Clinco-Anatomical And Radiological Study Of Varicose Veins Of Lower Limb And Their Management Outcomes

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Abstract

Twenty percent of varicose vein surgery worldwide including India is done for recurrent disease, which frequently is due to technically inadequate or inappropriate treatment most often based on incomplete knowledge of this fascinating yet troublesome disease. Aim of the study: To study the clinical presentations and venous Doppler findings of varicose veins of legs and study the outcome of conservative and surgical measures. Material and methods: This prospective study was carried out over a period of 12 months in the Department of General Surgery at Himalayan Institute of Medical Sciences, Dehradun, where all patients with varicose veins of the lower limb were included. The clinico-etiological and radiological assessments of the varicose vein were classified under the Clinico-Etiological-Anatomical-Pathological classification (CEAP Classification). Management was done either by conservative or surgical measures depending upon the evaluation of the patient. Results: Patients with CEAP Class 4 or more will invariably be symptomatic and even if the saphenofemoral or saphenopopliteal junctions are competent they should undergo surgical treatment specially to avoid any future ulceration.

INTRODUCTION

Varicose veins by definition are a combination of permanently elongated and dilated veins whose path has become tortuous, inducing pathological circulation and are a common complaint in the lower limb that can take many forms, ranging from a non-pathologic condition to an invalidating chronic disorder. Up to 20% of varicose vein surgery worldwide is done for recurrent disease, which frequently is due to technically inadequate or inappropriate treatment most often based on incomplete knowledge of this fascinating yet troublesome disease. Currently, the best way of assessing is by routine ultrasound investigations. The approach to varicose vein has changed due to recent awareness of cosmetic considerations and the way they can affect quality of life, as well as the development of new treatments (i.e. echo-guided sclerotherapy, foam sclerotherapy, endovascular obliteration) and ambulatory care practices.1,2

AIM OF THE STUDY

The aim of the study was to study the clinical presentations of varicose veins, correlate the clinical presentation with venous Doppler findings and study the outcome of both conservative and surgical measures.

MATERIAL AND METHODS

This prospective study was carried out over a period of 12 months from September 2010 to August 2011 in the Department of General Surgery at the Himalayan Institute of Medical Sciences, Dehradun, India. All patients with varicose veins of the lower limb presenting were included in the study and assessed by etiological and clinical examination. Diagnosis was confirmed by Venous Doppler study. Based upon the clinico-etiological and radiological assessment the varicose veins were classified under the Clinico-Etiological-Anatomical-Pathological classification (CEAP Classification).3

Classification of Chronic Lower Extremity Venous Disease (49)
Clinical Classification (C, A, P)

Any limb with possible chronic venous disease is first placed into one of seven clinical classes (C0-C6) according to the objective signs of disease.

Clinical Classification of Chronic Lower Extremity Venous Disease

Class 0: No visible or palpable signs of venous disease
Class 1: Telangiectasia, varicose veins, malarial flare
Class 2: Venous reflux
Class 3: Edema without skin changes
Class 4: Skin changes associated to venous disease (e.g., pigmentation, venous stigma, lipodermatosclerosis)
Class 5: Skin changes as defined above with healed ulceration
Class 6: Skin changes as defined above with active ulceration

Any limb with possible chronic venous disease is first placed into one of seven clinical classes (C0-C6) according to the objective signs of disease.

Etiologic Classification (E, A, S or E2)

Venous refluxation may be congenital, primary, or secondary. These suspects are usually exclusive. Congenital venous disorders are present at birth but may not be recognized until later. The method of diagnosis of congenital abnormalities must be described. Primary venous refluxation is defined as venous refluxation of unknown cause of one of congenital origin. Secondary venous refluxation occurs as an acquired condition resulting in chronic venous disease, for example, deep vein thrombosis. The etiology classification (E2, E1, or E0) is based on the presence or absence of deep vein thrombosis.

Etiologic Classification of Chronic Lower Extremity Venous Disease

Congenital (E0): Congenital venous disorder present since birth
Primary (E1): Chronic venous disease of undetermined cause
Secondary (E2): Chronic venous disease with an associated known cause (post-thrombotic, post-traumatic, obstetric)

Anatomic Classification (A0, A1, or A2)

The anatomic site of the venous disease should be described as superficial (A0), deep (A1), or perforating (A2) veins.

One, two, or three systems may be involved in any combination. For reports requiring greater detail, the two systems of the superficial, deep, and perforating veins may be localized by use of the anatomic segments.

Segmental Localization of Chronic Lower Extremity Venous Disease

SEGMENT (NO VEINS)

SUPERFICIAL VEINS (A0/A)

1. Telangiectasia/varicose veins
2. Greater (long) saphenous vein
3. Lesser (short) saphenous vein
4. Nonsaphenous

DEEP VEINS (A2/A)

5. Inferior vena cava
6. ILIAC
7. Common
8. External
9. Internal
10. Pollic; gracilis; saphenous veins

PERFORATING (A1/A)

11. Common
12. Deep
13. Superficial
14. Perforating
15. Tibial (anterior, posterior, or saphenous)
16. Muscular (perforating, saphenous, etc.)

SUMMARY (N/A)

Performing Veins (AP/A)

17. Thigh
18. Calf

Pathophysiologic Classification (P, A, C)

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Management was done either by conservative or surgical measures depending upon the evaluation of the patient. Patients were followed up for up to one year.

**OBSERVATION**

A total of 50 patients of varicose veins of the lower limb were included in the study. In patients who presented with bilateral disease each lower limb was evaluated separately as each limb had its unique presentation. Hence in 50 patients, 63 lower limb presentations were studied.

Seventy-eight percent of the patients were male and 22% were female. The commonest age group presenting with varicose veins was 31-40 years (30%) and the least common 71-80 years (2%). It was seen that unilateral presentation (74%) was more common than bilateral presentation (26%). Including both unilateral and bilateral cases, a total of 57% cases had left lower limb involvement and 43% had right lower limb involvement.

In the study the commonest clinical presentation was with the complaint of dilated, tortuous swellings/varicose veins in the lower limb which was present in all the cases. (FIG. 1) Including both unilateral and bilateral cases, a total of 57% cases had left lower limb involvement and 43% had right lower limb involvement.

**Figure 2**

53.9% of patients presented with dull aching pain which was followed by the complaint of non-healing ulcer (28.5%). The least common symptom was that of night cramps (11.1%). Nine out of 63 varicose venous legs had an underlying deep vein thrombosis (DVT) amongst which 4 had left lower limb, 3 had right side and one case had bilateral involvement. (FIG. 2)

**Figure 3**

The commonest deep venous thrombosis was that of the common femoral vein (55.5%). In our study there were 7 patients who had had 3 or more pregnancies which revealed an incidence of 63.63% in the total of 11 female patients. None of the patients gave any history of oral contraceptive pill intake. Only 6 patients out of 50 had a positive family history of varicose veins in first blood relations (12%). In the study it was seen that the majority who developed varicose veins had history of long standing hours. Occupations like barber, security guard, labourer, carpenter, tailor, cook and housewife were all present in the study group. Twenty-seven out of 50 patients stood in their jobs for more than 8 hours (54%) and 12% more than 6 hours but less than 8 hours. (FIG. 3)
In the study of 27 lower limbs, 25 patients out of 50 presented with Class 2 of clinical severity which comprised 50% of the study group. Ten patients of Class 2 were asymptomatic whereas 17 patients were symptomatic. The second commonest grade of severity was Class 6 which had 18 patients at the time of presentation (36%). The least common presentation was Class 3 with only 1 patient (2%). No patient presented with Class 0 and Class 1 grade as the presenting feature. (Table 1)

Ninety percent of patients had primary etiology. Only 5 patients had underlying demonstrable deep vein thrombosis hence came under secondary etiology which was only 10%. None of the patients could be labeled under congenital etiology. In the superficial veins, 15 lower limbs had above knee Great Saphenous Vein (GSV) involvement (23.8%) and 52 lower limbs had below knee GSV presentation (80.9%). The Short Saphenous Vein (SSV) was involved in 4 cases which comprised 7.9%. There were 9 cases with both above knee and below knee GSV involvement. (Table 2)

On Venous Doppler studies the most common deep venous involvement was that of common femoral vein which was seen in 6 cases (9.5%) followed by 3 cases each of popliteal and tibial veins. (Table 3)

Below knee perforators (Ap18) were more commonly involved (97.05%) than above knee perforators (Ap17) (only 11.7%). Out of 63 cases, 37 had saphenofemoral junction (SFJ) incompetence and 11 had saphenopopliteal junction (SPJ) incompetence (58.7% and 11%, respectively). (FIG. 4) (FIG. 5)
In the study, 52 (82.5%) cases out of 63 represented reflux as the pathophysiology. Obstruction as the underlying cause was demonstrated in 16% of cases. Only 1 case represented both reflux and obstruction. (FIG. 6)

In the study a total number of 11 cases had SPJ incompetence out of which 6 cases were of class 2 (22.2%), 4 cases were of class 6 (22.2%) and 1 case was of class 4 (8.3%). (Table 4)

It was observed that out of 27 cases of class 2, 15 cases had SFJ incompetence (55.5%). Similarly, out of 18 cases of class 6, 9 cases had SFJ incompetence which again came out to be a percentage of 50 %. In class 4 there were 6 cases out of 12 showing SFJ incompetence (50%). Class 3 & 5 showed 100% SFJ incompetence. Hence it was noted that all cases of presentation had 50% or more established diagnosis of SFJ incompetence. (Fig. 7)

In the present study that 5 patients with leg ulcers out of 18 had SFJ incompetence and 4 had SPJ incompetence. Perforator incompetence was found in the maximum number, 12 out of 18 cases (66%), and deep venous insufficiency in 6 legs (33.3%).

Table 4: Correlation of clinical grades with SPJ incompetence (Doppler Study)

<table>
<thead>
<tr>
<th>Class</th>
<th>Total number of Legs Studied</th>
<th>SFJ Incompetence</th>
<th>Percentage of Incompetence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Class 2</td>
<td>27</td>
<td>6</td>
<td>22.2%</td>
</tr>
<tr>
<td>Class 3</td>
<td>1</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Class 4</td>
<td>12</td>
<td>1</td>
<td>8.3%</td>
</tr>
<tr>
<td>Class 5</td>
<td>5</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Class 6</td>
<td>18</td>
<td>4</td>
<td>22.2%</td>
</tr>
</tbody>
</table>
In the study out of 63 lower limb presentations, 28 were given conservative management (44.4%) and 35 underwent surgical treatment (55.5%). In the study all the cases of post-thrombotic varicose veins were given conservative treatment. All were relieved of symptoms (100%). Next were asymptomatic patients, they were 8 in number, they all were given conservative treatment, though 6 out of these had SFJ incompetence, 5 out of these 6 patients were satisfied by the treatment given and disease did not progress in one-year follow-up. Two patients who were symptomatic and given conservative trial due to Class 2 grade of disease (though SFJ incompetent) both had no relief. (Table 6)

In the above study there were 3 asymptomatic patients (4 legs) who opted for surgery. There were 26 legs that were symptomatic with SFJ/SPJ incompetence and underwent surgery. There were 5 cases left in the symptomatic group which had competent saphenofemoral or saphenopopliteal junctions but 4 out of them were of advanced chronic venous insufficiency (Class C4 and above) hence were operated. The one patient left was Class C2 but he opted for surgery. Fifteen cases (legs) underwent SFJ flush ligation with GSV stripping. Six patients had SFJ flush ligation with perforator ligation. Five patients were subjected to SFJ flush ligation with multiple stab avulsions of leg varicosities. (Table 7)

### DISCUSSION

Varicose veins (VVs) of the lower limbs are a common complaint that can take many forms, ranging from a non-pathologic condition to an invalidating chronic disorder.

The prevalence of varicose veins reported in several studies seems to vary widely, from 2 to 56 per cent in men and from less than 1 to 73 per cent in women. In our study it was observed that a higher percentage of men presented than women. Most studies show that varicose veins are more common in women than men. In our study it was seen that the middle age group were in majority and the commonest age group presenting with varicose veins was 31-40 years (30%). The Edinburgh Vein Study also reported an increase of prevalence with age: 11.5 and 55.7 per cent in those aged 18-24 and 55-64 years, respectively.4,5

In our study the commonest complaint which brought all the 50 patients to the hospital was the complaint of dilated, tortuous swellings over the lower limb with the commonest symptom being dull aching pain (53.9%). The Edinburgh Vein Study described aching/heaviness as the commonest symptom in women and itching as the commonest symptom in men. Carpentier et al., in their study, concluded that pregnancy is a risk factor for the development of varicose veins. During pregnancy, weight gain from increased total body fluid and raised intra-abdominal pressure may predispose a woman to varicose vein formation. Furthermore, upregulation of certain hormones, such as relaxin, oestrogen and progesterone, causes venous relaxation and increases vein capacitance. In this study it
was observed that, out of 11 females, there were 7 patients with 3 or more pregnancies which comprised 63.63%. It was also observed that the majority who developed varicose veins had history of long standing hours. London and Nash, in their paper, mentioned occupations requiring long standing as a risk factor for developing varicose veins.5-8

The rapid development and massive usage of duplex sonography of the lower extremity veins, together with the introduction of the clinical, aetiological, anatomical and pathological (CEAP) classification, bring the requirements of improvement of the anatomical knowledge of lower extremity vein nomenclature. In our study, 25 patients out of 50 presented with class 2 of clinical severity which comprised 50% of the study group. The second commonest grade of severity was class 6 with 18 patients at the time of presentation (36%). Third in line was the group which presented with skin changes ascribed to venous disease like pigmentation, venous eczema or lipodermatosclerosis, i.e. Class 4 with 11 patients (22% of the total patients). This is in contrast to western countries where significant numbers of patients come for cosmetic reasons.9

In our study, 90% of patients were under primary etiology. In the superficial veins, 15 lower limbs had above-knee Great Saphenous Vein (GSV) involvement (23.8%) and 52 lower limbs had below-knee GSV presentation (80.9%). The SSV was involved in 4 cases which comprised 7.9%. There were 9 cases with both above-knee and below-knee GSV involvement.

Moore et al., in their paper, brought into light that studies suggested that femoral veins contain between one and six valves; and popliteal veins contain between zero and four valves. Deep vein valves were consistently located in the common femoral vein (within 5cm of the inguinal ligament), the femoral vein (within 3cm of the deep femoral vein tributary) and in the popliteal vein near the adductor hiatus. Valves are consistently located at specific locations in the deep veins of the leg, although there is often significant variability between subjects. This could explain why some deep veins are more commonly involved than others. In our study it was observed that the most common involvement was that of the common femoral vein which was seen in 6 cases (9.5%) of total cases, followed by popliteal and tibial veins, with 3 cases each.10

In our study, amongst 63 cases, 34 cases had perforator incompetency, out of which only 1 case had purely above-knee incompetent perforator. The below-knee perforators were more commonly involved (97.05%) than above-knee perforators (only 11.7%). Further 37 patients had SFJ incompetence and 11 had SPJ incompetence (58.7% and 11%, respectively). Linton attributed a key role to ‘communicating’ veins in the mechanism of venous ulceration, an idea embraced later by Cockett, Dodd and several other investigators. The rationale of surgical interruption of perforating veins was to prevent transmission of elevated venous pressure from the deep to superficial venous system during ambulation and thereby promote healing. Mercer and group, in their study, detected reflux at the SFJ in 59 legs (66 per cent) and at the SPJ in 26 (29 per cent) by duplex imaging (89 legs).11,12

It was observed in the present study that 5 leg ulcers out of 18 had SFJ incompetence and 4 had SPJ incompetence (total 50%). The perforator incompetence accounted for the maximum number, 12 out of 18 cases (66%), and deep venous insufficiency was found in 6 legs (33.3%). Weiss, in his work, mentioned that most venous ulcers are caused by venous reflux that is purely or largely confined to the superficial venous system. Only a minority are caused by chronic DVT or by valvular insufficiency in the deep veins.13

In our study, the treatment modality was divided into conservative management and surgery. A randomized trial comparing surgery and conservative treatment for severe varicose veins by Michaels et al. showed that surgical treatment produced better results than conservative measures in terms of health-related quality of life, symptomatic relief, anatomical extent and patient satisfaction. Stalder et al. recommend that in a symptomatic varicose vein, if the duplex scan shows any incompetence along the long or small saphenous vein and if there are no contraindications for surgery, operative treatment should be done. Kompally et al., in their clinical study, operated according to the CEAP classification; class 2 and 3 patients with clinically and Doppler-detected reflux underwent surgical treatment. All patients of Class 4, 5 and 6 needed surgical treatment.9,14,15

In the present study there was one patient who had recurrence in subfascial perforator ligation and underwent stripping after 10 months. One patient had SPJ ligation along with SFJ flush ligation with GSV stripping in the same leg. After one year, recurrence was seen in the short saphenous system. This indicates the efficacy of stripping. In all the cases which underwent SFJ flush ligation with GSV stripping, no recurrence was seen. In cases of SFJ flush
ligation with perforator ligation, there was one case of recurrence which later underwent injection sclerotherapy. Also in SFJ flush ligation with multiple stab avulsions of leg varicosities, one case showed recurrence. Hence ideal surgery was SFJ flush ligation with GSV stripping. Van den Bremer et al., in their study in 2010, concluded that at present, the gold standard treatment of varicose veins still is surgical ligation and stripping of the insufficient vein. Recurrence could be attributed to neovascularization also. Despite this, there could be altered venous hemodynamics with new sites of reflux, hence it is better to strip the vein. Bhutia and coworkers, in their study, mentioned that a variety of treatment methods were available for those who develop symptoms or complications. The traditional open surgical treatment still formed the mainstay of treatment.16,17

CONCLUSION
Varicose veins are a combination of permanently elongated and dilated veins whose path has become tortuous, inducing pathological circulation with a wide spectrum of presentation ranging from telangiectasia to lipodermatosclerosis and active ulceration. The C-E-A-P classification is a recent scoring system that stratifies venous disease based on clinical presentation, etiology, anatomy, and pathophysiology. This classification scheme is useful in helping to thoughtfully assess a limb afflicted with venous insufficiency and then arrive at an appropriate treatment plan. Patients with CEAP Class 4 or more will invariably be symptomatic and even if SFJ/SPJ are competent they should undergo surgical treatment specially to avoid any future ulceration.

References
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