



## Radiodiagnosis

## COLOUR DOPPLER AND ITS PATTERNS IN LOWER LIMB VENOUS INSUFFICIENCY: A DESCRIPTIVE PROSPECTIVE STUDY

<b>Dr. Anand Kamat</b>	MD, Professor, Pondicherry Institute of Medical Sciences, Puducherry, 605014
<b>Dr. Prashant Naik*</b>	MD, Head of Department, Dept. Of Radio-Diagnosis, Smt. Kashibai Navale Medical College and General Hospital, Narhe, Pune, Maharashtra. *Corresponding Author
<b>Dr. Pallav Bhatner</b>	Resident, Dept. Of Radio-Diagnosis, Smt. Kashibai Navale Medical College and General Hospital, Narhe, Pune, Maharashtra.

**ABSTRACT** A hospital based prospective descriptive study was done to describe the patterns of chronic venous insufficiency (CVI) using Colour Doppler and Duplex scan. Duplex ultrasonography scanning was done with clinical examination of 250 patients referred with possible chronic venous insufficiency. Of the 378 limbs, 302 (80%) limbs showed presence of varicose veins. Pain (64%) was the most common clinical finding. For the skin changes in lower limbs, pigmentation (87%) was the most common. The most common colour Doppler findings in the lower limbs were saphenofemoral incompetence (49%) and perforating vein incompetence (28%). The study concludes that duplex sonography is an integral part of the modern evaluation and management of patients with venous insufficiency. Precise anatomic and flow mapping is required prior to planning treatment in all patients with varicose veins.

**KEYWORDS :** chronic venous insufficiency, saphenofemoral incompetence, duplex sonography.

**INTRODUCTION**

Lower limb varicose veins are dilated, tortuous, elongated veins on the skin surface, especially in the calf.<sup>1</sup>

These can cause minor cosmetic problems in the young individuals or venous ulceration in the elderly. Treatment for varicose veins, including laser therapy, injection sclerotherapy and surgery changes depending on the cause and severity of the varicose veins.<sup>2,3</sup> However, local recurrence and incomplete treatment remain a clinical challenge.<sup>3</sup>

Preoperative assessment of lower limb varicose veins is especially important for planning the treatment choice. With the introduction of ultrasound (US), ultrasonic venous duplex examination (UVDE) of primary and secondary varicosities has become a promising modality for preoperative evaluation.<sup>4,5</sup>

Clinical assessment based solely on the division of the venous abnormality can suggest a pattern of incompetence.

Unfortunately, because several different patterns of incompetence may lead to similar appearance of abnormalities, treatment decisions based only upon clinical evaluations are often burdened with errors. Thus, it is strongly suggested that all patients undergo evaluation for lower extremity varicose veins, edema, or venous skin changes (CEAP clinical stage 2–6) go through an ultrasound study of the superficial venous system to determine the pattern or patterns of incompetence prior to making treatment recommendation.<sup>6,7</sup>

**MATERIALS & METHODS:**

Study Design: This is a prospective descriptive study.

Study period: One year.

Study Area: Tertiary care Hospital.

Sample size: with the convenient sampling methods

**Patients:**

Duplex ultrasonography scanning along with clinical examination of 250 patients was done. 128 patients were referred for bilateral lower limb examinations (256 limbs) and 122 patients were referred for unilateral lower limb examination (122 limbs). Hence, a total of 378 lower limbs with possible chronic venous insufficiency were examined.

**Study tool: Following tools were used-**

1. Pre-designed, Semi-structured Questionnaire which included General information about patient, clinical examination findings.
2. Colour Doppler and Duplex scan findings.

Doppler duplex scanners (Siemens X-300) was used.

All studies were performed on one unit.

The long and short saphenous veins, the common femoral, superficial femoral, and popliteal veins, and the three sets of crural veins were examined. A separate examination detailing the frequency of reflux in crural veins<sup>8</sup> showed that reflux almost always included the posterior tibial veins so that results for the other crural veins are not provided to simplify the presentation.

The superficial and deep veins were studied for patency and competence. The patients were examined while they stood supported on the edge of a couch with weight placed on the opposite side. To allow easy access to the groin, thigh and back of the knee, the thigh was externally rotated and moderately flexed at the hip. The leg was dependent, and posterior tibial veins were examined by approaches previously described<sup>9</sup>. Upward flow in deep and superficial veins resulted from compressing the calf muscles for around 0.5 seconds, and the site of the compress was varied to find the best site to get the utmost outflow for each limb. Pneumatic cuff technique was not used. Reflux was diagnosed if retrograde flow was observed after release and persisted for more than 0.5 seconds. We did not attempt to quantify the reflux. Reflux into the long or short saphenous veins was consistently associated with reflux in the common femoral or popliteal veins above the saphenous junctions so that deep reflux at either site was diagnosed only if retrograde flow extended to below either saphenous junctions. Medial calf perforators were detected by observing a vein passing through the deep fascia, which is a very distinct band on the B-scan, and confirming its identity by observing augmented flow on colour doppler.

Doppler imaging was done after compressing the calf muscles proximal to the site of assessment. The full length of the leg was examined behind the tibia. Outward flow in the perforator was confirmed if colour doppler flow was seen in the appropriate direction during isometric calf muscle contraction by forcible plantar-flexion against resistance. Diameters of the perforators were not analyzed.

**Statistics:**

Data will be described using appropriate qualitative and quantitative methods like mean & Proportion.

Appropriate statistical methods will be applied to draw the inference from study results. The most appropriate Chi-square test will be applied. Statistical significance is considered when p value is less than 0.05

**RESULTS:**

Total of 378 limbs in 250 patients were examined.

Of these, 175 (70%) were males and 75 (30%) were females. 5 (2%) patients were less than 20 years old, 80 (32%) patients were between 20-40 years old and 165 (66%) patients were more than 40 years of age.

**Table No.1: Presence of Varicose Veins in all limbs examined.**

Varicose Veins	Total
Present	302 (80%)
Absent	76 (20%)
Total Limbs	378 (100%)

Out of the total 378 limbs examined, 302 (80%) limbs showed presence of varicose veins while 76 limbs (20%) did not show presence of varicose veins.

**Table No.2: Clinical Findings in lower limbs**

Clinical Finding (n=378)	Total
Visible Veins	180 (48%)
Skin Changes	131 (35%)
Pain	243 (64%)
Edema	227 (60%)

Pain (64%) was the most common clinical finding followed by edema (60%), visible veins (48%) then skin changes (35%).

Out of the total skin changes seen in lower limbs, pigmentation (87%) was the most common change seen followed by thickening (38%).

**Table No.3: Colour Doppler patterns in lower limbs with varicose veins.**

USG/Colour Doppler Findings (n=302)	Total
SAPHENOFEMORAL Incompetence	149 (49%)
SAPHENOPOPLITEAL Incompetence	30 (10%)
Perforating veins Incompetence	86 (28%)
Reflux in Deep Veins	19 (6%)

The most common colour Doppler findings in the lower limbs were saphenofemoral incompetence (49%) and perforating veins incompetence (28%). Saphenopopliteal incompetence and reflux in deep veins was noted in 30(10%) and 19(6%) limbs respectively.

4 patients had all findings (saphenofemoral Incompetence, saphenopopliteal Incompetence, perforating veins incompetence & reflux in Deep Veins) present together for both lower limbs. 11 patients had saphenofemoral incompetence, saphenopopliteal incompetence & perforating veins incompetence present for both lower limbs. 5 patients had saphenofemoral incompetence & saphenopopliteal incompetence for both lower limbs.

## DISCUSSION:

Good long-term results depend on selecting the correct method of treatment for varicose veins, and on carrying out any procedures thoroughly. If there is reflux in the long saphenous system, then the basis of surgical treatment is saphenofemoral ligation and stripping. If saphenopopliteal incompetence is present, then saphenopopliteal ligation needs to be done.

Many surgeons still assess varicose veins by clinical examination only, making pragmatic decisions on management which will often be right. However, clinical examination is relatively poor for assessment of the short saphenous vein, and gives negligible information about the deep veins.<sup>10</sup>

In our study, we found 49% of lower limbs with varicose veins had saphenofemoral incompetence whereas study conducted by Chang HL et al<sup>11</sup> showed that 50% lower limbs with varicose veins were caused by saphenofemoral valvular incompetence which is comparable with the present study findings. Also, the study by Chang HL et al<sup>11</sup> showed that 5% limbs had deep vein reflux whereas in the present study 6% showed deep vein reflux. This finding is also similar suggesting similar pattern in varicose vein patients.

The treatment course for varicose vein depends on its etiology and severity. To prevent local recurrence, patients with lower limb varicose vein need to be evaluated using colour Doppler and duplex scanning.<sup>11</sup>

## CONCLUSION:

Colour Doppler and Duplex scanning of lower limbs is an integral part of the modern evaluation and management of patients with chronic venous insufficiency. Precise anatomic and flow mapping is required prior to planning treatment in all patients with varicose veins.

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