Results and Significance of Colour Duplex Assessment of the Deep Venous System in Recurrent Varicose Veins

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Objectives. To establish the status of the deep veins in patients presenting with recurrent varicose veins and the effect on treatment decisions.

Design. Retrospective clinical series.

Materials and methods. Duplex examination of 570 consecutive patients (843 limbs) presenting with recurrent varicose veins (CEAP C2-4).

Results. Approximately one third of these patients (34.8%: 294 limbs) had no deep venous abnormality; 173 limbs with superficial vein abnormalities only had great and/or small saphenous junction incompetence, the remaining 121 legs had deep venous abnormalities. Deep venous abnormalities were found in 549 limbs with evidence of persisting deep venous obstruction in only 20. Deep venous incompetence was found in 529 limbs (62.7% of all limbs). However, three segment incompetence (common femoral, femoral and popliteal veins) was found in only 181 legs (21.4%), two segment incompetence in 137 (16.2%) and one segment incompetence in 211 (25%).

Conclusions. Deep vein incompetence is common in patients with recurrent varicose veins. Deep venous obstruction is an infrequent finding but total deep venous reflux (three segment incompetence) affects just under one quarter of all limbs with recurrent varicose veins. Ablation or surgery of varicose veins in this group may be less effective. Patients should be advised of the implications of this finding.

Keywords: Recurrent Varicose Veins; Duplex scanning; Deep Veins.

Introduction

The reported rates of recurrence of varicose veins after primary surgery range from 20–80% depending on definition, method of assessment, initial case mix and the duration of follow up. A prospective follow up study using duplex ultrasound and plethysmography has suggested recurrence can be detected from 3 months post-operatively, with most appearing between the first and third post treatment years, and changing little until 5 years. However, detailed data on recurrence beyond five years is scanty. If we take the lowest figure of 20% recurrence at five years, which concords well with the fact that 20% of surgery for varicose veins is undertaken for recurrence, this still represents a sizeable problem for the clinician and the health economy. Recurrence of varicose veins can be due to inadequate primary assessment before surgery resulting in inappropriate surgery, technically inadequate surgery, and the reparative process after surgery or progression of the underlying disease process. Inadequate pre-operative assessment may lead to failure to identify and treat all sites of superficial venous incompetence or failure to identify significant pre-existing deep venous disease thus increasing the risk of recurrence. Technically inadequate surgery, especially at the sapheno-femoral and saphenopopliteal junctions has been widely recognized as a major cause of recurrence, as has the importance of failure to strip the long saphenous vein(s) in the thigh. Neovascularisation is a well documented cause of recurrence as is progression to varicosities in previously normal veins.

Debate remains about the level of assessment required prior to primary varicose vein intervention. There is general agreement that in cases of recurrence, imaging of the deep and superficial venous system is advisable. Phlebography, varicography or functional tests such as plethysmography may still...
be occasionally required in complex cases but duplex ultrasound has become the investigation of choice.\textsuperscript{13,20} Knowledge of the venous system is required to select the most appropriate treatment, especially if one of the newer modalities of treatment, such as foam sclerotherapy and laser or radio frequency ablation of veins is to be used.\textsuperscript{21–23}

Many of the studies have concentrated on superficial venous abnormalities in patients with recurrent varicose veins.\textsuperscript{2,24,25} The purpose of this study was to identify the incidence, significance and distribution of deep venous disease in patients presenting with simple recurrent varicose veins and the potential effect of this deep venous disease on management decisions.

**Method**

The duplex findings of all patients who underwent duplex scanning for varicose veins at Bedford Hospital were prospectively collected to record demographics, indications for investigation, results of investigation and the treatment recommendations. The records of all patients scanned between 1992 and 2003 were analysed and those who were scanned for recurrent varicose veins formed the study population. Patients with active or healed leg ulcers, and those with post thrombotic limbs with gross chronic venous insufficiency as the primary indication for scanning were excluded from this study. Patients with skin changes but without ulceration were included (clinical CEAP classes C2-4).

All patients were scanned by one of the authors (MC) using Hewlett Packard Sonos scanners with a variable frequency linear array transducer. A standard examination was performed in all cases. The deep venous system was scanned from the groin down to the below knee segment with the patient in the recumbent position as well as standing. The presence and site of occlusion or partial occlusion was noted. The site and extent of any reflux in the deep venous system both on Valsalva manoeuvre and after manual calf compression was documented. The whole length of the vein was scanned for evidence of occlusion and observations for reflux made in the common femoral vein, proximal and distal femoral vein and the proximal and distal popliteal vein. The superficial venous system was also assessed in the recumbent and standing positions.

The deep system was divided into three segments (common femoral, femoral, and popliteal) and the limbs were classified according to the presence of any significant reflux in one, two, or all three segments. Significant reflux was defined as reflux lasting a minimum of one second although in most cases it continued for a longer period.

**Results**

A total of 3089 patients were scanned during an 11 year period. 1797 patients were scanned for simple primary or recurrent varicose veins. Primary varicose veins was the most common indication investigation but a total of 570 patients had duplex scans for recurrent varicose veins (31.7%) and these 570 cases form the study group. Two hundred and seventy three of the study group had bilateral recurrent disease, and had both legs scanned giving a total of 843 limbs studied.

Residual or neovascular sapheno-femoral junction (SFJ) incompetence was found in 497 (59%) of limbs and sapheno-popliteal incompetence in 202 (24.5%) of limbs. In 183 (22%) limbs recurrence was due to perforating vein incompetence.

Two hundred and ninety four (34.8%) of these legs had no evidence of any deep venous abnormality on ultrasonography (superficial disease group) and 549 (65.1%) had some evidence of deep venous abnormality (deep venous disease group). The superficial disease group had abnormalities in the great saphenous vein (GSV) or small saphenous vein (SSV) or isolated perforator disease only (Fig. 1).

The deep venous disease group all had superficial vein abnormalities by definition as they all had recurrent varicose veins. The group with deep venous abnormalities was subdivided into those who had deep venous obstruction and those who had deep venous reflux (Fig. 1). Only 20 (3.6%) of the 549 had evidence of deep venous obstruction (2.37% of all legs with recurrent veins), and the remaining 529 had deep venous reflux with no obstruction.

Single segment deep vein reflux was the most common abnormality (211 limbs); 115 in the common femoral vein, 20 in the femoral vein and 76 in the popliteal vein. As might be expected, there was a very strong correlation between GSV incompetence and reflux in the common femoral vein (102/115: 88.7%, Fig. 2). Correlation between SSV reflux and popliteal vein reflux was less marked (28/76: 36.8%). A relatively small number had isolated femoral vein reflux (20) and this was associated with thigh perforator disease in 10 (50%) and an incompetent high sapheno-popliteal junction (SPI) or unusually proximal perforating vein in a further 3; the remaining seven patients in this group had GSV incompetence.

Two segment reflux was found in 134 legs. Fifty four per cent of those with two segment reflux (72) had...
reflux in the common femoral and femoral veins but had a competent popliteal vein. Forty three had associated long saphenous reflux only; six had both GSV and SSV incompetence and one had SSV incompetence only. The remaining twenty two patients had incompetent thigh perforating veins.

The remainder (62) had incompetence in the popliteal vein associated with either incompetence in the femoral or the common femoral veins. Fifty per cent (31) of this subgroup had reflux in both the distal and proximal popliteal veins, 5 had distal popliteal incompetence extending into the upper calf only and the remaining 26 had proximal popliteal incompetence only.

Three segment reflux, suggesting complete failure of the deep venous valvular system, was found in 184 limbs. In the majority of this group (145) the distal popliteal and proximal calf veins were also incompetent and in the remainder (38) the reflux extended into the SSV or gastrocnemius veins.

Discussion

This clinical series suffers from the limitation that analysis is retrospective, even though data was collected prospectively. Data recording pre-dated the CEAP classification so this information could not be analysed. The study group all had previous operative treatment but the exact nature of the procedures could not always be established as many had been treated elsewhere. Varying techniques were used to assess the primary varicose veins (clinical examination, continuous wave Doppler, duplex ultrasound and even...
varicography or phlebography) in different centres and even in the same centre between different clinicians. As a result no reliable information could be obtained about the state of the deep or superficial veins at the time of primary treatment or even the nature of the primary operative treatment.

Most clinicians would agree that patients who have recurrent varicose veins due to superficial venous incompetence alone will benefit from removal or ablation of the affected veins. However the situation for limbs with associated deep venous abnormalities is less clear. In common with other authors, this series has demonstrated that the common sites for recurrence are the SFJ, residual GSV in the thigh and new or recurrent SSV incompetence.

Many of the patients in this series predated the CEAP classification and so it has not been used to classify the duplex findings. To ensure consistency we have used a simple anatomical classification for the site of reflux. This classification has the benefit of simplicity and each segment correlates with a site of potential deep to superficial reflux; the common femoral with the GSV, the popliteal with SSV or gastrocnemius vein incompetence and the femoral with thigh perforator incompetence.

The data suggests that the majority of legs (65.1%) with recurrent varicose veins have some associated deep venous abnormalities. The use of duplex scanning is essential to identify this problem since it may affect treatment decisions. Few patients (20/549) had evidence of deep venous obstruction but ablating superficial veins may result in worsening of symptoms in this group. Management of these limbs will be largely conservative with compression and elevation.

The remaining 529 legs with deep venous abnormalities had varying degrees of reflux. The most common abnormality (211/529) was single segment reflux, most commonly in the common femoral (115) or popliteal segments (76) and rarely in the isolated femoral segment (20). The level of deep reflux often correlated well with the site of superficial disease. This concordance was most marked between common femoral reflux and sapheno-femoral reflux (102/115). Although isolated femoral vein reflux was much less common, it was associated with perforating veins or SSV incompetence with a high SPJ in 13/20 cases and with SFJ reflux in the remaining seven limbs. The concordance is less good in the popliteal region and also in either the femoral or common femoral levels. Twenty six of these had competent distal popliteal valves, correctable disease and could benefit from intervention, the remaining thirty six had deep venous incompetence extending down into the calf and the benefits of superficial surgery would be less clear.

Although many of the 184 limbs with three level incompetence had correctable superficial disease, it is unlikely that they will get a lasting benefit from superficial venous surgery alone. Compression stockings will minimise symptoms and some may benefit from surgical treatment to large incompetent junctions, saphenous trunks and varices.

**Conclusions**

This study has shown that there is a high incidence of deep venous abnormalities in patients who present with simple recurrent varicose veins. One third of legs (35%) have no evidence of deep venous disease and treatment of their superficial disease with an appropriate modality would carry a high chance of success. One quarter (25%) have single segment deep venous reflux and associated superficial venous incompetence and are likely to get a good result from superficial vein treatment. One tenth (11.5%) have two segment reflux, with correctable superficial disease and competent distal valves, and may benefit from intervention. A significant minority (28.5%) will either have deep venous occlusion, three segment deep reflux or two segment deep reflux extending into the
calf veins which would be a relative contra indication for intervention. Surgery in this group is less likely to be successful in controlling the veins and these patients should be warned of a higher probability of recurrence.

References


Accepted 12 February 2007
Available online 30 April 2007