

Original Research Article

Incidence and Risk factors for deep vein thrombosis of lower limbs after major orthopaedic surgeries in Indian patients

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Abstract

Introduction: Venous thrombo-embolism (VTE), which consists of deep vein thrombosis (DVT) and pulmonary embolism, is a potentially fatal condition. According to Western literature, DVT of lower limb veins is one of the most common complications following surgeries for lower limb. Few studies have been published from India on the subject and little is known about the true incidence of the DVT. Complications of DVT carry high mortality and morbidity. Thus, it is important to understand every aspect of DVT for which it is advisable to determine incidence of DVT by using proper diagnostic tools which have high sensitivity and specificity.

Materials and Methods: A hospital based observational study was conducted in the department of orthopaedics after approval from the ethical committee. Data was collected from the admitted patients who were willing to take part in study according to selection criteria and willing to undergo colour Doppler evaluation for fractured lower limb. 42 subjects were included in the study. Pre-operative and post-operative venous colour Doppler was done on 5th post-op day for fractured lower limb.

Results: In the study there were 42 subjects, with average age of 51.12±20.09 years. There were 15 females and 27 males in the study. Post operatively 9 subjects had DVT. Incidence of DVT after major orthopaedic surgeries was observed as 21.4%. Diabetes, alcohol intake, smoking and obesity were independent risk factors for development of DVT.

Conclusion: Results of our study and other previous studies show that DVT is more common in Indian population than it was thought. Among the major fractures of the lower limb, hip

fractures were more commonly associated with DVT. Therefore, we suggest that colour Doppler should be used as a screening tool after major orthopaedic surgeries especially in elderly age group in whom risk factors and co-morbid conditions are present.

Keywords: Major orthopaedics surgeries, hip fracture, DVT-Deep vein thrombosis, PE-pulmonary embolism, VTE-venous thromboembolism

Introduction

Deep-vein thrombosis (DVT) is a common clinical condition which is associated with considerable morbidity and mortality. Major medical problems associated with DVT include death, post-thrombotic syndrome, right ventricular dysfunction, increased right arterial pressures and the risk of recurrent DVT. The risk factors for DVT include pregnancy, hormone replacement therapy, prolonged immobility, obesity, increasing age, long bone trauma, post-phlebotic syndrome which is associated with chronic leg swelling, pain, and sometimes skin ulceration. There are sporadic reports concerning the incidence of DVT but a systematic basis for diagnosing and preventing these complications has not been established. The venogram and ultrasound has been verified as the benchmark for detecting DVT [5]. Deep Vein Thrombosis (DVT) is defined as formation of thrombus in one of the veins in body [6]. DVT can lead to various complications which can be life threatening like Pulmonary Embolism (PE), Post thrombotic syndrome (PTS), chronic venous ulceration. Virchow first described the pathological basis regarding formation of thrombus in 1856. There is enough data available in western world regarding incidence of DVT. In India we don't have enough data about the incidence of DVT due to various reason like lack of availability of diagnostic modalities, unawareness among doctors. The clinical signs and symptoms are not specific to diagnose DVT as pain and tenderness in the calf muscles can be due to injury per se so we need to study about incidence of DVT after major orthopaedic surgeries in Indian scenario to establish guidelines which can reduce mortality and morbidity among patients by the diagnostic modality which is readily available, has high sensitivity and specificity and doesn't have major limitations. Contrast Venography is the gold standard to diagnose DVT but it has various complications like contrast related anaphylactic reactions, acute renal failure. Its major disadvantage is that it is invasive method. In this study we have done pre and post-operative colour Doppler which has high sensitivity and specificity and it is non-invasive method. By conducting this study we want to establish that if colour venous Doppler be made as screening tool after every major lower limb orthopaedic surgery.

Methodology

A prospective hospital-based study was conducted over a period of one year from January 2020 to December 2020 after institutional ethical approval. Diagnosis was confirmed based on Colour Venous Doppler study of fractured lower limb pre-operatively and post-operative 5th day. A total of 42 patients were enrolled based on selection criteria.

Selection criteria

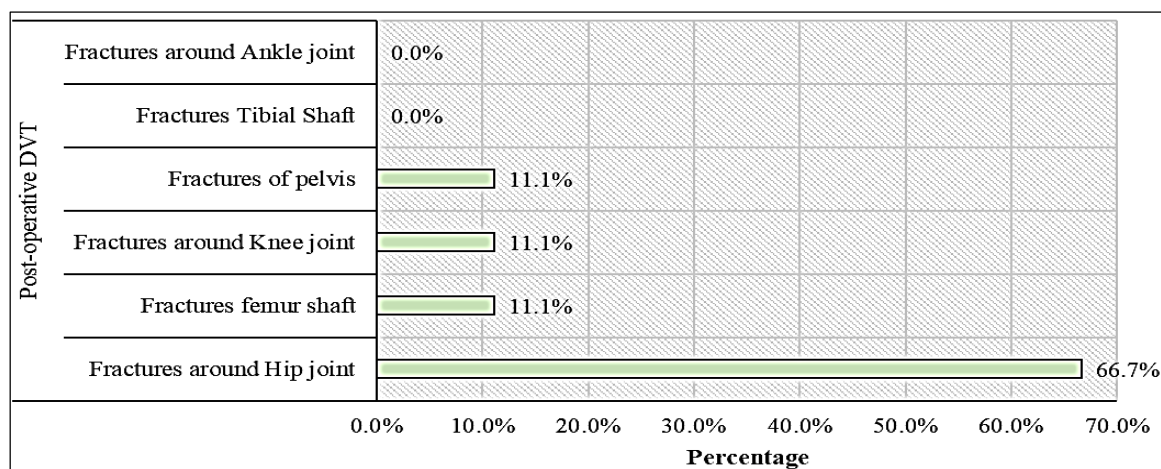
Adult male and female patients with acute lower limb fractures that require surgical treatment and those who stayed in the hospital for minimum of 5 days were included in the study. Patients diagnosed with pathological fractures, tumour/carcinoma or any haematological disease were excluded. Patients with pre-operative DVT or having DVT in the past or those on oral anticoagulants or oral contraceptive pills were also excluded.

Study design

In this observational study 42 subjects were included after taking consideration of inclusion and exclusion criteria. Informed consent was taken from all the participants in their own vernacular language. Approval of ethical committee was obtained. All the study subjects underwent pre-operative and post-operative venous Doppler ultrasonography for the diagnosis of DVT. Post-operative colour Doppler was done on 5th post-operative day. Colour Doppler was used as diagnostic modality because it offers many advantages like it is non-invasive in nature, has sensitivity of 89%, a specificity of 100% and an accuracy of 94%.

Results

Out of 42 subjects there were 15 females and 27 males with mean age of 51.12±20.09. Among 42 subjects 9 patients were diagnosed to have DVT with incidence of 21.4%. All DVT patients received prophylactic treatment according to latest guidelines. Among 9 DVT patients 7 were smokers, 7 were diabetics, 8 had BMI >25, 6 had history of alcohol intake concluding that diabetes, alcohol intake, smoking and obesity are independent risk factors for development of DVT. Among fracture patterns DVT was most common in case of fractures around hip joint. Out of 9 fracture patterns 3 patients had Intertrochanteric fracture (IT), 2 patients had neck of femur fracture, 1 had subtrochanteric fracture, 1 had patella fracture, 1 had acetabulum fracture.



Summary of variables

Variables	Sub-category	Number of subjects
Age (in years)	≤ 30	12
	31-40	4
	41-50	2
	51-60	7
	61-70	9
	71-80	6
	≥ 81	2
Sex	Female	15
	Male	27
Smoking	No	31
	Yes	11
Alcohol	No	33
	Yes	9

DM	Absent	33
	Present	9
	Present	12
BMI (Kg/m ²)	< 25	24
	≥ 25	18
Diagnosis	Fractures around Hip joint	18
	Fractures femur shaft	7
	Fractures around Knee joint	4
	Fractures Tibial Shaft	10
	Fractures around Ankle joint	2
	Fractures around Pelvis	1
Type of Operation	CRIF with IMIL	27
	ORIF with plating	5
	Tension band wiring	1
	Hemiarthroplasty	5
	External fixation with external fixator/LRS	3
	ORIF with DHS	1
Pre-Operative Doppler Evaluation	Normal Doppler Study	41
	Superficial Thrombophlebitis	1
Post-Operative Doppler Evaluation	Deep Vein Thrombosis	9
	Normal Doppler Study	32
	Varicose Veins	1

Discussion

The incidence of DVT after major orthopaedic surgeries was 21.4% in our study. Out of 9 DVT patients 5 were diagnosed with hip fractures. An observational study with colour doppler on patients with neck of femur fractures by Ya-Hui Fu *et al.* found that the incidence of DVT preoperative and postoperative were 32% and 56%, respectively. Blood loss, diabetes and open reduction internal fixation were independent risk factors for DVT. Lim Y W *et al.* Studied 104 patients with intertrochanteric fracture, subtrochanteric fracture and neck femur fractures. The colour-Doppler was performed on 5th day post-operatively. They concluded DVT incidence to be 8%. Singh R *et al.* did similar study and determined DVT incidence to be around 18.13 percent. Colour Doppler was performed after orthopaedic surgeries around hip and knee. The findings of our study are consistent with this study.

Our study revealed that smoking, alcohol intake, DM, hypertension, BMI >25 are found to be the self-determining risk factors for DVT. Out of 9 DVT patients 7 had history of smoking, 6 had history of alcohol intake, 8 had BMI > 25, 7 had history diabetes mellitus. In the study of 2468 thromboembolic subjects by Gregory Piazza *et al.* , 476 had history of diabetes mellitus hence it was concluded that diabetes mellitus is the independent risk factor for developing DVT. This finding is consistent with finding of our study. Yun-Jiu Cheng *et al.* conducted a study to evaluate smoking as a risk factor for development of DVT using literature search and concluded that smoking increases the risk for development of DVT.

KAL Darvall *et al.* conducted study to find association of DVT with obesity by using Cochrane library database and concluded that obesity is the independent risk factor for development of DVT. This finding is consistent with finding of our study.

Conclusion

In conclusion, the incidence of DVT after major orthopaedic surgeries was 21.4%. Diabetes, alcohol intake, smoking and obesity are independent risk factors for development of DVT.

Among the fracture patterns, DVT was most common in case of fractures around hip joint. Results of our study and other previous studies show that DVT is more common in Indian population than it was thought. Therefore, we suggest that colour doppler should be used as a screening tool after major orthopaedic surgeries especially in elderly age group in whom risk factors and co-morbid conditions are present so that the devastating complications like Pulmonary embolism, post thrombotic syndrome can be prevented and mortality and morbidity of the patient can be reduced.

Limitations of the study

Sample size of our study was small. To confirm the findings of this study, larger pool of patients is needed.

Recommendations

1. To conduct large scale studies to find out true incidence of DVT in Indian population after major orthopaedic surgeries.
2. To make colour Doppler as a screening tool for DVT after major orthopaedic surgeries especially in elderly age group in whom risk factors and co-morbid conditions are present.

Conflicts of Interest: None.

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