



PROSPECTIVE STUDY OF ASSESSING THE RISK FOR DEVELOPMENT OF DEEP VENOUS THROMBOSIS IN SURGICAL PATIENTS USING ADAPTED CAPRINI SCORING SYSTEM

Surgery

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ABSTRACT

AIM: To determine the incidence, morbidity and mortality due to Deep Venous Thrombosis in surgical patients, and to assess the validity and reliability of Adapted Caprini scoring in risk stratification for DVT prophylaxis.

METHODOLOGY: This was a prospective observational study in a Government Rajaji Hospital, Madurai on patients who underwent elective surgeries over a period of 12 months. An Adapted Caprini score was devised which included only the clinical criteria. The patients were scored by two persons independently at admission and followed up till the 30th post-operative day and primary and secondary end points were statistically analyzed.

RESULTS: Three hundred and two patients were included and the overall incidence of DVT at 30 days was 4.3%. The risk of developing DVT was found to be significantly higher among the >7 score group as compared to 3-4 group or the 5-6 group. Patients with a score of >7 were more likely to develop DVT as compared to 3-4 group or the 5-6 group.

CONCLUSION: The risk of developing DVT is less significant in the 5-6 score group compared to 7 or more score group. Further stratification of the highest risk groups is recommended to provide appropriate prophylaxis only to the patients with high scores, thereby reducing complications due to DVT prophylaxis.

KEYWORDS

Risk assessment model, DVT, Thromboembolism prophylaxis

INTRODUCTION

Deep vein thrombosis is a significant cause of morbidity and mortality in surgical patients and one of the important preventable causes of in-patient mortality. Numerous studies have quoted data regarding the incidence of DVT in the Western population. There is a common presumption that DVT is not so frequent in the Asian population, particularly the Indian subgroup. However, recent Indian studies have shown that the incidence of DVT in Indian population is not as uncommon as thought before.

Lack of proper risk factor assessment tools, inadequate documentation, asymptomatic presentations of DVT, misdiagnosis or attribution to other diagnosis and inadequate follow up in the postoperative period are a few obstacles faced in quantifying the actual burden of DVT and the magnitude of its complications. Correctly identifying the risk group for DVT prophylaxis is very important to reduce the incidence of DVT and related morbidity and mortality. Routine DVT prophylaxis may increase the risk of bleeding and other complications in general surgery patients, in addition to the unnecessary financial burden to the health care delivery system.

The two commonly used methods to assess the VTE risk factors in patients include group assessment and individual assessment. Recent publications concluded that it would be more appropriate to use the individual risk assessment approach. Several individualized VTE risk assessment models (RAMs) have been proposed and evaluated clinically, the most notable being those developed by Caprini, Cohen, Kucher, Roger and NICE guidelines. The Caprini risk assessment model was derived more than a decade ago, based on a combination of clinical experience and published data. Several modifications of the model have been validated in surgical patients in the western population. In addition to risk assessment, the model also gives appropriate recommendations for prophylaxis according to the score and the level of risk. This RAM has been adapted several times by different individuals and organizations. This study was conducted to assess the incidence of DVT in surgical patients and to assess the validity and reliability of adapted Caprini scoring in risk stratification for DVT prophylaxis.

METHODOLOGY

STUDY DESIGN:

This study was a prospective cohort study conducted at GRH Madurai over a period of 12 months. Study was conducted in the department of surgery.

INCLUSION AND EXCLUSION CRITERIA:

All patients who underwent either elective operations under regional or general anesthesia in the department of general surgery were included in the study. All the patients who were diagnosed as having DVT at the time of admission, those who were on anticoagulant treatment for any reason, those planned for lower limb vascular interventions, those in whom anticoagulation therapy was contraindicated due to any reason, and those on antiplatelet drugs were all excluded from the study.

ADAPTED CAPRINI RAM

The Caprini risk assessment model was utilized to score individual patients based on co-morbidities and peri-operative risk factors. In this model, each independent risk factor is associated with specific points ranging from 1 to 5, based on the risk for DVT for each factor. A total risk factor score is calculated which corresponds to the risk of developing DVT. The reported risk levels include low (0-1 point) with DVT incidence of 2%; moderate (2 points) with DVT incidence of 10-20%; higher (3-4 points) with DVT incidence of 20-40% and highest risk (5 or more points) with DVT incidence of 40-80%. The RAM was modified to include only the clinical criteria. The lab parameters including Leiden factor V, serum homocysteine, anti cardiolipin antibodies, prothrombin 20210A, lupus anti-coagulant were excluded from the study.

These lab investigations included in the original Caprini RAM were removed due to either unavailability or high cost involved in performing the same.

STUDY PROCEDURE

Data and variables were recorded according to the Adapted Caprini RAM by the principle investigators or co-investigators, in a specified proforma at the time of admission. The scoring was done by two persons independently for assessing inter-rater reliability. DVT was suspected when there was swelling of the leg or along the vein in the leg, pain or tenderness in the leg on walking or standing, increased warmth in the swollen area, redness or discoloration of the leg. The symptoms or signs of DVT were evaluated on the 3rd, 7th, 14th and 30th day in patients who remained in the in-patient care.

OUTCOME MEASURES

In patients with suspected DVT, Duplex ultrasound was done to confirm the presence of thrombus, flow and compressibility. Further propagation of thrombus was assessed after one week by repeating

Duplex ultrasound. The morbidity due to DVT was assessed by the presence of complications including phlegmasia alba dolens, phlegmasia cerulea dolens, ischemia or gangrene of the leg, compartment syndrome and requirement of major or minor amputations.

In the patients who were discharged before 30 days, the symptoms of DVT were assessed on the above specified days by either personal or telephonic interview. At the time of discharge they were advised to report to the outpatient or emergency department if they developed any such symptoms. Patients were stratified according to the scores and incidence of DVT was calculated in each score category to assess the validity of the adapted Caprini RAM.

ETHICAL APPROVAL

Institute ethics committee approval was obtained to conduct the study. Informed consent was obtained from all the patients after explaining the nature, methodology and risks involved in the study.

ANALYSIS

The primary and secondary end points were assessed statistically. The Caprini score and DVT incidence in each group were derived using percentages and the 95% confidence intervals were calculated. Risk factors were analyzed using Chi square test and the relative risk for each was calculated. P value < 0.05 was taken to be statistically significant. All statistical analysis was done using SPSS software package version 16.

OBSERVATION AND RESULTS:

In the study 302 patients were assessed for risk of developing DVT using Adapted Caprini Scoring System and the following results were obtained. Majority of the patients were in the age group 41-60(42.3%) and 30% patients in 21-40 group. Age >60 pts were found to be only 21% of total study size. The occurrence of DVT among the age group of 41 -60 is 3.1%, whereas the occurrence of DVT among the age group >60 is 14%. The lower age groups had no incidence of DVT. Among the 302 patients studied 184 were males and 118 were females. Incidence of male patients suffering from DVT among the total study sample was 2.71% and female counterpart was 6.7%. There appears to be around 3 times increased incidence among females when compared to males. Of the 302 patients studied only 13 developed symptoms suggestive of DVT like swelling of limb or pain. Only 21 patients were of score >7 and remaining majority were of score <7. Among 65 smokers 5 developed DVT which corresponds to 7.6%, whereas among the 237 non smokers 8 developed DVT which corresponds to 3.3%. But the incidence of smoking in DVT positive cases was around 38%. 84%(11 out of 13) of the patients who developed DVT had malignancy. There is a statistical significance between malignancy and occurrence of DVT in this study which is similar to the studies conducted previously

DOPPLER CONFIRMED CASES:

Patients who developed symptoms of DVT(13) were subjected to Doppler study for confirmation of diagnosis. All the 13 patients (4.3%) with symptoms had DVT.

TABLE -1

TOTAL SCORE VS DOPPLER		
	YES	NO
<7(281)	4	277
>7(21)	9	12
TOTAL	13	289

Out of 21 patients with score >7, 9 (42%) were diagnosed of having DVT which is statistically significant (<0.001). And 4 out of 281(1.4%) patients with score <7 had DVT.

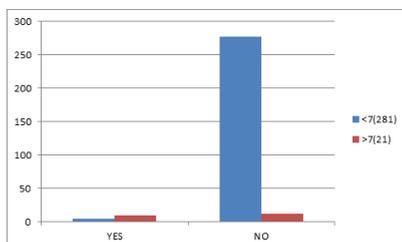


CHART -1 ; DOPPLER CONFIRMED CASES

SCORE DISTRIBUTION:

No. of positive patients with score 3-4 was 1(7.6%) and score 5-6 was 3 (23%) and score of 7-8 was 9 (69.2%).

TABLE -2

Total score	No. of cases
3 - 4	1
5 - 6	3
7 - 8	9
> 8	0
Total	13

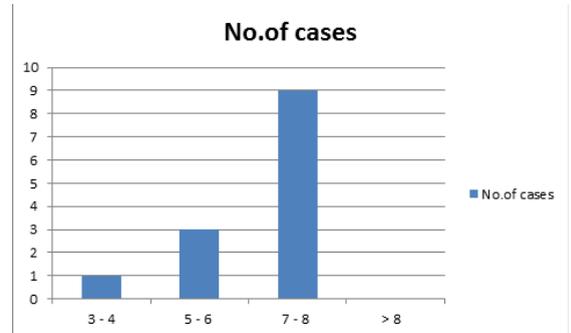


CHART -2; SCORE DISTRIBUTION

DISCUSSION

DVT is a relatively common complication among surgical patients, with many risk factors, which contribute to the disease. However, it was found that DVT prophylaxis was not used widely, probably due to limited awareness among the medical fraternity regarding identification of patients at high risk who need prophylaxis. The use of a risk assessment model may help improve the current situation. The present study intended to validate the adapted Caprini RAM, which can be used to stratify the risk of developing DVT in hospitalized patients based on their individual risk factors. In the present study it was found that a high adapted

Caprini score and the cumulative risk level was associated with an increased risk of DVT. The incidence of DVT events in the low and moderate groups was zero. This is contrary to previous data by Caprini et al., which described the incidence in low risk group to be 2%, moderate risk group to be 20%. The highest group in their study was described as having an incidence of VTE of 80%. In the present study the incidence of VTE among the highest risk group was found to be 84%. In the original Caprini RAM, all patients with a score >5 were placed in the same group. Bahl et al. modified the Caprini RAM and added a separate "super high risk" group (>8) and recommended an extended duration of chemoprophylaxis for the same. Further splitting the highest risk category patients, it was observed that the difference in incidence of VTE among the patients with adapted Caprini score of 7-8 (69%) was statistically significant (P < 0.001), while among the score group of 5-6 it was statistically not significant.

Of all the risk factors listed in the Adapted Caprini RAM, it was found that age, sex, Major surgery, malignancy, patient confined to bed (>72 h), history of DVT/PE were associated with increased risk of DVT. (>45 min) smoking were found to have marginally significant risk. All these factors are well recognized risk factors associated with development of VTE. However, as described in the study by Anderson et al. these risk factors are not of equal weight. Malignancy was found to be an important risk factor in our study (92%) which is similar to most of the studies and further risk stratification is required regarding the type and stage of cancer. In this study relation between smoking and DVT was not significant This observation may be due to either insufficient power of the study or because some of these factors may not be significant determinants of DVT risk in the Indian population. For some of the established parameters like, oral contraceptives or hormone replacement use, pregnancy or postpartum (<1 month), history of still born, heparin induced thrombocytopenia, stroke (<1 month), multiple trauma (<1 month), major lower limb arthroplasty, acute spinal cord injury, the risk of developing VTE could not be evaluated as there were no patients with these conditions in the present study.

The present study had certain limitations. Firstly, only patients who had symptoms of DVT were evaluated for the same. Routine screening for asymptomatic DVT was not done, which may have resulted in a lesser incidence being reported. Secondly, all the parameters of thrombophilia were not evaluated on any of the patients and some established risk factors (mentioned above) were not reported in any of the patients in the study group and hence no information could be obtained about these relevant risk factors from the study population. As a result of this, the patients' risk level may be underestimated. Thirdly, no orthopedic cases were included in the study, and hence most of the parameters, which are assigned a high risk scoring of 5 points, were not studied.

CONCLUSION

Deep vein thrombosis is one of the significant, yet preventable causes of in-patient morbidity and mortality. It is important to raise awareness among medical fraternity regarding detection and prevention of the same. The adapted Caprini RAM is an economical, practical and effective tool to stratify general surgical patients for perioperative DVT risk. Unlike the Western population, the present study found that within the high risk group (score >5), the risk of developing DVT is not significant in the 5-6 score group, as compared to that in the group with a score of >7. Hence further stratification of this group to provide appropriate prophylaxis only to the patients with scores >7 is recommended, thereby reducing complications due to DVT prophylaxis. However, further multicenter and larger scale validation studies for the use of this adapted score in this region population are recommended.

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