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## Risk of Venous Thromboembolism and Thrombophylaxis in Surgical Patients at a Tertiary Hospital in South-west Nigeria

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### ABSTRACT

#### Background:

Venous thromboembolism (VTE) is an important complication of major surgery that may result in high morbidity and mortality. There is still however paucity of information on the prevalence, risk factors, prophylaxis and mode of treatment in this environment.

#### Aims and Objectives:

The aim of this study is to determine the risk of developing VTE among major surgery patients and to evaluate the pattern of the thromboprophylaxis

administered.

#### Materials and Methods:

All case notes of patients who underwent major surgery over a twelve month period were reviewed for clinical and radiological evidence of VTE and the pattern of thromboprophylaxis employed.

#### Results:

Three thousand and thirty-eight (3,038) casenotes were obtained and reviewed. The mean age was 43±16.3 years and 2,043 (67.2%) were females, 1209 from O&G. Of the 589 (19.4%) patients that received thromboprophylaxis, 531 (90.1%) were orthopaedic patients. The most commonly used thromboprophylactic agent was LMW heparin (77.4%). The thromboprophylactic regimen was taken for less than a week in 459 (77.9%) patients. Clinically overt VTE occurred in 17 (0.56%) patients; 12 (0.39%) had deep venous thrombosis (DVT) while five (0.17%) developed PE. Six of the 17 (35.3%) had thromboprophylaxis (LMW heparin), but still developed DVT. Patients with clinically overt VTE had a significantly higher BMI than those without 28.5±0.86 vs 26.9±0.84 (p = 0.01).

#### Conclusion:

Although the prevalence of clinically overt VTE was low in this study, it was higher in overweight/obese patients, especially those with orthopaedic surgical intervention. The use of thromboprophylaxis was lower than expected.

**Keywords:** venous thromboembolism, thromboprophylaxis, pulmonary embolism, surgical patients

### INTRODUCTION

Venous thromboembolism (VTE), which includes deep vein thrombosis (DVT) and pulmonary embolism (PE), is an important and common complication of major surgical procedures. It is a common disease, with an average annual incidence rate of more than 1 per 1000. [1] Venous thromboembolism and its complications result in a high rate of morbidity and mortality. It is a fatal disease, especially when PE occurs. One week survival rate after a PE is 71%, and almost 25% of all cases present

as sudden death. [2] It is a major threat to patients undergoing surgery and it has a high prevalence. In the absence of thromboprophylaxis, DVT occurs in approximately 20% of all major surgical procedures and PE occurs in 1-2%. [3] The prevalence of VTE is higher in orthopedic patients, since more than 50% of major orthopedic procedures are complicated by DVT and up to 30% by PE when thromboprophylaxis is not instituted. [4] Without thrombo-prophylaxis, the frequency of fatal postoperative PE ranges from 0.1% to 0.4% in

patients undergoing elective general surgery and from 1% to 5% in patients undergoing elective hip or knee surgery, emergency hip surgery, and surgery for major trauma or spinal cord injury. [5] Thus, appropriate thromboprophylactic intervention is necessary. Therefore this study is aimed at determining the prevalence of VTE, the risk factors and the pattern of thromboprophylaxis among patients who have undergone major surgical procedures.

**MATERIALS AND METHODS**

The study was carried out in the Departments of Surgery, Orthopaedics and Obstetrics and Gynaecology at the OAUTHC, Ile-Ife, Osun State, Nigeria. Ethical approval was obtained from the Ethical and Research Committee of OAUTHC, Ile-Ife (ERC/2012/06/06). All case notes of patients from these departments that underwent major surgery (any invasive operative procedure involving a risk to the life of the patient in which a body cavity is entered; with a potential for encouraging permanent anatomic or physiologic impairment) in 2012/2013 were reviewed for the pattern of thromboprophylaxis; clinical and radiological evidence of VTE. Clinically, the diagnosis was based on the documented signs and symptoms, which included history of pain and swelling in the leg(s), history of long standing leg ulcer, presence of varicose veins, tenderness on the calf and history of chest pain with or without cough. Deep vein thrombosis was confirmed using Doppler ultrasound while PE was confirmed using CT scan and post-mortem findings. This was based on the

departmental protocol for diagnosing VTE. Data obtained was stored and analyzed using the computer software, Statistical Package for Social Sciences (SPSS) version 21.

**RESULTS**

Three thousand and thirty-eight (3,038) major surgeries were carried out across the three departments over the study period and all casenotes were available for review.

Table 1 shows the characteristics of the patients; the mean age was 43±16.3. There were 2043 females of which 1209 (59.2%) were from the Department of O&G and the male: female ratio was 1: 2. The mean BMI was 25.7±3.6kg/m<sup>2</sup>. Thirty-eight (1.3%) were underweight (18±0.45kg/m<sup>2</sup>), while 202 (6.6%) were obese (34±2.1 kg/m<sup>2</sup>).

Table 2 shows the pattern of thromboprophylaxis in 589 (19.4%) patients across the three departments. Most of the patients (531; 90.1%) had orthopaedic surgery, while 53 (9.0%) had general surgery and 5 (0.9%) had gynaecologic surgery. Seventeen (0.56%) of the patients developed VTE; 12 (0.39%) had DVT, five (0.17%) had PE. Of the patients who developed VTE, 10 (58.8%) had orthopaedic surgery, 3 (17.6%) had gynaecologic surgery and 4 (23.5) had general surgery.

Of the patients that developed DVT, one (8.3%) died, five (41.7%) completed therapy while 6 (50%) were lost to follow up. Among the PE patients, 1 (20%) survived and completed therapy while four (80%) died.

**Table 1:** Characteristics of patients in the study

Characteristics	Orthopaedics N=1120	O&G N=1209	Surgery N=709	Total N=3038
Age (years)	40.6±16.1	31±6.5	45.1±15.9	43.1±16.3
Sex				
Female	419 (37.4%)	1209 (100%)	415 (58.4%)	2043 (67.2%)
Male	701 (62.6%)	0	294 (41.6%)	995 (32.8%)
BMI (kg/m <sup>2</sup> )	26.2±3.8	25.5±3.3	25.2±3.8*	25.7±3.6
Underweight	12 (1.1%)	2 (0.2%)	24 (3.4%)	38 (1.3%)
Normal	390 (34.8%)	500 (41.4%)	297 (41.9%)	1187 (39.1%)
Overweight	620 (55.3%)	657 (54.3%)	334 (47.1%)	1611 (53.1%)
Obese	98 (8.8%)	50 (4.1%)	54 (7.6%)	202 (6.6%)

\*P-value 0.89

**Table 2:** Pattern of thromboprophylaxis and frequency of VTE in surgical patients

Variable	Orthopaedics N=1120	O&G N=1209	Surgery N=709	Total N=3038
<b>Thromboprophylaxis</b>				
Yes	531 (47.4%)	5 (0.4%)	53 (7.5%)	589 (19.4%)
No	589 (52.6%)	1204 (99.6%)	656 (92.5)	2449 (80.6%)
<b>VTE</b>				
DVT	7 (0.63%)	2 (0.17%)	3 (0.42%)	12 (0.39%)
PE	3 (0.26%)	1 (0.08%)	1 (0.14%)	5 (0.17%)
<b>Total</b>	10 (0.89%)	3 (0.25%)	4 (0.56%)	17 (0.56%)

The most commonly used agent for thromboprophylaxis across these departments (Table 3) was LMW heparin alone (456; 77.4%), followed by warfarin in combination with LMW heparin (112; 19.0%) and compression stockings (21; 3.6%). The dose of LMW heparin used in all the patients was 40mg daily irrespective of weight; warfarin varied between 2.5-5mg daily. Three hundred and sixty-two (61.5%) were commenced on prophylactic anticoagulant preoperatively while 227 (38.5%) started thromboprophylaxis post-operatively. The prophylactic regimen was taken for less than a week in 459 (77.9%) patients. Despite the use of thromboprophylaxis, six (1.0%) of the patients who had prophylaxis developed DVT with no fatality recorded.

## DISCUSSION

The mean age of the patients in the study (Table 1) shows that the majority of patients having surgery in the targeted departments were in the age group of the middle aged and elderly who are expected to have increased risk of VTE. [6,7] Five hundred and eighty-nine (19.4%) had thromboprophylaxis, this confirms the observation of other authors that there is limited use of thromboprophylaxis among surgeons despite the availability of effective medication. [8,9,10] The reason adduced for this is said to be multifactorial and include the fear of post operative haemorrhage, lack of enough information about the available forms of prophylaxis, dosages and duration of use as well as perceived low incidence of VTE. [10]

**Table 3:** Type, timing, duration and outcome of usage of thromboprophylactic measures

Variables	Orthopaedics N= 531	O&G N=5	Surgery N=53	Total N=589
<b>Agent used</b>				
Compression stockings	10 (1.9%)	0	11 (20.6%)	21(3.6%)
LMW heparin alone	413 (77.8%)	5 (100%)	38 (71.7%)	456 (77.4%)
Both heparin &warfarin	108 (20.3%)	0	4 (7.5%)	112 (19.0%)
<b>Time commenced</b>				
Pre operatively	319 (60%)	5 (100%)	38 (71.7%)	362 (61.5%)
Post operatively	212 (40%)	0	15 (28.3%)	227 (38.5%)
<b>Duration of usage</b>				
1-3 days	38 (7.1%)	1 (20%)	28 (52.8%)	67 (11.4%)
4-6 days	380 (71.6%)	0	12 (22.6%)	392 (66.6%)
7-9 days	89 (16.8%)	2 (40%)	9 (17.0%)	100 (16.9%)
.....	24 (4.5%)	2 (40%)	4 (7.6%)	30 (5.1%)
<b>Developed VTE despite prophylaxis</b>	3 (0.56%)	1 (20%)	2 (3.8%)	6 (1.0%)

The lack of a hospital policy on thromboprophylaxis contributed in no small measure to the inadequate usage of prophylactic anticoagulation. [10]

The use of thromboprophylaxis was found to be higher among orthopaedic patients. This was not unexpected as the incidence of VTE has been consistently reported to be higher after orthopaedic surgeries. [11,12] Seventeen (0.56%) of the patients in the study developed VTE. This is lower than what has been reported by most authors. [11,12,13] Orthopaedic patients made up 58.8% of the population that developed VTE in spite of the fact that 47.4% of them had thromboprophylaxis. This is not surprising since the risk for VTE among orthopaedic patients is twice the risk among general surgical and gynaecological patients. [4] The most commonly used prophylactic agent in this study was LMW heparin. This is contrary to the findings of Caprini *et al* [14] where mechanical agents- sequential intermittent pneumatic compression and graduated elastic stockings were the preferred method of thromboprophylaxis. This is probably because the study was conducted in the pre-LMW heparin era, since other researchers in the post-LMW heparin era found that LMW heparin was popular with surgeons. [9,10]

The optimal timing for the first dose of LMW heparin prophylaxis remains controversial. [15] In this study, majority of the patients (61.5%; Table 3) had thromboprophylaxis preoperatively while the remaining had prophylaxis postoperatively. Most of the patients who had preoperative prophylaxis (76.5%) were commenced within 48 hours of the surgery, while most of those commenced postoperatively (89.2%) started 24 hours after the surgery. Surgeon preference could have informed the timing of the prophylaxis as well as the fact that some of the patients had been on admission days before the planned surgery either due to the primary pathology or logistics (e.g. waiting time) which is common in a low resource setting like Nigeria. However, Raskob and Hirsh following a meta-analysis of available evidence concluded that preoperative initiation is not required for good efficacy and when begun within six hours of surgery, increases

major bleeding. They advised that initiation at six hours postoperatively is effective and not associated with increased major bleeding. [15] On the other hand, the American College of Chest Physicians in an evidence-based clinical practice guideline on antithrombotic and thrombolytic therapy recommended starting LMW heparin either 12 hours or more preoperatively or 12 hours or more postoperatively, rather than within four hours or less preoperatively or four hours or less postoperatively. [16]

The thromboprophylactic regimen that was used mostly by the surgeons in this study lasted for less than one week in 459 (77.9%) patients. The Australian Government National Health and Medical Research Council advised that thromboprophylaxis should be continued for up to one week or until the patient is fully mobile following major general surgery or gynaecological surgery and for 14-35 days following orthopaedic surgery depending on the type of surgery. [17] The ACCP also suggested extending thromboprophylaxis in the outpatient period for up to 35 days from the day of surgery for patients undergoing major orthopaedic surgery, rather than for only 10 to 14 days routinely recommended for major general or gynaecologic surgery. [16] It should be noted that the ACCP also gives room for extension of thromboprophylaxis to 28 days in selected high risk patients undergoing major general or gynaecologic surgery. [16]

## CONCLUSION

This study has shown that the prevalence of VTE in surgical patients post-operatively in this setting is low; it was independent of the use of thromboprophylaxis and patients who had orthopaedic surgery were more at risk. Venous thromboembolism occurred more in the middle age and the elderly and it was also more common in the overweight and the obese. The most commonly used thromboprophylaxis was LMW heparin and duration of use in most of the patients in this study was suboptimal, being administered for less than a week. This could be due to the absence of hospital and national guidelines on thromboprophylaxis.

### Limitations of the study

The outcome of patients lost to follow-up was unknown and post-mortem was not conducted on patients that died.

### Acknowledgement

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### Conflict of Interest:

The authors have no conflict of interest to declare.

### Contribution of Authors:

This study was conducted by KJ O-A, while NOA, KJ O-A, OOA, MOO, EAA and OK contributed to the study design and wrote of the paper. NOA initiated the study.

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