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ORIGINAL RESEARCH

A clinical, radiological and operative study of varicose veins of lower limb

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ABSTRACT

Background: Varicose veins are veins that have become dilated and tortuous. The term commonly refers to the veins on the leg, although varicose veins can occur elsewhere. When veins become varicose, the leaflets of the valves no longer meet properly, and the valves do not work (valvular incompetence). Colour flow duplex ultrasound scan has as the gold standard imaging modality for venous disease. As conventional surgery is minimized due to cosmetic purpose the lower recurrence and fewer complications. This study is performed to clinically evaluate the cases of varicose veins of the lower limb and to evaluate varicose vein in lower limb by Duplex scan. **Materials and Methods:** Patients with varicose veins admitted in Department of CTVS & Surgical wards of our Medical College fitting in inclusion and exclusion criteria were taken. A detailed clinical examination was done. Duplex scan (colour Doppler) study of lower limb venous system. **Results:** In this study, most of the patients were having anatomically involvement of superficial veins + perforators in 29 patients (69.05%) and only superficial veins in 13 patients (30.95%). Out of 42 patients who underwent colour doppler, 25 patients (59.5%) found unilateral saphenofemoral incompetence + perforator incompetence. **Conclusion:** Surgically management like Saphenofemoral flush ligation with stripping of veins was most common procedure, tredelenberg operation with multiple ligation of veins, radiofrequency ablation, sclerotherapy and conservative management like compression hosiery, elastic bandage therapy were most commonly performed in our hospital with satisfactory results. In these procedures have minimum recurrence rate and complication were found.

Keywords: Varicose Veins; Duplex Scan; Saphenofemoral flush ligation; Tredelenberg operation.

INTRODUCTION

Varicose veins and their associated symptoms and complications constitute the most common chronic vascular disorders leading to surgical treatment. The term varicose is derived from the Latin word "Varicous" which means dilated. The definition of varicose veins varies widely ranging include-

According to Arnoldi, "Clearly visible, dilated, tortuous and possibly prominent subcutaneous veins of lower extremities"

According to Dodd and Cockett "dilated veins secondary to loss of valvular efficiency"

According to WHO "Vein with a secular dilatation which is often tortuous".

The term "varicosity" is generally applied to elongated, tortuous, pouched, thickened, inelastic and friable vessels which have permanently lost its valvular efficiency though similar changes may also occur in veins in the anal canal, as hemorrhoids, varicocele of pampaniform plexus, and Varicose in the lower end of oesophagus with portal hypertension.[1,2]

Vascular disease of varicose vein is abnormal condition of lower limb extremity in which venous dilation and twisting of the lower extremities occur mainly due to dysfunction of valves in great saphenous vein, small saphenous vein, perforator vein artery, and other subcutaneous veins in the leg, and occurs in people who are engaged in prolonged standing for long hours on the job, high physical activity intensity or long sedentary station; the incidence rate of this disease among adults is generally 20%-40%.[3]

The variation in the definition of varicose veins has lead to wide discrepancies in its incidence reported in the literature

The prevalence has been variously reported from as little as 2% to over 20% in population studies .[1,2] This enormous variation results from the different populations studied, different definitions applied and the different assessment or examination techniques used. Western studies have shown that 20% population

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suffers from varicose vein and 2% have skin changes proceeding to venous ulceration [1,2] .

Varicose veins are veins that have become dilated and tortuous. The term commonly refers to the veins on the leg, although varicose veins can occur elsewhere. Veins have pairs of leaflet valves to prevent blood from flowing backwards (retrograde flow or venous reflux). When veins become varicose, the leaflets of the valves no longer meet properly, and the valves do not work (valvular incompetence). This allows blood to flow backwards and they enlarge even more. Varicose veins are most common in the superficial veins of the legs, which are subject to high pressure when standing.

Investigation

Imaging studies are usually performed as part of the assessment of patients with varicose veins. Colour flow duplex ultrasound scan has as the gold standard imaging modality for venous disease. [4-5] Duplex scan is useful for mapping reflux within the saphenous systems, detecting SSV disease, locating SPJ and incompetent non-junctional perforators, as well as evaluating the deep venous system.

Presently there is increased use of endovascular technologies for the treatment of varicose veins, it is becoming almost routine to perform duplex scanning prior to treatment.[6]

Other investigations such as venoghrphy (varicography) and plethysmography have largely been replaced by duplex ultrasound scan, and serum investigation used in day to day usual clinical practice .[7]

Management

The primary varicose veins of lower extremity, including medical elastic stocking therapy, elastic bandage therapy and intermittent pressure compression therapy, which can temporarily relieve pain by external pressure. Surgical intervention as the main way of treatments of varicose veins of lower extremity, and commonly includes conventional procedure high ligation and stripping and valvuloplasty in main stream.[8] In recent 10 years, with the development of minimally invasive techniques, laser therapy and sclerotherapy as new treatment choices for patients have attracted increasing attention. Minimally invasive technology has become the currently preferred by surgeon because better complains for patients.

As conventional surgery minimized due to cosmetic purpose the lower recurrence and fewer complications [9-10]

The minimally invasive procedure include-

1) Endovenous laser ablation (EVLA)
2) Radiofrequency ablation

1) Endovenous laser ablation (EVLA)[11] - Endovenous laser ablation has been postulated to be mediated both by direct effect and indirectly via laser induced steam generated by the heating of small amounts of blood within the vein.

a) This cause thermal damage to endothelium and sub endothelial layer resulting in focal coagulation necrosis and shrinkage leading to thrombotic occlusion in the vein.
b) Diod laser most commonly used for EVLA laser generators exist with multiple different wavelengths.
c) Histological studies at 3and 6 months following EVLA indicated failure of endothelial regeneration and progressive damage to the muscle layers of the vein wall resulting in the further shrinkage.

Radiofrequency Ablation Therapy [12-13]

The original radiofrequency endovenous ablation system worked by thermal destruction venous tissue using electrical energy passing through tissue in the form of high frequency alternating current. This current was converted to heat, which causes irreversible localized tissue damage. Radiofrequency energy is delivered though a special catheter with deployable electrode at the tip; the electrodes touch the vein wall and deliver energy directly into the tissues without coagulating blood.

The newest system called closure Fast delivers infrared energy to vein walls by directly heating catheter tip with radiofrequency energy.

In the developed countries patients turn up to treatment of the disease and not for cosmetic reasons.

However in our Indian scenario it is the complications and not the cosmetic reasons that brings the patient to the doctor. In our country the disease is one of the common surgical problems in low socio-economic class people, which at times compel the patient to change his occupation which is very disturbing.

AIMS AND OBJECTIVES

1. Clinically evaluate the cases of varicose veins of the lower limb.
2. The study to evaluate varicose vein in lower limb by Duplex scan (colour doppler).
3. To study the various management of varicose veins of lower limbs at a Tertiary Medical College Hospital and to study the outcome.

MATERIALS AND METHODS

Patients with varicose veins admitted in respected Department of CTVS & Surgical wards of Medical College and associated Maharana Bhupal Govt. Hospital, Udaipur (Rajasthan).

Sample size

Cases admitted in Govt. Hospital, Udaipur were included after taking proper approval from the Institutional Ethical Committee. Since adequate numbers of cases are admitted in our hospital, all patients admitted with symptoms and signs of varicose veins were included during the study period of April 2022 to March 2023.

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Inclusion criteria

1. All patients with primary varicose veins of lower limb due to superficial and perforator incompetence. (Including long shaphenous & short shaphenous varicosity)
2. Patients with the following symptoms of varicose veins: ulceration, phlebitis, bleeding, aching, skin changes (eczema, lipodermosclerosis, pigmentation).

Exclusive criteria

1. Secondary varicose veins (due to abdominal & pelvic pathology)
2. Deep venous thrombosis (to secondary superficial varicosity)
3. Pregnancy and abdominal mass
4. Varicosity others than lower limb

Investigations

A through history was taken in all the patients. A detailed clinical examination was done. All testes were applied in included case those subjected to colour Doppler study of lower limb to confirm diagnosis.

Following investigation are elaborated:-

- Duplex scan (colour Doppler) study lower limb venous system.
- Clinical examination-

After obtained adequate history, the patients were examined in standing position with good illumination, exposing both the lower limbs completely. The following tests were performed.

1. Brodie trendelenberg 1st and 2nd
2. Modified Parthe's test
3. Multiple tourniquet test
4. Schwartz test
5. Morrissey`s cough impulse test
6. Fegan'stest
7. Abdominal and rectal examination.

The result of the tests were documented according to clinical proforma.

Colour Doppler ultrasonography

Using a 10 MHz probe, the patient was examined in standing position along the whole length of long saphenous vein & short saphenous vein.

The following sign were specialy looked for

1. Saphenofemoral junction incompetence
2. Saphenopopliteal junction incompetence
3. Perforator incompetence
4. Deep venous system
5. Presence of abnormal and unnamed veins or perforator

- Laboratary investigation as follow-

1. Hemoglobin %
2. Total and differential WBC count
3. E.S.R.
4. Blood grouping and typing
5. Blood urea, Serum creatinine, Random blood sugar
6. ECG
7. Chest X ray PA view
8. 2D ECHO (wherever indicated)

The site of incompetence were marked by indelible skin pencil.

In this study the case & data collection of individual those patients were surgical management &operative procedure & operative finding.

- High flush ligation of Saphenofemoral junction with or without stripping of long saphenous vein.
- High flush ligation of Saphenofemoral junction without stripping of short saphenous vein.
- Incompetent perforator vein ligation.
- RFA was done in selected patients.

Follow Up

All patients were discharged 5-10 days with mean 7 days after surgery with elastic bandage applied up to 6 weeks.

All the patients underwent treatment based on their clinical and investigation profile. Post operative course was noted. Further the patients were followed– up and final outcome evaluated. Ethical clearance was obtained from the ethical committee prior to conducting study

OBSERVATIONS

This study was conducted in 42 patients suffering from varicose veins of lower limbs. A thorough clinical examination was done in all patients in clinical examination as per the Performa.

Table 1: Distribution of patients according to age (n=42)

		No. of patients	%
Age group (years)	20-30	9	21.42
	31-40	13	30.95
	41-50	10	23.80
	51-60	6	14.28
	61-70	3	7.14
	>70	1	2.38
Gender	Male	34	81%
	Female	8	19%

Out of 42 patients, youngest patient in the study was 20 yrs old and oldest was 74 yrs old and maximum number of

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patients were in age group of 31-40 yrs (30.95%). Out of 42 patients, majority were 34 (81%) male and 8 patients (19%) were females.

Table 2: Color Doppler study of lower limb in varicose vein patients (n-42)

Incompetence	Unilateral lower limb	Bilateral lower limb
SFI	7	2
SFI + Popliteal incompetence	4	0
SFI + Perforator	25	2
SFI + Popliteal + Perforator	6	1

Above table showing that out of 42 patients, 7 patients (16.6%) colour Doppler study of lower limb found unilateral saphenofemoral incompetence & 2 patients (4.76%) were found B/L saphanofemoral incompetence & 4 patients (9.52%) were found SFI +popliteal incompetence in unilateral limb &no any case found B/L saphenofemoral +popliteal incompetence & 25 patients (59.5%) colour Doppler study founds U/L sapheno femoral incompetence + perforator incompetence & B/L 2 patients (4.76%) SFI + Perforator incompetence found. 6 Patients (14.2%) colour Doppler study found SFI+ Perforator incompetence + popliteal incompetence in unilaterally & 1 patient (2.38%) found B/L SFI + Popliteal incompetence + perforator incompetence.

Table 3: Distribution of patients according to Clinical manifestation (n=42)

Symptoms	No. of patients	%
Pain & prominent Veins	21	50
Prominent veins &swelling	13	30.95
Eczema & pigmentation	6	14.28
Ulcer, eczema & pigmentation	2	4.7

Above tables show that out of 42 patients, 21 patients (50%) were pain with prominent veins and 13 patients (30.95%) were prominent vein 7 swelling, 6 patients (14.28%) were pigmentation with eczema on limbs and 2 patients (4.7%) were ulcer.

Table 4: Distribution of patients according to treatment done (n=42)

Treatment	No. of patients	%
Compressivestocking/crept bandage	4	9.52
Sclerotherapy	3	7.14
Trendelenberg procedure with stripping	15	35.71
Sapheno-popliteal ligation	3	7.14
Radiofrequency ablation	7	16.66
Trendelenberg procedure with multiple ligation	10	23.80

Out of 42 patients in our study 4 patients (9.5%) were treated by Compressive stocking/ Crept bandage, and 3patients (7.14%) were treated by Sclerotherpy, 15 patients (35.71%) were treated by trendelenberg procedure with stripping, and 7 (16.6%) were treated by radiofrequency ablation, 3 patients (7%) treated by saphenopopliteal flush ligation and 10 patients (23.80%) trendelenberg procedure with multiple ligation.

Table 5: Distribution of patients according to Complications (n = 42)

Complications	No. of cases	Percentage
Seroma	1	2.38
Haematoma	3	7.14
Infections	2	4.76
Limb Edema	1	2.38
Parasthesia	0	
Recurrance	0	
Deep Vein Thrombosis	0	

Above table show that out of 42 patients 1patients had (2.38%) post operatively seroma formation and 3 patients had (7.14%) haematoma formation and 2 patients (4.76%) had post operatively wound infections. And 1 patient (2.38%) also had limb edema.

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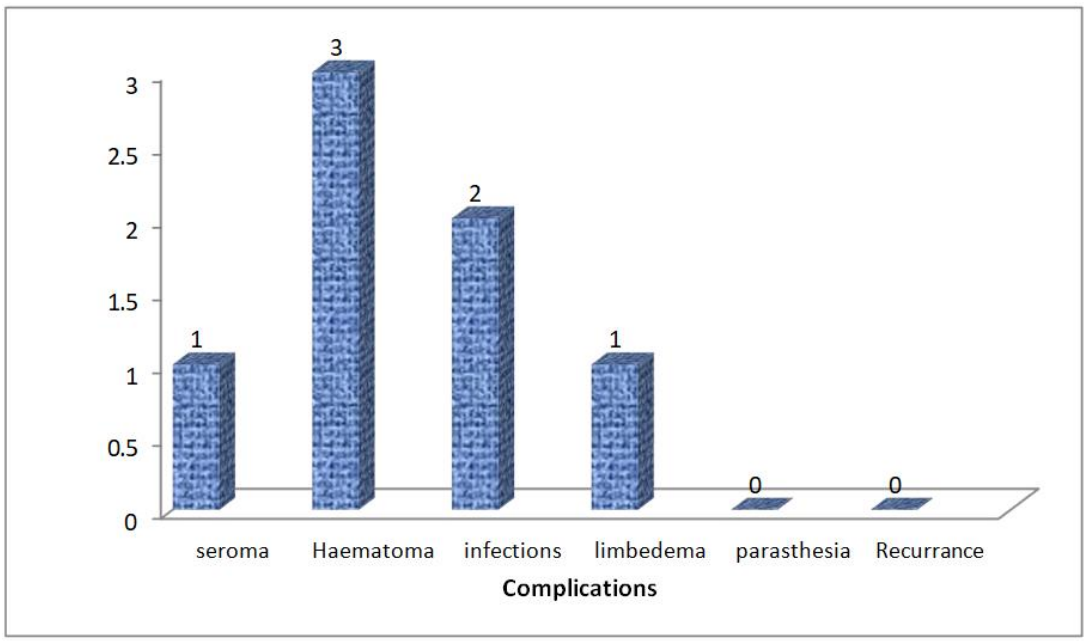

DISCUSSION

This study was conducted in 42 patients suffering from varicose veins of the lower limbs was admitted in respected department of CTVS & Surgical wards in Rabindranath Tagore Medical College & associate Maharana Bhupal Govt. Hospital, Udaipur (Raj.).

Majority of patients 13 (31%) were found between age group 31-40 years. The youngest patient in this study was 22 years and oldest was 74 years age range. Campbell showed the commonest age at presentation was 30-40 years which is also close to our study.[14]

According to our study varicose veins of lower limbs were found in male 34 patients (81%) and only 8 patients (19%) were female patients. Similar to ours Pramod M[15] in their study found that men (75%) patients were found more than female (25%) patient. Pawan B.[1] also showed similar result in which male (78%) and female (22%). Female patients in this study were mainly treated for symptoms and complications rather than for cosmetic reason.

In our study, out of 42 patients, 21 patients (50%) had symptoms of pain & prominent veins and 13 patients (30%) had prominent vein & swelling and 6 patients (14%) had Eczema & pigmentation, 2 patients (4%) had ulcer, eczema & pigmentation. These findings correlates well with other studies done by Campbell[14] with dilated veins symptoms being (90%) and pain 57% cases. Also study done by Pramod M[15] found similar results. The most common symptom was pain with prominent veins. It is evident that cosmetic purpose is not a factor which prompts the Indians to seek treatment for varicose vein as do those in the west

In the present study long saphenous vein was involved in 55% of cases (23 patients), the short saphenous vein in 24% (10 patients) and both long & short in 21% (9 patients).

Delbe and Mocquet [16] in their study found varicosity of long saphenous vein in 98% and only 2% in short saphenous veins. Al-Mulhim [17] of Saudi Arabia found that it was 68.42% long saphenous veins and both long and short saphenous veins were involved in 6.25% of cases and short saphenous vein was involved in 3.13 % of cases.

In this study colour doppler study is the primary non invasive method of assessing venous insufficiency which has an overall accuracy at 94%. This finding is in conformity of Masuda [18] and Kroger K[19] who showed that Doppler study had an overall accuracy of 88%. Eight patients had associated venous ulcer that were due to superficial venous incompetence. Clinical examination detected all cases to have sapheno femoral Junction incompetence by colour doppler. In our study we had a found many perforators incompetence by clinical examination and colour doppler. The commonest group of perforators that were incompetent was the above ankle group.

In this study majority of the patients in the study had incompetence at multiple sites. Out of 42 patients, who underwent colour doppler study. 25 patients (59%) found unilateral lower limbs saphenofemoral with perforators incompetence and 3 (7%) patients, had bilateral lower limbs saphenofemoral + perforators incompetence was found. 7 patients (16%) had unilateral lower limb suphenofemoral incompetence while in 2 patient (4.7%) bilateral lower limb incompetence was found. In 4 patients (9.5%) colour dopper study found unilateral lower limb saphenofemoral incompetence + popliteal incompetence was present. None of the cases had bilateral lower limb saphenofemoral + popliteal incompetence. In 6 patient (14.2%), unilateral lower limb saphenofemoral + popliteal + perforators incompetence were found. bilateral saphenofemoral incompetence + popliteal + perforator incompetence was found in (2.3%) patients.

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Khan B[20] group, in their study, detected incompetence at saphenofemoral + perforators (46%) cases and saphenofemoral incompetence (20%), perforators incompetence (16%) and saphenofemoral + popliteal incompetence (10%) cases, saphenofemoral + popliteal + perforators incompetence (8%) cases found, thise incompetence which is close to our findings.

Weiss RA[21], in their study found that saphenofemoral junction + perforators incompetence (58%) cases, perforators incompetence (20%) and saphenofemoral incompetence (25%) cases, which is also close to our study.

Modified trendelenberg and stripping of great saphenous vein is currently most common used and effective method for varicose veins treatment.

Stalder[22] recommended that in a symptomatic varicose veins, if the imaging scan shows any incompetence along the long or short saphenous vein and if there are no contraindications for surgery, operative treatment should be done.

In our study out of 42 patients, 4 (9.5%) patients treated with medical management (compressive stocking& crept bandage). 38 patients (90%) were treated by surgical management. Out of them 3 patients (7.1%) were treated by sclerotherapy. 15 patients (35.7%) were treated by modified trendelenberg + stripping of veins. 10 patients (23.8%) were treated by tredelenberg + multiple ligations of veins. 7 patients (16.6%) were treated by Radiofrequency ablation technique. 3 patients (7.1%) were treated by saphenofemoral flush ligation.

Treatment results were our study close to study done by Lee[23] who showed in (54%) cases modified trendelenberg + stripping of long saphenous vein, and in (29%) cases saphenofemoral flush ligation + multiple ligations of veins.

Vander Bremer[24], in their study concluded that at present, the gold standard treatment of varicose veins still is surgical ligation and stripping of the incompetence vein.

Bhutia[25] in his study also mentioned that open surgical treatment still formed the mainstay of treatment.

Post operatively compression treatment was followed routinely to prevent haematoma formation. After stripping elastic crepe bandage / stockings application was advised for three to four months.

In our study, out of 42 patients, few complications were observed during post operative periods. 1 patient (2.3%) had post operatively seroma formation, 3 patients (7.1%) had haematoma formation, 2 patients (4.7%) had post operative wound infections and 1patient (2.1%) limb edema noticed.

Incidence of sensory impairment following surgery was not found. This could be because the long segment stripping of saphenous vein whenever possible was avoided. There was no incidence of deep vein thrombosis or pulmonary embolism post operatively.

The study was conducted during the period of COVID-19 pandemic which resulted in the decreased number of cases and there was also a decrease in recurrent cases and loss to follow-up.

CONCLUSION

The varicose veins of the lower limbs is a disease of younger and middle age group, occurring in lower and middle class (socioeconomics) with occupation involving prolonged standing and violent muscular efforts are more prone for developing varicose veins. Family history is found to be another contributory factor.

In our study, colour doppler (Duplex scan) is the investigation of choice give valuable information for management of varicose veins disease.

Surgically management like Saphenofemoral flush ligation with stripping of veins was most common procedure, tredelenberg operation with multiple ligation of veins, Radiofrequency ablation, sclerotherapy and conservative management like compression hosiery, elastic bandage therapy were most commonly performed in our hospital with satisfactory results. In these procedures have minimum recurrence rate and complication were found.

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