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Original Research Article

Deep vein thrombosis: experience from a tertiary care centre in central India

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ABSTRACT

Background: Deep vein thrombosis is a disease of potentially serious consequences and is still often unsuspected. The present study was undertaken to look into etiological factors, management approaches and complications in patients presenting primarily with DVT at a tertiary care centre.
Methods: This was a descriptive study profiling 75 confirmed DVT cases admitted at a tertiary care government hospital over two years. Detailed assessment included thorough clinical examination, duplex venous ultrasound and basic investigations, along with special investigations and CT angiography in selected few. Appropriate management was provided, and details recorded. Patients were followed up clinically and by ultrasound after 1 week, 2 weeks and 3 months. The complications, if any were also recorded.
Results: The mean age of participants was 39.5±14.4 years, with 28% between 30-39 years. Majority (40%) did not have any obvious predisposing factor and most of them presented with pain and swelling. Most (52%) of the cases had involvement of both proximal and distal veins, 45.33% cases had involvement of only proximal veins whereas only 2.67% had restricted involvement of distal veins. Around 60% of cases have complete clinical resolution and approximately 50% cases have complete ultrasonographic resolution at the end of 3 months.
Conclusions: Young adults without any obvious risk factors may develop and present with DVT and hence factors leading to thrombosis in them are recommended to be thoroughly evaluated. Duplex venous ultrasound is reliable non-invasive diagnostic modality and is recommended for diagnosis of DVT in clinically suspected cases.

Keywords: Deep venous thrombosis, Duplexvenous ultrasound, Management

INTRODUCTION

Often overlooked as an entity, venous thrombo-embolism (VTE) (encapsulating both deep vein thrombosis and pulmonary embolism) is the third most common cardiovascular illness after acute coronary syndrome and stroke, with pulmonary embolism being the commonest preventable cause of hospitalisation related deaths across world.[1] Deep venous thrombosis (DVT) was presumed to be a little less in occurrence in the Asian countries, a myth broken only recently.[2,3] Around 2.5 lac patients are identified as having an acute venous thrombo-embolic event in India annually.[3] Recent studies have shown that DVT is quite common among younger age groups and has been observed to be one significant cause of morbidity and mortality, in contrast to previous evidence depicting higher incidence in elderly.[4-7]

Due to often silent nature of the condition it has been difficult to estimate true incidence of VTE. Patients at times present with non-specific signs and symptoms making the diagnosis difficult; while, to initiate effective

treatment, it is imperative to diagnose the condition as early as possible. Most of the literature available in India is from the surgical disciplines and entails research on post-operative patients. Only a handful studies have focussed on profiling idiopathic DVT. With this research lacuna in mind, the present study was undertaken to look into etiological factors, management approaches and complications in patients presenting primarily with DVT at a tertiary care centre.

METHODS

The present study was prospective observational in design, conducted over duration of two years at a tertiary care government hospital in Central India. Ethical clearance was obtained from Institutional Ethics Committee prior to the commencement of study.

Inclusion criteria

- Patients presenting primarily with deep venous thrombosis,
- Diagnosis confirmed by venous Doppler and patient admitted to medicine wards of the institute,
- Patients giving consent.

Exclusion criteria

- Patients admitted for any other cause
- Patients developing DVT during hospital stay
- Patients with secondary DVT
- Patients developing DVT due to trauma.

A total of 75 patients fulfilling the mentioned selection criteria were finally recruited following written informed consent. After detailed history taking and physical examination, those patients presenting with clinical features suggestive of deep vein thrombosis were subjected to duplex venous ultrasound. The ultrasound was conducted by senior faculty from the department of radiology, who was not part of the study. Presence of thrombus, its characteristics and extent were recorded. Side and site of involvement were recorded and classified as 'Proximal' (above knee deep vein thrombosis, involvement of popliteal vein and above) and 'Distal' (below knee deep vein thrombosis, involvement of anterior and posterior tibial veins and soleal veins). Patients having simultaneous involvement of above and below knee veins were recorded as having both. Patients were followed up clinically and by duplex ultrasound after 1 week, 2 weeks and 3 months. Follow-up scans were categorized by the radiologist as 'no change', 'improved', 'worse', 'resolution' or 'chronic' on the basis of predefined radiological criteria.

Routine laboratory investigations such as complete blood count, peripheral smear, renal function test, liver function test, random blood sugar and baseline INR were done in all patients, along with ECG and chest x-ray. In addition, participants also underwent following fasting lipid profile, quantitative D-dimer levels (assessed by Nyco card reader), serum homocysteine levels (assessed by competitive chemi-luminescent assay) and serum anti-phospholipid antibodies. Those with clinical suspicion of pulmonary embolism were further subjected to CT pulmonary angiography.

All patients received anti-coagulation with heparin (either low molecular weight or unfractionated) and warfarin with regular INR monitoring as standard treatment of DVT. Heparin was continued for at-least five days with warfarin overlap and until two successive INR done at-least one day apart were within therapeutic range. Catheter directed thrombolysis and inferior vena cava filter placement was done in selected patients, if recommended based on standard indications and with due consideration of affordability.[8] All patients were followed up to look for development of complications such as recurrence, post-thrombotic syndrome and pulmonary embolism.

Chi-square test and student 't' test were used to compare categorical data and continuous data respectively. SPSS (version17) was used for statistical analysis.

RESULTS

In this descriptive study profiling primary DVT cases admitted at a tertiary care hospital, 120 patients presented with symptoms and signs suggestive of deep vein thrombosis such as pain, swelling and tenderness of affected extremity. All of them were subjected to duplex venous ultrasound of affected limb to confirm the diagnosis of DVT. Seventy five (62.5%) cases out of total 120 had evidence of thrombosis in deep veins and fulfilled the mentioned selection criteria. These 75 cases were considered for final analysis. The mean age of participants was 39.5±14.4 years, with a major chunk (21, 28%) belonging to the age group of 30-39 years. There was insignificant male preponderance with M:F ratio of 40:35 (1.14:1).

History and clinical examination led to observation of some important trends. All patients presented with pain and swelling of affected extremity. Similarly, edema and tenderness were observed in all cases. Homan's sign was positive in 37 (49.33%) cases, while skin changes in the form of erythema, discoloration, blebs etc. were present in 21 (28%) cases. Majority of the cases (30, 40%) did not have any obvious predisposing factor.

This was followed by smoking (17, 22.67%), hyperhomocysteinemia (11, 14.67%), hypertension and pregnancy or post-partum status (8, 10.67% each), and prolonged immobility, prior venous thromboembolism, malignancy and chronic kidney disease (CKD) in 5 (6.67%), 4 (5.33%), 3 (4%) and 1 (1.33%) cases respectively. Eleven (14.67%) participated reported to have multiple risk factors. None of the cases tested positive for anti-phospholipid antibodies. Similarly, none of the subjects had history of oral contraceptive use (Table 1).

Table 1: Findings on history and clinical examination (n= 75).

Finding	Number	Percent
Predisposing factor		
No known predisposing factor	30	40
Smoking	17	22.67
Multiple risk factors	11	14.67
Hyperhomocysteinemia	11	14.67
Hypertension	8	10.67
Pregnancy/post-partum	8	10.67
Prolonged immobility	5	6.67
Prior thromboembolism	4	5.33
Malignancy	3	4
Others	2	2.67
Dyslipidemia	1	1.33
CKD	1	1.33
Clinical presentation		
Pain	75	100
Swelling	75	100
Edema	75	100
Tenderness	75	100
Homan's sign	37	49.33
Skin changes	21	28

Mean value of hemoglobin, D-Dimer and serum homocysteine were 10.59±2.52 g/dL, 2.73±0.98 mg/L and 19.00±13.89 µmol/L respectively. Out of total 75 cases, chest x ray was found to be normal in majority (69, 92%) of the cases, while cardiomegaly was seen in 3 (4%), dilated pulmonary artery in 2 (2.67%) and consolidation in 1 (1.33%) cases.

ECG, Likewise, was also normal in majority (65, 86.67%) of the cases, with 4 (5.33%) cases each having findings suggestive of left ventricular hypertrophy and sinus tachycardia. Left ventricular strain pattern and right bundle branch block were observed in 1 (1.33%) case each.

Duplex venous ultrasound was undertaken revealed that 39 (52%) had involvement of both proximal and distal veins, 34 (45.33%) cases had involvement of only proximal veins whereas only 2 (2.67%) had restricted involvement of distal veins. 57 (76%) cases had involvement of left lower limb. DVT on the right side was observed in 16 (21.33%) cases and 2 (2.67%) had bilateral involvement.

Details of management of all the cases are as detailed in Table 2. All cases received anticoagulation, 56 (74.67%) received low molecular weight heparin and 19 (25.33%) patients were given unfractionated heparin. Four patients (5.33%) underwent catheter directed thrombolysis along with IVC filter placement, whereas only IVC filter placement was done in 5 (6.67%) cases. All of the cases who underwent catheter directed thrombolysis had IVC filter placement done prior to thrombolysis to prevent embolisation of clots. Rest of the 66 (88%) cases did not receive any intervention.

Table 2: Management details of the participants (n= 75).

Management details	Number	Percent
Type of heparin received		
Low molecular weight heparin	56	74.67
Unfractionated heparin	19	25.33
IVC filter placement and catheter directed thrombolysis (CDT)		
Only IVC filter placement	5	6.67
Catheter directed thrombolysis with IVC filter placement	4	5.33
No intervention	66	88

All the cases were followed up clinically as well as by duplex ultrasonography, at the end of first week, second week and then at 3 months post discharge. Clinically, at the end of first week, 11 (14.67%) cases had no resolution of signs and symptoms, partial resolution was observed in 63 (84%) cases and 1 (1.33%) had complete resolution. But after three months of follow up, 48 (64%) cases had complete clinical resolution.

On duplex ultrasonography, improvement was noticed in 47 (62.67%) cases whereas there was no change in 26 (34.67%) cases and resolution in 2 (2.67%) cases by the end of first week. After 2 weeks, there was improvement in 67 (89.33%) cases, no change in 3 (4%) and resolution in 5 (6.67%). At the end of 3 months, resolution was seen in 36 (48%) and improvement in 14 (18.67%) cases. However, 15 (20%) cases developed chronic changes. Total 10 (13.33%) cases were lost to follow up (Table 3).

Table 3: Follow-up outcome details of the participants (n= 75).

Follow-up outcome	Follow-up timeline		
	After 1 Week	After 2 weeks	After 3 months
Clinical outcome			
No resolution	11 (14.67%)	0 (0.00%)	0 (0.00%)
Partial resolution	63 (84%)	64 (85.33%)	17 (22.67%)
Complete resolution	1 (1.33%)	11 (14.67%)	48 (64%)
Duplex venous ultrasonography outcome			
No change	26 (34.67%)	3 (4.00%)	0 (0.00%)
Improved	47 (62.67%)	67 (89.33%)	14 (18.66%)
Resolution	2 (2.67%)	5 (6.67%)	36 (48.00%)
Chronic	0 (0.00%)	0 (0.00%)	15 (20.00%)

At 3 months follow-up, when duplex ultrasonography findings were compared between those with both proximal as well as distal DVT versus those with only

proximal involvement; in cases with both proximal and distal involvement, 11 (28.2%) cases had findings suggestive of improvement, whereas in proximal group only 3 (8.82%) cases showed improvement, the difference being significant. But when the clinical outcomes were compared at 3 months, the difference in resolution was not statistically significant.

As for complications, post-thrombotic syndrome was observed to develop in 6 (8%) cases and pulmonary embolism in 3 (4%) cases. Recurrence of DVT was observed in 2 (2.67%) cases and 2 (2.67%) cases developed coagulopathy as an adverse effect of treatment.

DISCUSSION

The present study was carried out on 75 cases of deep vein thrombosis admitted in medicine wards over a period of 2 years. The objectives were to establish diagnosis of DVT by Doppler venous ultrasound in cases presenting with signs and symptoms of DVT, to study clinical profile including predisposing factors in cases presenting primarily with DVT and to look for clinical and ultrasonographic outcome of DVT after three months.

Out of 120 cases presenting with clinical features of DVT, 75 (62.5%) had duplex venous ultrasound proven thrombosis, which is largely in line with available evidence, except in the study by Lensing et al, in which the low proportion (35%) could have been due to only femoral and popliteal veins being examined.[9-11] The age and gender distribution of in the present study is also similar to majority of previous similar studies.

DVT is known to present with pain, swelling and tender edema, which held true in the present study as well. Other commonly observed clinical features were Homan's sign (49.33%) and various skin changes (erythema, discoloration, blebs etc.) (28%), which were similar to previous observations.[6,7,12] No predisposing factor was identified in majority (40%) of the participants. Chinglensena et al, also had not identified any risk factors in 45% cases and Kamerkar et al, did not find any known predisposing cause in 47.49% of their cases, similar to our finding.[6,7] In the Prospective Registry On Venous thromboembolic Events (PROVE) also, it was concluded that the overall incidence of idiopathic DVT was similar to the incidence of DVT occurring after a precipitating event.[13] Hereditary thrombophilia could have been the predisposing factor in cases without any obvious risk factor, as reported by Kreidy et al.[14] However, authors could not test for same due to lack of facility and cost restrictions. Smoking (22.67%) was the single most common identifiable predisposing factor observed in the present study. Kasabe et al, in their study on 50 cases with DVT, reported smoking to be most prevalent risk factor (46%), the number being this high probably due to relatively lenient definition of smoking as having 'ever smoked'.[15] The observation of multiple risk factors in 14.67% cases is similar to that of Kreidy et al, in which more than 3 risk factors were reported to be present in 19.3% of cases.[14]

Cases with both proximal and distal involvement had significantly higher D-Dimer values as compared to those with only proximal DVT, which is to be expected because of more fibrinolysis. Eleven (14.67%) cases had raised serum homocysteine levels. These findings correlate well with previous similar studies.[16,17] DVT was observed to occur more commonly during post-partum period, especially after caesarean section, and with left-sided predominance, which is in accordance with available evidence.[18-20]

As for treatment implications, patients managed with catheter directed thrombolysis (CDT) had faster resolution, both clinically and on DVU, much in line with observations from previous similar studies.[21,22]

After 3 months of follow-up, both proximal and distal DVT cases were compared with those with only proximal DVT, both clinically and on DVU. On DVU, cases with only proximal DVT had significantly higher proportion of improvement in comparison to those with both proximal and distal DVT. Schweizer et al, had also observed similar findings on follow-up DVU after 3 months in his study evaluating short and long term outcomes after thrombolytic treatment of deep vein thrombosis.[22] This was the only point of significant difference between the two groups at 3 months follow-up.

Study of complications showed development of pulmonary embolism in 3 (4%) patients. Kasabe et al, observed it to occur in 4% cases, which is similar to our study.[15] The rate of recurrence of DVT (2.67%) is also similar to previous observations.[8,23]

In conclusion, it can be said that, young adults without any obvious risk factors may develop and present with DVT and hence factors leading to thrombosis in them are recommended to be thoroughly evaluated. Duplex venous ultrasound is reliable non-invasive diagnostic modality and is recommended for diagnosis of DVT in clinically suspected cases.

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