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Incidence and Diagnostic modality for Deep Vein Thrombosis in Lower Limb Surgeries in Rural India

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Abstract

The association between injury and venous thromboembolic events (VTEs) is well recognized. The reported incidence of VTE after trauma varies from 7% to 58% depending upon the demographics of the patients, the nature of the injuries, the method of detection and the type of VTE prophylaxis (if any) used in the study population. We conducted a prospective cohort study to evaluate the frequency of deep vein thrombosis in major lower limb surgeries in rural India along with its risk factors and any associated contributing factors. All the patients operated in tertiary care orthopaedic Indian rural hospital for lower limb between periods of 2 years (May 2007-Oct 2009) were included in the study. All these patients were followed up after surgery till they get discharged from the hospital. On 6th post operative day, all these patients were screened for deep venous thrombosis by non invasive duplex colour doppler. On 7th post operative day, all patients were screened by invasive contrast venography procedure. We reported an incidence of 5.94% (12 cases in 202) for deep venous thrombosis in Indian rural population after major lower limb surgery. The incidence of proximal deep vein thrombosis was higher as compared to the distal deep vein thrombosis in our study group. Clinical sign and symptoms are less helpful for diagnosis of DVT. We concluded that though the invasive contrast venography is more sensitive and specific than duplex colour doppler for diagnosis of DVT. duplex colour doppler is preferred over contrast venography as not much difference was found in sensitivity and specificity amongst both. colour Doppler being less invasive and cost effective is advised over venography.

Key words: Contrast venography, Deep Venous Thrombosis(DVT), Duplex Colour Doppler, Lower limb surgery

Introduction

Deep vein thrombosis (DVT) is a silent killer. It is a serious threat to recovery from surgery and is the third most common vascular disease, after ischemic heart disease and stroke. Data from epidemiological studies suggests that the annual frequency of DVT in the general population is approximately 160 per 100,000.¹ Venous thrombus embolism (VTE) is a condition in which a blood clot (thrombus) forms in a vein. It most commonly occurs in the deep veins of the legs; this is called deep vein thrombosis. The thrombus may dislodge from its site of origin to travel in the blood – a phenomenon called embolism. VTE encompasses a range of clinical presentations. Venous thrombosis is often asymptomatic; less frequently it causes pain and swelling in the leg. Part or all of the thrombus can come free and travel to the lung as a potentially fatal pulmonary embolism. Symptomatic venous thrombosis carries a considerable burden of morbidity, including long-term morbidity because of chronic venous insufficiency. This in turn can cause venous ulceration and development of a post-thrombotic limb (characterized by chronic pain, swelling and skin changes).² Acute venous thromboembolism (VTE) is a serious and potentially fatal disorder, which often complicates the course of hospitalized patients, but may also affect ambulatory and otherwise healthy people. In 1884, Rudolph Virchow first proposed that thrombosis was the result of at least one of three underlying etiologic factors: vascular endothelial damage, stasis of blood flow, and hypercoagulability. In the last century, there has been increased recognition that all risk factors for venous thromboembolism (VTE) are mediated by these underlying patho-physiologic processes and that VTE does not usually develop in their absence.³ High risk for developing deep vein thrombosis is found in patients with the condition such as stroke (59-100%), orthopedic surgery (17-84%), elective surgery (3-70%) and trauma (40-60%). The five most frequent co-morbidities were hypertension (50%), surgery within 3 months (38%), immobility within 30 days (34%), cancer (32%) and obesity (27%).⁴ Every year, an estimated 200,000 up to 600,000 Americans will suffer from deep-vein thrombosis (DVT) and pulmonary embolism (PE). Deep-vein thrombosis and PE are collectively known as venous thromboembolism (VTE). In the United States, more people die each year from PE than motor

vehicle accidents, breast cancer or AIDS.⁵ The incidence of DVT in India as reported is one percent of the adult population after the age of forty and is 15% to 20% in hospitalized patients. The risk of DVT is 50% in patients undergoing orthopedic surgery, particularly involving the hip and knee, and it is 40% in patients undergoing abdominal or thoracic surgery. 1/100 who developed DVT can develop PE which can be fatal. As per India-specific ENDORSE data presented at Geneva, 1 of 2 hospitalized patients in India is at high risk of developing VTE at any point in time.⁶ The association between injury and venous thromboembolic events (VTEs) is well recognized. The reported incidence of VTE after trauma varies from 7% to 58% depending upon the demographics of the patients, the nature of the injuries, the method of detection (i.e. surveillance imaging versus clinical detection), and the type of VTE prophylaxis (if any) used in the study population. The purpose of this study was to evaluate the incidence of deep vein thrombosis in Indian rural population undergoing major lower limb surgeries along with the risk factors and any associated contributing factors. We also compared the efficacy of duplex colour doppler and contrast venography in the diagnosis of DVT.

Method and Materials

Patients undergoing lower limb orthopaedic surgery at a tertiary care rural Indian hospital over a period of two years (May 2007-Oct 2009) and full filling the inclusion criteria were included in the study. Inclusion criteria include patients age more than 18 years and willing for the invasive procedure. Patient with grade III compound fracture as per Gustilo Anderson were excluded. Detailed history of the patients were taken in term of age, sex, occupation, addiction, height, weight, BMI, Co-morbidity, any drug intake, mode of injury, preoperative duration, type of surgery, duration of surgery, postoperative duration of immobilization and previous history of DVT. All these patients were followed up till they discharged from the hospital. Written and informed consent was taken from each patient for his participation in the study. Before the start of study, necessary approvals from ethics committee as per the institutional policy was obtained. All the patients were screened by non invasive duplex colour doppler on 6th post operative day. All duplex colour doppler were done by an experienced radiologist using 7.5 or 10 MHz linear transducer probes. Limb was scanned from calf to groin region with help of Phillips Enviior USG & Duplex color Doppler Unit. Posterior and Anterior tibial, Peroneal, Popliteal, Superficial, and common femoral veins were visualised. Non-compressibility Augmentation or visualisation of an intra luminal thrombus was considered as evidence of DVT. On 7th post operative day all patients were screened with invasive contrast venography procedure. For this Digital Subtraction Angiography Unit of Phillips Allura FD 20 and Iohexol 350 mg (50 % dilution) were used.

Observation and Results

Total of 364 patients underwent major lower limb surgery during period of 2 years .Out of which 202 patients were included in the study. All the patients were screened post operatively for development of DVT. We did not screen any patient preoperatively for DVT. The mean age of our patients was 51.57 years. There were 67% male and 33 % female patients.

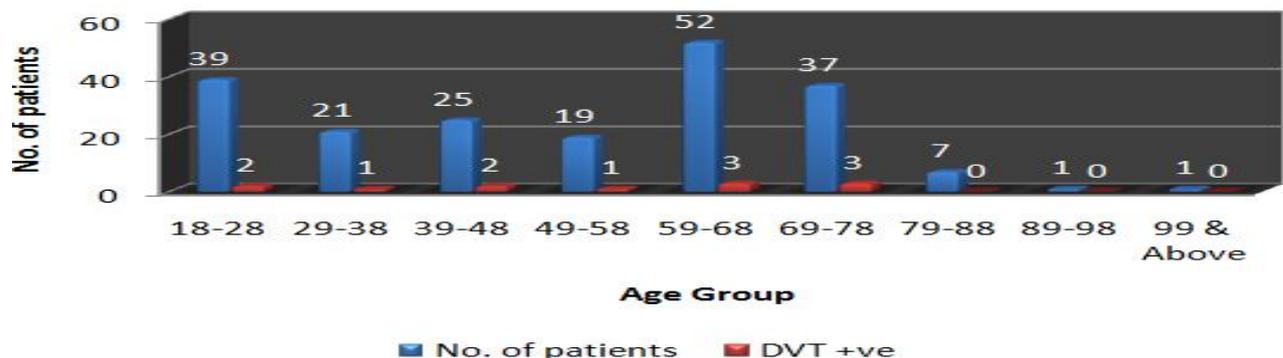


Figure 1: The age wise distribution of the patients and incidence of DVT

The incidence of DVT in our study was 5.94 % (12 in 202). We also found the age specific incidence of deep vein thrombosis. The age group 69 to 78 years in our study was found to have the highest incidence of DVT of 8.1% second only to 39 to 48 years of 8%. 7.57% of female patients developed DVT as compared to 5.14% males.

Table 1: Distribution of patients according to incidence of DVT in various treatment modality

Treatment modalities	No. of patients	DVT positive	Incidence (%)
THA	7	0	0.00
TKA	2	0	0.00
Inter trochantric fracture	85	7	8.23
Fracture neck femur	37	0	0.00
Fracture proximal femur	4	1	25
Shaft femur	35	2	5.71
Tibia	26	1	3.84
Supracodylar femur	4	1	25
Miscellaneous	2	0	0.00
Total	202	12	5.94

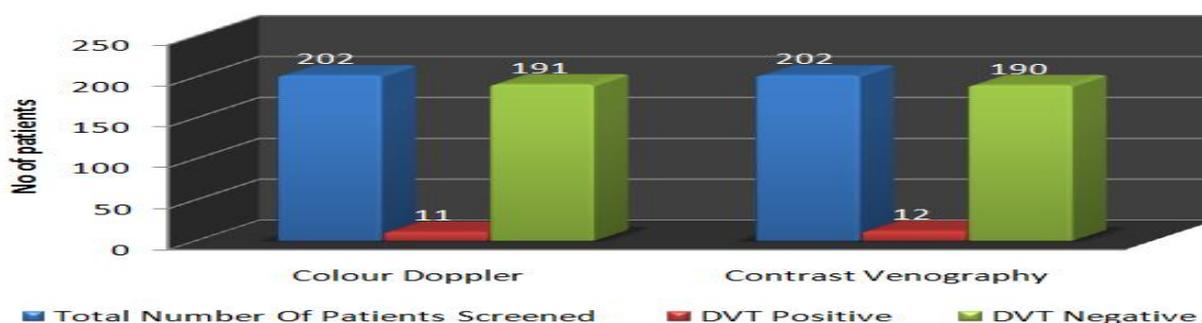


Figure 2: Comparison of Colour Doppler versus Contrast Venography in diagnosis of DVT

Discussion

In our study, the incidence of DVT was 5.94 % (12 in 202). Our results were similar to those of Bagaria et al⁷, Malvankar et al⁸ and Jain et al⁹, who have reported 6.2%, 7.2% and 3.3% incidence of DVT in their studies respectively. Amongst the total DVT positive patients (i.e. 12 patients) the incidence of proximal DVT was 58.33% while that of distal DVT was 41.67%. In the western literature and studies carried out in Asian sub continent by Piovella et al¹⁰, Sudo et al¹¹, Wang et al¹², Dhillon et al¹³, Mitra et al¹⁴ etc, the incidence of DVT ranged from 4 % to 62.5 %. The highest incidence (62.5 %) was reported by Dhillon et al¹³ who has used only venography as diagnostic modality. The lowest incidence was reported by Jain et al⁹ and Atichartakarn et al¹⁵ (4 %), but Jain et al⁹ used colour Doppler while Atichartikarn et al¹⁵ used venography as diagnostic modalities. Ko et al¹⁶ in a prospective study of 80 “low-risk” Chinese patients undergoing total knee arthroplasty (TKA) and total hip arthroplasty (THA) showed 27-31% incidence of postoperative deep vein thrombosis detected by duplex sonography. They concluded that patients who are labeled “low-risk” for DVT actually had a significant risk and suggested that the current practice of providing prophylaxis to only patients deemed at “high risk” should be revised. The DVT incidence in our study was low and hence we do not recommend routine thromboprophylaxis in Indian patients. In our study, there were 12 patients who were detected positive for DVT by venography, while Doppler detected only 11 cases, 1 case of DVT missed by colour Doppler. This showed that Colour Doppler is less sensitive as compared to Contrast Venography. The contributing factors for development of DVT in our study were duration of surgery (>2 hours), preoperative stay (> 7 days), postoperative duration of immobilization (> 72 hours), and previous history of DVT. Other proven risk factors suggested by various other studies like age, female gender, tourniquet time, obesity etc were not found to be significant in our study. Clinical signs and symptoms did not help in the diagnosis of DVT. Of 12 DVT positive patients, only 4 were symptomatic for DVT while the rest of 8 were asymptomatic and could have been missed if not screened for DVT.

Conclusion

The incidence of DVT in lower limb surgeries is higher in rural India than it's expected. Clinical sign and symptoms are less helpful for the diagnosis of DVT. Hence the entire patients especially high risk patients undergone lower limb surgery should be screened for DVT. Though the invasive contrast venography is more sensitive and specific than duplex colour Doppler for diagnosis of DVT. Duplex Colour Doppler is preferred over contrast venography as not much difference was found in sensitivity and specificity amongst both. colour Doppler being less invasive and cost effective is advised over venography.

Limitation

We recommend further studies for finding out the actual incidence of DVT in large population. The cost of imaging can become a limiting factor.

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