

A Comparative Study For The Role Of Color Doppler And Clinical Examination In The Management Of Varicose Vein

Dr Anish Deepak Baxla¹, Dr Upasana Khalkho², Dr Kumar Yogesh³

¹Senior Resident, Department Of Surgery, RIMS ,Ranchi

²Senior Resident, Department Of Pathology, SNMMCH, Dhanbad

³Senior Resident ,Department Of Pathology, SNMMCH, Dhanbad

Corresponding Author

Dr Anish Deepak Baxla

Senior Resident, Department Of
Surgery, RIMS ,Ranchi

Keywords:

Doppler study, Varicose veins,
Incompetent perforating veins

Abstract:

Background: The significance of recognizing and locating incompetent perforating veins for treating the patients with varicose vein and venous ulcers is well established. Several methods of diagnosing incompetent perforating veins have been evaluated in the past, however, none show satisfactory accuracy in predicting incompetent perforating veins. Clinical examination with digital palpation of fascial defects is the most widely used method. These fascial clefts are generally thought to keep up a correspondence to incompetent perforating veins. Further evidence is obtained when digital pressure relief on the defect leads to filling of superficial varicose veins or if a tourniquet applied beneath the defect prevents it. The purpose of the present study was to compare clinical examination with that of Doppler venous study in the diagnosis of incompetent perforating veins of lower limbs. **Methods:** This is a Cross-sectional comparative study which was carried out in 50 patients with lower limb varicose veins admitted to the department of general surgery in RIMS, Ranchi. They were evaluated by clinical tests and Doppler ultrasound. **Results:** Sensitivity and specificity of colour Doppler for SFJ and SPJ is 100% while for perforators is 91.58%. Specificity of clinical examination for SFJ is 100% and for perforators 60%. Sensitivity of clinical examination for SFJ is 90% for perforators 60%. **Conclusions:** From this study and results, it shows that doppler ultrasound evaluation of the varicose veins should be done for accurate diagnosis in all patients before planning surgery.

Received : 01-08-2025

Revised : 16-08-2025

Accepted: 25-08-2025

Published : 29-08-2025

Introduction

Varicose veins and their associated symptoms and complications constitute the most common chronic vascular disorders leading to surgical treatment. Varicosity is the penalty for verticality against gravity¹.

The definition of varicose veins varies widely ranging from clearly visible, dilated, tortuous and

possibly prominent subcutaneous veins of lower extremities according to Arnoldi, varicose veins secondary to loss of valvular efficiency according to Dodd and Cockett, Vein with a saccular dilatation² which is often tortuous according to WHO. This variation in the definition of varicose veins has lead to wide discrepancies in its incidence

Journal of Dermatological Case Reports

reported in the literature. Though varicose veins were recognized from the past times, presently considerable knowledge has been gained concerning the anatomy of venous system of the leg, the physiological mechanism of venous return to heart against gravity and pathology of the disorder, which has lead to many newer modalities of treatment. The term varicosity is generally applied to elongated, tortuous, pouched, thickened, inelastic and friable vessels which have permanently lost its valvular efficiency though similar changes may also occur in veins in the anal canal, as hemorrhoids, varicocele of pampiniform plexus³, and in cases of portal hypertension at the lower end of esophagus as esophageal varices. Varicose veins affect 10 to 20 % of population in western world but in developing countries because of their way of living the incident is about 2%. Various predisposing factors have been implicated like pregnancy; prolong standing, obesity, old age, athletics, hereditary etc.

The aim of clinical examination is to localise the sites of incompetence whether the problem are at the saphenofemoral junction, saphenopopliteal junction or at perforators level. The development of Duplex Ultrasonography especially with bidirectional colour flow mapping provides simple, repeatable and non- invasive investigation for the study of venous system. By this technique both anatomical and functional aspects the three venous systems can be evaluated and exact localisation of valvular incompetence⁴ can be determined, so that surgery can be done through small incision.

Aims And Objectives

1. Accurate/exact localisation of incompetent sites.
2. To optimise sensitivity and specificity of diagnosis.
3. Better surgical outcome through small incision.

Perforator Incompetence Marked by Clinical

Materials And Methods

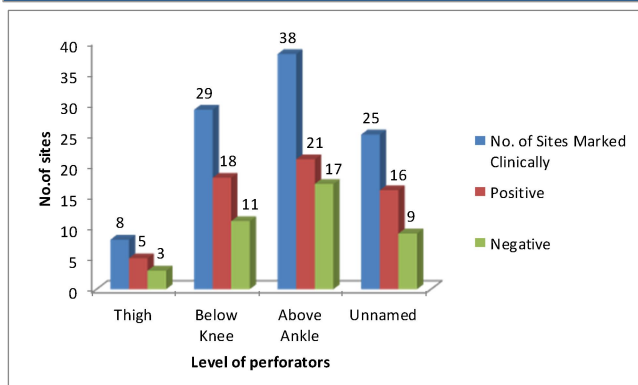
In the present study, fifty patients with varicose veins admitted to the Department of General Surgery in Rims, Ranchi. Patients with dilated tortuous veins in the lower extremity and operated were included in the study, and excluded the patients who had deep vein thrombosis, superficial thrombophlebitis, and recurrent disease from the study.

A detailed history including the identification detail of the patient, presenting complaints, duration of illness is obtained. The patients were evaluated clinically using clinical examination (Brodie-Trendelenburg test I and II, multiple tourniquet tests, Schwartz test, Perthes test, Morrissey's cough impulse test, and Fegan's test.). Venous Doppler of affected lower limb was done. The competence of the saphenofemoral junction and the sites of incompetent perforators were done separately by a clinician and a sonologist. Incompetent saphenofemoral incompetence (SFJ) was treated by flush ligation and incompetent perforators was treated by subfacial ligation by small transverse incisions. Intraoperatively, incompetency was confirmed by TurnerWarwicks bleed back sign. The result of clinical examination of incompetent perforators with doppler study were documented.

Results

50 (fifty) patients with primary varicose veins who were treated in Surgery department at RAJENDRA INSTITUTE OF MEDICAL SCIENCES, Ranchi. Our patients presented with varied symptoms, out of which dilated veins were most common in 46 (92%) patients followed by aching pain in 23 (46%) patients. Long saphenous system was the most common venous system affected 72% (36 patients). Both system affected in 12% (06 Patients).

Journal of Dermatological Case Reports

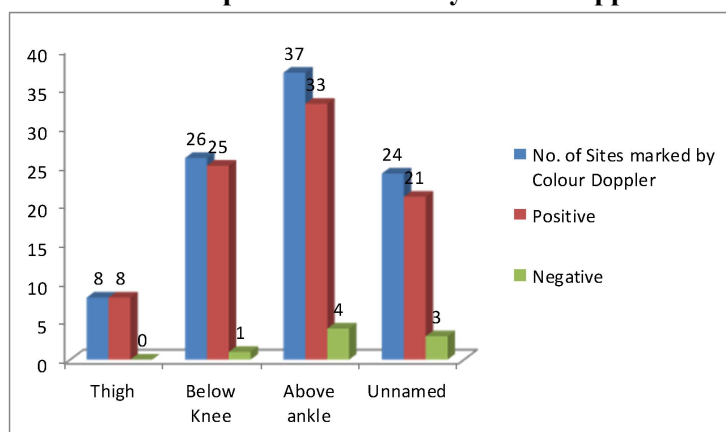


Examination

Total number of incompetent perforators marked clinically 100. Operative finding 60 (60%). Wrongly marked 40 (40%). Most of incompetent perforators were above ankle groups.

Total Number of incompetent perforators marked by Colour Doppler 95. Operative finding 87 (91.58%). Wrongly marked 08 (08.42%). Most of Incompetent perforators were above ankle groups.

Perforator Incompetence Marked by colour Doppler



Sensitivity and Specificity of Clinical Examination

SENSITIVITY

Level of Incompetence	Total no. of sites marked clinically	Operative finding	percentage
SFJ	36	40	90
SPJ	00	02	00
Perforators	100	60	60

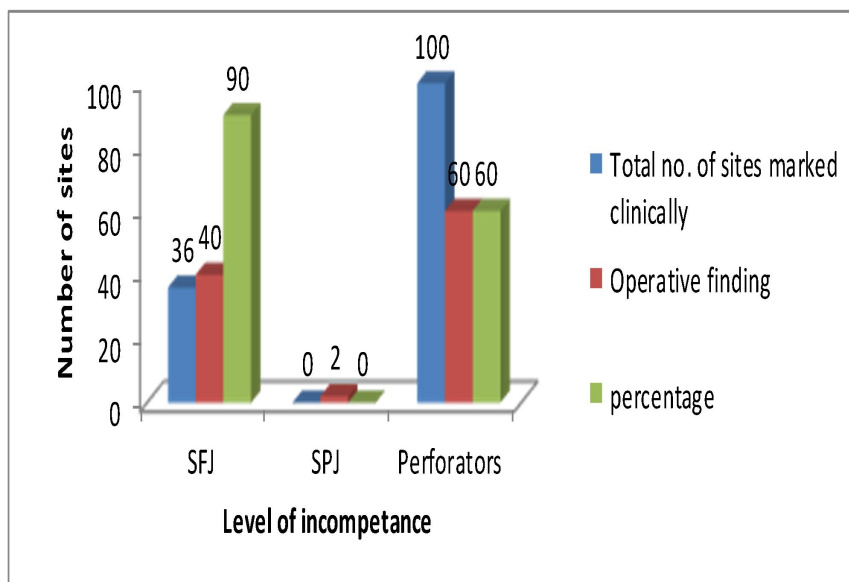
SFJ- Saphenofemoral junction, SPJ - Saphenopopliteal junction Sensitivity relates to the test's ability to identify positive results. Sensitivity of clinical examination for SFJ is 90% for perforators 60%.

SPECIFICITY

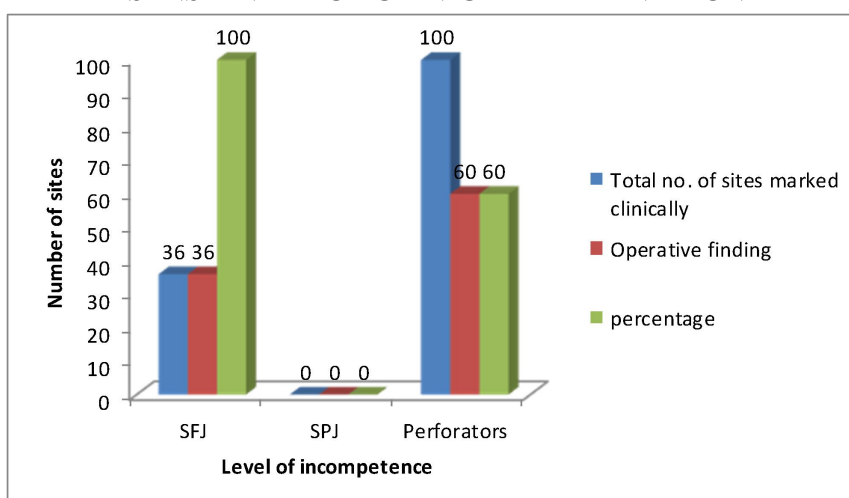
Level of Incompetence	Total no. of sites marked clinically	Operative finding	percentage
SFJ	36	36	100
SPJ	00	00	00
Perforators	100	60	60

Journal of Dermatological Case Reports

SFJ - Saphenofemoral Junction, SPJ - Saphenopopliteal junction Specificity relates to the ability of the test to identify negative result. Specificity of clinical examination for SFJ is 100% and for perforators 60%.



SENSITIVITY OF CLINICAL EXAMINATION



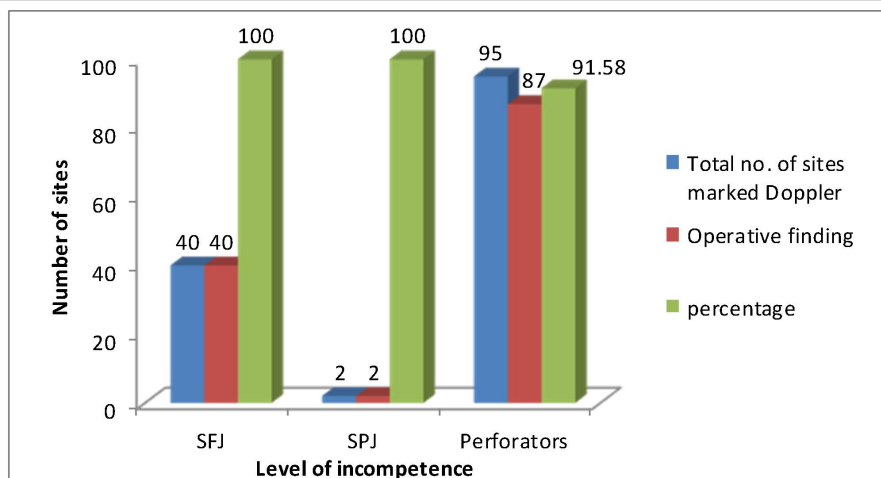
SPECIFICITY OF CLINICAL EXAMINATION

Sensitivity and Specificity of Colour Doppler

Level of Incompetence	Total no. of sites marked Doppler	Operative finding	percentage
SFJ	40	40	100
SPJ	02	02	100
Perforators	95	87	91.58

SFJ- Saphenofemoral Junction, SPJ- Saphenopopliteal junction. Sensitivity and specificity of colour Doppler for SFJ and SPJ is 100% while for perforators is 91.58%.

Journal of Dermatological Case Reports

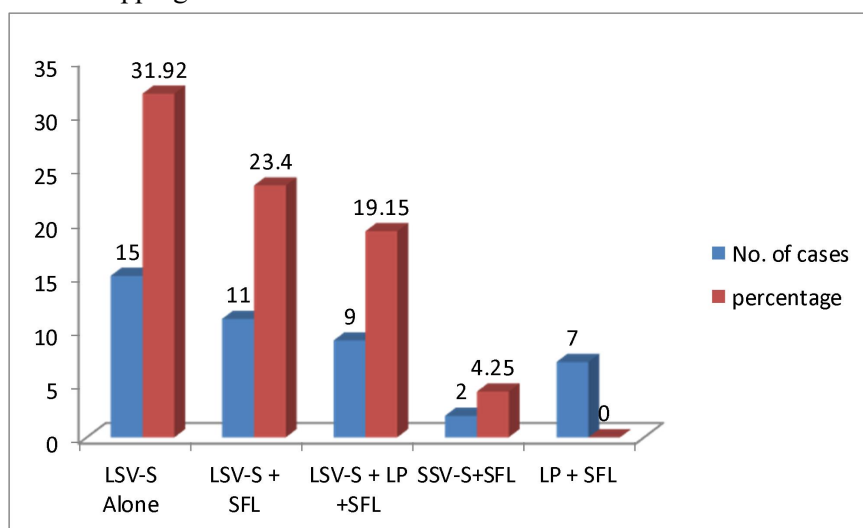


MANAGEMENT OF VARICOSE VEIN

Treatment given

Treatment Given	No. of cases	percentage
LSV-S Alone	15	31.92
LSV-S + SFL	11	23.40
LSV-S + LP +SFL	09	19.15
SSV-S+SFL	02	04.25
LP + SFL	07	14.90S
Total	47	100

LSV-S = Long saphenous vein stripping, LP = Local Phlebectomy, SFL Sub-fascial ligation, SSV-S = Short saphenous vein stripping.



TREATMENT MODALITY

Discussion

The Japanese research led by Satomura and Nimura was the earliest instance of diagnostic exploitation of the Doppler Effect⁶. Venous duplex scanning

(DS)ⁱ was introduced in 1982 by Talbott and has become the standard method of diagnosing deep venous thrombosis and venous insufficiency of the lower extremities⁷

Van der Heijden FH, Bruyninckx CM. (1993; Netherlands) conducted a study to evaluate the role

Journal of Dermatological Case Reports

of colour-coded duplex scanning in the preoperative assessment of varicose veins⁸

M. M. Baldt, K. Bohler, T. Zontsich et al (1996; Austria), prospectively examined 137 limbs in 112 consecutive patients with clinical evidence of severe varicosis by colour coded duplex sonography and ascending venography (including varicography in 48 limbs) to evaluate the diagnostic capabilities of colour coded duplex sonography in the assessment of venous anatomy, variant varicosis⁹, post thrombotic changes, and incompetence of the superficial and perforating venous system¹⁰.

Baumgartner I, Braunschweig M, Triller J (1998) demonstrated that complete identification of calf veins increased from 80.5% using colour doppler to 97.9% using complementary power doppler. Chronic post thrombotic changes were more reliably recognized using colour doppler (83%) compared to power doppler (66%) due to tissue motion artifacts and inability to discriminate the direction of blood flow¹¹

Aydin Kurt, Ugur Ünlü, Ali Ipek et al (2007) studied 212 patients with signs and symptoms of CVI using colour doppler sonography. 34 patients who had previous venous surgery sclerotherapy and DVT were excluded from the study. Short saphenous vein diameter showed good correlation with venous incompetence (deep and superficial of same limb)¹².

Trendelenburg did ligation of long saphenous vein at the mid thigh. Later his student Perthes devised modern day flush ligation at saphenofemoral junction.

.Muhammad Zaria Ibrahim, Joseph Bako Igashi, Suleiman Lawal, Bello Usman, Abdullahi Zubair Mubarak, and Hafsat Maiwada Suleiman in 2020 said after concluding his study Doppler sonography is recommended for all cases of limb swelling in Zaria, especially those with risk factors for DVT due to limited sensitivity of clinical evaluation in the diagnosis of DVT. In my study fifty (50) patients with varicose veins were admitted, investigated, operated and followed up during the period of September 2018 to October 2020. The sensitivity and specificity of Colour Doppler and Clinical examination were compared, considering Intraoperative findings as the reference gold standard.

In my study the age of the patient ranges from 11 yrs to > 61 yrs, Maximum number of cases were

observed in the age group of 31 to 40 yrs (48%). Left limbs were more affected (29 cases) than right limbs (14 cases) and in 07 cases both limbs were affected. 60% (30 cases) of patients were involved in occupations which required long hours of standing. The commonest symptom in 46 (92%) cases were that of dilated and tortuous veins, 23 (46%) cases had complaints of dull aching pain in the affected limb and venous ulcer were present in 13(26%) of cases.

Colour duplex ultrasonography was done in all patients preoperatively. By colour Doppler, the patency of deep veins was assured in all patients. SFJ incompetence was detected in 40 patient legs, SPJ incompetence in 2 and incompetent perforators were marked at 95 sites.

Out of 40 incompetent SFJs. 36 were detected by clinical examination and 4 sites were missed (90% sensitivity) and all the 36 sites marked as incompetent SFJ on clinical examination were found to be incompetent on operative exploration (specificity 100 %). No SPJ incompetence could be detected by clinical examination. Out of 100 incompetent perforators marked by clinical examination, only 60 could be detected on operative exploration.

In my study, the efficacy of clinical examination in detecting SFJ incompetence was high with a sensitivity and specificity of 90% and 100%, respectively. Chan et al. have reported it as 78% and 82% while Fegans reported it as 72% and 80%, respectively. This is nearly comparable with the study.

In my study, SPJ incompetence was found in two patients on operative exploration, but none of them could be detected on clinical examination. A sensitivity rate of 60% has been reported for SPJ incompetence in other studies. Causes of failure of detecting SPJ incompetence are inconstant position of the junction and T-shaped junction in some patients because of presence of a Giacomini vein.

Regarding perforators, out of 100 sites marked clinically, perforators could be found only at 60 sites on operative exploration and at 40 sites there was no perforator. So sensitivity and specificity of clinical examination in detecting perforator incompetence was 60%.

In my study, the SFJ was incompetent in 40 patient and all these were detected correctly by colour duplex USG. So sensitivity and specificity was 100%. The SPJ was incompetent in two patient and

Journal of Dermatological Case Reports

in both cases it was detected preoperatively by colour duplex USG, giving a sensitivity and specificity of 100%. But out of 95 perforators marked by Colour Doppler only 87 sites were found on operative exploration, and 8 sites were wrongly marked. So the sensitivity and specificity of colour duplex USG for perforator incompetence was 91.58%. Antoch et al. (2002) have reported a sensitivity and specificity of 80% and 74%, respectively by colour duplex USG, while Hoare has reported it to be 79.2% and 100%, respectively.

Conclusion

Sensitivity and specificity of Clinical examination for SFJ incompetence is 90% and 100%, for perforators incompetence sensitivity and specificity is 60. Not a single SPJ incompetence detected clinically.

Sensitivity and specificity of Colour Doppler for SFJ and SPJ incompetence is 100% and for perforators incompetence is 91.58%. So the results of my study demonstrate that Colour Duplex USG is superior to clinical examination in evaluation of superficial and perforator incompetence. So it is recommended that colour duplex USG should be done in all patients of varicose veins preoperatively, to improve the results of surgery and to avoid recurrence of the disease as this investigation is available in most of the district level centers.

References

1. Abramowitz. Veins and great lymph vessels, Lee Mc. Gregors Synopsis of Surgical Anatomy, 1986, 12th Edition: 258-263.
2. A.H.M. Dur, A.J.C Mackay et al. Duplex assessment of clinically diagnosed chronic venous insufficiency, Br. J. surg. June 1992; 79: S, 155-161
3. Amjid. A. Riazi; Rajeev shukla; K.L.Ng. Michael. Use of hand held doppler to Identify venous tributaries. ANZ J. Surg. 2009; 79: 648-650.
4. Anton Krnić, Nikša Vučić, Zvonimir Sučić. Correlation of Perforating Vein Incompetence with Extent of Great Saphenous Insufficiency: Cross Sectional.
5. A. W. Bradbury, J. A. Murie and C.V. Ruckley. Role of the leukocyte in the pathogenesis of vascular disease, Br. J. Surg. 1993; Vol.80; December: 1503-1512.
6. Baldt M.M., Bohler K., Zontsich T., Bankier A.A et al. Preoperative imaging of lower extremity varicose veins: colour coded duplex sonography or venography? J Ultrasound Med, 15 (1996, Feb) 143-54.
7. Masuda F.M., Kistner R.L., Prospective comparisons of Duplex scanning and descending venography in assessment of venous insufficiency.
8. Killewich LA, Bedford GR, Beach KW, Strandess ED. Diagnosis of venous thrombosis a prospective comparing duplex scanning to contrast venography Circulation 1989; 79(4):811-814.
9. Khaira HS, Parnell A, and Crowson MC, Colour flow duplex in the assessment of recurrent varicose veins. Annals of the Royal College of Surgeons of England 78(2):139-41, 1996 March.
10. Fedor Lurie et al. Mechanism of venous valve Closure and role of the valve incirculation: A new concept, J vasc surg 2003; 38: 955-61.
11. Grosser S, Kreymann G, Kühns A. Value of color-coded duplex sonography in diagnosis of acute and chronic venous diseases of the lower extremity. Ultraschall Med. 1991 Oct;12(5):222-7. German.
12. Figueiredo M; Araujo S; Barros N jr; Mirandar F jr; Results of surgical treatment Compared with ultrasound-guided foam sclerotherapy for varicose veins. European J. Endo vascular surgery 2009; sep ;(8) 697-70 1.