved	17	14	
After 1 month			
Delayed	44	42	0.564
Total	6	8	

Table 5 shows postoperative pain relief after 1 week and 1 month among two groups of patients. There is no significant difference in postoperative pain relief after 1 week and after 1 month between two groups of patients, as evidenced by p values.

4.8. Recurrences

Among the patients who underwent venous stripping, after 6 months, 4 patients (8%) have had a recurrence; in patients who underwent saphenofemoral flush ligation, 10 patients (20%) have had a recurrence. There were no postoperative complications in our study participants except for recurrence in some patients. No patient had deep vein thrombosis, migraine, or posterior tibial vein thrombosis.

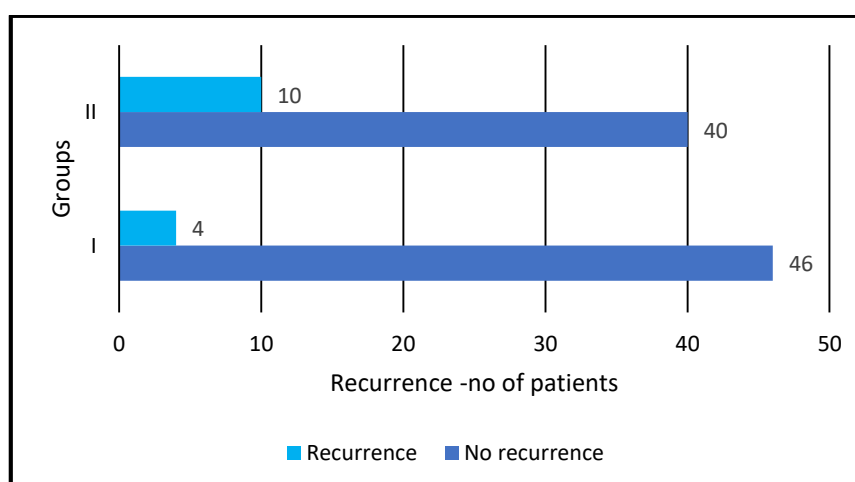


Fig 4: Recurrence among patients

Figure 4 shows the recurrence rate among two groups of patients. The overall recurrence rate was 14% in the study. It was more in group II patients. But the chi-square value is 2.99; P-value is 0.089, indicating no difference between the two procedures regarding recurrence after 6 months.

5. DISCUSSION

High ligation and stripping of the great saphenous vein is the most common and effective method for treating varicose veins.¹⁹ But due to various surgical incisions, high ligation of GSV and point-form-stripping became the challenge for medical workers. FS can be used as 1st line therapy for telangiectasia and small varicose veins and as a supplementary management mode for large varicose veins.²⁰ In the current study, among the 100 patients, 72% of the patients are males. The results obtained are comparable to the studies done by M.G.Vashisht et al.²¹, who also showed varicose veins to be common among males. In the study by Anirban Bhunia et al.²² 88.6% of the involved cases were males, and 11.4% of the involved cases were females. These results are comparable to the present study. It might also be due to cultural factors, due to which females do not usually wear short clothes and are not more cosmetically inclined. They only usually show up due to complications of the varicose veins other than cosmetic reasons. One survey conducted by Weddell JM.²³ found more prevalence of varicose veins among women compared to men. These observations were similar to the study of Framingham.²⁴ There is no significant difference in the mean age of patients between the two groups, and most patients were 41 to 50 years in the current study. In the study by Arun Prashanth et al.²⁵, the age incidence was maximum in the group 21-40 years, which accounted for 52% of patients, and the incidence in the age group of 41-60% was about 36%. It is comparable to the study by Prasad and Balraj et al.²⁶, who found that varicose veins are commonly seen among patients aged 40-50. In the present study, 40% of patients had right-sided varicose veins, and 54% had left-sided ones. Bilateral involvement was seen in 6% of the patients. In the study by J.Ravinder Naik et al.²⁷, in 36% of cases, the right lower limb was involved; in 60% of cases left lower limb was involved, and in 4%, both limbs were involved. In the study by Reddy GVR et al.²⁸, 48% of the cases had left-side involvement, and 52% had right-sided involvement. In the current study, 20% of the patients had delayed wound healing. In the study done by Pranav Patel et al., delayed wound healing was seen in only 3% of the cases.²⁹ These results were also comparable with the study of Kam, S G Tan, et al.³⁰, who showed that delayed healing was seen in 5.8% of patients who underwent venous stripping. In the current study, when patients were ambulated on the first postoperative day, overall, in both groups, 62% of the patients had comfortable ambulation and 38% had painful ambulation. In the study done by Natraj D et al.³¹, when the patients were encouraged to walk on the first postoperative day, 68% of those who underwent stripping and 92% of those who underwent ligation alone had comfortable ambulation. 14% of the patients from the two groups had recurrence after 6 months in the current study; saphenopopliteal reflux

is most encountered among these patients after saphenofemoral flush ligation and stripping. In a hospital-based study by H. Nagaraj et al.³² 14% of the patients had a recurrence. No serious side effects were seen in any patient in the current study. Peng et al.³³ found that the incidence of saphenous nerve injury in the above-knee group was less compared to conventional surgery. The study compared the above knee technique with conventional surgery in treating varicose veins. The study concluded that the above-knee technique helps to improve clinical outcomes, decrease intraoperative blood loss and incidence of complications.

Our study has a few limitations.

- Small sample size.
- It was conducted in a single tertiary care center, so the results cannot be extrapolated to the general population.
- Other modalities of treatment were not studied.

6. CONCLUSION

Patients who underwent venous stripping had painful ambulation on the first postoperative day. There is no significant difference between the two procedures concerning wound healing, duration of postoperative hospital stay, and postoperative pain relief at the end of 1st week and 1st month. After 6 months of follow-up, recurrence rates were higher in the group that underwent GSV flush ligation without stripping. Saphenofemoral junction (SFJ) flush ligation with incompetent perforators ligation without venous stripping appears to be better than SFJ flush ligation with incompetent perforators ligation with venous stripping in this short-term study of the two procedures.

7. ACKNOWLEDGMENTS

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8. AUTHORS CONTRIBUTION STATEMENT

Dr. Megavath Motilal designed and planned the entire study. Dr. Kathi Ravi Kumar collected patient data through a case record form. Dr. Kari Veerabhadra Swamy did the statistical analysis. All the authors drafted and approved the final version of the manuscript.

9. CONFLICT OF INTEREST

Conflict of interest declared none.

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