



A multicenter review of epidemiology and management of varicose veins for national guidance



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HIGHLIGHTS

- Perforator veins were most commonly involved indicating risk of future complications.
- Most common symptom at the time of presentation of varicose veins was ulceration.
- Recurrence of varicose vein was reported in 13.5% cases.
- High risk groups for common risk factors, symptoms and complications in varicose veins were identified.
- Saphenous vein stripping was the most common surgical procedure performed.

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ABSTRACT

Background: Varicose vein is a common surgical problems in India. This study was done to assess the clinico-epidemiological profile, risk factors and management practices in varicose veins.

Materials and methods: Medical records of 170 varicose vein cases admitted in tertiary care hospitals in Mangalore between May 2011 to April 2014 were reviewed retrospectively.

Results: Majority of cases 53(31.2%) were of the age group 41–50 years. Majority were males 127(74.7%) and majority were unskilled workers 101(59.4%). Superficial veins were involved in 123(72.4%) cases. Perforator followed by great saphenous vein were most frequently involved. Veins on the left side were more involved than on the right. Common symptoms at the time of presentation was ulceration 98(57.6%) followed by pain in the legs 96(56.5%). Ulceration was seen significantly more among females ($p = 0.027$) and among house wives ($p = 0.004$). Complications like eczema 46(27.1%), non-healing ulcers 21(12.3%) and deep vein thrombosis 10(5.9%) were reported among cases. Eczema was present significantly more among elderly patients aged above 60 years ($p = 0.019$). Risk factors like prolonged standing was observed in 86(50.6%) cases. This history was significantly seen among males ($p = 0.001$) and among those involved in unskilled occupations ($p < 0.001$). Recurrence of varicose vein was reported in 23(13.5%) cases. It was associated with patients of the age group 21–30 years ($p = 0.021$). Doppler ultrasound was the most common 120(70.6%) investigation done. Micronized purified flavonoid fraction was used in management in 15(8.8%) cases. Conservative management methods like limb elevation 50(29.4%) and compression stocking 36(21.2%) was advised to patients. Saphenous vein stripping was the most common surgical procedure 40(23.5%) performed.

Conclusion: The high risk groups identified in this study need to be made aware of risk of developing varicose veins. Use of compression stocking at work place added with newer procedure in management could help in betterment in their quality of life.

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1. Introduction

Varicose veins arise due to incompetence in valves of deep, superficial and/or perforating veins. This incompetence leads to reflux of blood causing increase in venous pressure resulting in dilated, elongated or tortuous subcutaneous veins of lower legs [1].

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This condition is primarily considered to be a cosmetic problem and widely mistaken to be medically unimportant and given low priority for treatment [2,3]. However the fact is that the associated pain, swelling, open ulceration and other morbidities increase cost of its management [2,3]. The debilitation adds on to the time lost from work and wages [4].

In Indian set up it has been identified as a common surgical problems in low socio-economic groups and has also resulted in change of occupation out of compulsion [5]. It is not surprising that several studies have found that it affects the quality of life (QoL) of the individual [6,7].

Despite it being a common condition affecting adolescents to elderly, the etiological aspect of it is not completely understood [1,2,8]. Moreover the type of patients who tend to be more vulnerable to the severity or complications in this condition is also not known [8].

Other issues like absence of definitive system to identify which type of patient will benefit the most from a particular surgical intervention or lack of an established frame work for its diagnosis and management needs to be resolved [8]. The wide range of presentation in varicose veins also makes the management strategies a test of skill for the healthcare professional [9]. Thus large regional differences in management practices of varicose veins has been reported not only in India but also in developed countries like United Kindgom [8].

It was therefore essential to compare regional management practices in different patient types and disease presentations with national and international guidelines to give an overview about the same to health care professionals in the present settings.

This study was hence done to assess the clinic-epidemiological profile, risk factors and management practices in varicose veins in various tertiary care hospitals in Mangalore, a coastal city in south India.

2. Methods

This retrospective record based study was conducted in May 2014 in two major hospitals in Mangalore namely Government Wenlock Hospital and Kasturba Medical College Hospital, Attavar. The study was approved by the Institutional Ethics Committee. The permission to do the study was taken from the medical superintendents of the respective hospitals. The case sheets of patients with varicose veins admitted over the past three years from May 2011 to April 2014 was examined by the investigators. All confirmed cases of varicose veins were included in this study. Grossly incompletely filled case sheets were excluded.

The information regarding socio-demographic details of the patients, type of vein involved in varicosity, risk factors, symptoms, signs and complications associated with varicose veins and management practices which these patients underwent were recorded in a pre-designed proforma. Data was entered and analyzed using SPSS version 16.0. Chi square test was used test association between variables. $p \leq 0.05$ was taken as statistically significant association.

3. Results

Out of the total 170 patients with varicose veins, 120(70.6%) were admitted to the government hospital. Mean age of the patients was 46.7 ± 14.5 years. Majority 53(31.2%) were of the age group 41–50 years, were males 127(74.7%) and were doing unskilled occupation 101(59.4%). Majority were residents of urban areas 111(65.3%) (Table 1). The common veins involved in varicosity were left perforator vein (LPV) 79(46.5%), right PV 74(43.5%), left great saphenous vein (LGSV) 69(40.6%) and right GSV 58(34.1%).

Table 1
Socio demographic distribution of varicose vein patients.

Characteristics	Number	Percentage
Age group (years)		
21–30	26	15.3
31–40	33	19.4
41–50	53	31.2
51–60	30	17.6
61–70	18	10.6
>70	10	5.9
Gender		
Males	127	74.7
Females	43	25.3
Marital status (n = 63)		
Married	54	85.7
Unmarried	9	14.3
Monthly family income INR (n = 118)		
≤Rs. 1000	39	33.1
Rs. 1001–1500	58	49.1
>Rs.1500	21	17.8
Occupational status		
Unskilled ^a	101	59.4
Semi-skilled ^b	26	15.3
Skilled ^c	13	7.7
House wives	16	9.4
Teacher	14	8.2
Place of residence		
Urban	111	65.3
Rural	59	34.7
Total	170	100.0

^a Unskilled occupations comprised of manual labourers 95, watchmen 6.

^b Semi-skilled occupations comprised of hotel workers 15, barbers 11.

^c Skilled occupations were Tailors 7, Drivers 4, Carpenters 2.

Superficial veins were involved in 123(72.4%), PV in 110(64.7%) and deep veins (DV) in 10(5.9%) cases. The most common pattern of vein involvement was LGSV and LPV 21(12.3%). Veins on the left side of the limbs were more involved in varicosity compared to the right side (Table 2).

The most common presentation in varicose veins was ulceration 98(57.6%) followed by pain 96(56.5%) and change in skin colour 91(53.5%) at the site. Out of the 10 cases with deep vein thrombosis (DVT), in 8 cases LPV, 6 cases RPV, in 1 case RGSV and in 3 cases LGSV was involved. In 6 cases, there was bilateral presentation, 1 case right sided and in 3 cases left sided presentation (Table 3). Ulceration at the site of varicose veins was seen significantly more among females ($p = 0.027$) and among house wives ($p = 0.004$) (Table 5). Out of 170 patients, 36(21.2%) did not suffer from any complications due to varicosity. Eczema at the site of involvement was seen significantly more among elderly patients aged above 60 years ($p = 0.019$) (Table 5).

The most common risk factor for varicose veins was identified as prolonged standing 86(50.6%) (Table 4). It was positive among significantly greater proportion of males ($p = 0.001$) and patients doing unskilled work ($p < 0.001$) (Table 5). Recurrence of varicose veins at the same site was reported in 23(13.5%) cases (Table 4). Among these 23 cases, bilateral veins were involved in 11(47.8%), only left sided veins in 9(39.1%) and only right sided veins in 3(13%) cases. The veins involved in recurrence were LPV 14(60.9%), RPV 10(43.5%), LGSV 8(34.8%) and RGSV in 3 cases. History of recurrence was positive among significantly greater proportion of patients in the younger age group of 21–30 years ($p = 0.021$) (Table 5).

The various comorbidities reported among varicose vein patients were diabetes mellitus 29(17.1%), hypertension 23(13.5%), respiratory system morbidities (tuberculosis, asthma, bronchitis, lower respiratory tract infections) 18(10.6%), thrombo embolic diseases in 5, hypothyroidism 4, vasculitis 2, epididymoorchitis 2, myelofibrosis 2, rheumatoid arthritis 1, filariasis 2, exfoliative dermatitis 1, epilepsy 2, leprosy 3, ischaemic heart disease 1 and

Table 2
Characteristics of varicose veins presentation among patients (n = 170).

Veins affected	Number	Percentage
Left perforator vein	79	46.5
Right perforator vein	74	43.5
Left great saphenous vein	69	40.6
Right great saphenous vein	58	34.1
Right small saphenous vein	16	9.4
Left small saphenous vein	11	6.5
Right deep vein	8	4.7
Left deep vein	3	1.8
Class of veins involved		
Superficial	58	34.1
Perforator	40	23.5
Deep	1	0.6
Superficial, perforator	62	36.5
Superficial, deep	1	0.6
Perforator, deep	6	3.5
Superficial, perforator, deep	2	1.2
Vein involvement pattern		
Left GSV, left perforator vein	21	12.3
Left GSV, left perforator vein, right GSV, right perforator vein	19	11.2
Right and left perforator vein	19	11.2
Right GSV, Right perforator vein	10	5.9
Right GSV, Lt GSV, Rt SSV, Lt SSV	5	2.9
Rt Perforator vein, Rt Deep vein	5	2.9
Rt GSV, Rt SSV	4	2.3
Rt GSV, Rt SSV, Rt Perforator vein	4	2.3
Lt GSV, Lt SSV, Lt Perforator	3	1.8
Rt GSV, Lt GSV	3	1.8
Rt GSV, Lt GSV, Rt Perforator vein, Lt Perforator vein	2	1.2
Side of vein involvement		
Right side	49	28.8
Left side	58	34.1
Bilateral	63	37.1

hernia in 4 cases.

The various investigations done among varicose vein patients were Doppler ultrasound examination 120(70.6%), Duplex colour flow imaging 10(5.9%), electro cardio gram 58(34.1%) and plain ultrasound 17(10%).

Limb elevation 50(29.4%) was the most common conservative management practices advised to patients. The commonest antibiotic used for treating secondary infection was Cephalosporins 147(86.5%). Of which Cefotaxime was used in 64(43.5%) and Cefadroxil was used in 56(38.1%) cases. Venoactive drugs like MPFF (Daflon) were used 15(8.8%) cases while non-veno active drugs like Pentoxifylline was used in 13(7.6%) cases and all these cases had venous ulcers. Varicose veins specific surgeries were done in 137(80.6%) cases. Saphenous vein stripping 40(23.5%) was the most common surgical procedure performed among cases (Table 6).

4. Discussion

Major proportion of varicose veins cases in this study and other studies [2,10] were of the age group 41–60 years, while it was 21–40 years in few Indian studies [11,12]. Greater proportion of cases were males, as also observed in other studies probably due to occupationally related risk factors [4,11–13]. Several other studies on the contrary found a female preponderance among cases [1,2,10,14–16].

In this study majority of cases affected were of poor ses groups like manual labourers compared to other studies where it was farmers [2,11] or house wives [16]. These support the observation that occupations involving prolonged standing and violent muscular activity are at high risk for developing varicose veins [11]. These activities result in reflux of blood down the legs thereby increasing pressure on the veins. Tensing and relaxing of the calf muscles repeatedly will help in aiding venous return. Moving from

one leg to another might also help in relieving symptoms [9].

Superficial followed by perforator and deep veins were involved in varicosity in this study. Lees TA et al. reported varicosity involving superficial followed by deep and perforator veins [17]. Superficial veins have thin and fragile walls, are hence commonly involved in varicosity [18]. Large number of cases with PV could also mean high risk of complications as these veins are known to result in more haemorrhage and ulceration than other tributaries [13].

Superficial veins was involved here in 72.4% cases compared to 65.3% [17] and DV were involved in here in 5.9% cases compared to 8.4% [17] in Lees TA et al. study.

Leeds TA et al. also reported isolated superficial vein involvement in 53% cases and isolated DV in 15% which was more than, while isolated PV was reported in 4% cases which was lesser than our observations [17]. Also the commonest vein involved in varicosity namely GSV observed in 58%–90.6% cases in other studies was more than our observations [11,19,20].

Bilateral presentation of varicose veins was seen in 9.4%–26% cases in other studies [2,11,12,21] compared to 37.1% observed in this study.

In this study considering both unilateral and bilateral presentation of varicose veins, left side involvement was seen more frequently. This was similar to other studies where left side involvement ranged from 53.8% to 65% cases [2,11,16,21]. The venous drainage through the pelvis follows a more tortuous course in the left lower limb. This is because the right common iliac artery traverses over the left common iliac vein thus enhancing the risk over the left side [5].

Right sided varicosity (either unilateral or bilateral) was seen in 65.9% cases in this study compared to 46.2%–61.3% in other studies [2,11,16,21].

The most common presenting symptom in varicose veins in this

Table 3
Clinical presentation in varicose veins (n = 170).

Symptoms	Number	Percentage
Ulceration	98	57.6
Pain in the legs	96	56.5
Change in skin colour	91	53.5
Ankle swelling	49	28.8
Itching	34	20.0
Claudication	17	10.0
Swelling of entire lower limbs	10	5.9
Numbness in legs	8	4.7
Induration	7	4.1
Sensation of heavy legs	6	3.5
Signs		
Inguinal swelling	20	11.8
Corona Phlebectasia	6	3.5
Onychomycosis	4	2.3
Lymph node enlargement	4	2.3
Reticular veins	3	1.8
Melanonychia	2	1.2
Complications		
Eczema	46	27.1
Non healing ulcers	21	12.3
Discharge from wound	19	11.2
Cellulitis	16	9.4
Infection of inguinal femoral area	14	8.2
Deep vein thrombosis	10	5.9
Lipodermatosclerosis	9	5.3
Bleeding	7	4.1
Superficial thrombophlebitis	5	2.9
Bullae	1	0.6
Paraesthesia	1	0.6
CEAP classification		
C1 Reticular veins (<4 mm diameter)	3	1.8
C2 Varicose veins (>4 mm diameter)	167	98.2
C3 Edema	34	20
C4 Skin changes		
C4a Hyperpigmentation	91	53.5
C4a Venous eczema	46	27.1
C4b Lipodermatosclerosis	9	5.3
C5 Skin changes with healed ulceration	77	45.3
C6 Skin changes with active ulceration	21	12.3

Table 4
Distribution of risk factors among varicose vein cases (n = 170).

Risk factors	Number	Percentage
Prolonged standing	86	50.6
Alcohol	47	27.6
History of previous surgery at the site ^a	35	20.6
Smoking	33	19.4
Trauma to the site	23	13.5
Recurrence	23	13.5
Prolonged sitting	13	7.6
Chewing tobacco	11	6.5
Family history of varicose veins	6	3.5
Constipation	2	1.2
Other physical activities	2	1.2
Pregnancy	1	0.6
Thermal injury	1	0.6

^a Skin graft 10, Sapheno femoral ligation 14, Varicose vein stripping 8, Surgery for gangrene 3.

study was ulceration in contrast to several studies which reported pain [4,11,16,19]. Pain was the second most frequent complaint in this study reported in 56.5% cases compared to other studies where it was reported between 37.5% and 80% cases [11,12,16,19].

Edema of the limbs was reported in 42.5%–65.5% in varicose veins cases elsewhere [13,16,19] compared to 20% reported in this study. Other symptoms like heaviness of legs 53.5%, cramps 53.0%, lipodermatosclerosis 39.0%, superficial thrombophlebitis 33.5%, cellulitis 12.5% and bleeding 9.1% reported in a study done in

Malaysia was more than our observations [16]. Another study done in Finland reported itching in 26% cases compared to 20% observed in this study [19]. A study done in UK, reticular veins was seen in 18.3% of varicose vein cases which was again more than our observations [13].

However eczema seen in 22% cases in a Malaysian study was lesser than 27.1% reported in this study [16]. Also lipodermatosclerosis reported in 2.5% cases in a study done in UK was lesser than 5.3% reported in this study [13]. These skin conditions are usually complications due to late referral of chronic venous insufficiency and ulceration, making cure difficult [13]. This highlights the importance of early diagnosis and management among high risk patients in the settings. Initiation of appropriate preventive measures needs to be also emphasized.

Itching over the skin was reported in 20% cases in this study. This is a common manifestation in varicose eczema [9]. The region around medial malleolus is the area of great venous hypertension. Such sites where skin changes occur typically should be moisturized periodically to prevent ulcers and infection [9].

In this study complications like wound discharge at site in 11.2%, cellulitis 9.4% and infection of inguino femoral were reported in 8.2% cases. In a study done in Bagalkot, India the commonest complication was wound infection (25%) followed by haematoma (6.25%) [11]. These complications can be avoided by good nursing care and antibiotic support [9].

Under the CEAP classification, proportion of cases in other studies with C1 was 22% [13], with C2 was 31%–51.4% [11,13,15,22], with C3 was 28.6%–51% [11,13,15,22], with C4 was 11.4%–28% [11,13,22], with C5 was 2.9% [11] and with C6 was 17.1% [11] in comparison to ours where more cases were concentrated in C2, C4 and C5. This indicates that skin changes and ulcerations where very frequent among varicose veins cases in the present settings.

As per the Indian guidelines, for management of varicose veins with ulceration, there is no need of surgery but compression alone is recommended [23]. However for varicosities involving ulceration corresponding to CEAP 5 and 6 stage in the present study surgical procedures were done in 46(46.9%) of the total cases in these categories.

Similarly NICE guidelines in UK recommends compression hosiery as first-line treatment for symptomatic varicose veins [8]. In this study out of all the cases with varicose vein ulceration, only in 26(26.5%) cases stocking was used and in 10(10.2%) cases crepe bandages were used.

Proportion of varicose veins cases with history of smoking in this study was 19.4% which was lower than 45.6% reported in an Edinburgh study [13]. Smokers had 1.8 times greater risk in studies done in Finland [1] and France [24]. However the role of tobacco in varicosity is not clearly understood [1].

Proportion of alcoholics was 27.6% observed in this study. The study done in Finland observed a 1.5 times greater risk among regular alcohol users [1]. This could be a result of influence of alcohol on the vascular system but details of which is also unclear [25].

In this study family history of varicose veins was reported only in 3.5% cases compared to other studies [11,12] where it was reported in 12%–25% cases and increased risk has been noticed elsewhere in other studies [1,26]. Genetic etiology on venous function and in varicosity has been established too in genetic studies [27,28].

In this study recurrence of varicose veins was seen in 13.5% cases compared to other studies where it ranged from 3% to 37.3% [2,4,14,15]. The cause of these recurrence could be due to inadequate initial treatment, failure in identifying all incompetent veins or due to neovascularization where varices arise in the pathway of previously stripped veins [29].

Table 5

Association between socio demographic variables with most common symptom, complication and risk factor observed in varicose veins and with recurrence of varicose veins among cases.

Age groups	Eczema present	Eczema absent	Total
21–30	5(19.2)	21(80.8)	26
31–40	5(15.2)	28(84.8)	33
41–50	14(26.4)	39(73.6)	53
51–60	7(23.3)	23(76.7)	30
61–70	10(55.6)	8(44.4)	18
>70	5(50)	5(50)	10
	46	124	170
		$X^2 = 13.5, df = 5, p = 0.019$	
	Recurrence present	Recurrence absent	
21–30	8(30.8)	18(69.2)	26
31–40	5(15.2)	28(84.8)	33
41–50	5(9.4)	48(90.6)	53
51–60	4(13.3)	26(86.7)	30
61–70	1(5.6)	17(94.4)	18
>70	0(0)	10(100.0)	10
	23	147	170
		$X^2 = 11.6, df = 4, p = 0.021$	
Gender	History of prolonged standing present	History of prolonged standing absent	
Males	74(58.3)	53(41.7)	127
Females	12(27.9)	31(72.1)	43
	86	84	170
		$X^2 = 11.8, df = 1, p = 0.001$	
	Ulceration at site of varicosity present	Ulceration at site of varicosity absent	
Males	67(52.8)	60(47.2)	127
Females	31(72.1)	12(27.9)	43
	98	72	170
		$X^2 = 4.92, df = 1, p = 0.027$	
Occupational status	History of prolonged standing present	History of prolonged standing absent	
Unskilled	74(73.3)	27(26.7)	101
Semi-skilled	5(19.2)	21(80.8)	26
Skilled	2(15.4)	11(84.6)	13
House wives	5(31.3)	11(68.7)	16
Teachers	0(0)	14(100)	14
	86	84	170
		$X^2 = 54.2, df = 4, p < 0.001$	
	Ulceration at site of varicosity present	Ulceration at site of varicosity absent	
Unskilled	61(60.4)	40(39.6)	101
Semi-skilled	10(38.5)	16(61.5)	26
Skilled	9(69.2)	4(30.8)	13
House wives	14(87.5)	2(12.5)	16
Teachers	4(28.6)	10(71.4)	14
	98	72	170
		$X^2 = 15.6, df = 4, p = 0.004$	

In a study done in Finland among unilateral recurrent veins, left side were involved in 71% cases which was similar to our findings observed in 75% cases [19].

In this study DVT as a complication of varicose veins was reported in 5.9% case compared to 1.5% [4] and 14.3% [12] reported in other studies. Hotoleanu C et al. found varicose veins as an independent risk factor in venous thrombo embolism (VTE) [30].

The study done in Dehradun, India reported that out of 8 cases with DVT, 4 had left, 3 right and one case had bilateral lower limb involvement [12]. On the contrary, in this study majority of cases with DVT had bilateral vein involvement. The commonest vein involved in DVT in the former study was common femoral vein (55.5%) followed by popliteal and tibial veins in comparison to PV observed here [12].

Other complications in varicose veins like bleeding reported in 3% cases and wound infection in 6% cases in a study done in Pakistan was lesser than our observations [4]. Superficial thrombophlebitis which requires treatment with anti-inflammatory drugs and compression hosiery was present in 2.9% cases in this study [9].

In this study, the commonest investigation used was Doppler ultrasound. However methods like Duplex colour flow imaging was used only in 5.9% cases in comparison to another study done in Bagalkot, India where it was used to confirm diagnosis in all cases

[11]. The ultrasound picture in this method provides information on venous deformities and colour flow shows direction of blood flow thus identifying vein incompetence accurately [31]. Hence these modern methods need to be more popularized in the settings. The duplex can also identify DVT, malformations of venous system and cause of recurrent varicose veins [4,9]. The National Institute for Health and Care Excellence (NICE) guidelines labels duplex ultrasound as assessment of choice to confirm diagnosis, to find extent of truncal reflux, and to plan treatment for primary or recurrent varicose veins [8].

In this study compression stockings was used for management in 21.2% cases. This is because in 72.4% cases superficial veins were involved and in spite of its incompetence the deep veins can remove 90% of the blood [32]. Thus patients with varicose veins but without any medical urgency can cope up with life using such conservative methods [33]. Compression stockings are easy to wear and can be used throughout the day for those in whom prolonged standing is unavoidable during work hours. It brings relief of symptoms and halts further complications of varicose veins [9].

Limb elevation was advised in 29.4% cases in this study. Such protective measures helps to reduce the pressure of blood in the vein by reversing the effect of gravity, prevent them from worsening and relieves associated symptoms [9,32].

MPFF with its anti-inflammatory actions by which it brings

Table 6
Management practices in varicose vein patients (n = 170).

Conservative management	Number	Percentage
Limb elevation	50	29.4
Compression stockings	36	21.2
Crepe bandage	22	12.9
Propped up position	5	2.9
Buergers exercise	2	1.2
Massage	1	0.6
Medical management		
Cephalosporins	147	86.5
Analgesics	91	53.5
Metronidazole	53	31.2
Fluoroquinolones	19	11.2
Micronized Purified Flavonoid Fraction	15	8.8
Pentoxifylline	13	7.6
Penicillins and derivatives	13	7.6
Aminoglycosides	11	6.5
Oral anticoagulants	7	4.1
Sclerotherapy	2	1.2
Others ^a	32	18.8
Surgical procedures		
Saphenous vein stripping	40	23.5
Perforator ligation	35	20.6
Trendelenburg procedure	27	15.9
Saphenofemoral ligation	26	15.3
Saphenous vein ligation and stripping	10	5.9
Skin graft	13	7.6
Others ^b	13	7.6

^a Diazepam 4, Diethyl carbamazine 6, Albendazole 15, Iron supplementation 7.

^b Sub facial ligation 3, Reconstitution 1, Sclerotomy 2, Phlebectomy 3, Stab avulsion 2, Multiple ligation 2.

symptomatic relief in varicose veins was used in few cases. In patients with venous ulceration treated with compression, drugs like MPFF and Pentoxifylline was reported to fasten the healing process [34–36]. In this study nine patients with venous ulceration were treated with MPFF.

Varicose veins specific surgeries was performed in 55.5% cases in a study done in Dehradun, India which was lesser than our observations [12]. Saphenous vein stripping was the most common procedure in this study and also in a Malaysian study, wherein 93.5% cases underwent this procedure [16]. The choice of method used is multifactorial based on anatomy of venous system and type of valve involved. Stripping is usually recommended as only ligation would alter venous hemodynamics resulting in newer sites of reflux [12].

Ligation of the GSV at the sapheno femoral junction is a well-known method of varicose veins surgery with varying outcomes. It was performed in 15.3% cases in this study and in 93.7%–96.5% cases in other studies [11,16]. It is described as a suitable procedure in early stages of varicose veins [14]. However this procedure has risk of recurrences on short-term follow-up [14].

In this study, out of the 23 cases with recurrent varicose veins, sapheno femoral ligation was done in 6 cases, saphenous vein stripping in 3 cases, perforator ligation in 8 cases, trendelenburg procedure in 1 case, sub fascial ligation in 2 cases and was not mentioned in 3 cases.

The combination of high ligation, division and stripping with multiple stab avulsions is described as the gold standard for varicose vein surgery [12,14,37] and also by standard guidelines in India [23]. This was done in 5.9% cases in the present study and in 42.8%–75% in other studies [2,12]. This procedure has the least frequency of recurrence too [4,12].

In a study done in Pakistan [2], 25% of the cases underwent “phlebectomy” technique compared to 3 cases in this study. Trendelenburg procedure which was done in 15.9% cases in this study is supposedly to have most episodes of recurrence [4]. Sub fascial ligation was done in 3 cases in this study compared to 8.6%–10.5%

in other studies [12,16].

Procedures like radiofrequency ablation, endovenous laser treatment and endovenous thermal ablation were not performed in this study. These procedures can be done on outpatient basis, is successful in saphenous veins varicosity for long-term maintenance of vein closure [3], has shorter recovery period with fewer complications [15], an improved QoL and less expenses on the subject [38,39]. Probably the need for specialized equipment prevent surgeons from practicing these procedures [14].

Sclerotherapy was used in management in 2 cases with tortuous dilated sub cutaneous vein in the present study. Previous studies have reported improvement over 80% in spider veins and reticular veins using sclerotherapy [40]. As per the NICE guidelines, veins with truncal reflux are best managed by endothermal ablation and endovenous laser treatment. Only when these procedures are not done then ultrasound guided foam sclerotherapy is done [8].

Compression treatment with stockings further improves treatment of spider veins [41,42]. But these procedures were not done in such presentations in the present study.

The role of sclerotherapy in the treatment of long saphenous vein and incompetent perforating veins has not been established [43] and was also not done in this study.

None of the patients who underwent sclerotherapy had morbidities like diabetes mellitus or superficial/deep vein thrombosis. This was in accordance to standard treatment guidelines followed in India which rules out such procedures in patients with underlying serious systemic illnesses [44].

5. Conclusion

Major proportion of varicose veins was observed among males and unskilled workers probably due to life style factors like prolonged standing during work hours and probably due to habits like smoking and alcoholism. Added to this could be the lack of awareness and understanding of these patients on issues related to occupational risk involved in this condition. A wide range of presentations of varicose veins was noticed in this study which requires varied management decisions. The commonest of which being ulceration and pain which indicates how debilitating this condition is, if there is delay in seeking medical care. Use of compression stocking at work place would be beneficial if prolonged standing is unavoidable during work hours. Modern procedures which offer benefits of shorter recovery period at a lower costs can be considered for the benefit of these daily wage workers. Management of varicose ulcers can be better managed using compression hosiery in this settings. Duplex ultrasound to be popularized here as a mode of diagnosis. The combination of high ligation, division and stripping with multiple stab avulsions also needs to be popularized as the standard for varicose vein surgery in the present settings as recommended by national guidelines.

6. Limitation

This was a hospital record based study and hence results cannot be generalized to the population. Also information on certain risk factors was found missing in few records.

Ethical approval

Kasturba Medical College Ethics Committee dated May 7th 2014.

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None.

Contribution by authors

NJ: guarantor of this research work, concept, design, literature search, manuscript preparation.

AB: data collection, data analysis, statistical analysis, interpretation of data.

MFT: data collection, data analysis, statistical analysis.

UDM: data collection, data analysis, statistical analysis.

AA: data collection, manuscript editing, manuscript review.

IJ: data collection, literature search, manuscript editing.

All authors approved the final version of the manuscript.

Conflict of interest

None.

Trial registry number

None.

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References

- [1] T. Ahti, Risk Factors of Varicose Veins [Dissertation], University of Tampere, Tampere, 2010.
- [2] K. Das, S. Ahmed, S. Abro, M.S. Arain, Varicose veins; outcome of surgical management and recurrences, *Prof. Med. J.* 21 (2014) 509–513.
- [3] J.P. Schoonover, J.T. King, C. Gray, K. Campbell, C. Sherman, 3 alternatives to standard varicose vein treatment, *J. Fam. Pract.* 58 (2009) 522–526.
- [4] Latif A, Farhan MA, Waliullah K, Hamid A. Treatment and Incidence of Recurrence of Varicose Veins of Lower Limb. *Medical Forum Monthly*. Available from: <http://www.medforum.pk/index.php/article-database/9-articles/92-treatment-and-incidence-of-recurrence-of-varicose-veins-of-lower-limb>
- [5] M.J. Callam, Epidemiology of varicose veins, *Br. J. Surg.* 81 (1994) 167–173.
- [6] X. Kurz, D.L. Lamping, S.R. Kahn, U. Baccaglioni, F. Zuccarelli, G. Spreafico, L. Abenheim, Do varicose veins affect quality of life? Results of an international population-based study, *J. Vasc. Surg.* 34 (2001) 641–648.
- [7] I. van Korlaar, C. Vossen, F. Rosendaal, L. Cameron, E. Bovill, A. Kaptein, Quality of life in venous disease, *Thromb. Haemost.* 90 (2003) 27–35.
- [8] Varicose veins, Diagnosis and Management, National Institute of Health and Care Excellence, Manchester, 2013. Available from: <https://www.nice.org.uk/guidance/cg168/resources/varicose-veins-diagnosis-and-management-35109698485957> [Cited 2016 Apr 20].
- [9] L. Allen, Assessment and management of patients with varicose veins, *Nurs. Stand.* 23 (2009) 49–57.
- [10] E.M. Lins, J.W. Barros, F. Appolonio, E.C. Lima, M.B. Junior, E. Anacleto, Epidemiologic profile of patients who underwent varicose vein surgery of the lower limbs, *J. Vasc. Bras.* 11 (2012) 301–304.
- [11] P. Mirji, S. Emmi, C.J. Joshi, Study of clinical features and management of varicose veins of lower limb, *J. Clin. Diagn. Res.* 5 (2011) 1416–1420.
- [12] S. Sahu, S. Bhushan, P. Sachan, Clinico-anatomical and radiological study of varicose veins of lower limb and their management outcomes, *Internet J. Surg.* 28 (2)(2012). Available from: <http://print.ispub.com/api/0/ispub-article/13926>.
- [13] L. Robertson, A.J. Lee, K. Gallagher, S.J. Carmichael, C.J. Evans, B.H. McKinstry, et al., Risk factors for chronic ulceration in patients with varicose veins: a case control study, *J. Vasc. Surg.* 49 (2009) 1490–1498.
- [14] J. Barandiaran, T. Hall, N. El-Barghouti, E. Perry, Day case management of varicose veins, *Vasc. Surg. Princ. Pract.* (2012). Available from: <http://www.intechopen.com/books/vascular-surgery-principles-and-practice/day-case-management-of-varicose-veins> <http://dx.doi.org/10.5772/51935>.
- [15] Tonev AO, Genadiev SG, Dimitrov SG, Zahariev TT, Nachev GK, A retrospective study of 100 patients with varicose veins treated with radiofrequency ablation and stripping, *Phlebology* 20 (3) (2013) 150–154. Available from: <http://www.phlebology.org/a-retrospective-study-of-100-patients-with-varicose-veins-treated-with-radiofrequency-ablation-and-stripping/>.
- [16] N.L. Murlı, I.D. Navin, Classical varicose vein surgery in a diverse ethnic community, *Med. J. Malays.* 63 (2008) 193–198.
- [17] T.A. Lees, D. Lambert, Patterns of venous reflux in limbs with skin changes associated with chronic venous insufficiency, *Br. J. Surg.* 80 (1993) 725–728.
- [18] Blanchemaison P, Camponovo J, Greney P. The saphenofemoral junction - Accessory saphenous veins. Available from: http://www.phlebologia.com/en/saph_access.asp [Cited 2015 Sep 7]
- [19] J. Saarinen, V. Suominen, M. Heikkinen, R. Saaristo, R. Zeitlin, J. Vainio, I. Nordback, J.P. Salenius, The profile of leg symptoms, clinical disability and reflux in legs with previously operated Varicose disease, *Scand. J. Surg.* 94 (2005) 51–55.
- [20] Al-Mulhim, Surgical correction of mainstem reflux in the superficial venous system, *World J. Surg.* 27 (2003) 793–796.
- [21] F.S. Barros, J.M.G. Perez, E. Zandonade, Evaluation of pelvic varicose veins using color Doppler ultrasound: comparison of results obtained with ultrasound of the lower limbs, transvaginal ultrasound and phlebography, *J. Vasc. Bras.* 9 (2010) 15–23.
- [22] S. Ziegler, Chronic venous disease is highly prevalent in hospital employees, *Phlebology* 13 (3) (2006) 150–155. Available from: <http://www.phlebology.org/chronic-venous-disease-is-highly-prevalent-in-hospital-employees/>.
- [23] N. Sarma, Guidelines and recommendation on surgery for venous incompetence and leg ulcer, *Indian Dermatol. Online J.* 5 (2014) 390–395.
- [24] S. Gourgou, F. Dedieu, H. Sancho-Garnier, Lower limb venous insufficiency and tobacco smoking: a case control study, *Am. J. Epidemiol.* 155 (2002) 1007–1015.
- [25] P. Bau, C. Bau, G. Rosito, W. Manfroi, F. Fuchs, Alcohol consumption, cardiovascular health, and endothelial function markers, *Alcohol* 41 (2007) 479–488.
- [26] P.H. Carpentier, Epidemiology and physiopathology of chronic venous leg diseases, *Rev. Prat.* 50 (2000) 1176–1181.
- [27] M. Brinsuk, J. Tank, F.C. Luft, A. Busjahn, J. Jordan, Heritability of venous function in humans, *Arterioscler. Thromb. Vasc. Biol.* 24 (2004) 207–211.
- [28] M.Y.M. Ng, T. Andrew, T.D. Spector, S. Jeffery, Linkage to the FOXC2 region of chromosome 16 for varicose veins in otherwise healthy, unselected sibling pairs, *J. Med. Gen.* 42 (2005) 235–239.
- [29] T. Kostas, C.V. Ioannou, E. Touloupakis, E. Dastalaki, A.D. Giannoukas, D. Tsetis, et al., Recurrent varicose veins after surgery: a new appraisal of a common and complex problem in vascular surgery, *Eur. J. Vasc. Endovasc. Surg.* 27 (2004) 275–282.
- [30] C. Hotoleanu, A. Andercou, Risk factors in venous thromboembolism in hospitalized patients, *Central Eur. J. Med.* 9 (2014) 729–735.
- [31] T.A. Lees, Investigation of venous disease, in: A.H. Davies, T.A. Lees, I.F. Lane (Eds.), *Venous Disease Simplified*, TFM Publishing, Shrewsbury, 2006, pp. 45–58.
- [32] G. Belcaro, A.N. Nicolaidis, G. Stansby, The Venous Clinic: Diagnosis, Prevention, Investigations, Conservative and Medical Treatment, Sclerotherapy and Surgery, Imperial College Press, London, 1998.
- [33] D. Baker, B. Higgs, J. Beard, Surgical management of varicose veins, in: J.D. Beard, S. Murray (Eds.), *Pathways of Care in Vascular Surgery*, TFM Publishing, Shrewsbury, 2002, pp. 255–262.
- [34] M.S. Gohel, A.H. Davies, Pharmacological agents in the treatment of venous disease: an update of the available evidence, *Curr. Vasc. Pharmacol.* 7 (2009) 303–308.
- [35] P.C. Smith, Daflon 500 mg and venous leg ulcer: new results from a meta-analysis, *Angiology* 56 (2005) S33–S39.
- [36] M.T. De Sanctis, G. Belcaro, M.R. Cesarone, E. Ippolito, A.N. Nicolaidis, L. Incandela, et al., Treatment of venous ulcers with pentoxifylline: a 12-month, double-blind, placebo controlled trial. *Microcirculation and healing, Angiology* 53 (2002) S49–S51.
- [37] J. Van den Bremer, F.L. Moll, Historical overview of varicose vein surgery, *Ann. Vasc. Surg.* 24 (2010) 426–432.
- [38] T. Rautio, A. Ohinmaa, J. Perala, et al., Endovenous obliteration versus conventional stripping operation in the treatment of primary varicose veins: a randomized controlled trial with comparison of the costs, *J. Vasc. Surg.* 35 (2002) 958–965.
- [39] R.J. Darwood, N. Theivacumar, D. Dellagrammaticas, et al., Randomized clinical trial comparing endovenous laser ablation with surgery for the treatment of primary great saphenous varicose veins, *Br. J. Surg.* 95 (2008) 294–301.
- [40] E. Rabe, F. Pannier-Fischer, H. Gerlach, F.X. Breu, S. Guggenbichler, M. Zabel, German Society of Phlebology. Guidelines for sclerotherapy of varicose veins (ICD 10: I83.0, I83.1, I83.2, and I83.9), *Dermatol. Surg.* 30 (2004) 687–693.
- [41] M.P. Goldman, How to utilize compression after sclerotherapy, *Dermatol. Surg.* 28 (2002) 860–862.
- [42] P. Nootheti, K.M. Cadag, A. Magpantay, M.P. Goldman, Efficacy of graduated compression stockings for an additional 3 weeks after sclerotherapy treatment of reticular and telangiectatic leg veins, *Dermatol. Surg.* 35 (2009) 53–58.
- [43] P. Kern, A.A. Ramelet, R. Wutschert, H. Bouname, D. Hayoz, Singleblind, randomized study comparing chromated glycerin, polidocanol solution, and polidocanol foam for treatment of telangiectatic leg veins, *Dermatol. Surg.* 30 (2004) 367–372.
- [44] N. Khunger, S. Sacchidanand, Standard guidelines for care: sclerotherapy in dermatology, *Indian J. Dermatol. Venereol. Leprol.* 77 (2011) 222–231.