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Role of Doppler Ultrasound In Lower Limb Chronic Venous Insufficiency

KEYWORDS: VARICOSE, PERFORATORS, VENOUS INCOMPETENCE, DVT

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ABSTRACT *Chronic venous insufficiency (CVI) occurs due to incompetence or weakness of walls of superficial veins, deep veins or perforators of lower limbs. Varicose veins though presenting as a cosmetic deformity but in truth they are many times indicators of a more dangerous underlying disorder. This study aims to evaluate the role of Doppler ultrasound in lower limb CVI. Prospective cross sectional study carried out in the department of Radiodiagnosis of a tertiary healthcare institute for a period of 1 year from December 2011 to December 2012. Total 28 patients with clinical complaints of CVI were evaluated. The results were tabulated and discussed. Findings of CVI on Doppler ultrasound are also discussed. The manuscript is concluded with limitations of study and future directions.*

INTRODUCTION

The present day's life involves professions with long hours of standing, lack of exercise coupled with habits like improper footwear, drug abuse. Added to this is the growing burden of disorders like diabetes mellitus, hypertension and obesity. All these predispose the individual to variety of lower limb venous diseases[1].

Chronic venous insufficiency occurs due to incompetence or weakness of walls of superficial veins, deep veins or perforators of lower limbs. The result of which is retrograde filling of vein i.e. from deep to superficial causing venous hypertension in lower limb. The pathophysiology of CVI is complex with many cases due to recanalisation of underlying thrombosed veins but other causes like enlarged veins and congenital causes are also encountered. CVI manifests clinically as dull aching in legs, feeling of heaviness in legs, swollen legs, itching and eczematous changes. On examination dilated and tortuous veins are seen and the diagnosis can be put up clinically however it is not possible to comment on the underlying cause, the location of incompetence and extent of disease on mere clinical examination. Varicose veins though presenting as a cosmetic deformity but in truth they are many times indicators of a more dangerous underlying disorder like deep venous thrombosis (DVT). CVI per se is rarely a fatal disorder but it causes significant morbidity in an affected patient.[2,3]

Ultrasonography combined with Doppler imaging has been found to useful in the mapping of venous anatomy of lower limbs. Also it is very sensitive to identify thrombus, site of venous incompetence and provide dynamic assessment of the hemodynamic status of the vessel. Thus Doppler ultrasound imaging is safe, non invasive cheap, easily available, reproducible investigation for study of lower limb vasculature.[4] This study aims to evaluate the role of Doppler ultrasound in lower limb chronic venous insufficiency.

Materials and methods: Prospective cross sectional study carried out in the department of Radiodiagnosis of a tertiary healthcare institute for a period of 1 year from December 2011 to December 2012. Total 28 patients with clinical complaints of CVI were evaluated using a Siemens Acuson X 300 ultrasound machine with color Doppler. Subjects in pediatric age group, those having burns or degloving injury to lower limb were excluded from the study. Dedicated Doppler ultrasound was performed on each patient, data collected and entered in master chart and analyzed using standard statistical software. Prior approval of institutional ethics committee was obtained.

Results: The patients were evaluated for etiology, involvement of vessels and level of incompetence and findings tabulated in table 1 to 3.

Table 1: Etiological classification of CVI.

Cause	Number	Percentage
Primary	18	64.28
Secondary to DVT	9	32.14
Congenital	1	3.57
Total	28	100

Table 2: Distribution of varicosities in CVI.

	GSV	SSV
Left	15	6
Right	7	3
Total	22	9
Percentage	70.96	29.03

*Total 31 as bilateral involvement in 3 cases.

Table 3: Distribution based on site of incompetence.

Level	Bilateral	Unilateral	
		Right	Left
SFJ	2	5	9
SPJ	1	3	5
Above ankle	1	1	0
Below knee	2	5	6
Mid Calf	2	4	10
Above Ankle	3	4	9

Discussion: In our study In our 28 cases diagnosed with CVI 18 cases were of primary origin while 9 were secondary to underlying DVT and only one case was of congenital origin. Thus primary cases of CVI predominated in our study. The single case of congenital CVI was diagnosed to be Klippel-Trenaunay syndrome. However it is important to identify cases secondary to DVT as it may be their sole manifestations. DVT can complicate into pulmonary thromboembolism which is a life threatening condition.[5] In all the cases of CVI varicosities had a predominance of Great

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saphenous veins (GSV) with involvement in 70.96% cases and Short saphenous vein (SSV) was involved in 29.04% of cases. Incompetence of saphenofemoral junction (SFJ) was noted in 16 (51.67%) cases and out of these 10 cases had dilated superficial venous systems. Saphenopopliteal junction (SPJ) incompetence was noted in 9 (29.03%) cases out of which 4 had dilatation of superficial venous system. This is in accordance with a study done by Engelhorn et al[6] who found reflux involving GSV in 77% cases and SSV in 36% cases of CVI. Perforator incompetence was noted in 24 cases with below knee, mid calf and above ankle perforators involved in 13, 16 and 16 cases respectively. This correlated with the study done by Dellis et al[7] who found that IPV's are located predominantly on the medial aspect of lower extremity. In that also middle third of calf is the most common site to be involved followed by lower calf and middle thigh. Clinically severe CVI is associated with large number of IPV's and they have predominantly calf involvement.

Colour Doppler findings in CVI: In our all cases of CVI the reflux was assessed qualitatively only. As the quantitative methods are cumbersome and involve calculations and even complex software programming hence were avoided. Reflux which was directed towards the transducer was seen as red on color flow imaging. Spectral Doppler sample showed increase in amplitude of spectral waveform and audible signal in 90% of cases. Valsalva maneuver and compression tests were done at all the levels of superficial to deep communications. Positive reflux was taken as detectable flow seen as red in colour in varicosities on release of compression or identification of flow on valsalva. Positive reflux was seen in 95% of cases. These results are similar to the findings of Engelhorn et al.[6]

Conclusion: This study proves that Doppler ultrasound imaging is an excellent tool to not only identify the possible etiology but also to locate the level of insufficiency and should be routinely used as a screening tool to identify chronic venous insufficiency of lower limbs. The limitations of our study were small sample size and use of only qualitative methods to identify reflux. Hence more studies with a larger sample size and use of quantitative methods should be undertaken in future.

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