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**Original Research Article****Prevalence of deep vein thrombosis with lower limb trauma patients****Smit Shah\*<sup>1</sup>, Rushay Bhalodia<sup>2</sup>, Krunal Patel<sup>3</sup> and P. P. Golwala<sup>4</sup>**<sup>1</sup>Assistant Professor, Department of Orthopaedics, SBKS Medical Institute & Research Centre, Piparia<sup>2</sup>Resident, Department of Orthopaedics, SBKS Medical Institute & Research centre, Piparia<sup>3</sup>Senior Resident, Department of Orthopaedics, GMERS, Gotri<sup>4</sup>Professor and Head, Department of Orthopaedics, SBKS Medical Institute & Research Centre, Piparia**\*Correspondence Info:**

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E-mail: [smitshah506@gmail.com](mailto:smitshah506@gmail.com)**Abstract****Introduction:** Venous thromboembolism (VTE), which consists of deep vein thrombosis (DVT) and pulmonary embolism, is a potentially fatal condition. According to the Western literature, DVT of lower limb veins is one of the most common complications following surgeries for lower limb fractures and arthroplasty. Very few studies have been published from India on the subject and very little is known about the true prevalence in India.**Material and Method:** A study to determine the prevalence of DVT and its complication was done from September 2011 to June 2013 in 125 patients with lower limb trauma in Dhiraj General Hospital Piparia which is a tertiary care centre in a rural area.**Results:** In our series of 125 patients, 107 were male and 18 female (M: F=5.9:1). Out of them 6 patients were DVT positive (4.8%). Amongst them 3(2.4%) had proximal DVT and 3(2.4%) had distal DVT. Only 1 had pulmonary embolism.

Out of 47 patients with periacetabular fractures, 4 (8.51%) developed DVT and Out of 8 patients with floating knee injury, 2 (25%) developed DVT.

Combination of risk factors rather than a single risk factor had played important role for development of DVT in our study.

**Conclusion:** Prevalence of DVT is low in Indian population thereby avoiding the need for chemoprophylaxis in all patients. However based on fracture geometry and co morbid conditions chemoprophylaxis may be justified in few individuals.**Keywords:** lower limb trauma, DVT, PE, prevalence, color Doppler**1.Introduction**

Deep vein thrombosis (DVT) means a blood clot (thrombus) in the deep venous system of the leg. DVT is not dangerous in itself. The situation becomes life-threatening when a piece of the blood clot breaks off (embolus), travels downstream through the heart into the pulmonary circulation system, and becomes lodged in the lung which could be life threatening. Hence early diagnosis and treatment of a deep venous thrombosis (DVT) is essential to prevent this catastrophe.

Deep vein thrombosis (DVT) and pulmonary embolism (PE), known collectively as

venous thromboembolism (VTE), affect an estimated 900,000 people in the U.S. each year resulting in several hundred thousand hospitalizations and about 300,000 deaths[1]. In general surgical patients without prophylaxis against VTE, the incidence of DVT has been reported to be as high as 30%, with an associated fatality risk of 1% [1].

Low incidence has been reported in Asians and it can be attributed to several factors like high fibrinolytic activity, complete lack of Activated Protein C resistance, a higher incidence of blood group 'O', low intake of fat, lower incidence of

obesity and climatic differences [2-6]. Some workers have shown that even established thrombi in Asian patients resolve spontaneously without any long-term consequences[7][8].

The reported lower incidence of DVT could also be because of the lack of awareness among the doctors and the patients, and availability of diagnostic facilities in this part of the world; thus many of the cases remain undiagnosed.

Most of the studies which have reported very low incidence of DVT in India have been conducted in patients undergoing elective orthopedic surgery and used color duplex for diagnosis

Kakkar *et al*[9] in their review article have stated that the Indian perspective on this topic is lacking due to the non-availability of published Indian data.

Hence in the absence of any study in this population under the high-risk condition of trauma, it is unwise to assume that Indians are genetically protected against VTE after Trauma.

Some recent studies report an increasing incidence of VTE in the Indian subcontinent[10][11]. The increased incidence is attributed to increased life expectancy, changing lifestyle and better methods of diagnosis[11]. Clinical signs are insensitive to the diagnosis of VTE. This is especially true in trauma patients in whom lower limb swelling, pain, chest pain, breathlessness and fever can all occur due to injury *per se*. [12]

The above facts clearly bring out the need to study the prevalence of DVT with lower limb trauma in Indian patients by an authentic as well as a practical approach to plan a generalized management of DVT and avoid its catastrophe.

## 2. Materials and methods

A study was conducted on 125 patients having lower limb fractures (excluding foot fractures and grade III compound fractures) in a tertiary care centre in a rural area from September 2011 to June 2013.

They were thoroughly evaluated based on history, fracture pattern, associated injuries and co morbid conditions along with colour doppler pre operatively. Only DVT positive patients were given chemoprophylaxis. No mechanical or chemoprophylaxis was given to rest of patients.

They were operated according to the fracture. No mechanical or chemical prophylaxis was administered even in the postoperative period. They were evaluated daily for signs and symptoms of DVT like pedal edema, calf-pain, calf tenderness (positive

Homan's sign), and erythema during their course in hospital.

Color doppler ultrasonography of traumatic lower limb was performed on 4<sup>th</sup> post operative day in every patient. The Doppler assessment included examination of bilateral common femoral, superficial femoral, popliteal, anterior tibial and posterior tibial veins. They were assessed for flow, visualized thrombus, compressibility and augmentation. A diagnosis of DVT was made where there was visualization of thrombosis, absence of flow, lack of compressibility or lack of augmentation. In DVT positive patients initially LMWH (0.6) subcutaneously O.D. was started. Activated partial thromboplastin time (APTT) was closely monitored and was maintained at 1.5-2.5 times control. Tab. Warfarin-5 mg per day was commenced simultaneously and international normalized ratio (INR) was monitored every two days. When therapeutic level of INR (between 2 and 3) was achieved, LMWH was discontinued. Warfarin was continued till the recanalisation occurs.

A repeat doppler study was performed at 3 months post-operatively in every patient. The DVT positive patients who did not show recanalisation at 3 months post operatively were subjected to a repeat color doppler study at 6 months post operatively.

## 3. Observation and discussion

Out of 125 patients 107 patients are male (85.60%) and 18 patients are female (14.40%) with the Male: Female ratio 5.9:1 in accordance with male predominance seen in trauma series. [M: F- 6:1][13][14][15].

As young population is more active and mobile, they are more prone to road traffic accidents. More often they use two wheelers and hence have more chances of lower limb trauma. Most of the patients of our series are from younger age group (21-60years; 72.8%) with the mean age of 52 years (age range 14-90 years). Our demographic profile of patients is comparable to others studies. In Rajagopalan *et al* study; it was found 54% patients were from age group 21-60 [13][16].

Out of 125 patients 66 patients (52.8%) were operated after 5 days of trauma and out of 66 patients 4 patients (6.06%) developed DVT in our study. So an association can be between delay in surgery and the development of DVT, a finding similar to Sharma *et al*[14], Bagaria *et al*[15] and Stannard *et al*[17] who reported significant association of VTE with prolonged period of immobilization, which fits with current

understanding of VTE pathogenesis (haemostasis due to immobilization).

Most common type of fracture in our study was inter trochanter (34) followed by upper third tibia-fibula (25), lower third tibia-fibula (18) and shaft femur (17). Thus out of 125 patients, most commonest presenting fractures were peri-acetabular fractures [47 patients (37.6%)] which included acetabular fractures, inter trochanteric fractures and neck of femur fractures. It was followed by fractures around knee [20 patients (16%)] and floating knee injuries [8 patients (6.4%)]. Most of the patients were treated by closed reduction and internal fixation (70/124).

1 patient was diagnosed to have DVT pre operatively and was started with chemoprophylaxis,

but the relatives did not agree for operative intervention and further treatment and took the patient home. He died after 14 days.

Rest 5 patients were diagnosed to have DVT on colour Doppler done on 4<sup>th</sup> post operative day. In our series of 125 patients, 12 patients had clinical features of DVT post operatively. Among them 5 patients (41.66%) were diagnosed DVT positive. Out of 6 DVT positive patients, 1 clinical feature was present in 3 patients (50%), 2 clinical features were present in 1 patient (16.66%), 3 clinical features were present in 1 patient (16.66%) and 1 patient (16.66%) had no clinical features of DVT as shown in **Table 1**. The most frequent clinical feature in our DVT positive (6) patients was edema (83.33%), followed by calf tenderness (33.33%), calf pain (16.66%).

**Table 1: Distribution of clinical features of DVT**

Clinical features of DVT	Present in Number of DVT positive patients
Oedema	5(83.33%)
Calf pain	1(16.66%)
Calf tenderness (positive Homan's sign)	2(33.33%)
Erythema	0(0%)

In DVT positive patients chemoprophylaxis was given and they were followed by repeat Doppler at 3 months and 6 months as needed. Thus all patients were evaluated for a minimum of 6 months. [Average follow up is 8.5 months (6-11 months)]

In our series, all 3 distal DVT patients showed recanalisation within 3 months post operatively without single episode of PE. Among them 1 patient showed recanalisation even without anticoagulant therapy. Mavalankar *et al* [18] in his study did not administer anticoagulants to the patients

with distal DVT, even though resolution of thrombosis occurred in all of them.

Out of 3 proximal DVT patients, one had episode of PE and died because of that. One patient took longer time (6 months) for recanalisation where as one showed recanalisation at 3 months postoperatively.

By looking at these 6 positive patients significant correlation between ages, type of fracture, prolonged immobilisation, surgical duration and development of DVT found [**Table 2**].

**Table 2: Likely vulnerable factors for DVT**

Likely vulnerable factors for DVT	DVT positive Patients					
	1	2	3	4	5	6
Age (years) & sex	72/M	33/F	76/M	60/M	45/M	74/F
type of fracture	Peri-acetabular	Floating knee injury	Peri-acetabular	Peri-acetabular	Floating knee injury	Peri-acetabular
co morbid condition	SE	none	SE	SE	none	HT,SE
injury operation interval	18days	14days	Not applicable	6 days	1day	60days
duration of surgery(hrs)	2	4	Not applicable	2.5	4	3
more than one fractures in ipsilateral lower limb	no	yes	no	No	yes	no
No of risk factors present	3	3	2	5	2	4

SE- senility, HT – hypertension

Though age is uncertain as a risk factor, we found an increasing evidence of thrombosis with greater age. In our study, out of 6 DVT patients

4(66.7%) patients were  $\geq 60$  years of age. This reconfirms the results of studies carried out by Sharma *et al* [14] in which 81% DVT positive

patients were > 60 years of age group; Mavalankar *et al*[18] in which all DVT positive patients were >60 years of age group. Changes in the vessel wall, blood flow and compromised cardiovascular status with age could be the reason for this.

Male: Female ratio among DVT positive patients is 2:1. We could not find any correlation of type of sex and DVT as numbers of female patients (18) are less compared to male (107) in our study.

Out of 6 DVT positive patients, 4 had periacetabular fractures and 2 had floating knee fractures. Out of 47 patients with periacetabular fractures 4(8.51%) had developed DVT. None of the 20 patients with fractures around knee had developed DVT. Out of 8 patients with floating knee injury, 2(25%) had developed DVT. These findings are correlated with Sharma *et al*[14] in which 19.6% developed DVT from 112 hip fracture patients, Bagaria *et al*[15] in which 6.8% developed DVT from 102 proximal femoral fracture patients and Sen *et al*[13] in which 28.6% developed DVT from 56 pelvi-acetabular fracture patients. This facts show clearly that the proximity of fractures to hip and knee increase risk of DVT.

Our study showed that surgery lasting for more than two hours was associated with significant risk of development of VTE as out of 6 DVT positive patients 4 patients(66.67%) had>2 hours operative period. Our findings are correlated with the study carried out by Sen *et al*[13] and Bagaria *et al*[15].

We also saw that a combination of risk factors rather than a single risk factor has more importance for development of DVT. Patients who developed DVT in our study had combination of 3 or more risk factors except one young patient with floating knee injury. This fact was also observed by Sharma *et al*[14] and Bagaria *et al*[15].

#### 4. Summary

- In our series of 125 patients,107 were male and 18 female( M: F =5.9:1)
- More than 5 days immobility was present in 66 patients (52.8%)
- Majority of our patients had peri-acetabular fractures [47patients (37.6%)] followed by fractures around knee [20 patients (16%)] and floating knee injury [8 patients (6.4%)].
- No chemoprophylaxis or mechanical prophylaxis was given to any of our patients pre-operatively.
- 6 patients were DVT positive (4.8%). Amongst them 3(2.4%) had proximal DVT and 3(2.4%) had distal DVT. There was only 1 case of PE.

- a combination of risk factors rather than a single risk factor has more importance for development of DVT

#### 5. Conclusion

We believe that though there is enough evidence in the Western literature to advocate routine thromboprophylaxis for patients undergoing total joint replacement and surgery for fractures of lower limb, there is not yet enough evidence to justify the same for Indian patients undergoing major lower limb surgery.

From our study, it appears that DVT and PE in Indian patients with lower limb trauma is a fairly low-incidence problem and hence pharmacological prophylaxis should be used only for the high-risk patients (having combination of risk factors like advanced age >60 years, comorbid conditions, peri-acetabular or floating knee injury, immobilization more than 5 days, surgery lasting more than 2 hours) in whom the potential benefits clearly appear to outweigh the risks. However, a close clinical monitoring with a high level of suspicion for DVT and pulmonary embolism must be exercised.

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