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Original Article

Open Surgical Management of Varicose Veins of Lower Extremities: Institutional Experience and Comparative Analysis of Outcome with Published Data of Endovenous Procedures

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Abstract

Introduction: Despite all the advances in management, stripping remains important in the treatment of varicose veins and is usually preferable to endovenous procedures if carried out correctly.

Aims and Objectives: The aims of the study were as follows: (1) To study the epidemiology (age, sex, and occupational), precipitating factors, clinical manifestations, and complications of varicose veins of lower limbs, (2) to study the surgical management (great saphenous vein [GSV] stripping and perforator ligation) and its outcome at Maharaja Yeshwantrao Hospital (MYH), Indore, and (3) to compare the outcome of GSV stripping in case of saphenofemoral junction incompetence and perforator ligation in case of perforator incompetence with the results of endovenous procedures performed in our institute and published in literature.

Materials and Methods: The present study was conducted on 50 patients (sample size) of varicose veins of lower extremities in the Department of Surgery at MYH Hospital and Mahatma Gandhi Memorial Medical College, Indore (Madhya Pradesh), after getting informed written consent from patients. The patients were randomly assigned among different operative procedures. Follow-up was done regularly.

Results: The most common complication reported in high ligation with stripping (HL/S) was tenderness (n = 26) followed by infection in six patients whereas in foam sclerotherapy, complications were less prevalent and only two patients had tenderness. Similarly in radiofrequency ablation (RFA), one patient each had recurrences, skin color change, and tenderness. None of the patients undergoing HL/S and foam sclerotherapy had recurrences. It was found that duration of hospital days was more with HL/S; majority had D6 duration of hospital days whereas 13 patients had it for 4 days. In RFA, majority had duration of hospital days of 2 days only.

Conclusion: Despite all the advances in management, open surgical management remains important in the treatment of varicose veins and is usually preferable to endovenous procedures and associated with less morbidity if carried out correctly.

Key words: Endovenous procedures, High ligation, Lower limb disease, Stripping, varicose veins

INTRODUCTION

Since the prehistoric era, varicose veins of lower extremities are one of the most common ailments affecting humankind. With the adoption of erect posture, human became susceptible to pathology of varicose veins of dependent venous system.

Varicose vein is dilated, elongated, tortuous, and often palpable superficial venous system of the body, especially of the lower extremities, having subcutaneous veins with diameter ≥3 mm measured in upright erect position with demonstrable reflux.

Varicose veins can be caused by several pathophysiological mechanisms, common among them are venous

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hypertension, incompetence of valves, changes in vein structure, inflammation and sheer stress, venous outflow obstruction, or calf pump failure.[1]

The most common peripheral vascular disease is the varicose veins of lower extremities. The prevalence of varicose veins among adults is estimated to range from 20 to 40%. The presence of varicose veins reported a prevalence of varicose veins in 10–40% in men and 26–32% in women.[2]

Treatment of varicose veins can be justified by its positive impact on quality of life. The treatment is determined by the stage of the disease, early cases are treated with pressure therapy, including medical elastic stocking therapy, elastic bandage therapy, and intermittent pressure compression therapy, which can temporarily relieve pain by external pressure. As the disease progresses, these treatment methods for patients with varicose veins of lower limb are not very effective. Surgical intervention as the main way of radical resection of varicose veins of lower extremities commonly includes high ligation and stripping (HL/S) and valvuloplasty.[3] However, the above methods have some disadvantages including more surgical incisions. There have been no clear guidelines on when to select conventional surgeries or endovenous procedure for the management of varicose veins.

Despite all the advances in management, stripping remains important in the treatment of varicose veins and is usually preferable to endovenous procedures if carried out correctly. In very superficially coursing saphenous veins in particular, an invaginating stripping procedure can produce a better cosmetic result.

MATERIALS AND METHODS

The present study was conducted on 50 patients (sample size) of varicose veins of lower extremities in the Department of Surgery at Maharaja Yeshwantrao Hospital (MYH) Hospital and MGM Medical College, Indore (Madhya Pradesh), after getting informed written consent from patients.

Criterion for Selection

Inclusion criteria

1. Patient presenting with varicose vein of lower limb presenting for the 1st time to hospital with proven saphenofemoral junction incompetence and/or perforator incompetence on color Doppler study.
2. All age/sex.
3. Patient must be willing to participate in study and come for follow-up regularly.

Exclusion criteria

The following criteria were excluded from the study:

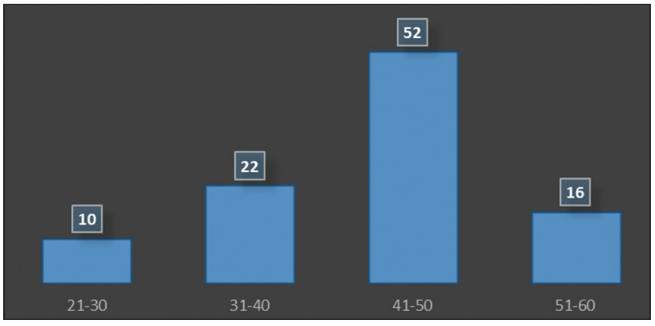
1. Patients with previous history of surgery or varicose vein presenting with recurrence.
2. Patients with deep vein thrombosis (DVT) precluding surgery for varicose vein.
3. Patients who are found to have varicose vein secondary to some other pathology which has not been treated adequately yet (i.e. persistent primary pathology).
4. Patients with one or more comorbidities that preclude surgical intervention.
5. Varicose vein as a part of syndrome like Klippel–Trenaunay syndrome.

Study Designs and Measurements

The study is a retrospective and prospective, analytical, randomized-controlled clinical study. Patients who were fit as per the inclusion criterion were randomly assigned to various operative procedures which includes high ligation and stripping [Figure 1], foam sclerotherapy [Figure 2], radio-frequency Ablation [Figure 3]. The patients were explained entire treatment and follow-up procedure by the investigator and the patients were then treated. The patients were randomly assigned among different operative procedures. Follow-up will be done at 1 month, 3 months, and 6 months

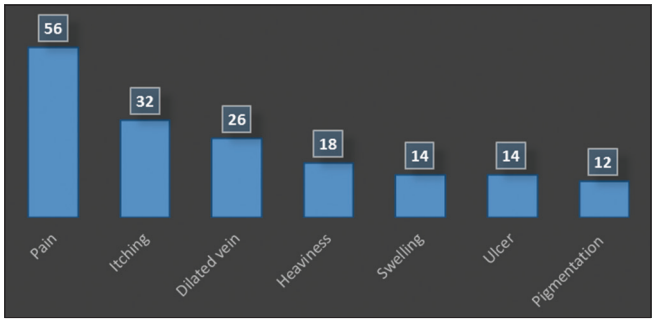
OBSERVATION AND RESULTS

- It was found that majority of the patients with varicose veins had age between 41 and 50 years (52%) followed by 31 and 40 years (22%). The mean age of study population was 40.42 ± 10.24 years [Graph 1].
- It was found that majority of the patients with varicose veins were male (54%) followed by females (46%).
- It was found that majority of the patients with varicose veins was pain (56%), followed by itching (32%), dilated vein (26%), and heaviness (18%). There were 14% of patients who had swelling and ulcer followed by pigmentation (12%) [Graph 2].
- It was found that majority of varicose patients had unilateral limb involvement (86%) out of that right one was more common (48%).

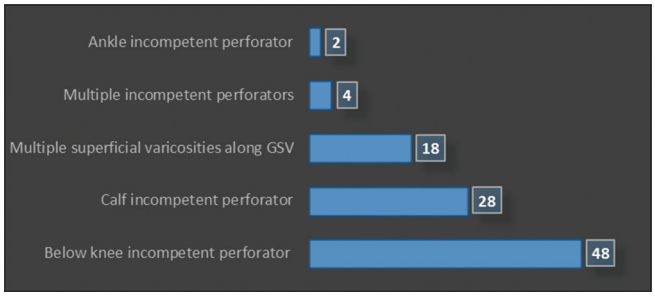


Graph 1: Distribution of varicose patients according to age of patients

- It was found that most common incompetence observed was below-knee incompetent perforator (48%) followed by calf incompetent perforator (28%) and multiple superficial varicosities along great saphenous vein (GSV) (18%). There were 4% of patients who had multiple incompetent perforators and 2% had ankle incompetent perforator [Graph 3].
- It was found that majority of the patients with varicose vein had occupations involving prolonged standing (66%) whereas 34% had occupations not involving prolonged standing.
- It was found that out of 50 patients, 22% had the family history of varicose vein.
- Clinical-etiological-anatomical-pathophysiological clinical staging: In the present study, out of 50 patients with varicose vein, majority were managed by HL/S (n = 30). It was also found that out of 30 patients with clinical staging of C2, 23 were managed by FL/S, whereas six were managed by sclerotherapy and one was managed by radiofrequency ablation (RFA). Out of seven patients having clinical staging of C2+C3, four were managed by HL/S whereas one each was managed by RFA and sclerotherapy. Out of six patients with clinical staging of C2+C4a, four were managed by HL/S, one each was managed by RFA and sclerotherapy. Similarly, out of six patients with C2+C5, two each were managed by HL/S, RFA, and sclerotherapy [Graph 4].
- The treatment given. Patients with varicose vein were treated with HL/S (70%) followed by foam sclerotherapy (20%) and RFA (10%).

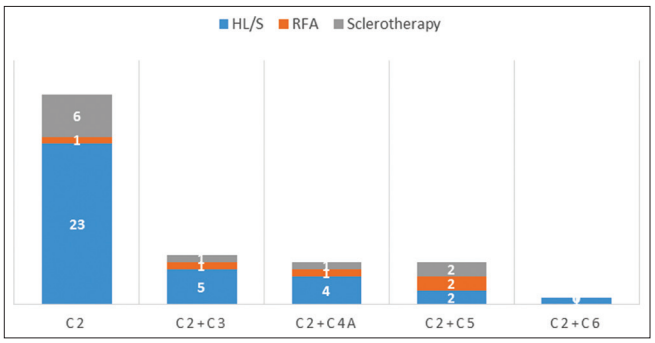


Graph 2: Type of presenting symptoms

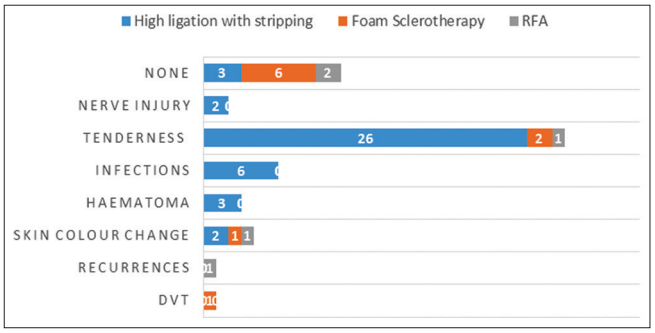


Graph 3: Incompetence observed on color Doppler

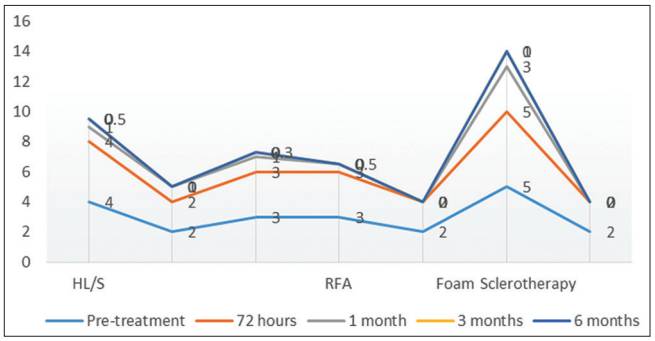
- It was found that most common complication reported in HL/S was tenderness (n = 26) followed by infection in six patients whereas in foam sclerotherapy, two patients had tenderness. Similarly, in RFA, one patient each had recurrences, skin color change, and tenderness. None of the patients undergoing HL/S and foam sclerotherapy had recurrences [Graph 5].
- It was found that with all the treatment methods, the ulcer size was improved significantly [Graph 6 and Table 1]
- It was found that majority (n = 12) of the patients in HL/S has returned to work in 10 days of treatment and day 15 and day 20, 10 and 9 patients, respectively, had returned to work. Whereas in foam sclerotherapy, five and three patients have returned to work on day 10 and day 15, respectively. Whereas no patient remained



Graph 4: Clinical-etiological-anatomical-pathophysiological clinical staging



Graph 5: Complication



Graph 6: Ulcer size

Figure 1: High ligation and stripping

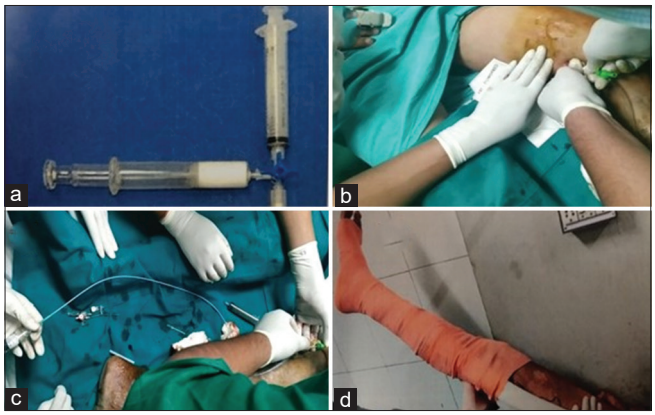


Figure 2: (a-d) Foam sclerotherapy

Table 1: Ulcer size

Measures	Treatment	Pre-treatment	72 h	1 month	3 months	6 months
Ulcer size (cm)	HL/S	4	4	1	0.5	0
		2	2	1	0	0
		3	3	1	0.3	0
	RFA	3	3	0.5	0	0
		2	2	0	0	0
	Foam sclerotherapy	5	5	3	1	0
		2	2	0	0	0
P value		0.556	0.034	<0.001	0.002	NA

in RFA to return to work beyond day 20 [Graph 7].

- The average number of days patients needs injectable analgesia: With HL/S, majority of the patients ($n = 16$) were post-operative day (POD) 2 whereas 14 patients required beyond POD 5. In foam sclerotherapy, majority require POD 2 and beyond. Whereas in RFA, majority require POD 1 [Graph 8].
- It was found that duration of hospital days was more with HL/S; majority had D6 duration of hospital days, whereas 13 patients had it for 4 days. In foam sclerotherapy; majority of patients discharged within 4 days. In RFA; majority had duration of hospital days of 2 days only.

DISCUSSION

The etiology of varicose veins is still incompletely understood despite the fact that it is a very common disease affecting all ages from teenagers to elderly people.[4]

The prevalence of varicose veins increased with age in both genders. Varicose veins are not lethal and appear throughout the adult life, therefore, it is expected that the prevalence of varicose veins increases with increase in age.[5]

In the present study, common symptoms of varicose veins were pain (56%), followed by itching (32%), dilated vein (26%), and heaviness (18%). There were 14% of patients who had swelling and 14% were with ulcer followed by pigmentation (12%).

Similar study by Saif *et al.* (2019) reported most common presentation as dilated veins. The common associated symptoms were itching and pigmentation in 27 patients (54%) and ulceration in 13 patients (26%).[6]

Athar *et al.* (2019) study also reported pain as the most common symptom with prominent veins which occurred alone or in combination with edema, eczema, pigmentation, or ulceration.[7]

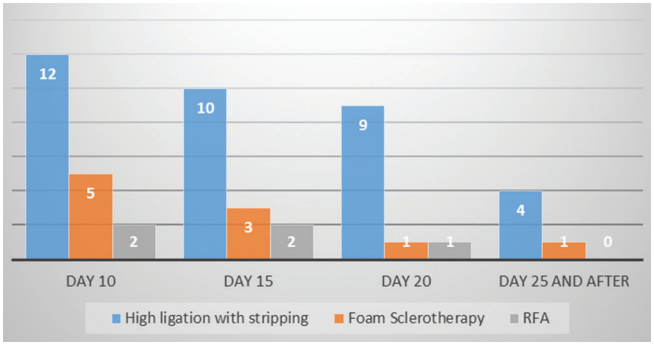
Clinical evaluation of varicose veins most commonly entails imaging with Doppler ultrasound, which is an objective, non-invasive measure of venous insufficiency that is invaluable in identifying valvular incompetence.

The incompetence observations on color Doppler show that most common incompetence observed was below-knee incompetent perforator (48%) followed by calf incompetent perforator (28%) and multiple superficial varicosities along GSV (18%). There were 4% of patients who had multiple incompetent perforators and 2% had ankle incompetent perforator.

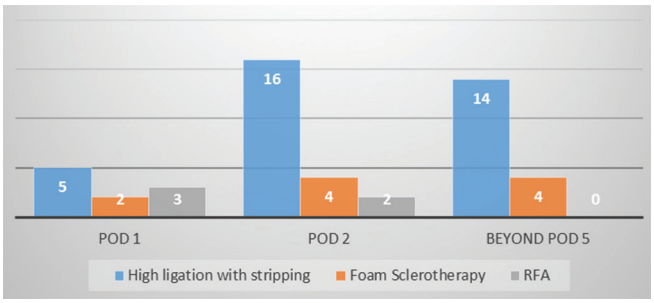
Similar study by Mulla *et al.* (2017) reported among the 70 limbs studied, 30 (42.85%) patients had the involvement of GSV and communicating system, 6 (8.57%) had involvement of GSV and SSV systems, whereas SSV and CS were affected in 2 (2.85%) patients. Two (2.85%) had all the three systems involved. Only communicating system was affected in 8 (11.42%) limbs, GSV alone was affected in 18 (25.71%) limbs and SSV was the sole system involved in the rest 2 (5.71%) limbs.[8]

Relation of varicose vein with occupation shows that majority of the patients with varicose vein had occupations

Figure 3: Radiofrequency ablation



Graph 7: Early return to work



Graph 8: Average number of days patients needs injectable analgesia

involving prolonged standing (66%) whereas 34% had occupations not involving prolonged standing.

Similar results were reported by Mulla *et al.* (2017), it found that 47.14% of farmers who admitted that their occupation required standing for long intervals. Furthermore, worth noticing was the fact that the other people affected were policemen and teachers, jobs associated with prolonged standing.[8]

Distribution of complications shows that DVT occurred in one patient following foam sclerotherapy and not occurred in other procedures of management. Similarly, in RFA, one patient had recurrence, one had skin color change, and one had tenderness. None of the patients undergoing HL/S and foam sclerotherapy had recurrences. The most common complication reported in HL/S was tenderness (n = 26) followed by infection in six patients which were not worrisome whereas in foam sclerotherapy, two patients had tenderness.

In similar study by Anim *et al.* (2017), 64% of patients described the treatment with saphenofemoral junction ligation with stripping as successful (Grade 0), as compared to 34% of patients describing it successful (Grade 0) after saphenofemoral junction without stripping.[9]

Bozoglan *et al.* (2016) reported that minor complications in endovenous laser ablation (EVLA) and RFA were hyperemia at 20.7% and 31.0%, ecchymosis at 31.0% and 51.7%, and edema at 27.6% and 65.5%, respectively. Comparison of ulcer size reveals that with all the treatment methods, the ulcer size was improved.[10]

Distribution of the early return to work found that majority (n = 12) of the patients in HL/S has returned to work in 10 days of treatment and at day 15 and day 20, 10 and 9 patients had returned to work. Whereas in foam sclerotherapy, 5 and 3 patients have returned to work on day 10 and day 15, respectively, whereas all the patients in RFA have returned to work to the end of day 20.

Results of Cotton *et al.* (2016) show that the patient information leaflet (PIL) specifically stated that following EVLA or ultrasound-guided foam sclerotherapy "most people are able to return to work within 2–3 days of treatment, but some people go back the following day or even the same day," and that following surgery "people can return to office or sedentary work after 2–3 days; and that most people will be back at work within a week after surgery to one leg and 2 weeks after surgery to both legs."[11]

The present study has some limitations in terms of small sample size, inappropriate follow-ups were recorded post-treatment.

CONCLUSION

The present study concludes that the varicose veins of the lower limb are a fairly common clinical entity. No definite conclusion could be drawn from the present series regarding etiology, as the number is small. However, a definite relationship exists between the occupation, age, gender, family history, and the incidence of varicose veins.

Based on the findings, it can be concluded that varicose vein was more prevalent in the age groups of 41–50 years followed by 31–40 years and was mainly males. Varicose vein was also more prevalent in those who had occupations involving prolonged standing. The most common symptoms in patients with varicose vein are pain, itching, dilated vein, and heaviness. It was found that majority of varicose patients had unilateral limb involvement out of that right one was more common. The most common incompetence observed was below-knee incompetent perforator.

None of the patients undergoing HL/S had DVT and recurrence which favors the procedure selection for management. However, HL/S was associated with tenderness followed by infection, which were not worrisome. Furthermore, none of the patients undergoing foam sclerotherapy had recurrences. Ulcer size was significantly improved by all the treatment methods. HL/S has resulted in early returned to work with less no. of days of injectable analgesia and minor complications compared to others.

Conservative treatment though relieves symptoms, it cannot be the definitive treatment and it has to be followed by some form of definitive treatment. Operative line of treatment is a primary procedure in the management of varicose veins of lower limbs. Despite all the advances in management, open surgical management remains important in the treatment of varicose veins and is usually preferable to endovenous procedures and associated with less morbidity if carried out correctly. In very superficially coursing saphenous veins in particular, an open procedure can produce a better cosmetic result.

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