Venous Thromboembolism in Jamaican Women: Experience in a University Hospital in Kingston

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ABSTRACT

Objective: *To review cases of venous thromboembolism (VTE) at UHWI from 1999–2004, to identify methods of diagnosis, risk factors and to evaluate differences between survivors and fatalities.*
Methods: *Patients coded with the diagnosis of thromboembolism at the University Hospital of the West Indies (UHWI) from 1999–2004 were identified. The medical records were reviewed to determine the prevalence of thromboembolism and possible variables associated with this diagnosis. In addition, variables associated with fatality were examined by evaluating cases diagnosed at autopsy.*
Results: *There were 959 patients coded for thromboembolism between 1999–2004 at UHWI. Of these, 657 (68.5%) were females and 302 were males (31.5%). During that period, 65 657 women and 40 826 men were admitted to hospital with prevalence rates for thromboembolism of 1% in women and 0.7% in men. Of the 657 females, 520 case notes were located (case identification 80%). Of this, 435 were analysed as confirmed thromboembolism. The median age was 51 years with a range of 2–95 years. Common associations were obesity, 53.5%; age over 50 years, 52.5%; hypertension, 44.7%; immobilisation, 36.3%; cardiac disease, 26%; diabetes, 19.4%; fibroids, 16.3%; surgery, 15.8% and cancer 14%. Recurrent venous thromboembolism occurred in 12.8% and 15.8 % of women (66) died, diagnosed with PE at post-mortem. Using logistic regression analysis, leading risk factors in fatalities compared to survivors were hypertension and increased age. Obesity and surgery were significantly more likely in survivors.*
Conclusion*: Venous thromboembolism was common in this cohort of women and avoidance of risk factors and institution of prophylaxis in high risk women is important to decrease morbidity and mortality.*

Tromboembolismo Venoso en Mujeres Jamaicanas: Experiencia en un Hospital Universitario en Kingston

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RESUMEN

Objetivo: *Examinar los casos de tromboembolismo venoso (TEV) en el HUWI desde 1999 a 2004, a fin de identificar los métodos de diagnosis y factores de riesgo, y evaluar las diferencias entre sobrevivientes y casos fatales.*
Métodos: *Se identificó a los pacientes codificados con el diagnóstico de tromboembolismo en el Hospital Universitario de West Indies (HUWI) de 1999 hasta 2004. Se revisaron las historias clínicas para determinar la prevalencia de tromboembolismo y las variantes posibles asociadas con este diagnóstico. Además, examinamos las variables asociadas con la fatalidad, evaluando los casos diagnosticados mediante autopsia.*
Resultados: *Hubo 959 pacientes codificados por tromboembolismo entre 1999–2004 en el HUWI. De estos 657 (68.5%) eran mujeres y 302 eran hombres, 31.5%. Durante ese período, 65 657 mujeres y 40 826 hombres fueron admitidos con tasas de prevalencia de tromboembolismo de 1% en las mujeres y 0.7% en los hombres. De las 657 mujeres, localizamos 520 notas de casos (80% de identificación de casos). De estas, 435 fueron analizadas como tromboembolismos confirmados. La edad promedio fue*

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de 51 años y un rango de 2–95 años. Las asociaciones comunes fueron: obesidad (53.5%), edad mayor de 50 años (52.5%), hipertensión (44.7%), inmovilización (36.3%), enfermedad cardíaca (26%), diabetes (19.4%), fibromas (16.3%), cirugía (15.8%), y cáncer (14%). El tromboembolismo venoso recurrente ocurrió en un 12.8%, y murieron 66 (15.8%) mujeres, diagnosticadas post-mortem con EP. Utilizando un análisis de regresión logística, se halló que los principales factores de riesgo en los casos fatales comparados con los de los supervivientes, fueron la hipertensión y los años de edad. La probabilidad de obesidad y cirugía fue significativamente más alta en los sobrevivientes.

Conclusión: *El tromboembolismo venoso fue común en esta cohorte de mujeres, y para disminuir la morbilidad y la mortalidad, es importante evitar los factores de riesgo e instituir la profilaxis para las mujeres expuestas a ellos.*

West Indian Med J 2009; 58 (3): 244

INTRODUCTION

Venous thromboembolism (VTE) is a condition where clots form in intact blood vessels as a result of endothelial damage or occlusion, stasis of blood flow or conditions causing increased coagulation (Virchow's Triad) and migrate to other remote sites. This may involve both the arterial and venous circulation (1). The main complication of Deep Vein Thrombosis (DVT) is Pulmonary Embolism (PE) which may be fatal unless detected early and treated with long-term anticoagulation, sometimes for life.

Women are at special risk of VTE because this condition is associated with pregnancy and the puerperium and also with hormonal therapy such as hormonal replacement therapy (HRT), hormonal contraception (1, 2) [oral contraceptive pills (OCP), injections and patches with oestrogen] and also selective oestrogen receptor modulators (SERMS) such as tamoxifen, used in treatment of breast cancer (3). Some women are also at risk because of a sedentary occupation, long periods of immobilization as well as obesity [Body Mass Index (BMI) > 30] (4), intra-abdominal malignancy and large benign pelvic tumours such as fibroids (5) or ovarian tumours that compress pelvic veins. With increasing age, many women are not only at risk of arterial thromboembolism because of atherosclerosis but are also at risk of venous thromboembolism because of concurrent medical conditions requiring hospitalization such as paralysis, coma, hypertension, diabetes, renal disease, depression and dementia as well as surgical conditions such as cancer and fractures (4).

It is difficult to determine the incidence of VTE disease. Clinical signs and symptoms may be nonspecific and screening tests are not always sensitive enough to detect disease in asymptomatic patients. According to population studies, the overall age- and sex-adjusted annual incidence of venous thromboembolic disease is 1 to 2 per 1000 people. More than a third of these cases represent recurrent disease. Extrapolation of these data suggests that more than 250 000 cases of VTE are diagnosed annually in the United States of America (USA). At least 50 000 (20%) of these cases are fatal (6, 7), although available autopsy data suggest that this figure is probably a significant underestimation of actual mortality.

Acute VTE most typically consists of DVT or PE with death complicating the latter, whereas chronic sequelae may include post-thrombotic syndrome, venous insufficiency and pulmonary hypertension (8). Acute venous thromboembolism is the leading cause of maternal death in some countries accounting for up to 20% of such deaths in the USA (9, 10). The impact of VTE as a medical condition in Jamaican women for the most part is unknown, although in a retrospective study from Jamaica, 841 cases of sudden natural deaths in men and women comprising 51.3% of the medico-legal autopsies conducted over the 15-year period, January 1983 to December 1997, pulmonary embolism accounted for 7.4% of deaths (11).

Thromboembolism is therefore a serious complication of many conditions in women and there have been no cohort studies in Jamaica describing a large group of these patients to see what peculiar characteristics put them at risk.

SUBJECTS AND METHODS

All patients coded at the University Hospital of the West Indies (UHWI) with the diagnosis of thromboembolism were identified. These cases were managed at UHWI over a six-year period 1999–2004. The case-notes of all the women were searched for. The aims were to look at variables which may have precipitated the occurrence of thromboembolism and to analyse the diagnostic strategies used to make the diagnosis to confirm VTE/PE using lung scan, venogram, doppler ultrasound or by the typical S1 Q3 T3 electrocardiographic (ECG) changes (a prominence of S waves in lead I, Q waves in lead III and T-wave inversion in lead III). The variables examined were age, parity, weight, height, type of thromboembolism, risk factors (pelvic mass, surgery, pregnancy, thrombophilia), protein S and C deficiencies and antiphospholipid syndrome (APS), thrombocytosis and polycythaemia, chronic illnesses (hypertension, diabetes, systemic lupus erythematosus), immobilisation (surgery, trauma, fractures, depression and psychosis, paralysis, a bedridden state, long trips by air or road), use of steroids such as oral contraceptives, HRT and SERMS, cancer, pregnancy and cardiac disease. Determination of BMI was hampered by missing data. Only 49/439 (11.1%) women had height recorded, while BMI was available in 58/439 (13.2%) women,

the clinicians described many women as obese or morbidly obese. Therefore, the available BMI data as well as the clinical description of the patients were used to crudely determine obesity. All autopsy reports of patients with a clinical diagnosis of pulmonary embolism during the same period were examined to see if these patients differed in any way from their surviving counterparts.

The study was a descriptive one with the frequencies of known risk factors determined. Other categorical risk factors such as age, obesity, haemoglobin and platelet levels were evaluated and the methods of diagnosis were determined (ECG and lung scan patterns). Risk factors and their association with fatal PE compared to survivors were analysed by logistic regression.

The study was approved by the Ethics committee of the University of the West Indies/University Hospital of the West Indies.

RESULTS

There were 959 patients coded for VTE during the period 1999–2004 at the University Hospital of the West Indies. Of these 657 (68.5%) were females and 302 were males (31.5%). During that period 106 483 persons were admitted (VTE rate 0.9%), 65 657 were women (VTE rate 1%) and 40 826 were men (VTE rate 0.7%). Of the 657 females, 520 case notes were located (case identification 80%). Of these, 439 were analysed as these were confirmed as having VTE. The median age at presentation was 51 years with a range of 2 – 95 years.

The typical ECG displaying right heart strain with S1, Q 3, T3 was only found in 9 patients (7.1%) with pulmonary embolism and 30% of the patients had a S1 change, 34.2% had a T3 change and 32.2% had a Q3 change. A total of 283 (65%) women were diagnosed as PE and of the 188 women who each had a lung scan for suspected PE, 149 (79.2%) had a high probability for PE, while 15 (7.9%) had a scan of intermediate probability. There was no correlation between these ECG changes and a positive lung scan. None of the patients had a computed tomography (CT) scan or D-Dimer assay done during the period of the study.

In the study population, the most common associations are summarized in Table 1. The most common associations were obesity and age over 50 years followed by hypertension, immobilisation and cardiac disease. While recurrent TE occurred in 12.8%, only one patient had a test for the inherited thrombophilias which was positive for protein S and C deficiencies. While two had tests for acquired thrombophilia, the antiphospholipid syndrome (APS), using the lupus anticoagulant test. Two patients had multiple recurrent VTE, one with four and the other with six reported episodes. One woman reported that three sisters had a history of DVT, two of whom had died. All of these women were less than 50 years old. Tests for thrombophilia were not done in any of these patients.

Table 1: Common risk factors for thromboembolism in Jamaican women in the total cohort and in those that died

Variable	Total n = 439	Died n = 66
Age (median and range)	51 (2–95)	57 (22–95)
Age > 50	52.5%	75%
Obesity	53.5%	15%
Hypertension	44.5%	35%
Age > 60	39.1	48%
Immobilisation	36.3%	33.8%
Benign pelvic Mass	16.8%	24.2%
Cardiac	26%	16.7%
Diabetes	19.4%	11.2%
Fibroids	16.3%	23%
Surgery	15.5%	29%
Atherosclerosis		21%
Malignancy	14%	24.2%%
Recurrent	12.8%	1.5%
Hormonal	8.7%	0
Pregnancy	5.9%	4.8
Long trip	5%	1.5%
Smoking	4.3%	0
Fracture	3.8%	4.8
Mental illness	3.9%	0
Systemic Lupus	3.9%	

In the study population, only three women (3/373, 0.6%) had haemoglobin of more than 16g/dL (polycythaemia) and only 16/355 (3.3%) women had platelet counts of more than 400 x 10^9/L. Leucocytosis was not analysed.

During the study period, 26 women had VTE in pregnancy and there were 14 661 deliveries with a VTE rate of 0.177% of deliveries. Of the pregnant women 8/24 (33.3%) were described as obese and 9/24 (37.5%) had surgery while pregnant. Of these women, 4/24 (16.6%) had major surgery, 2/24 (8.33%) had Caesarean section, 2/24 (8.33%) had laparotomy for ectopic pregnancy, while 5/24 had minor surgery, 4/24 (16.6%) had dilatation and curettage (D & C) and 1/24 had tubal ligation. This last patient had bilateral DVT after a spontaneous abortion with retained products at 20 weeks gestation. Three of these pregnant women died from PE which was confirmed at post-mortem: one with morbid obesity and a large uterine fibroid died after laparotomy for ectopic pregnancy. One woman had sickle-cell disease and one had APS.

Of the cohort, 12/439 (2.7%) had VTE after gynaecological surgery (excluding ectopic pregnancy and D & C). Of the 66 women that died, five (7.6%) had VTE after hysterectomy, four had total abdominal hysterectomy and bilateral salpingo-ophorectomy and one had vaginal hysterectomy. All of these women were post menopausal, with a mean age of 69.6 years, median age of 68 years and a range of 57–81 years. At post-mortem, 4/5 (80%) of these women were found to have atherosclerosis. Of those who survived, the median age was 42 years with a range of 39–48 years.

When hormonal therapy was evaluated as a risk factor, five smokers developed DVT while using the hormonal

contraceptive or HRT. Three women developed DVT after they were started on OCP soon after surgery. One woman, a smoker, was put on conjugated equine oestrogen and OCP and developed a DVT when she had a D and C, because she had an abortion. One woman with a family history of DVT, who was also a smoker and on the OCP developed DVT after a long air trip. Two women over age 50 years old developed DVT on OCP. One of them aged 54 years was also on the HRT patch at the same time. The median age of these women was 32 years with a range of 17–54 years. This was less than that of the entire cohort (median 51 years, range 2 –95 years). Of these women with hormonal contraceptive steroids, 14/31 (45.2%) were described as obese.

There were 22/439 (5%) women with history of a recent long trip: by air, 15 women (65.2%) or by car or van 8 (34.8%). Of the 22 women, 12 (54.5%) were less than 50 years old, 8 (67%) of these 12 women were listed as obese, two (17%) were on OCP and one (8%) was pregnant and had pre-eclampsia. One woman, aged 78 years, died while being treated for PE.

During the study period, 66 (15.8%) women died and were confirmed as PE at post-mortem. The median age in this group was 57 years with a range of 22–95 years. Of those who died, 74.2% were older than 50 years ($p < 0.1$). The most common associations are summarised in Table 1. Significant among these were age over 50 years, hypertension, immobilisation, surgery and the presence of a large benign pelvic mass. The women who were older than 50 years, had significantly more hypertension (43% *versus* 13%, $p = 0.04$) and more atherosclerosis (28% *versus* 5%, $p = 0.016$). The main association in women who died less than 50 years old was pregnancy.

Using logistic regression analysis, the main risk factors in those who died compared to survivors were hypertension and increased age. Obesity and surgery were significantly more likely in the survivors (Table 2).

Table 2: Binary logistic regression for risk factors in those that died *vs* survivors

Variable	*p* Value	OR	CI
age	0.003	1.176	1.055–1.311
pregnancy	0.454	3.192	0.153–66.47
obese	0.051	8.253	0.994–68.499
BP	0.033	0.073	0.007–0.810
immobile	0.172	4.298	0.529–34.904
surgery	0.571	1.978	0.187–20.927

DISCUSSION

Venous thromboembolism is a common medical problem in men and women. Women seem to have more risk factors for thromboembolism as they get older especially those over age 60 years, while the rate for men is the same in all age groups (7). The occurrence of VTE in men in only 31% of the cohort was similar to that found in a recent study by Yamaki *et al* (2008) of 38.4% (8). However, the findings in this hospital-based cohort of 1% of women and 0.7% of men is much higher than that found in population based studies of 1.1/1000 and 1.3/1000 females and males respectively (7). This is expected as hospitalization is a major risk factor for VTE (12).

Venous thromboembolism occurs in about 10–30% of medical patients (13) and about 10–20% of patients with complicating PE will die (14, 6, 7). In this series, the death rate was 15.1% and this is in keeping with published rates. However, the high incidence of hypertension (15) and cardiovascular disease in Jamaican women compared to other countries may also put them at higher risk of VTE and also of dying from the condition.

Diagnosis is difficult, hence the recommendation that full heparinization should be started as soon as the diagnosis is suspected clinically and only discontinued when these conditions are ruled out by one of several tests. The usual methods of diagnosis are inaccurate with the typical S1,Q3/S1Q3T3 ECG pattern only seen in 4.5–14% cases according to a meta-analysis by Massoti *et al* (16). The frequency of 7% in the present study was within that range. Lung scans are also inaccurate and the finding of almost 80% of women with suspected PE having a lung scan of high probability is acceptable. Spiral CT scan and D-Dimer tests are expensive and not readily available. However, even with positive CT scans and ultrasound tests, the diagnosis is not always in keeping with the clinical picture. In one study of 290 patients with positive CT findings for PE, DVT signs or symptoms were present in only 90 patients (32%) and doppler ultrasound detected DVT in 169 patients [60.1%] (17). A study by Perrier and colleagues evaluated whether the use of D-dimer and multi-detector-row CT (MDRCT), without lower-limb ultrasonography (LL-US), might exclude PE (18). A total of 756 patients with clinically suspected PE from the emergency room were included and followed for three months. Among the 82 patients with a high clinical probability of PE, multi-detector-row CT showed PE in 78 (95%). Of the 674 patients without a high probability of PE, 34% had a negative D-dimer assay and an uneventful follow-up; CT however showed PE in 109 or 16.2% of these patients. First-generation single-detector-row helical CT scanners have 90% specificity but only 70% sensitivity for pulmonary embolism (19). In this present series, only a third of the patients would have been diagnosed with any abnormality of the typical ECG changes.

The usual most commonly recognised risk factors include previous VTE, malignancy, increasing age, prolonged immobility and obesity as well as inherited or acquired thrombophilia (13). In one large series, multivariate analysis suggested that the greatest risks were with surgery, trauma and inpatient hospitalisation (20). However, in this present series, the greatest risk appears to be associated with age, obesity, hypertension and immobility, in both those who survived and those who died. Atherosclerosis is a well recognised cause of hypertension as the vessels become less

pliable with the increasing atheromatous plaque deposition. While hypertension and atherosclerosis are diseases of arteries and VTE affects the venous system, there appears to be some relationship between the two. The association between PE and atherosclerosis has been studied in a recent report, which found that carotid plaques were more prevalent among those with idiopathic PE than those with identifiable risk factors (21). Inpatient immobilisation was also found as a significant risk factor in both survivors and those who died. Also prominent were obesity, surgery, a benign pelvic mass and cancer. All of these suggest hopitalisation or immobilisation and possible vessel trauma and this is a significant finding as VTE is preventable in many of these cases by thromboprophylaxis. The other major risk factors such as contraceptive steroids, long travel by air or car, obesity and pregnancy were less common than found in other series (22). The association with contraceptive steroids, HRT and tamoxifen are now well known. It is also well known that certain women should avoid the use of these drugs which are known to cause iatrogenic VTE. Despite this, several iatrogenic cases were detected. Individual anecdotal cases of contraceptive related VTE have been emphasised to remind readers that iatrogenic VTE is still prevalent and is preventable with correct prescribing practices. Also very important is the taking of a proper history prior to prescribing these drugs to detect possible risk factors which would make them contraindicated.

Critically ill patients represent a special group with high risk of DVT. Hospitalisation and surgery increased the odds of thrombosis by 11 and 6, respectively (23). In a recent study, authors found four independent risk factors for ICU-acquired DVT: personal or family history of VTE (hazard ratio 4.0, 95% confidence interval 1.5, 10.3), end-stage renal failure (hazard ratio 3.7, 95% confidence interval 1.2, 11.1), platelet transfusion (hazard ratio 3.2, 95% confidence interval 1.2, 8.4) and vasopressor use [hazard ratio 2.8, 95% confidence interval 1.1, 7.2] (24). The average number of risk factors increased with increasing age. One or more risk factors for VTE was present in 78% of hospital patients.

Obesity is now regarded as a serious problem in the Jamaican population due to changes in lifestyle [poor diets and lack of exercise] (25). The occurrence of obesity in 53.5% of this cohort is therefore not surprising. This is higher than the 27% found in a study done in Spain (26) and may be a reflection of differences in obesity rates in the general population in the two countries. There is no doubt that obesity is a risk factor for VTE and one recent study has described obesity as a risk factor for recurrent VTE (27).

In this study, 14% of cases were associated with a malignancy which is comparable similar to a population based study from the USA, where 18% of incident venous thromboembolism cases were attributable to active malignant neoplasm (28). The effects of malignancies on thrombogenesis is multifactorial. Tumours may be prothrombotic by the elaboration of various cytokines and tumour factors but the associated increased age, decreased mobility, direct compression of veins by tumour, surgery, pharmacologic agents to treat cancer and hospitalisation all increase the VTE risk. Patients with cancer all need prophylaxis against VTE especially when hospitalized and undergoing surgery. The finding of a benign pelvic tumour in 24.2% of women who died is very significant as uterine fibroids are very common in women in our population (29) and this risk factor is not usually emphasized.

The inherited thrombophilia are now recognised as a major cause of VTE. However tests for these conditions are infrequent in our setting, because of unavailability and high cost. Many of these tests are difficult to interpret in patients who have already started anticoagulation. Unless these patients have samples drawn prior to initiation of anticoagulant therapy, these tests are never offered. The conditions are usually associated with recurrent thrombosis in young patients (less than 50 years old, or in those with a family history (30). The presence of recurrent thrombosis in 12.8% of the patients in this series suggests that inherited and acquired thrombophilia should be entertained and investigated for in appropriate patients. The finding that all the patients with multiple recurrences (more than one) and a family history of VTE were less than 50 years old emphasizes the need to screen these people for these uncommon conditions and advise them on prophylaxis when necessary (hospitalisation or long trips). Acquired thrombophilia (APS) has been studied in Jamaica as a cause of thrombosis. In the patients studied, the anticardiolipin antibody test was positive in 32% of cases with thrombosis, compared to only 17% of controls (31). Other haematological conditions such as polycythaemia vera and essential thrombocytosis are typically complicated by thrombosis, with a rate of major thrombosis as high as about 50% (32). Leucocytosis, which was not studied in this cohort, is now also recognised as an independent risk factor (32).

Pregnancy associated VTE cannot be predicted except for the patient known to have inherited thrombophilia, preious VTE and some operative deliveries. Prophylaxis for the pregnant patient without known risk factors should therefore not be offered (33).

Clinical VTE after prolonged air travel is rare, accounting for only 27 PE per million flights or 0.05% of symptomatic deep venous thrombosis (DVT) diagnosed through screening ultrasounds (22). Nevertheless, this is a recognised preventable entity especially in high risk patients on long flights over six hours. In one large series examining the subject, the findings were almost identical to what was found in this cohort. Kesteven *et al* studied 1250 cases of VTE and found a positive history for a long trip by air or road (more than 100 miles) in 3.8% of their patients which is similar to the 5% in the present cohort. They also found that 60% of the patients had travelled by air and 36% by road which is also what was found in this study [65.2% air and 34.8% van or car] (34). All travellers, regardless of VTE risk, should

avoid dehydration and frequently exercise leg muscles. Travellers on a flight of less than six hours and those with no known risk factors for VTE, regardless of the duration of the flight, do not need DVT prophylaxis. Travellers with one or more risk factors for VTE should consider graduated compression stockings and/or low molecular weight heparin (LMWH) for flights longer than 6 hours (22, 35).

Psychiatric patients are at risk for DVT because of trauma (when they are being subdued or restrained), drug induced obesity, depressive illnesses and psychoses with catatonic states and also as a complication of newer medical treatment modalities (36). Atypical antipsychotic use has been tied to an elevated risk of VTE, ranging from 87% for olanzapine, 98% for risperidone, to 168% for clozapine and quetiapine fumarate. By contrast, treatment with phenothiazines or other conventional agents did not seem to increase the risk of VTE (37).

The logistic regression analysis in this cohort has shown that women with overt risk factors such as obesity and surgery are less likely to die compared to women with hypertension and advanced age. This was also shown by other researchers. In one study, independent predictors of increased long-term survival included higher BMI, hormone therapy and recent surgery (38). Another study by Becattini *et al* evaluated the incidence of cardiovascular events in the long-term clinical course of patients with a first episode of PE. Outcomes were cardiovascular events (recurrent VTE, acute MI, stroke, sudden otherwise unexplained death), cardiovascular death and death due to any cause. More cardiovascular events occurred in patients with idiopathic TE than those with transient risk factors such as fractures (7.5% patient-year *versus* 3.1% patient-year). The working hypothesis is that those with idiopathic PE were more likely to suffer from cardiovascular disease such as atherosclerosis (39). While it is unlikely that atherosclerosis is directly linked to thrombosis in the venous system it has recently been suggested that both conditions have similar risk factors such as age, obesity, cigarette smoking, diabetes mellitus, arterial hypertension, hyperlipdaemia and metabolic syndrome and also that the two conditions may have similar biological stimuli responsible for activating coagulation and inflammatory pathways (40).

At the time of this study, the commonest prophylaxis for VTE in medical patients was done using 5000 units twice daily of unfractionated heparin. However, this dose was shown to be no better than placebo in preventing VTE in medical patients (31). The more recent use of low molecular weight heparin as prophylaxis has resulted in better outcomes. In a systematic review of randomised controlled trials, Yalamanchili *et al* assessed the efficacy of unfractionated heparin *versus* placebo and *versus* low-molecular-weight heparin in medical patients. Heparin 5000 U s/c twice daily was less efficacious than low-molecular-weight heparins and unfractionated heparin 5000 U s/c three times daily (42).

Surgical patients are risk stratified for VTE and depending on the risk will require 2–4 prophylactic measures in combination (43): graded compression stockings, intermittent pneumatic compression devices, low-dose UFH and LMWH have been shown to reduce VTE effectively in postoperative patients (23). Risk stratification is therefore important in selecting suitable prophylaxis. Patients at low risk for VTE are those younger than 40 years who are undergoing surgery lasting less than 30 minutes, with no additional risk factors. Patients at moderate risk for VTE are considered to be those undergoing surgery lasting less than 30 minutes, with additional risk factors; those aged 40 to 60 years with no additional risk factors who are undergoing surgery lasting less than 30 minutes or those undergoing major surgery who are younger than 40 years, with no additional risk factors (23).

High risk is defined as surgery lasting less than 30 minutes in patients older than 60 years or who have additional risk factors, or major surgery in patients older than 40 years or who have additional risk factors (23).

Patients in the highest risk category for VTE are those older than 60 years undergoing major surgery who have risk factors of a previous VTE, neoplasm or hypercoagulable state (23).

The fact that all the gynaecological surgical patients who died were over 55 years supports the schema above. All such patients who need surgery should be regarded as high risk and be given prophylaxis.

Asymptomatic DVT is highly linked to pulmonary embolism, with one-third of those with DVT developing PE (23). The goal therefore would be to prevent asymptomatic venous thrombosis since it has been reported that the most fatal PE will arise from this (44).

In conclusion, VTE was a common complication in this cohort of Jamaican hospitalized women. It was associated with many conditions some of which are modifiable such as obesity and immobilization as well as prophylaxis at the time of surgery. The diagnosis should be suspected in such women with a high level of suspicion and treatment started with anticoagulation to avoid morbidity and mortality.

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