

**VENOUS THROMBOEMBOLISM PROPHYLAXIS: A SURVEY OF SURGEONS
CURRENT PRACTICE IN HIGH ALTITUDE AREA**

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ABSTRACT

Background: Awareness of venous thrombo-embolism (VTE) and its prophylaxis among surgeons will reduce the incidence of hospital deaths and morbidity in patients undergoing surgery. **Objective:** In this study we aimed to examine knowledge, attitude and practices of VTE prophylaxis among surgeons in high altitude area. **Method:** A questionnaire was distributed to surgeons (consultant and Specialist) from different specialty in three hospitals in Al Taif, Saudi Arabia. **Results:** 86% of our respondents routinely prescribe for thrombo-prophylaxis. 66% of respondents routinely scored patients preoperatively using Wells score. A combination of physical and pharmacological methods was used by 50% of surgeons and 64% of them were begun prophylaxis 2h preoperatively. **Conclusions:** Surgeons included in our study are generally aware of the importance of perioperative VTE prophylaxis, however, a number of inconsistencies and possible deficiencies exist. Continuous medical education is advised on proper identification of at risk patients, importance of risk stratification, and thrombo-prophylaxis methods and regimens.

KEY WORDS: Venous Thrombo-embolism; Deep Vein Thrombosis; Low Molecular Weight Heparin; VTE prophylaxis, Anticoagulant Therapy.

INTRODUCTION

Venous thrombo-embolism (VTE) is a term encompassing deep vein thrombosis (DVT) and pulmonary embolism (PE) or a combination of both, occurring in about 0.1% of people every year.^[1] DVT is a silent killer, sometimes causes no symptoms and therefore clinical data are unreliable for its diagnoses.^[2]

The true incidence of VTE in the Kingdom of Saudi Arabia (KSA) is unknown. Assuming similar rate to those present in other parts of the world, approximately 25,000 people are affected in the KSA annually.^[3]

About 25% of DVT occur in the calf veins which can extend to involve the proximal veins (including the popliteal, femoral and iliac veins). Proximal DVT if left untreated can dislodge and embolism to the lungs in about 50% of cases, leading to PE. The risk factors for development of VTE include obesity, increasing age, major surgery, immobility, pregnancy, HIV infection and sickle cell anemia. About 25% of cases with PE will present with sudden death as the first symptom.^[4]

Without anticoagulant prophylaxis incidence of DVT varies from 10% in low risk to 40-80% in high risk surgical patients and fatal PE occurs in 0.1-0.8% of patients undergoing elective general surgery with 2-3% undergoing elective hip replacement, and up to 4-7% undergoing surgery for a fractured hip.^[5]

National institute of health survey results of health care providers in the year 2008 revealed that in many hospitals, prophylaxis for DVT/PE is not yet standard practice. Result shows that DVT occurs in 10-40% of Medical or General Surgery patients and in 40-60% of patients after major Cardiac, Orthopedic, Gastro and Neurosurgery.^[6]

Nevertheless despite the publication of international guidelines, many reports, mainly from developed countries, show suboptimal use of thrombo-prophylaxis. In fact, routine use of simple well-established and effective methods of DVT prevention would save thousands of hospitalized patients each year.^[7]

Implementation of already existing protocols has suffered on account of lack of understanding of clear indications and contraindications for prophylaxis and perceived risk of bleeding. To overcome this fear, various ways have been used to improve the awareness of VTE prophylaxis. Recently, a protocol involving a computer-based clinical decision support and program of training seminar, electronic reminders and even didactic lectures have been used.^[8]

Studies have been conducted to figure out the reason for this discrepancy between the actual rate of patients in need of DVT prophylaxis and the actual rate of DVT prophylaxis prescription in practice, showed that three main reasons have been associated with this problem, including underestimation of VTE risk, lack of formal prophylaxis programs and lack of interest.^[9]

The relationship between high altitude-related hypoxia and the development of VTE has been relatively well studied in air travelers and mountaineers.^[10] The lower ambient oxygen concentration at higher altitudes can lead to hypoxia, which in turn causes increased platelet aggregation and activation of blood coagulation factors, resulting in a pro-thrombotic state.^[11]

The purpose of the current study was to assess surgeon's knowledge, attitude towards VTE prophylaxis, by considering their awareness and adherence to clinical guidelines, treatment preferences and personal beliefs.

METHOD

A semi-structured questionnaire to assess the knowledge, attitude and clinical practice of surgeon on VTE prophylaxis, which was adopted from other study,^[7] with some modifications was distributed to surgeons (consultant and Specialist) from different specialty; General, Orthopedics, Cardiothoracic, Plastic, Neuro, Urology, Vascular and Ob-gyne surgery, who were working in three hospitals in AL-Taif, a city in Mecca Province of Saudi Arabia at an elevation of 1,879 m on the slopes of Sarawat Mountains, in the period from May-July 2017.

The questionnaire was anonymous and the respondents were told that their opinion will be analyzed and published. The research protocol was approved by Taif University ethical committee.

The questionnaire consisted of four sections;

Section A: Demographic data, Includes Position and Specialty of surgeons.

Section B: Structured knowledge questionnaire, includes the minimum requisites information about VTE prophylaxis. Each correct answer carries one mark and wrong answer carries zero, the maximum score is 7. The scores are categorized as: Good knowledge: 5-7 Average knowledge: 3-4 Poor knowledge: 0-2.

Section C: Structured attitude questionnaire, used for assessing the attitude of surgeons, and was based on statements on prevalence of DVT in high altitude area, common concerns expressed regarding VTE prophylaxis, the presence of institutional guidelines/protocol and application of pretest probability assessment.

Section D: Structured clinical practice questionnaire used for assessing the practice of the surgeons and was based on statements on the diagnostic modality preferred by the surgeons, preferences for the different modalities of VTE prophylaxis, the commonest complications reported by surgeons, timing to start prophylaxis and Duration of thrombo-prophylaxis. Results were analyzed with SPSS® version 20.0 computer software (SPSS Inc, Chicago IL, USA).

RESULT

One hundred surgeons included in the survey; 42 were consultant while 58 were specialist. The responders included 24 from department of general surgery, 16 from orthopedic department, 5 from Cardiothoracic department, 9 from plastic department, 7 from Neurosurgery department, 13 from urology department, 12 from vascular department and 14 from obstetrics - gynecology department (Table 1).

Table 1: Participants by specialty.

Specialty	No.
General surgery.	24
Orthopedic surgery	16
Cardiothoracic surgery.	5
Plastic surgery.	9
Neurosurgery.	7
Urology.	13
Vascular surgery.	12
Obstetrics - gynecology	14
Total	100

Knowledge: 84 % of the subjects had good knowledge on prevention of VTE and 16% had average knowledge on prevention of VTE.

Attitude: Most surgeons surveyed (86%) routinely prescribe for thrombo-prophylaxis. Surgeons from surgery department were the majority who gave prophylaxis.

When asking about their suspicion about the prevalence of DVT is higher in high altitude area, 88% of our responder's surgeons believed that the prevalence of DVT is higher in high altitude area.

The most common concerns expressed regarding VTE prophylaxis were risk of postoperative complications (50%), required strict monitoring (26%), and 17% had the impression that it is not necessary (Table2).

Table 2: Concern about VTE prophylaxis.

If you occasionally, rarely or never used DVT prophylaxis did so on account of the fact that?	Percent
Expensive increased cost to the patients.	4%
In-effective	3%
Not needed	17%
Risk of Complications	50%
Required Strict Monitoring	26%
Total	100%

42% of the responders thought that DVT developed in hospitalized patients is mostly symptomatic when they were asked about their opinion and practice if most of hospitalized patients who develop DVT symptomatic.

When we asked if they followed National Guidelines for Thrombo-prophylaxis and routinely scored patients preoperatively using pretest probability assessment (Wells score)? Only 66% of responders said that they routinely scored patients preoperatively using pretest probability assessment (Wells score), while 34% of all surgeons not scoring patients.

Some of the doctors prescribed anticoagulants because they felt the patients had a high risk of developing VTE (68%), others prescribed it because it was routine in the unit to do so (20%), or did so because they had seen a similar case develop VTE (12%) (Table 3).

80% of surgeons reported they knew that there was an institute-based protocol for VTE prophylaxis at their hospital while 20% of respondents did not know if there is a policy in their department or not.

Table 3: Anticoagulant prescription.

Why the surgeons prescribed anticoagulants?	Percent
They felt the patients had a high risk of developing VTE.	68%
Because it was routine in the unit to do so.	20%
Because they had seen a similar case develops VTE.	12%
Total	100%

Practice: 71% of surgeons relied on Doppler venous ultrasonography to diagnose VTE postoperatively while 29% of them relied on clinical examination (Table 4).

Table 4: diagnosis of DVT.

What is the single tool you preferred for diagnosis of DVT?	Percent
Clinical examination	29%
Doppler venous ultrasonography.	71%
D-dimer assay.	0%
Total	100%

There was a wide disparity in the commonly used thrombo-prophylactic methods. 30% advised pharmacological prophylaxis and 20% advised mechanical prophylaxis. Another 50% advised a combination of mechanical and pharmacological prophylaxis.

Table 5: Mechanical agent for thrombo-prophylaxis.

Mechanical agent of choice in thrombo-prophylaxis?	Percent
Early mobilization.	18%
Limb physiotherapy.	3%
Compression stockings.	3%
Early mobilization and limb physiotherapy.	9%
Early mobilization and compression stockings.	25%
Early mobilization, limb physiotherapy and compression stockings.	38%
Pneumatic compression.	4%
Total	100%

When they asked about mechanical agent of choice in thrombo-prophylaxis for their patients; 18% of surgeons advised early mobilization only, 38% said they advised mechanical prophylaxis with early mobilization, limb physiotherapy and compression stockings together and 25% used early mobilization and compression stockings together. Only 4% of surgeons advised Pneumatic compression (Table 5).

Table 6: Pharmacological agent for thrombo-prophylaxis.

Pharmacological agent of choice in thrombo-prophylaxis?	Percent
Unfractionated Heparin	17%
Low Molecular Weight Heparin	63%
Warfarin	18%
Asprin	2%
Dextran	0%
Total	100%

63 % of our surgeons said that they would advise low-molecular-weight heparin (LMWH) as the pharmacological agent of choice in thrombo-prophylaxis (Table 6).

Table 7: Complication of pharmacological agents.

Complication from pharmacological agents you experienced?	Percent
Minor hemorrhage	33%
Major hemorrhage.	6%
Wound hematoma.	42%
No complication.	19%
Total	100%

The commonest complications reported by surgeons after use of pharmacological agents for prophylaxis were

wound hematoma (42%) and excessive wound oozing (33%) (Table 7).

With regard to timing to start prophylaxis, all surgeons started prophylaxis before surgery, 28% of them was begun 12h preoperatively, 64% begun 2h preoperatively and 8% started prophylaxis with the premedication.

When asking the surgeons when would they stop prophylaxis after the surgery? All surgeons continued prophylaxis after surgery; 71% until the patient was mobile, and 18% until the patient was discharged, 7% continued prophylaxis for seven days after discharge, and 4% would continue prophylaxis in high risk cases for 14 days after discharge.

DISCUSSION

VTE is a major cause of hospital deaths and morbidity; this can be easily prevented by simple measures. Guidelines for thrombo-prophylaxis are available for past many years but the compliance remains disappointing throughout the world.^[12]

The purpose of the current study was to assess surgeon's knowledge, attitude towards VTE prophylaxis, by considering their awareness and adherence to clinical guidelines, treatment preferences and personal beliefs.

Eighty four percent of the respondents had good knowledge on prevention of VTE. This high percentage may originate from the high knowledge of the predisposing risk factors and clinical presentation, thus a potential patient with a risk for VTE will be correctly identified.

In our study 86% of the responders routinely prescribed VTE prophylaxis. Our finding was higher than the finding in the study of Bhatti *et al.*^[13] where only 63.3% of responders prescribed VTE. Surgeons from surgery department were the group that most frequently prescribed anticoagulants as a prophylaxis which is similar to our study.

It is well recognized that a hyper-coagulable state exists when a person is exposed to high altitude environment. This may manifest as early thromboembolic episodes, which result in acute pulmonary embolism. A few reports of DVT and cerebral, retinal and portal and splenic vessel thrombosis have also been reported.^[14] Most of our surgeons believed that the incidence of DVT is higher in high altitude area and they should be cautious about thromboembolic prophylaxis.

In our study, half of the respondents had the concern while using VTE prophylaxis as they were afraid of postoperative bleeding. Similarly a hospital based study by Ansari *et al.* found that only 47% of patients received pharmacological prophylaxis for fear of bleeding.^[15]

Of the responders, 42% of surgeons believed that the most of hospitalized patients who develop DVT were

symptomatic. With the fact that DVT is asymptomatic in approximately 5% of cases,^[4] patients with VTE may go undiagnosed if about half of the responders were not aware of it.

In our study 66% of responders routinely scored patients preoperatively using pretest probability assessment (Wells score), this finding is higher than the study by Prasannan *et al.*, who found that only 21.8% of consultants were following national guide lines.^[16]

More than two third of our respondents prescribed anticoagulants because they felt the patients had a high risk of developing VTE.

80% of surgeons reported they knew that there was an institute-based protocol for VTE prophylaxis at their department while 20% of respondents did not know if there is a policy in their department or not. While in national survey in UK 34.4% of surgeons said that they had departmental policy for thrombo-prophylaxis.^[17]

All our surgeons relied on Doppler venous ultrasonography and clinical examination to diagnose DVT post-operatively, no one in our study said they used D-dimer assay. While in a study by Bates *et al.* found that 38% of their surgeons used D-dimer assay for diagnosis.^[18]

The ACCP recommends that the diagnostic test is dependent on the pretest probability of VTE. In low-to-moderate VTE risk, D-dimer is advocated as the diagnostic test of choice. In high VTE risk whole-leg ultrasound is preferred.^[18]

According to the commonly used thrombo-prophylactic methods, 30% of our surgeons advised pharmacological prophylaxis and 20% advised mechanical prophylaxis, while 50% advised a combination of mechanical and pharmacological prophylaxis.

A traditional non-pharmacological prophylaxis strategy for DVT is a mainstay for conditions with absolute contraindications to antithrombotic or anticoagulant therapy like neurosurgery, ocular surgery. Such strategies include early mobilization and the use of sequential compression devices to prevent blood clotting. In addition, non-pharmacologic prophylaxis is recommended for low-risk patients throughout the preoperative period until they are ambulatory.^[7]

Sixty three percent of our surgeons said that they would advise low-molecular-weight heparin (LMWH) as the pharmacological agent of choice when prescribing thrombo-prophylaxis agents. There seems little doubt that the LMWHs are the most convenient of the pharmacological methods to administer: they are given once daily and require no laboratory monitoring. There should be a wider adoption of LMWH for prophylaxis,

which is justified on the basis of greater safety, patient acceptability, and saving of nursing time.^[19]

In our study the commonest complications reported by surgeons after prophylaxis were wound hematoma (42%) and excessive wound oozing (33%), while major hemorrhagic complications, have not been noted by any of them. Postoperative bleeding as a complication of VTE prophylaxis was frequent in the study of Hull et al, occurring in 55% of cases. Major bleeding was reported by 9%. They explained this by aspects of anticoagulant administration such as the dose of drug used and its proximity to surgery may account for some of the excess bleeding.^[20] The recent guidelines from seventh (ACCP) consensus conference in 2004 recommend that every hospital develop formal strategy to prevent complication of Thrombo-embolism.^[21]

In our study most of surgeons started prophylaxis 2h preoperatively (64%). As expected all surgeons start prophylaxis before surgery, with the majority starting it more than two hours before operation. There appears to be no adverse consequence of giving the first dose two hours before operation and there may be an additional benefit of preventing DVT developing during operation or in the immediate postoperative period. However high risk patients (where higher doses are required) would probably benefit more if prophylaxis started earlier (12hours before an operation), in order to avoid excessive intraoperative bleeding.^[22]

In our study the restoration of mobility is seen as the commonest indication for stopping prophylaxis (71%). There is evidence that the thrombotic risk persists for many weeks after surgery, despite this prophylaxis being stopped by the majority within days of operation.^[23]

The seventh ACCP conference recommended that LMWH or other prophylaxis should be continued for a minimum of 10 days. In patients undergoing total hip replacement or hip fracture surgery as well as in other high-risk patients, prophylaxis should last 28-35 days or longer postoperatively.^[24]

CONCLUSIONS

Our results indicate that our surgeons have a good knowledge on the prevention of VTE and 88% of them believed that the prevalence of DVT is higher in high altitude area. All the respondents routinely use prophylactic measures with 50% using a combination of pharmacological and physical methods. 80% of surgeons knew that there are protocols that are available in their units. However , practices among the surgeons appears doubtful given the fact only 66% of these surgeons carry out VTE risk assessment/stratification of hospitalized patients as well as comply with the clinical guidelines on thrombo-prophylaxis use.

Continuous medical education is advised on proper identification of at risk patients, importance of risk

stratification, improving the adherence to clinical guidelines and onset of prophylaxis and its duration needs more attention.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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