



## Clinical spectrum of findings in deep venous thrombosis of lower limbs referred for color Doppler ultrasound.

### KEYWORDS

Anxiolytic, Diltiazem, Potentiation.

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### ABSTRACT

**Background:** Deep venous thrombosis (DVT) of lower limbs is one of the most common cause for the majority of deaths caused by pulmonary embolism. Many medical and surgical disorders are complicated by DVT. Most venous thrombi are clinically silent. B-mode and color Doppler imaging is needed for early diagnosis of DVT to prevent complications and sequelae of DVT. **Aim and Objectives:** The objective is to study the spectrum of clinical findings in patients with DVT, referred for Colour Doppler Materials and Methods: 50 patients irrespective of age and sex belonging to the rural population were evaluated in Doppler ultrasonography division for diagnosis of possible DVT. **Results:** The range of age of patients with suspected DVT in our study was 20-79 years, 24 (48%) were females, with 14 (45.16%) showing evidence of DVT. Males contribute a major group (52%) in our study of cases with suspected DVT and they also have a higher incidence (54.84%) of positive Doppler study. The symptoms that prompted for Doppler examination were pain in 9 patients (18%), edema in 19 (38%), pain and edema in 17 (34%), symptoms of pulmonary embolism in 3 (6%), prior history of DVT in 8 (16%) and 3 (6%) patients were asymptomatic. **Conclusion:** Leg swelling is most common presentation of patients for Color Doppler referred for DVT in symptomatic and at risk patients.

### Introduction

Venous thromboembolism (VTE) is a significant, but relatively under diagnosed health problem. The threat of deep venous thrombosis (DVT) and pulmonary embolism (PE) is a daily concern in intensive care unit (ICU), hospitalized and bedridden patients. Early diagnosis of DVT is mandatory to prevent unnecessary deaths from PE. The incidence of DVT varies in different parts of the world for reasons that are not yet completely understood. Though, some of the recent studies published from other Asian countries have shown that DVT is not a rarity in Asian patients as was thought earlier. The incidence of DVT in the general population has been estimated to be 80-100/1,00,000 annually in the western societies, 4-75/1,00,000 in South-Asia.

In India, the incidence of DVT is not well highlighted and literature survey shows scanty works in this field. Most of the literature available in India is from the orthopedic departments, overall incidence of DVT in the general population is largely unknown.

Though potentially preventable clinical condition, DVT of the lower limbs is associated with major surgeries, prolonged immobilization such as in acute myocardial infarction, CCF, stroke and postoperative convalescent. Other risk factors to mention the few are neoplasms, pregnancy, oral contraceptive pills and hypercoagulable states.<sup>1</sup>

A DVT occurs along a continuum with propagation, extension and progression. The early diagnosis of DVT is very important to prevent the complications and sequelae by early and appropriate treatment installation.

It would be impractical and detrimental to place everyone who has a clinical suspicion of DVT of lower limbs on a hospital course of anticoagulation with heparin, but not to treat patients with signs and symptoms of progressive DVT of lower limbs may lead to death. Hence a need of an objective technique to supplement the clinical diagnosis.<sup>2</sup>

Impedance plethysmography is a physiologic test that measures changes in venous capacitance during physiologic maneuvers and detects abnormalities in the venous outflow. The predictive value of this test for detecting occlusive thrombi of proximal veins is

approximately 90%.

However it has low sensitivity for detection of calf thrombi, is highly operator-dependent and gives false negative results in the presence of non occluding thrombi, prominent collaterals or a duplication anomaly of the deep venous system. False positive results can occur in patients with CCF, venous insufficiency and extrinsic venous compression.<sup>4,3</sup> The chief drawback of radiolabelled fibrinogen scanning is the 48-72 hour delay in obtaining the results, the tagged fibrinogen not getting incorporated into mature thrombi after the patient has been anticoagulated, recent leg surgery giving a false "hot" spot and accuracy limited to above the lower thigh; thereby limiting it as an acute diagnostic tool.<sup>5</sup>

The introduction of Doppler ultrasound technique has irrevocably altered the diagnosis and treatment of DVT. The rationale is quite simple: thrombotic obstruction of the underlying vein distorts the venous flow pattern and these perturbations are readily detected by the Doppler instrument.<sup>6</sup>

This technique is non invasive, repeatable, can be performed pattern and these perturbations are readily detected by the Doppler instrument. This technique is non invasive, repeatable, can be performed rapidly in the clinic, at patient's bedside or even at home and the results are available immediately. It can be used in pregnant women, permits multiple views in various positions of the leg<sup>5,2</sup> and the study is safe, painless and inexpensive.<sup>6</sup>

Venous system is evaluated for flow, phasicity, pliability and augmentation. It is useful as a screening modality in high-risk patients to ensure prompt and early treatment. The duplex scan can diagnose many thrombi at a stage when no major changes have occurred in the venous haemodynamics and the patient is asymptomatic or minimally symptomatic.<sup>7</sup>

One especially frequent subject of criticism is that the Doppler is inaccurate below the knee in detection of venous thrombi. However, calf vein thrombosis itself is a controversial issue, with regard to whether it is clinically important and how best to diagnose it.<sup>8</sup> The present study aims to evaluate clinically suspected patients of deep venous thrombosis of lower limbs by Doppler ultrasound in rural

population.

**Materials And Methods:**

In the present study, the clinically suspected cases of deep venous thrombosis of lower extremities were evaluated by color Doppler ultrasonography. 50 patients irrespective of age and sex belonging to the rural population were evaluated in Doppler ultrasonography division for diagnosis of possible DVT. The referring physician suspected or wanted to rule out DVT. The study included outdoor, indoor and referred patients. Patients with pain in the lower limb particularly located to the calf (unilateral or bilateral), , Edema of lower limb (unilateral or bilateral), pain and edema combined ,cellulitis,prior history of deep vein thrombosis, post-traumatic patients,bedridden patients,postoperative patients,shortness of breath (rule out pulmonary embolism),pregnant and postpartum patients,patient with known neoplasm,oral contraceptive pill users were included in the study Specifications of the color Doppler ultrasonography machine. Manufacturer :General Electric, USA. Model: Logic 400 PRO series. Image storage: Hard disc. 140 of storage capacity: 600 images. Type of transducer: Linear Array. Frequency of Transducer: 3.5 Hz, 7.5 MHZ.

In all patients protocol was followed . Detailed clinical history was elicited with reference to onset, duration and progress of the symptoms and special reference to risk factors and any evidence suggestive of pulmonary embolism.

Patients with following symptoms pain in the lower limb particularly located to the calf (unilateral or bilateral),edema of lower limb (unilateral or bilateral), pain and edema combined,prior history of deep vein thrombosis,shortness of breath (rule out pulmonary embolism) were included in the study.

Thorough clinical examination of the patient was carried out. Review of all the previous radiological (chest radiographs, ultrasonography of abdomen and pelvis, Doppler ultrasonography of lower extremities in patients with prior history of DVT etc.) and pathological investigations was done. Lower extremities in patients with prior history of DVT etc.) and pathological investigations was done.

Standard examination would evaluate common femoral vein and superficial femoral vein first, followed by popliteal and calf veins. External iliac veins and IVC were evaluated at last.

The patient was examined in supine position with legs abducted and externally rotated with slight flexion of knee for evaluation of femoral venous segment. Patient was given prone position for evaluation of popliteal veins. Calf veins were evaluated in supine position and the knee slightly flexed, internally rotated for the anterior tibial veins and externally rotated for the posterior tibial and peroneal veins.

7.5 MHz linear array transducer was used for femoral and popliteal venous segments and calf veins while 33 MHz convex transducer was used for evaluation of iliac veins and inferior vena cava. The Doppler report described presence or absence of deep vein thrombosis, location, extent, nature (acute vs. chronic) and complications, if any.

**Results:**

**Table No. 1 Distribution of cases by signs and symptoms (Multiple Response)**

Symptoms	Cases with Suspected DVT (n=50)	Cases shown Evidence of DVT (n =31)		
		No.	Percentage (%)	No.
1. Pain	9	18	7	22.58

2. Edema	19	38	12	38.71
3. Pain And Edema	17	34	9	29.03
4. Pulmonary Embolism	3	6	1	3.23
5. Asymptomatic	3	6	3	9.68
6. Prior History of DVT	8	16	8	25.81

**Table No. 2 Clinical Conditions in study population for Doppler ultrasound examination for suspected DVT**

Clinical Conditions	Cases with Suspected DVT (n=50)	Cases showing Evidence of DVT (n =31)		
		No.	Percentage (%)	No.
1. Bedridden	14	28	7	22.58
2. Post-operative	3	6	2	6.45
3. Trauma	2	4	1	3.23
4. OC Pill users	2	4	2	6.45
5. Post-partum	2	4	1	3.23
6. Patient with known neoplasms	3	6	2	6.45
7. No known predisposing condition	24	48	16	51.61

**Discussion:**

The range of age of patients with suspected DVT in our study was 20-79 years, with mean age of cases suspected to have DVT being 52.6 years and mean age of cases shown to have DVT being 49.84 years. There is no association between the age of the patients and evidence of DVT of lower limbs against the suspected cases in this study.( x2= 3.77 and p>0.05). In their study series, Hill SL et al43 (1997) had found mean age of males shown to have DVT 60.3 years and females shown to have DVT 65.5 years.

Males contribute a major group(52%) in our study of cases with suspected DVT and they also have a higher incidence(54.84%) of

positive Doppler study. In the present study of the cases with suspected DVT, 24 (48%) are females, with 14 (45.16%) showing evidence of DVT. However there is no statistically significant difference between the sex of patients with evidence of DVT on color Doppler USG. ( $\chi^2=0.26, p > 0.05$ ).

The study by Hill SL et al<sup>14</sup> in 1995 found higher incidence of DVT in males in their study. In their study, 22.1 % of males and 15.2 % of females had positive studies.

The symptoms that prompted for Doppler examination were pain in 9 patients (18 %), edema in 19(38 %), pain and edema in 17(34%), symptoms of pulmonary embolism in 3(6%), prior history of DVT in 8(16%) and 3(6%) patients were asymptomatic. All the 3 asymptomatic cases were the one with prior history of DVT, on anticoagulation and had come for follow up study. Color Doppler ultrasonography revealed partial chronic thrombi in them.

In cases showing evidence of DVT; 7(22.58%) had pain as presenting symptom, 12 (38.71%) had edema, 9(29.03%) had pain and edema, 1 (3.23%) had symptoms of pulmonary embolism, 8 (25.81%) had prior history of DVT while 3(3.12%) were asymptomatic. Amongst the patients showing evidence of DVT, the common symptom suggestive of DVT was edema. This correlates with the study by Glover J et al<sup>34,9</sup> and Eze et al<sup>26,10</sup> who found 25 patients with unilateral leg swelling to have DVT in their study. In their study, 40% were found to have DVT by duplex scanning whereas DVT was evident in only 5 % of patients in the absence of leg swelling. This is explained by the venous physiology that when major venous channels are occluded, the resultant increase in venous pressure and volume manifests itself in edema.

This is in correlation with the study by Langsfeld M et al<sup>11</sup> in 1987 who found leg swelling as the most common sign in patients diagnosed to have DVT. In patients showing evidence of DVT who presented with edema, 91.66% had contiguous thrombosis and 8.34% had isolated thrombosis. In contiguous segment involvement, the edema is the common presentation due to occlusion of major venous channels. Isolated thrombosis does not cause edema due to extensive collateral circulation.

In present study of the 3 cases with bilateral symptoms, only one case with bilateral pain and edema showed evidence of thrombosis. However in the study by Colucciello SA<sup>12</sup> (2001) DVT never occurred in the patients with bilateral symptoms.

Color Doppler USG was advised to rule out DVT of lower limbs as the source of pulmonary embolism in 3 cases. This is based on the concept that majority of pulmonary embolism originate in lower extremity veins<sup>13</sup>. Lower extremity Doppler US evaluation of possible pulmonary embolism is based on the noninvasive nature of the study and the rapidity with which results may be obtained in institutions where technical support is readily available. The merit to this approach is supported when the diagnosis of DVT is confirmed, as the diagnosis of pulmonary embolism may be safely assumed in the appropriate clinical setting. Though insensitive, it is a specific approach to the diagnosis of pulmonary embolism.

Amongst the 3 patients with suspected pulmonary embolism, color Doppler USG revealed DVT in only one case who had left calf tenderness on clinical examination. Of the 2 cases with suspected pulmonary embolism and normal color Doppler USG, 1 case had symptoms of left leg pain while other did not have any symptom pertaining to DVT.

In present study both post operative, bed ridden cases with suspected DVT with pain and swelling of the operated limb demonstrated the presence of thrombus. 1 case was operated for bilateral osteoarthritis 2 months prior the examination and other, 3 months prior the examination for fracture of tibia. Though reported incidence is 50%

in orthopedics wards after major procedures<sup>14</sup> in our study it is 100 %. The discrepancy is probably due to small number of post-operative symptomatic cases in our study population.

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