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## Evaluation of incidence of deep venous thrombosis and its associated risk factors in proximal femoral fractures

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### Abstract

About 2-5% of people experience deep-vein thrombosis (DVT) during their lives. Death, disease recurrence, post-thrombotic syndrome, and excessive bleeding due to coagulant medications are among the most important DVT complications. Proximal femoral fractures can cause increased risk of DVT due to its prolonged recumbency. In this study, we evaluated 120 patients with age > 40years to study incidence of DVT and associated risk factors for its development.

**Keywords:** deep vein thrombosis (DVT), immobility, risk factor

### Introduction

Deep vein thrombosis (DVT) is the formation of thrombus in deep veins of the lower limbs. Although not very dangerous itself, DVT can give rise to pulmonary embolism (PE) which is a life-threatening condition. Hence, timely diagnosis and treatment of DVT is essential.<sup>1</sup>

There is increased risk of DVT following proximal femoral fractures due to prolonged recumbency before and after surgery.<sup>2</sup> The fact that proximal femoral fractures are seen more commonly in the elderly age group further increases its chances as the prevalence of other risk factors like cardiovascular diseases, hypertension and diabetes is relatively more and also because immobilisation tends to be longer in these patients.

Although studies in the West have reported incidences of DVT as high as 50% following lower limb trauma warranting chemoprophylaxis,<sup>3</sup> the researches in the Indian setting although limited in number have reported a lower incidence of DVT, accounting it to lack of awareness among the doctors and patients and availability of diagnostic facilities leading to cases remaining undiagnosed, and several other factors like high fibrinolytic activity, complete lack of activated protein C resistance, low intake of fat, lower incidence of obesity and climatic differences.<sup>4</sup> Some recent studies though have reported an increasing incidence of DVT in the Indian subcontinent due to increased life expectancy, changing lifestyle and better methods of diagnosis.

Due to the scarcity of published data in the Indian setting, our knowledge in this field is limited. We, through our study, aimed to fill this lacuna by assessing the incidence of DVT, and the associated risk factors, following proximal femoral fractures and whether or not chemoprophylaxis should be indicated, keeping in mind its reported adverse effects.

### Materials and Methods

This prospective observational study was conducted at UCMS & GTB Hospital, Delhi from October, 2017 to March, 2019. 120 patients of either sex aged more than 40 years with proximal femoral fractures (neck femur, intertrochanteric femur, sub-trochanteric femur) were included in the study. Socio-demographic data of the patients was recorded and the risk factors were documented by taking a detailed history, which included assessment of smoking and alcohol consumption, comorbidities such as diabetes mellitus and hypertension, presence of varicose veins, chronic use of steroids, old age (especially more than 60 years), and prolonged bedridden conditions. In patients awaiting surgery, local examination was done to evaluate for

Clinical signs to suggest DVT including swelling and tenderness over calf, skin discoloration, neurovascular status of the limb and prominence of superficial veins. Each patient was subjected to venous colour Doppler of the affected lower limb at 3rd to 5th post-injury day and subsequently at weekly intervals till the patient was subjected to surgery. All patients were operated as in the normal course of the treatment depending upon the age of the patient, type of femoral fracture and as per respective indication (osteosynthesis or arthroplasty). Other parameters that were documented included injury-surgery duration, duration of surgery, signs and symptoms of DVT (daily assessment) and venous colour Doppler of affected lower limb vessels at 3rd postoperative day and at six weeks post-surgery in every patient. In patients having DVT, enoxaparin (1mg/kg SC every 12 hours) was administered as soon as DVT was identified. However, it was stopped 24 hours prior to surgery and restarted 48 hours post-surgery. Tab. Warfarin (5 mg) once daily was commenced simultaneously and international normalized ratio (INR) was monitored every two days. A repeat venous Doppler study was performed at third postoperative day and at 6 weeks post-surgery. When therapeutic levels of INR (between 2-3) were achieved, LMWH was discontinued.

### Results

The mean age of the study group was 52.2 years with majority (72.5%) being males.

Out of 120 patients, 50 (42%) had femoral neck fracture, 35 had intertrochanteric and subtrochanteric fractures each. Socio-economic status of study participants according to Modified Kuppaswamy scale 2016 showed that majority of subjects (79%) belonged to middle class, followed by 14% in lower middle class, 5% in upper middle class and 2% in upper class.

70 patients (58.3%) had sustained high-energy trauma while 50 (41.7%) had low energy trauma. Most patients (101/120) had a preoperative immobilisation of more than a week. The mean surgery time was found to be 103 minutes. Most patients could be (91/120) mobilised only after 48 hours post-operatively due to various factors like pain, age, presence of drain, urinary catheter etc.

In our study, 4 patients out of 120 (3.3%) developed DVT which was confirmed by Doppler ultrasound. There was no patient who developed pulmonary embolism and no mortality was reported. All the 4 affected patients developed DVT pre-operatively.

Two patients developed DVT within 2 weeks of hospital admission and one patient developed DVT in the 4th week of admission in the femoral neck fracture group. In the intertrochanteric fracture group, the sole patient developed DVT in 3rd week of hospital admission. None of the patients with subtrochanteric fractures had DVT.

None of the patients developed DVT post-operatively. 3 out of 4 patients developed thrombosis in the femoral vein, while in one patient popliteal vein was involved.

Smoking and alcohol consumption were noted in less than 20% of the subjects, mostly among males. One patient was bedridden before the trauma incident, two patients had pre-existent varicose veins in their lower limbs and one patient was on steroids before the trauma. The most common comorbidity observed was obesity

(n-57/120), followed by cardiovascular diseases (n-36/120) and diabetes mellitus (n-13/120). 3 out of the 4 patient who developed DVT had a combination of 3 risk factors, while 1 had a combination of 2 risk factors. It was noted that all the 4 patients who developed DVT had an injury-surgery duration of more than week. (Table 1)

**Table 1:** Risk factors for developing DVT

	DVT Patients	Non-DVT patients	P-value	Test applied
No. of Subjects	4	116	-	
Mean Age	52.1 years	51.8 years	0.881	Unpaired T test
Gender (Male)	2	85	0.459	Chi square test
Gender (Female)	2	31		
SES (High)	0	8	0.077	
SES (Middle)	3	92		
SES (Low)	1	16		
Mechanism of Injury (High)	3	67	0.023*	
Mechanism of Injury (Low)	1	49		
Smoking (yes)	3	13	0.044*	Mann Whitney Test
Alcohol (yes)	1	12	0.993	
Obesity	4	53	0.001*	
Chronic heart disease	3	33	0.041*	
Diabetes Mellitus	0	13	--	
Hypertension	1	11	0.562	

\*Statistically significant

### Discussion

Proximal femoral fractures can cause increased risk of DVT due to prolonged recumbency. Presence of other risk factors such as cardiovascular diseases, hypertension and diabetes can further increase the risk.

In this study, 120 patients aged more than 40 years with proximal femoral fractures were assessed to study the incidence of DVT and associated risk factors for its development and based on this, to decide if chemoprophylaxis should be indicated in such patients despite its reported side-effects.

4 patients in our study, out of 120, had DVT, all developing it in the pre-operative period, making it a low incidence of 3.3%.

Kapoor *et al.*, in 2016, had also found a low incidence (4.8%) of DVT following lower limb trauma while studying the Indian population.<sup>5</sup> On the other hand, studies conducted in the West have reported a much higher incidence of DVT, some reporting it to be as high as 50%. The low incidence in the Indian setting has been attributed to several factors such as 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.<sup>4</sup>

All the patients who developed DVT had an injury-surgery time of more than a week.

This correlation was found to be significant ( $p=0.03$ ). We,

hence, noted that longer preoperative immobilisation increased the risk of DVT. This was consistent with the finding of Kapoor *et al.* [5]

None of our patients developed DVT in the postoperative period. This indicates that surgery duration, which was longer in our study (mean surgery time being 104 minutes), and postoperative immobilisation (75% of our patients could be mobilised only after 48 hours of surgery due to factors like postoperative pain, age, in-situ drains and urinary catheters) had no bearing on the chances of developing DVT.

Various reported risk factors of DVT were studied. We found that smoking, obesity and chronic heart disease had positive correlations, whereas no correlation was seen with alcohol consumption, diabetes and hypertension. More importantly, 3 out of the 4 patients developing DVT had a combination of smoking, obesity and chronic heart disease, signifying that patients with multiple comorbidities are at a higher risk of DVT than patients with single or no associated risk factors.

A positive correlation between high-energy trauma and DVT was found ( $p=0.02$ ), which concurs with the finding of a study conducted by Stannard *et al.* that patients with high-energy skeletal trauma developed DVT despite thromboprophylaxis.

Previous studies had noted correlations between development of DVT and age (elderly being more prone due to co-morbid conditions) and socioeconomic status (high socioeconomic class being more vulnerable due to a more sedentary lifestyle).

However, in our study, we found no such correlation.

We concluded that following proximal femoral fractures there was a low incidence of DVT (3.3%) in the Indian population, patients with multiple co-morbid conditions, preoperative immobilisation for more than a week and high-energy trauma were at a higher risk of developing DVT, and can benefit from chemoprophylaxis. However, considering its cost and potential adverse effects, a multicentric study involving a larger number of patients with proximal femoral fracture is required to define the indication of chemoprophylaxis, if any, in the Indian setting.

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