

ORIGINAL ARTICLE

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Asymptomatic calf vein DVT in high risk surgical patients: A single centre study

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Abstract

Asymptomatic deep vein thrombosis (DVT) of calf veins is a known entity in high risk surgical patients, which can lead to fatal pulmonary embolism. The actual incidence of asymptomatic calf vein DVT in high risk surgical patients is not known in Indian population. We had conducted this study with an aim to determine the incidence of asymptomatic calf vein DVT in spite of providing extended prophylaxis against DVT in high risk patients. Our study was a prospective observational study conducted from Oct 2014 to Mar 2016 in a tertiary care teaching Hospital in Bangalore, in Department of surgery with help of Department of Nuclear medicine and Radio diagnosis. We examined more than 100 patients who were due for some surgical procedure and included 100 patients fell in high risk group with a risk stratification score of ≥ 5 . All patients screened for asymptomatic DVT with Duplex ultrasonography scan and 99mTc MAA venography. The patients who were detected to have asymptomatic calf vein DVT were therapeutically managed as cases of DVT. In the study 3 patients detected to have asymptomatic calf vein DVT making the incidence of 3.06%. In our study group we found duration of surgery of more than 60 mins being the most common risk factor followed by malignancy. Our incidence of asymptomatic calf vein DVT was 3.06% in high risk surgical patients. Duplex ultrasonography is a useful, easily available, non invasive and safe diagnostic modality in detecting asymptomatic calf vein DVT.

Keywords: Deep vein thrombosis, duplex ultrasonography, 99mTc MAA venography, malignancy, asymptomatic calf vein

Introduction

Deep vein thrombosis (DVT) of the lower limbs is a common disease among the patients who undergo surgery, often-asymptomatic. The true incidence of DVT is hard to get because of the often-silent nature of the condition. Venous thromboembolism (VTE) is stated as a major health problem and one of the most common preventable causes of hospital deaths in the developed countries; however, this has rarely evoked such consideration in India. Each year 1.6 per 1,000, people in industrial countries develop DVT [1]. About 1%-2% of these patients die of pulmonary embolism (PE) [2] and near about 25% of these patients will suffer from effects of chronic thrombotic syndrome by 20 yrs of development of DVT. It has been estimated that approximately 1 of 20 hospitalized medical patients will suffer a fatal PE if they have not received appropriate thrombosis prophylaxis [2].

VTE prophylaxis has generally been recommended for 7 to 10

days as the risk of VTE is highest within 2 weeks of surgery and remains elevated for 2 to 3 months post-surgery [2,3].

Asymptomatic PE is most common in postoperative patients with asymptomatic DVT, not given prophylaxis. Recent studies have found that extending preventive treatment for 4 weeks after hospital discharge is beneficial in patients undergoing surgery for cancer and other high risk group [3,4]. This study of ours was conducted to find out incidence of asymptomatic DVT in high-risk surgical patients as defined by Caprini risk stratification score [5] in spite of administration of extended DVT prophylaxis for 4 weeks post operatively and to manage those patients who are detected with asymptomatic DVT therapeutically to prevent complications of the same. Venography is gold standard for detecting DVT, duplex ultrasonography is a noninvasive, easily available and reliable diagnostic modality for detecting DVT in calf veins [6-8]. Hence both these modalities were used in all our patients to detect DVT.

Material and Methods

This prospective observational study was carried out for a period of 18 months, from October 2014 to March 2016 at a tertiary care teaching hospital, Bangalore in Department of Surgery with

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support of Department of Radio diagnosis and Department of Nuclear Medicine. Dept of Surgery of this Hospital is a referral centre for care of high-risk surgical patients and super speciality surgeries for other institutions in Karnataka and neighbouring states. The hospital ethical committee approval was obtained prior to the initiation of study.

All patients underwent major surgeries and were in high-risk group with risk stratification score 5 and above were included in the study and patients who had asymptomatic or symptomatic DVT pre operatively, pregnant women, patients who had history of allergy to albumin and patients who were unwilling to take part in the study were excluded from the study.

All patients who had to undergo surgery were assessed for venous thromboembolism risk factor during pre op work up and scoring of these patients was done as per risk assessment scoring system. This risk stratification score was followed as per the Caprini risk stratification scoring system.

Depending on the total risk factor score VTE risk stratification of these patients was done to determine if pre operatively and post operatively patients had asymptomatic DVT, a standard duplex scan and a Technisium99m macro aggregated albumin (99m Tc MAA) venography was carried out in pre-operative high risk Surgical patients picked up in a random fashion. Patients without DVT were given DVT prophylaxis peri-operatively as per our Hospital Protocol and they were reevaluated for asymptomatic calf DVT by repeating duplex scan and 99m Tc MAA venography with in 25h to 30th post op day prior to discontinuation of DVT prophylaxis, (as per Fig 1).

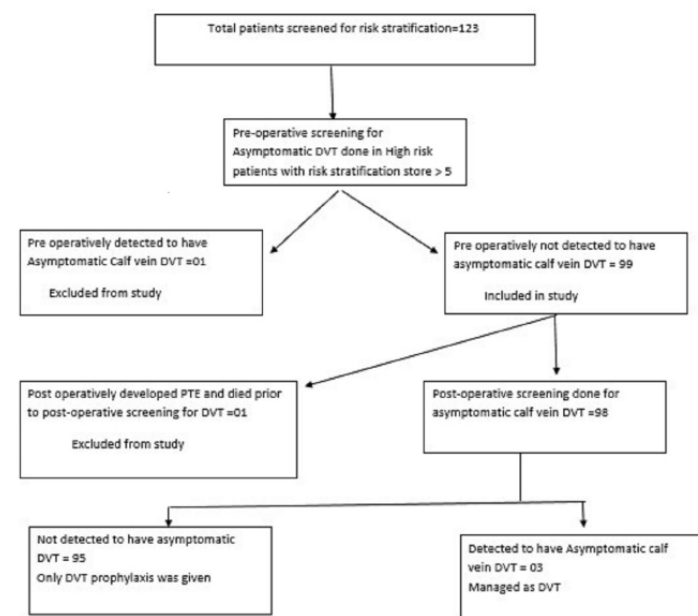


Figure 1. Flow chart

99m Tc MAA venography

This diagnostic procedure was carried out in Department of Nuclear Medicine; Kits for preparing 99mTc-MAA were available from a number of different manufacturers. We had used 99mTc MAA manufactured by Saxons biotech for this study. The adult dose for imaging study we had used in our study was 3-4 mCi

(containing between 100,000 - 250,000 albumin particles). The prepared solution was injected into the dorsal pedal veins, the total percentage of particles trapped in the lower extremities were determined through a whole body scan by dual head Gamma Camera. Albumin particles show retention and/or abnormal movement (delayed or collateral flow) in the peripheral veins of lower extremities was interpreted as presence of deep venous thrombosis.

Duplex Ultrasonography

Duplex ultrasound was also done for all our patients pre operatively and post operatively in Department of Radio diagnosis, by the radiologist. The key ultrasonography finding in excluding venous clot was the complete compressibility of the vein with downward pressure of the ultrasound probe. Often times the clot itself visualized echogenic ('gray') within the vessel lumen was considered as positive for DVT.

Methods of determination

The present study was a prospective observational study. Every patient's record was documented and maintained and the data was compiled for analysis. Conclusion was drawn based on the observations made during the study period. Correlation was made between calculated data and incidence according to the literature by using SPSS 2016.

Results

Among the 100 patients who were included in our study one patient was detected to have asymptomatic calf vein DVT pre operatively hence excluded from the study and one patient died of massive pulmonary embolism in early post-operative period hence couldn't be a part of complete study. Of the 98 patients who had completed the study we found the incidence of asymptomatic calf vein DVT as 3.06%.

The demographic factors are shown in table no 1. Most of the high risk patients were in the age group of ≥ 51 years and male percentage was 66%. Though obese patients are generally associated with high incidence of DVT but in our study, most of the patients had BMI less than 25 kg/m².

The risk factors associated with our patients are shown in figure no 2. The most common risk factor we found in our patients being duration of surgery > 60 minutes followed by malignancy as a risk factor in most of these patients.

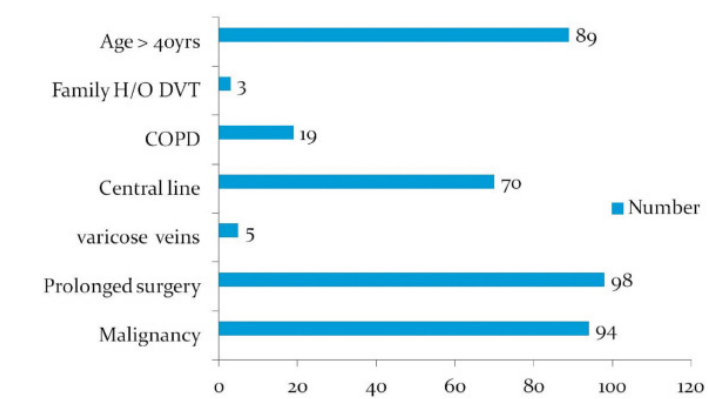


Figure 2. Various risk factors for DVT found in patients

Table 1. Demographic characterization of the patients

Age distribution		
Age in years	Number of patients	%
≤ 40yrs	9	9.0
41-50	18	18.0
51-60	35	35.0
≥61	38	38.0
BMI		
BMI (kg/m ²)	Number of patients	%
≤18.50	13	13.0
18.60-24.90	77	77.0
25.00-29.00	8	8.0
>30.00	2	2.0
Gender distribution of patients		
Gender	Number of patients	%
Male	66	66.0
Female	34	34.0
Distribution of Risk stratification (as per Caprini guidelines) Score of patients		
Risk stratification score	Number of patients	%
5	8	8.0
6-8	84	84.0
9-10	8	8.0

Table 2. Doppler and Venography finding in our patients

Diagnostic Modality	Pre op total scanned	Found to have DVT	Post op total scanned	Found to have DVT
Doppler Scan	100	01	98	02 [01 Bilateral calf veins DVT + 01 DVT of Rt Calf veins]
Venography	100	01	98	03 [01 Bilateral Calf Veins DVT + 02 DVT of Rt Calf veins]

Discussion

Asymptomatic calf vein DVT is a common problem in high risk surgical patients which can occur in spite of prophylaxis against DVT, though it can lead to a potentially life threatening pulmonary embolism [9], it is under diagnosed and under treated in Indian population. As high as 90% of pulmonary embolisms are due to asymptomatic DVTs. Incidence of asymptomatic DVT has varied from 2.3% to 43.2% in various studies undertaken in different group of patients with different clinical conditions [10,11]. In our study the incidence of asymptomatic DVT found to be 3.06% which is comparable with study done on orthopedic patients by Jain et al [10] and Angral R et al [12], though the study conducted by Agarwal et al. on orthopedic high risk patients showed venographic evidence of DVT as high as 43.2% [13] in spite of prophylaxis with LMWH.

A total of the 98 patients had completed our study and all these patients were assessed for asymptomatic calf vein DVT pre operatively and post operatively. Intra operatively all these patients were given graduated elastic compression stockings, post operatively all these patients were on LMWH 60mg / day given subcutaneously and they were placed on intermittent pneumatic compression (IPC) devices periodically compressing the calf and/or thigh muscles of the leg (inflation pressures 35-40 mmHg at about 10s/min) given as prophylaxis as per our hospital protocol. Demographic distribution in terms of age, gender, BMI and risk stratification score in our patients is as per table-2. Our patients were in the age group ranging from 25 yrs to 85 yrs however 73% of our patients were above 51 yrs and with male predominance. Though obese patients are more prone to develop DVT [13,14], in our study group most of the patients were with BMI < 25 kg/m² as most of our patients were cancer patients. Various risk factors for DVT assessed in our patients is as per Figure-2, Presence of malignancy and family history of DVT are very significant risk factors for developing DVT and both these conditions have a risk stratification score of 3 each as per Caprini guidelines. In our study group duration of surgery of more than 60 minutes being the major risk factor found in 98% followed by malignancy in 94% of our patients and 89% of the patients were of more than 40yrs of age which increases the risk of developing DVT in surgical patients. Only 3% of our patients had family history of DVT.

Finding of pre-operative and post-operative Doppler scan and 99mTc MAA venography are as per Table-2. Though 99mTc MAA venography is a very useful procedure to detect asymptomatic DVT, during our study we observed that placing a cannula in dorsal pedal veins is a painful procedure for most of our patients, it has various contraindication including pregnancy as 99 m Tc MAA has mutagenicity and crosses placenta, it can also cause side effects like severe anaphylaxis in people allergic to albumin and the procedure is also expensive. However, duplex ultrasonography is an easily available noninvasive diagnostic modality for detecting DVT, it is also a cost effective procedure and without any absolute contraindications. During pre-operative screening 01 patient was detected to have asymptomatic calf vein DVT by both Doppler and venography, however in post of screening of patients 03 patients who were found to have asymptomatic DVT on venography only 02 were could be detected to have DVT by Doppler scan. Thus the sensitivity of Doppler scan was found less than the sensitivity of venography. Though venography is an invasive and expensive procedure, it still stays gold standard for detection of DVT which has higher sensitivity and specificity than duplex ultrasonography scan.

Conclusion

Incidence of asymptomatic DVT has varied from 2.3% to 43.2% in various studies undertaken in different group of patients with different clinical conditions. Our incidence of asymptomatic calf vein DVT was 3.06% in high risk surgical patients. Though Venography remains the gold standard investigation to detect asymptomatic DVT, duplex ultrasonography is easily available, noninvasive and safe diagnostic modality useful in detecting asymptomatic calf vein DVT. We recommend extended DVT prophylaxis for 4weeks post operatively in all high risk surgical patients to prevent VTE related complications.

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