



## Stage of involvement, type of occlusion, pattern of involvement of thrombi with evidence of DVT on Doppler Ultrasonography

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### ABSTRACT

**Background :** Venous thromboembolism (VTE) is a significant, but relatively under diagnosed health problem. Early diagnosis of DVT is mandatory to prevent unnecessary deaths from PE. The recent European Consensus Statement on the prevention of venous thromboembolism recognizes that the optimal duration of secondary prophylaxis is not known. The present study aims to evaluate stage of involvement, type of occlusion, pattern of involvement of thrombi in study population with evidence of DVT on Doppler Ultrasonography in rural population. **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. **Result :** In their study, 22.1 % of males and 15.2 % of females had positive studies. Amongst the 50 cases studied 31 showed evidence of DVT of which 20 cases were of acute thrombosis and 11 cases of chronic thrombosis. Follow up study was performed 4 times in a patient with acute complete thrombosis of left SFV and PV. Follow up study 3 weeks later demonstrated multiple collaterals in the calf region. 7 of 31 cases with evidence of DVT had come for follow up color Doppler USG. **Conclusion :** Probably it might have also contributed to the presenting symptom of pain in this case. This study shows different stages of involvement, type of occlusion, pattern of involvement of thrombi in study population with evidence of DVT on Doppler Ultrasonography.

### KEYWORDS

#### 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>2-5</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>

It can be used in pregnant women, permits multiple views in various positions of the leg and the study is safe, painless and inexpensive.<sup>7,8</sup>

Initial therapy of acute DVT is based primarily on objective diagnosis, usually ascending venography or, more recently, duplex imaging, whereas secondary prevention of recurrences relies on protocols recommending at least 3 months of treatment with oral anticoagulants. The recent European Consensus Statement on the prevention of venous thromboembolism recognizes that the optimal duration of secondary prophylaxis is not known.

The present study aims to evaluate stage of involvement, type of occlusion, pattern of involvement of thrombi in study population with evidence of DVT on Doppler Ultrasonography 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 MHz, 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.

## Result :

**Table No.1:**

### Stage of involvement in study population with evidence of DVT on Doppler Ultrasonography

	No. of Cases	% of Cases
Acute	20	64.52
Chronic	11	35.48
<b>Total</b>	<b>31</b>	<b>100</b>

**Table No.2**

### Type of occlusion in study population with evidence of DVT on Doppler Ultrasonography

	No. of Cases	Percentage of
Complete	21	67.74
Incomplete	10	32.26
<b>Total</b>	<b>31</b>	<b>100</b>

**Table No.3**

### Pattern of involvement of veins in thrombosis in study population with evidence of DVT on Doppler Ultrasonography

Thrombosis location pattern	No. of Cases	Percentage of Cases (%)
Isolated	5	16.13
Multiple Contiguous	25	80.64
Multiple Non Contiguous	0	0
Bilateral	1	3.23
<b>Total</b>	<b>31</b>	<b>100</b>

## 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. ( $\chi^2=3.77$  and  $p>0.05$ ). In their study series, Hill SL et al<sup>43</sup>

(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>43</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 Amongst the 50 cases studied 31 showed evidence of DVT of which 20 cases were of acute thrombosis and 11 cases of chronic thrombosis. All of these cases were started on anticoagulant therapy by the referring physician. One with free floating thrombus in CFV was referred to higher centre for further management. However only 7 cases diagnosed to have DVT had come for follow up color Doppler USG.<sup>9,10</sup>

The finding of partial chronic thrombus in right SFV persisted in a patient at follow up study 2 months later. The PV and distal SFV showing chronic echogenic thrombus in a patient with carcinoma of breast, started on anticoagulant therapy, reverted back to normal showing spontaneous flow and phasic changes at a follow-up interval of 4 months.

Follow up study was performed 4 times in a patient with acute complete thrombosis of left SFV and PV. The findings persisted on a follow up study 1 week later. Follow up study 3 weeks later demonstrated multiple collaterals in the calf region. At an interval of 3 months along with multiple collaterals, irregularity and narrowing of the SFV and PV were formed with patchy flow present on augmentation suggesting partial recanalisation. Follow up study of elderly, bed ridden patient with acute thrombosis started on anticoagulants, at an interval of 3 weeks showed complete echogenic thrombosis of FV. Another follow up study after 3 weeks, having started on anticoagulants for a partial acute thrombosis involving CFV, SFV and SVS with saphanofemoral junction involvement showed presence of echogenic thrombus in above veins.

In another patient with partial chronic thrombus in SFV, follow up study at an interval of 3 months was normal, except for the presence of intramuscular haematoma in the left popliteal fossa. In another middle age patient with acute complete thrombosis of CFV, SFV and. EIV follow up study at 1 month interval revealed echogenic thrombus in the above mentioned veins. The finding of chronic complete thrombosis in a middle age male patient persisted on follow up study.

As only the 7 of 31 cases with evidence of DVT had come for follow up color Doppler USG, no conclusion about the evolution of DVT can be drawn. Amongst the total 50 cases studied for suspected DVT of lower limbs, 31 cases showed the presence of thrombus. In 19 patients, although there was clinical suspicion of DVT of lowerlimbs, the color Doppler study was negative for DVT.

The data published by Sheiman RG et al<sup>88</sup> in 1995 and Strothman G et al<sup>92</sup> in 1995 indicates a low incidence of thrombus in contralateral extremity. This supports the unnecessary of bilateral examination in patients with unilateral extremity symptoms. However the examination of both the lower extremities is advisable in patients with signs or symptoms of pulmonary embolism, even though one extremity is symptomatic.<sup>105</sup> However according to Sumner DS and Lambeth A<sup>11</sup> in 1979 accuracy can be improved by performing bilateral studies so that flow at the same anatomic level can be compared. In present study, bilateral examination was performed on request of referring clinician in 17 cases with unilateral symptoms.<sup>12,13</sup>

11 cases (22%) in the study population demonstrated clinical conditions mimicking DVT, of which 1 was showing evidence of

DVT showed presence of Baker's cyst of which I had ruptured Baker's cyst at clinical presentation with pain and marked swelling of the calf, clinically indistinguishable from DVT cases showed evidence of cellulitis with subcutaneous swelling. Bursitis was found in 2 cases as the cause of pain in patients with suspected DVT of which one was associated with fasciitis.<sup>14</sup> In a patient with prior history of DVT, on anticoagulation and now complaining of pain in the left calf; inflamed bursa was found on the medial aspect of the left knee joint in infrapatellar region.

Additional finding of intramuscular haematoma was found in the left rectus femoris muscle in patient with polycythemia vera who also had Doppler evidence of partially recanalised thrombus in distal SFV.

Probably it might have also contributed to the presenting symptom of pain in this case. Intramuscular haematoma in the left popliteal fossa was found in a patient on anticoagulation with prior history of DVT.

This study shows different stages of involvement, type of occlusion, pattern of involvement of thrombi in study population with evidence of DVT on Doppler Ultrasonography

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