

Research Article

Colour Doppler evaluation of varicose veins

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ABSTRACT

Background: Varicose veins are irreversibly dilated epifascial and perforating veins resulting from degenerative vascular wall changes, Depending on the aetiology, they are classified into Primary & Secondary forms. In the present clinical prospective studies, we evaluated the impact of ultrasound examinations on the pre-operative diagnosis of varicose veins and feasibility & efficacy of ultrasound.

Methods: The current prospective study was conducted in the department of general surgery, Pt. J.N.M. College and associated Dr. BRAM Hospital Raipur, during a period from 1st August 2006 to 15th Nov 2007. Detail history was taken from patient as appropriate. A thorough clinical examination was done. The patients were then subjected to the series of investigations. The routine investigations were performed. Then all the patients were submitted for colour Doppler study. Other clinical diagnostic tests were also done. Other relevant examinations were also performed. The patients were then submitted for colour Doppler examination of lower limb with the help of Department of radiology. The groin and both lower limb scanned for seeking the common femoral, superficial femoral, popliteal, short saphenous, peroneal, anterior and posterior tibial veins. Any reflux at saphenous-femoral junction, dilatation and tortuosity as veining, reversal of flow, to locate the incompetent perforators.

Results: The study included patients from 10-70 years of age group. The incidence was maximum (48%) in 31-50 yrs of age group. Sex wise distribution was nearly M: F- 5.25: 1. In our study, male appear to be more prone for the development of varicosity (84%). In our study it was found that maximum incidence noted in low socioeconomic status was 56%, second most common incidence noted in middle socioeconomic status (40%). Out of 25 patients one patient had associated thrombosis. In our study varicose vein was associated with anaemia 32%. Out of 25 patients, two patients received surgical management and 23 were managed conservatively.

Conclusions: Duplex ultrasound scanning is non-invasive, early, safe and sensitive investigation of choice.

Keywords: Varicose veins, Colour Doppler, Perforator

INTRODUCTION

Varicose veins are irreversibly dilated epifascial and perforating veins resulting from degenerative vascular wall changes, Depending on the aetiology, they are classified into Primary & Secondary forms.^{1,2}

The majority of the primary varicosities (75%) are hereditary. A clinical differentiation is made between varicosities of major vessels side branch varicosities of the perforating veins, reticular and cutaneous vessel

varicosities, with mixed forms also being known. Inspection and palpation are of predominant importance for the diagnosis, while Doppler & duplex Ultrasonography serves mainly to document valvular incompetence.

The use of improved imaging such as high-resolution ultrasound is likely to significantly improve our understanding of venous valve function and pathology and revolutionized the concept of management of varicose veins.^{3,4}

Duplex is non-invasive, but can be combined with invasive treatment such as injection of drugs or insertion of catheters. As veins vary in diameter depending on the posture of the body, temperature and sympathetic tone etc., it is important that the examination is performed according to a standardized protocol, especially so as it is examiner dependent and has a long learning curve. Thus such a scan produces a detailed road map of superficial and deep veins in the leg and can be an invaluable aid in the planning of more complex varicose vein surgery.

Within the National Health Care System the most common indications for treatment of varicose veins (VV) are relief of symptoms and the prevention or cure for venous ulcers and skin changes. There is considerable variation in practice as even the benefit of surgery for ulcer patients has been questioned. However, in a recent randomized study, superficial venous surgery (SS) and compression was more effective in preventing recurrence of venous ulcers than compression alone. Concerning symptomatic patients without skin changes there are at present no general recommendations concerning who will benefit from surgery.

When treatment of varicose veins (VV) is considered, there are two targets, the cosmetic appearance and the venous hypertension. For treatment of minor varicosities of cosmetic concern sclerotherapy and/or surgery is employed, and for telangiectases and reticular veins also laser therapy.

The mainstay for relief of the venous hypertension is compression with stockings or bandages, by which the diameter of the veins and thus the volume of blood within them are reduced and the outflow of venous blood from the leg is improved. Compression therapy is effective in alleviating symptoms and in healing of venous ulcers. Treatment is determined by the findings, symptoms and the individual situation and comprises in addition to such general measures as activity, hot/ cold foot bath, obliteration and surgery a conservative alternative is rigorously applied Compression treatment, which is also the most important concomitant measure to sclerotherapy and surgical operation.⁴⁻⁸

Ultrasonic image depends on the frequency of penetrancy of the waves. Particularly colour Doppler functions on the B-mode means brightness modulation show bright dots along the base line of cathode oscilloscope. In the present clinical prospective studies, we evaluated the impact of ultrasound examinations on the pre-operative diagnosis of varicose veins and feasibility & efficacy of ultrasound.

METHODS

The current prospective study was conducted in the department of general surgery, Pt. J.N.M. College and associated Dr. BRAM Hospital Raipur, during a period from 1st august 2006 to 15th November 2007.

It included patients from the department of general surgery who were seen as a case of varicose vein.

Patient selection criteria

1. All the patients presented with clinically significant dilated veins over lower limb.
2. Patients with dilated, painful or tortuous vein in all age groups.

Detail history was taken from patient as appropriate. A thorough clinical examination was done. The patients were then subjected to the series of investigations. The routine investigations included- Haemoglobin (Hb), TLC, DLC, Blood sugar, urea, BT, CT, PT, LFT, RFT and examination of urine.

Then all the patients were submitted for colour Doppler study. Other diagnostic tests like Brodies Tredelenberg’s test, Multiple tourniquet test, Schwartz’s test, Fegan’s Test, Pratt’s test, Modified Perthe’s test, Homan’s test, Moses test were done. Other relevant examinations were also performed.

The patients were then submitted for colour Doppler examination of lower limb with the help of Department of radiology. The groin and both lower limb scanned for seeking the common femoral, superficial femoral, popliteal, short saphenous, peroneal, anterior and posterior tibial veins. Any reflux at saphenous-femoral junction, dilatation and tortuosity as veining, reversal of flow, to locate the incompetent perforators. Appropriate management was done. Data was compiled in MS-Excel and checked for its completeness and correctness. Then it was analyzed.

RESULTS

The study included patients from 10-70 years of age group. The incidence was maximum (48%) in 31-50 yrs of age group (Table 1).

Table 1: Age wise distribution of patients.

| Age in yrs | No. of patients | Percentage |
|------------|-----------------|------------|
| 10-20 | 1 | 4 |
| 21-30 | 5 | 20 |
| 31-40 | 6 | 24 |
| 41-50 | 6 | 24 |
| 51-60 | 3 | 12 |
| 61-70 | 4 | 16 |
| Total | 25 | 100 |

Sex wise distribution was nearly M: F- 5.25: 1. In our study, male appear to be more prone for the development of varicosity (84%) (Table 2).

Table 2: Sex wise distribution of patients.

| | No. of patients | Percentage |
|--------|-----------------|------------|
| Male | 21 | 84 |
| Female | 4 | 16 |
| Total | 25 | 100 |

Patients were of different occupation, the most common risk factor was occupation involving prolonged standing. 20% patients were labour, 12% patients were paanthela owner, and 12% patients were house wife (Table 3).

Table 3: Distribution of varicose veins in different occupations.

| Occupation | No. of patients | Percentage |
|----------------------|-----------------|------------|
| Police | 1 | 4 |
| Bus driver/conductor | 2 | 8 |
| Students | 1 | 4 |
| House wife | 3 | 12 |
| Rikshaw Puller | 1 | 4 |
| Labourers | 5 | 20 |
| Panthela owner | 3 | 12 |
| Staff nurse | 1 | 4 |
| Doctor | 1 | 4 |
| Tailor | 1 | 4 |
| Farmer | 1 | 5 |
| Others | 5 | 20 |

In our study it was found that maximum incidence noted in low socioeconomic status was 56%, second most common incidence noted in middle socioeconomic status (40%) (Table 4).

Table 4: Distribution of varicose vein in different socioeconomic.

| Socioeconomic | No. of patients | Percentage |
|---------------|-----------------|------------|
| Low | 14 | 56 |
| Middle | 10 | 40 |
| Higher | 1 | 4 |
| Total | 25 | 100 |

In our study varicosity were more common in left lower limb (52%) (Table 5).

Table 5: Involvement of limb in varicose veins.

| Limbs | No. of cases | Percentage |
|---------------------|--------------|------------|
| Lt lower limb | 13 | 52 |
| Rt. lower limb | 7 | 28 |
| Rt. + Lt lower limb | 5 | 20 |
| Total | 25 | 100 |

In our study all the patients presented with dilated veins (100%) and second most common symptom was swelling (96%). Pain noticed in 80% of patients (Table 6).

Table 6: Most common symptoms of varicose veins.

| Symptoms | No. of patients | Percentage |
|---------------|-----------------|------------|
| Pain | 20 | 80 |
| Swelling | 24 | 96 |
| Dilated veins | 25 | 100 |
| Venous ulcer | 7 | 28 |
| Eczema | 4 | 16 |
| Pigmentation | 4 | 16 |

Out of 25 patients, 13 patient shows the complications of varicose vein in which venous ulcer (38.47%) are most common. Eczema noted in 30.77% of patients, pigmentation alone was noted in 15.38% and in 15.38% patient's pigmentation and ulcer was combined together (Table 7).

Table 7: Complications of varicose veins.

| Complications | No. of patients | Percentage |
|-------------------------------------|-----------------|------------|
| Venous ulcer | 5 | 38.47 |
| Eczema | 4 | 30.77 |
| Pigmentation | 2 | 15.38 |
| Skin pigmentation with venous ulcer | 2 | 15.38 |
| Total | 13 | 100 |

Most commonly involved venous system was long saphenous vein (76%). Both saphenous veins were involved in two cases (8%) and only one isolated perforator incompetence noticed clinically in one patient having (4%) (Table 8).

Table 8: Venous system involvement in clinical examination.

| System involved | No. of cases | Percentage |
|----------------------|--------------|------------|
| Long saphenous vein | 19 | 76 |
| Short saphenous vein | 3 | 12 |
| Both | 2 | 8 |
| Isolated perforator | 1 | 4 |

Out of 25 patients one patient had associated thrombosis (Table 9).

Table 9: Association of DVT in varicose veins.

| DVT | | No DVT | |
|--------------|------------|--------------|------------|
| No. of cases | Percentage | No. of cases | Percentage |
| 1 | 4 | 24 | 96 |

Out of 25 patients, 5 patients presented with involvement of both lower limbs. So that total 30 limbs involved with varicosity is studied under this head. Most common site of incompetence was of saphenofemoral valve 40% out of 25 patients, 16.66% patients presented with involvement of both saphenofemoral incompetence with perforator incompetence. One patient was having

saphenopopliteal incompetence along with perforator incompetence and DVT. Isolated perforator incompetence found clinically in two cases (Table 10).

Table 10: Sites of incompetence in clinical examination in 30 limb of 25 cases.

| Site of incompetence | No. of involved cases | Percentage |
|--|-----------------------|------------|
| Saphenofemoral | 12 | 40 |
| Saphenofemoral + perforator | 5 | 16.66 |
| Saphenopopliteal | 2 | 6.66 |
| Saphenopopliteal + perforator | 4 | 13.323 |
| Saphenopopliteal + perforator + DVT | 1 | 3.33 |
| Perforator | 2 | 6.66 |
| Saphenofemoral + saphenopopliteal + perforator | 2 | 6.66 |
| Saphenofemoral + saphenopopliteal | 2 | 6.66 |
| Total | 30 | 100 |

In our study 14 patient shows perforator incompetence out of which 8 patients (57.16%) were having leg perforator incompetence and thigh perforator incompetence and ankle perforator incompetence noticed in 21.4% patients (Table 11).

Table 11: Involvement of different perforators in varicose veins in clinical.

| Perforator | No. of limbs | Percentage |
|------------------|--------------|------------|
| Leg perforator | 8 | 57.16 |
| Thigh perforator | 3 | 21.42 |
| Ankle perforator | 3 | 21.42 |
| Total | 14 | 100 |

In our study only one patient had history of taking oral contraceptive pill (Table 12).

Table 12: Association with oral contraceptive pill.

| No. of involved cases | % | No. of cases not involved | % |
|-----------------------|---|---------------------------|----|
| 1 | 4 | 24 | 96 |

In our study varicose vein was associated with anaemia 32% (Table 13).

In our study, it was found that No patients had associated coagulation disorder (Table 14).

All patients of varicose vein had not associated with diabetes mellitus (Table 15).

Table 13: Varicose vein associated with anaemia.

| Haemoglobin | No. of cases | Percentage |
|-------------|--------------|------------|
| <11gm/dl | 8 | 32 |
| >11gm/dl | 17 | 68 |
| Total | 25 | 100 |

Table 14: Varicose vein associated with coagulation disorder.

| Coagulation disorder | No. of cases | Percentage |
|-----------------------------------|--------------|------------|
| BT, CT & PT within normal range | 25 | 100 |
| BT, CT & PT within abnormal range | 0 | 0 |
| Total | 25 | 100 |

Table 15: Varicose vein associated with diabetes mellitus.

| Patient | No. of cases | Percentage |
|---------------------------------------|--------------|------------|
| Not associated with diabetes mellitus | 25 | 100 |
| Associated with diabetes mellitus | 0 | 0 |
| Total | 25 | 100 |

30 limbs of 25 patients having varicose vein examined clinically to detect the site of incompetence. These patients were also submitted for colour Doppler study. Maximum incidence notes was Saphenofemoral incompetence in 12 patients (40%), second most common incidence noted was Saphenofemoral incompetence with perforator incompetence, in 5 patients (16.66%).

In 4 patients (13.33%) Saphenofemoral and saphenopopliteal incompetence detected out of which in 2 patients perforator incompetence detected clinically, but when all 4 patients submitted for colour Doppler study, perforator incompetence were detected in all 4 patients along with Saphenofemoral valve and saphenopopliteal incompetence.

One patient (3.33%) was having saphenopopliteal incompetence along with perforator incompetence and DVT, which was detected clinically and same was confirmed by colour Doppler study.

2 patients (6.66%) were having varicosity because of perforator incompetence which was confirmed by colour Doppler study and in these patients on colour Doppler study no other cause for varicosities were detected apart from perforator incompetence.

All patients were submitted for colour Doppler study and all above mentioned sites of incompetence were also detected in (46.46%) colour Doppler study, except the 2 perforators I incompetence in association with Saphenofemoral and saphenopopliteal incompetence

which was not detected clinically which was detected by colour Doppler study (53.29%) (Table 16).

Out of 25 patients, two patients received surgical management and 23 were managed conservatively (Table 17).

Table 16: Sites of incompetence in clinical examination with color Doppler study.

| Site of incompetence | Clinical Examination in involved limbs | | | | | Colour Doppler study | | | | |
|--|--|--------------------------|-------|--------------------------------|-------|--------------------------|-------|--------------------------------|-------|--|
| | No. of limb | No. SFV/SPV incompetence | % | No. of perforator incompetence | % | No. SFV/SPV incompetence | % | No. of perforator incompetence | % | |
| Saphenofemoral | 12 | 12 | 40 | - | 0 | 12 | 40 | - | 0 | |
| Saphenofemoral + perforator | 5 | 5 | 16.66 | 5 | 16.66 | 5 | 16.66 | 5 | 16.66 | |
| Saphenopopliteal | 2 | 2 | 6.66 | - | 0 | 2 | 6.66 | - | 0 | |
| Saphenopopliteal + perforator | 4 | 4 | | 4 | | 4 | | 4 | | |
| Saphenopopliteal + perforator + DVT | 1 | 1 | | 1 | | 1 | | 1 | | |
| Perforator | 2 | - | 0 | 2 | 6.66 | - | 0 | 2 | 6.66 | |
| Saphenofemoral + saphenopopliteal + perforator | 4 | 4 | 13.32 | 2 | 6.66 | 4 | 13.32 | 4 | 13.32 | |
| Saphenofemoral + saphenopopliteal | 30 | | | | | | | | | |

Table 17: Management of the cases.

| Management | No. of Cases | % |
|--------------|--------------|-----|
| Conservative | 23 | 96 |
| Surgical | 2 | 4 |
| Total | 25 | 100 |

DISCUSSION

Diseases of the venous system are common among the western population and result in considerable morbidity and costs to the health service. Half of the adult’s population has minor stigmata of venous disease (female: 50-55%, males: 40-50%) but less than a half of them have visible varicose veins (female: 20-25; males: 10-15%). The incidence of varicose veins (VV) increases with age.⁹

Knowledge of the distribution and exact localization of incompetent perforating veins of the lower leg is important in the treatment of (recurrent) varicose veins and venous ulceration. The recent development of Ultrasonography provides a simple, repeatable, and noninvasive instrument for the study of the venous system, and numerous reports have shown its usefulness in the evaluation of patients who have chronic venous

insufficiency. This technique has the advantage of providing detailed anatomic information regarding the nature of the venous pathologic condition and, in particular, is capable of discriminating competent veins from incompetent veins.¹⁰⁻²²

This study shows the distributions of varicose veins of lower limbs is more common in younger age group with male predominance, occupation demands prolonged standing during their duty period like police personale, bus driver, house wife Rikshaw puller, manual labourer and paanthela owner. Left lower limb varicosity is most common in our study. Commonest presenting symptom was the dilated veins followed by the swelling and pain.

Numerous reports have supported the importance of perforating vein incompetence in the cause of persistent and recurrent varicose veins and venous ulceration of the lower leg.²³⁻²⁵

In the current study, most commonly involved venous system was long saphenous vein. Clinically undiagnosed perforator incompetence can be accurately diagnosed by colour Doppler study. DVT is always to be confirmed by colour Doppler study before submitting the patient for any kind of surgical management. Isolated

saphenofemoral incompetence is more common rather than combined incompetence.

Venous ulceration seems to be most common complications in varicose vein and venous ulcers are located at the severe end of the spectrum of chronic venous disorders of the leg. Venous hypertension is the undisputed initiating factor in venous ulcer development. Venous ulcer reluctant to usual line of the treatment of ulcer i.e. local wound care and skin grafting, even after skin grafting sloughing of the skin and reulceration occur.

Surgical ligation of these incompetent perforating veins has been reported as giving good long-term results, but because of the absence of predilection sites and difficulties in accurate preoperative localization, 3 this usually necessitated subfascial surgical exploration through long incisions, frequently associated with postoperative necrosis of the wound margins or delayed wound healing. The recent development of duplex ultrasonography allows for a detailed evaluation of the anatomic and functional status of the perforating system, as well as of the deep and superficial systems. As a consequence, duplex-guided ligation of the incompetent perforating veins through multiple small local incisions in the natural skin lines has previously been advocated.^{26,27}

CONCLUSION

Venous disease is associated with a large burden of ill-health and it consumes a substantial amount of National Health Service resources. Varicose veins are one of the most common conditions seen in surgical clinic. Duplex ultrasound scanning is non-invasive, early, safe and sensitive investigation of choice.

Hence early detection and timely proper management of the disease will reduce the further morbidity.

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