

Venous Thromboembolic Risk Factors and Management of Prophylaxis in Elective Gynecologic Surgery Patients

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Abstract

Background: The aim of this study was to assess thromboembolic risk factors and prophylaxis in patients undergoing elective gynecologic surgery.

Patients and methods: This was a descriptive longitudinal approach with prospective data collection, from January to June 2021 in the intensive care and gynecology departments of the Yaoundé Gynaeco-Obstetric and Pediatric Hospital. The studied variables were socio-demographic data, indications for surgery, risk factors related to the patient and those related to surgery (according to the modified Caprini score), and the principles of thromboprophylaxis. The collected data were entered using CS Pro 7.0 software and analyzed by Epi-info software version 3.5.4.

Results: We recruited 84 patients. The mean age was 45.1±10.2 years. The risk factors found were cancer (41.5%), obesity (32.1%) and hypertension (13.2%). The high global risk was found in 40 cases (47.6%) followed by the very high global risk with 28 cases (33.3%). All patients benefited from early mobilization while 69% used compression stockings. In the overall population, enoxaparin was used alone in 84 cases (100%) and in combination with stockings in 58 cases (69.1%). In the high-risk population (n=68), enoxaparin was used in all the cases and in combination in 48 cases (70.5%). Six thromboembolic events were recorded.

Conclusion: VTE prophylaxis should be administered according to recognized guidelines to avoid inadequate prophylaxis. It is well codified. It reduced VTE events.

Keywords: Venous thromboembolic disease; Prevention; Risk factor; Gynecologic surgery.

Introduction

Venous thromboembolism (VTE), presenting as deep venous thrombosis (DVT) and pulmonary embolism (PE), remains a significant cause of morbidity and mortality in patients after operation [1,2]. PE, mainly caused by DVT, is the leading cause for about approximately 10% hospital deaths and 40% deaths after gynecological operation [2]. Venous thromboem-

bolism is a life-threatening condition.

An estimated 33% of patients undergoing an elective general surgical procedure will suffer some form of VTE as a postoperative complication. Autopsies show that approximately 10% of all in-hospital deaths are attributed to pulmonary embolism PE [3]. VTE is a significant problem in the perioperative period, increasing patient morbidity, mortality, and health care

costs. It is also considered the most preventable of the major postoperative complications [4]. The WHO estimated that in 2016, 17.9 million people died from cardiovascular disease, accounting for about 31% of all deaths worldwide, with VTE being one of the three leading causes [5]. Deep venous thrombosis is a major cause of morbidity and mortality among postoperative patients. Its incidence has been reported to range between 16% and 38% among general surgery patients and may be as high as 60% among orthopaedic patients. The most important clinical outcome of DVT is pulmonary embolism, which causes about 10% of hospital deaths. The only effective way of guarding against this fatal condition is therefore prevention/prophylaxis [6]. The prevalence of VTE and associated mortality are high following surgery, and in pregnant and postpartum women in Africa. At least one-quarter of patients who are at risk for VTE in Africa are not receiving prophylaxis. These results are generated from studies with small sample size, highlighting an urgent need for well-designed studies with larger sample size to evaluate the true burden of VTE in Africa. The prevalence of deep vein thrombosis (DVT) varied between 2.4% and 9.6% in postoperative patients [5]. A clinical trial involving more than 16000 high-risk surgical patients showed the necessity and efficacy of VTE prophylaxis. In this trial, VTE prophylaxis was shown to reduce the incidence of acute DVT by 66% and the mortality rate of PE by 50%. These findings have been confirmed by a consensus panel of the American College of Chest Physicians (ACCP). There are conclusive data that VTE prophylaxis is more effective in preventing death and more cost-effective than treating established disease [3]. Apart from the fact that VTE prophylaxis is generally poorly prescribed, it is also evident that the concept of VTE risk categories and the use of risk assessment models are not well implemented [3,7,8]. The risk of thrombosis can be estimated based on patient- and procedure-specific factors, using validated risk-assessment models such as the Caprini score. The aim of this study was to assess thromboembolic risk factors and prophylaxis measures in patients undergoing elective gynecologic surgery.

Patients and methods

This was a prospective longitudinal study from 1 January to 31 May 2021. It took place in the intensive care and gynaecology-obstetrics departments of the Gynaecology-Obstetrics and Paediatrics Hospital of Yaoundé. Included were all patients aged 18 years and over, all patients operated on for scheduled gynaecological surgery, and all patients who gave their consent. Not included were patients operated on for caesarean section, pregnant women, patients under anticoagulant treatment, and patients who did not give their consent. Sampling was consecutive and not probabilistic. We estimated the minimum sample size using the Schwartz formula. According to the study by Danwang et al [5], the prevalence of postoperative venous thromboembolic disease was 2.4%. The minimum size was 36 patients. Recruitment was carried out during pre-anaesthetic consultations and in the operating theatre. Patients were followed up during the intra- and post-operative periods using the data sheet. The data collected were preoperative data (socio-demographic data, lifestyle, risk factors, operative indication), intraoperative data (anaesthesia technique, intraoperative hydration, wearing of compression stockings) and postoperative data (postoperative hydration, postoperative analgesia, anticoagulants, compression stockings, evolution). Patient data were collected from medical records, anaesthesia charts, and nursing records. The evaluation of the principles of thromboprophylaxis was done according to the 2018 French

Society of Anesthesiologists and ACCP recommendations. The variables studied were: Sociodemographic data, risk factors (patient-related, surgery-related), according to the modified Caprini score, principles of perioperative prevention of VTE (preoperative stage, intraoperative stage, postoperative stage). The data collected were entered using CS Pro 7.0 software and analysed using Epi-info version 3.5.4 software. Quantitative data were expressed as mean, standard deviation. Categorical data were represented as headcount and percentage.

For scientific purposes only. Patients who refused to participate in the study were treated normally without discrimination.

Results

The sample size was 84 patients. The mean age was 45.1 ± 10.2 years with extremes ranging from 19 to 65 years. Patients over 40 years of age accounted for 71.4%. The most common surgery performed was hysterectomy ($n=34$). The most common risk factors were cancer (41.5%), obesity (32.1%) and hypertension (13.2%). According to the modified Caprini score, the overall risk was high (47.6%) and very high (33.3%). The anaesthesia techniques performed were general anaesthesia (66.7%) and locoregional anaesthesia (33.3%). The average duration of the surgery was 140.6 ± 32.5 minutes, with values ranging from 55 to 220 minutes. The mean intraoperative hydration was 2428.6 ± 694.7 ml with values ranging from 1000 to 4000 ml. The mean postoperative hydration was 2071.4 ± 283.1 ml/24 h with values ranging from 1500 to 3000 ml. Postoperative pain was managed with a balanced analgesia protocol in 100% of cases. Compression stockings were used in 69.1% of cases. Early mobilisation was recommended in all patients. Enoxaparin was used in 100% of cases. It was combined with compression stockings in 58 cases (69.1%). In the highrisk population ($N=68$), enoxaparin was used alone in 64 cases (100%) and in combination with compression stockings in 48 cases (70.5%). In the very highrisk population ($n=28$), enoxaparin (100%) and compression stockings (71.4%) were used. In the highrisk population ($n=40$) enoxaparin was used (100%), support stockings in 28 cases (70%). In the moderate risk population ($n=14$), enoxaparin was used in 14 cases (100%), compression stockings in 10 cases. Rivaroxaban was used in two patients (2.4%) who were at high risk. Six thromboembolic events such as deep vein thrombosis were recorded (7.1%). These events occurred in a context of non-observance of the constant wearing of compression stockings and unavailability of drug treatment due to financial difficulties.

Discussion

Venous thromboembolism is a life-threatening condition. VTE is a significant problem in the perioperative period, increasing patient morbidity, mortality, and health care costs. It is considered the most preventable of the major postoperative complications. The only effective way of guarding against this fatal condition is therefore prophylaxis.

The mean age in our series was 45.1 ± 10.2 years. This was a young and active population. Our results were comparable to those of Muleledhu et al [6] in Uganda in 2013 and Snyman et al in South Africa [3] in 2014 who found a mean age of 45 and 44.28 years respectively. The risk factors were cancer (41.5%) and cardiovascular risk factors (obesity, hypertension, diabetes). These results were similar to those found by Njonnou et al in 2019 who found obesity (58.1%) and hy-

Table 1: Clinical data.

Variables	Number (n)	Percentage (%)
Age (years)		
18-20	2	2.4
21-30	4	4.8
31-40	18	21.4
41-50	36	42.8
51-60	16	19.1
61 and above	8	9.5
Operative indication		
Hysterectomy	34	40.5
Mastectomy	18	21.4
Myomectomy	16	19.1
Breast Tumorectomy	10	11.9
Kystectomy	6	7.1
Risk factors (n=106)		
Cancer	44	41.5
Obesity	34	32.1
High Blood pressure	14	13.2
HIV	12	11.3
Diabetes mellitus	2	1.9
VTE risk (Caprini's Score)		

Low	2	2.4
Moderate	14	16.7
High	40	47.6
Very High	28	33.3
Anesthesia technique		
General Anesthesia	56	66.7
Spinal Anesthesia	28	33.3
Surgery's duration (minutes)		
0-60	2	2.4
61-120	14	16.7
121-180	60	71.4
181-240	8	9.5
Intraoperative fluids (ml)		
1000-1499	4	4.8
1500-1999	12	14.2
2000-2499	16	19.1
2500 and above	52	61.9
Postoperative fluids (ml)		
1500-1999	2	2.4
2000-2499	72	88.1
2500 and above	8	9.5

Table 2: Clinical data.

Variables	Low risk (n=2)	Moderate risk (n=14)	High risk (n=40)	Very high risk (n=28)
Compression stockings	-	10	28	20
Rivaroxaban (anti-Xa)	-	-	2	-
Enoxaparin (LMWH)	2	14	40	28
Association LMWH/stocking	-	10	28	20

hypertension (26.9%) [9], while Owono Etoundi et al in 2015 found obesity (16.5%) and hypertension (13.9%) [1]. Hysterectomy was the main operative indication (40.5%) in our series. This was similar to the data of Snyman et al. in 2014, who found total hysterectomy in 38% of cases [3]. The most important risk factors are malignancies, vascular disease, trauma, and surgery, as well as other conditions that lead to prolonged hospitalisations. Since surgery is an independent risk factor, postoperative patients are at a particularly high risk of developing DVT [6]. Patients qualified for surgery who are diagnosed with malignancy are three times as much in risk of deep vein thrombosis and twice in risk of pulmonary embolism as patients without a diagnosed cancer. Because of oncological indications, in most cases of cancer patients qualified for surgical treatment, we should assume the population of these patients as high risk and very high risk of VTE [10]. Surgery is considered high risk if the length of the general anaesthesia exceeds 45 minutes, if malignancy is present, if major surgery is performed to pelvic organs, and if there is prolonged postoperative immobilisation or bed rest [3].

The overall risk of VTE according to the modified Caprini score was high (47.6%) and very high (33.3%). These results were similar to those of Snyman et al. who found an overall very high risk (45%) and an overall high risk (38%) [3]. The ma-

majority of patients undergoing elective gynaecological surgery are either at high risk or very high risk for developing postoperative VTE-related morbidity. This group of patients require formal preoperative VTE risk assessment using a recognised scoring model [3]. Low (3%), Moderate (14%), high (38%), highest (45%). With application of the Caprini RAM, 77% of patients were found to be at risk of DVT. This figure is higher than the average of 64% in the ENDORSE study, but within the range of 44-80% for the 32 participating nations [11]. Some reports determined several risk factors associated with postoperative VTE in patients with gynecological disease, such as body mass index (BMI) 30 or 40 kg/m², 12, 13 operative time >180 minutes, 13 cancer surgery, and blood transfusion 2000 mL. 3 But they did not establish efficacious risk assessment based on these risk factors. Six independent factors including varicose vein, bed rest time 48 h, length of operation 3 h, laparotomy surgery, hypertension, and age 50 years significantly increased the incidence of postoperative DVT on multivariate analysis [2].

The anaesthesia techniques found in our patients were general anaesthesia (66.7%) and locoregional anaesthesia (33.3%). The anaesthesia technique was chosen mainly according to the patient's clinical condition and the surgical procedure. Locoregional anaesthesia has a better benefit in terms of thromboprophylaxis [8]. Intraoperative hydration was on average

2428.6±694.7 ml with values ranging from 1000 to 4000 ml. The quantities of fluids administered intraoperatively varied between 5 and 12 ml/kg/h. They were in accordance with the SFAR recommendations for vascular filling. The average postoperative hydration was 2071.4±283.1 ml/24 h with values ranging from 1500 to 3000 ml per 24 h. These fluids were calculated from the baseline requirement of 30-40 ml/kg/24 h. This administration was in accordance with the international standards prescribed by the SFAR [12]. Postoperative pain management was adequate. The protocols used 1st and 2nd level analgesics according to the WHO classification. These were paracetamol, non-steroidal anti-inflammatory drugs and tramadol. These results were similar to those of the series by Tazeem et al. [13].

Compression stockings were used in 69% of cases. These data were comparable to those of Tazeem et al. [13]. They differed from those of Deheinzelin in 2006 in Brazil, where a low rate of stocking use was found [14]. This could be explained by the establishment of service protocols for VTE prevention in line with international recommendations. Drug prevention consisted of the administration of anticoagulants. These were mainly low molecular weight heparins (enoxaparin). In the high-risk population, enoxaparin was used in 100% of patients and in combination with compression stockings in 24 cases (70.5%). This was similar to the results of Kesieme et al in 2016. They found a combination of LMWH and compression stockings in 77% of cases. These results were different from the previous data in our context. Kingue et al in 2011 found the use of low molecular weight heparin (LMWH) in 40.2% of cases. These results could be improved by the rigorous application of international recommendations by practitioners, as demonstrated in the study by Kesieme et al. in Nigeria [15].

The various reported methods to prevent DVT in postoperative patients are preoperative pharmacologic prophylaxis (unfractionated heparin and low molecular weight heparin) and mechanical. The audit revealed that only 5% of patients received the correct VTE prophylaxis, 55% received inadequate prophylaxis and 40% received no prophylaxis [3]. All 3 patients (100%) in the low-risk category received the correct prophylaxis. In the moderate-risk group, two patients (13.3%) received the correct prophylaxis but 13(86.6%) received no prophylaxis at all. In the high-risk group, 19(45.2%) patients received no prophylaxis and 23(54.8%) received inadequate prophylaxis, while in the highest-risk group 12(24.5%) received no prophylaxis and 37(75.5%) received some, but inadequate, prophylaxis. Prophylaxis (compression stockings and intermittent pneumatic compression). Combination of these strategies have been recommended by some for high risk DVT patients [16]. The correct therapy was prescribed to only 21% of elective patients. Although VTE is a problem in all patients, it is an enormous problem in patients admitted for an elective procedure/work-up, where a favorable outcome is usually anticipated, especially when a catastrophic event such as fatal PE occurs [11].

In our study, six thromboembolic events such as deep vein thrombosis were recorded, representing an incidence of 7.1%. They occurred during the first 7 days postoperatively. The causes were related to the non-observance of the constant wearing of compression stockings and the unavailability of the drug treatment. While current thromboprophylaxis consensus statements such as the ninth and most recent guidelines published by the American College of Chest Physicians help to

decrease the incidence of VTE, VTE remains a major perioperative complication. VTE continues to be a serious problem after surgery, resulting in disabling morbidity and death. VTE is perhaps the most preventable of all the major perioperative complications [4]. The incidence of lower limb deep vein thrombosis in post-operative period in general surgery patients varies from 16% and 38%. Hospitalized patients have over 100-fold increased incidence of acute DVT over community residents [9]. The prevalence of deep vein thrombosis (DVT) varied between 2.4% and 9.6% in postoperative patients [3]. In sub-Saharan Africa, this prevalence was, respectively, 2.4% in the study by Adeleye et al. in Nigeria [17], and 5% in the study by Muleledhu et al. in Uganda [6]. As a result, 800 patients in the data base were analyzed with an overall VTE incidence of 5.8% [18]. The overall incidence of DVT was 9.20% (68/739) in this patient population. A total of 66 (97.06%) DVT events were found within 7 days of surgery. The incidence of postoperative DVT and PE after gynecological surgery is high in patients with moderate or high-risk level. The incidence rate of DVT is about 10% to 40% in medical or general surgical patients without prophylaxis. With prophylaxis, the postoperative incidence of VTE was 1.14% in women with gynecological disease [2]. It is essential that every unit has a formal risk assessment model to objectively categorize patients in risk categories preoperatively. VTE prophylaxis guidelines should be readily available in an attempt to ensure that patients receive adequate and optimal VTE prophylaxis based on their risk profiles.

Limitations

Our study had several shortcomings. The limitations of our study were the small sample size due to the duration of the study and the pandemic in Covid-19. The latter had an impact on attendance at hospital training in our context. Our results cannot be generalized to the national level, as we were limited to two wards in one health facility. This was a single-center study. The difference in care practices in the two departments could have had an impact on the results.

Conclusion

Postoperative VTE can be a devastating and costly complication. VTE prophylaxis should be administered according to recognized guidelines to avoid inadequate prophylaxis. It is well codified. It reduced VTE events. VTE prophylaxis guidelines should be readily available in an attempt to ensure that patients receive adequate and optimal VTE prophylaxis based on their risk profiles. Low molecular weight heparins were routinely used postoperatively. A combination of drug treatment, compression stockings and early mobilization is more effective in preventing VTE.

Declarations

Ethical considerations: Ethical approval was obtained from the institutional review board of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé and the YGOPH ethics committee. A written informed consent was obtained from the study participants. The confidentiality of the information collected was effective. The information collected was used.

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Conflicts of interest: None.

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