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Venous Thromboembolic Disease and Thrombolysis at the Yaoundé Emergency Center during the Past Five Years, Cameroon

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Abstract

Background: Venous thromboembolic disease (VTE) is a clinical entity whose two clinical manifestations are deep vein thrombosis (DVT) and pulmonary embolism (PE). It is a frequent and severe disease in Cameroon, thus constituting a significant public health problem. We aimed to describe VTE management in the Yaoundé Emergency Center, in particular the use of thrombolysis. **Methods:** This was a retrospective study on patients hospitalized at the Yaoundé Emergency Center for DVT and/or PE from January 1, 2015, to December 31, 2020. We collected clinical signs, paraclinical signs, risk factors of VTE, and management methods from each patient. **Results:** We recruited 106 participants. Dyspnea was the most frequent symptom; PE was the most common form of VTE in eight patients on 10. Obesity and high blood pressure were the main cardiovascular risk factors. The main clinical signs were oedema and pain in the limb for DVT, dyspnea, and tachycardia for PE. Heparinotherapy was the most commonly used management modality. Thrombolysis was performed in 7.5% of participants, especially in the case of hypotension or massive PE. **Conclusion:** In VTE management, thrombolysis remains the least used therapeutic modality in our context. Heparinotherapy remains the basis of the therapy.

Keywords

Venous Thromboembolic Disease, Thrombolysis, Yaoundé-Cameroon

1. Introduction

Cardiovascular diseases are the leading cause of death worldwide [1]. They are

responsible for approximately 17.5 million deaths, *i.e.* overall mortality estimated at 31%, of which more than 75% concerns middle- or low-income countries [2]. Venous thromboembolic disease (VTE) is the third leading cause of cardiovascular disease and is associated with mortality and high social cost, especially in resource-limited countries [3] [4]. VTE is a clinical entity that includes deep vein thrombosis (DVT) and pulmonary embolism (PE). It is a common condition, and its incidence increases with age [5]. Hospital studies carried out in 2015 in Mali and Cameroon reported 4.02% and 1.6%, respectively [6] [7].

Although their clinical presentations are described in the literature, the particularities of the sub-Saharan context are rarely specified. Indeed, VTE is a multifactorial entity resulting from an interaction between genetic predisposition and acquired factors [8] [9]. In addition, factors such as late consultation are specific to the context of developing countries and can lead to unclassical clinical presentations. The rapid identification of these presentations is essential for good management [10].

This study aimed to describe the management of VTE disease in the Yaoundé Emergency Center (CURY), mainly the frequency of the use of thrombolysis.

2. Methods

2.1. Study Design and Setting

We carried out a retrospective study on hospitalized patient records from January 2015 to December 2020 at the Yaoundé Emergency Center (CURY), Yaoundé, Cameroon. CURY is a hospital specializing in emergency management in Yaoundé, Cameroon.

2.2. Participants

All records of patients admitted for VTE and whose diagnosis was confirmed by venous Doppler ultrasound of the limbs and/or chest CT angiography were included. Incomplete forms were not included.

2.3. Data Collection

Using a questionnaire pretested and validated, data were collected including: sociodemographic, clinical, paraclinical data, and the management modalities. Paraclinical data included D-dimers, Doppler ultrasound and thoracic CT angiography results. Therapeutic data contained the treatment received, particularly the administration of low molecular weight heparin and thrombolytics.

2.4. Statistical Analysis

Data recording and analysis were performed using SPSS version 23.0 software. Quantitative data were presented as mean and standard deviation and qualitative data as proportions. The association between qualitative variables was assessed using The Chi-square test. The threshold of significance was 0.05.

3. Results

3.1. General Characteristics of the Population Study

We included 106 patients aged 22 to 96 years, with an average of 58.03 ± 14.92 years. About 46% of our study population was between 61 and 80 years old, with a male/female sex ratio of 0.56.

In consultation, dyspnea was the main symptom, found in 48.1% of patients, followed by chest pain (22.6%). The VTE risk factors identified were high blood pressure (38.7%), overweight (26.4%), type 2 diabetes and sedentary lifestyle (see Table 1).

Table 1. General characteristics of the study population.

Variables	Effective (n = 106)	Percentage (%)
Sex		
Male	38	35.8
Female	68	64.2
Age (years)		
<40	16	15.1
41 - 60	37	34.9
61 - 80	49	46.2
>80	4	3.8
Cardiovascular and/or VTE risk factors		
History of VTE	4	3.8
Obese or overweight	28	26.4
Tobacco	1	0.9
Prolonged bed rest	16	15.1
cast immobilization	8	7.5
Neoplasia	7	6.6
Heart failure	10	9.4
Diabetes	16	15.1
Hypertension	41	38.7
HIV infection	2	1.9
Recent trauma	18	17
Recent surgery	13	12.3
Recent delivery (<45 days)	2	1.9
Recent trip	17	16
COVID-19	2	1.9

3.2. Clinical Characteristics of the Study Population

Clinically, the signs of DVT found were mainly edema and pain in the lower limbs in 96.4% and 85.7% of patients, respectively. Table 2 shows that dyspnea and tachycardia were the main signs of PE, found in 97.7% and 79.5% of patients.

3.3. Paraclinical Characteristics of the Study Population

D-dimer levels were > 500 ng/mL at the biology level in all patients. An electrocardiogram was performed in 54 patients, and the S1Q3 aspect was the majority electrical anomaly in 22.2% of patients, followed by the right bundle branch block (11.1%). A transthoracic Doppler ultrasound was performed in 35 patients and found pulmonary arterial hypertension (77.1%), the right cavities dilatation (60%) and dilatation of the trunk of the pulmonary artery (54.3%) as the major abnormalities. Venous Doppler ultrasound of the limbs found a thrombus in 28 of the 106 patients. The lower limbs were the most affected by DVT (92.9%). The most common location was popliteal in 46.4%, followed by the femoral site (25%). Chest CT angiography was performed in 88 patients. PE was bilateral in 65.9% and massive in 13.6% of patients. The main location was segmental and

Table 2. Clinical characteristics of the study population.

Variables	Effective	Percentage (%)
Chief complaint (n = 106)		
Limb pain	14	13.2
Oedema or swelling of a limb	14	13.2
Chest pain	24	22.6
Dyspnea	51	48.1
Hemoptysis	1	0.9
Syncope or malaise	6	5.7
Clinical signs of DVT (n = 28)		
Fever	17	60.7
Oedema and swelling of a limb	27	96.4
Erythema or local heat	21	75
Decreased calf sway	17	60.7
Limb pain	24	85.7
Homans sign	12	42.9
Signs of pulmonary embolism (n = 88)		
Acute dyspnea	86	97.7
Chest pain	42	47.7
Hemoptysis	3	3.4
Tachycardia	70	79.5

sub-segmental (53.4%). PE was the most form (73.60%) regarding the type of lesion, followed by DVT (17%) and VTE (both PE and DVT) on 9.4% (see Table 3).

3.4. Management of VTE in Our Population Study

Concerning therapy, the various management methods used are presented in Table 4. Low molecular weight heparin (LMWH) was used in 97.2% and

Table 3. Paraclinical characteristics of the study population.

Variables	Effective	Percentages (%)
Electrocardiogram (n = 54)		
Right bundle branch block	6	11.1
Appearance S1Q3	12	22.2
Transthoracic echocardiography (n = 35)		
Dilation of the trunk of the pulmonary artery	19	54.3
Right cavity dilation	21	60
Pulmonary arterial hypertension	27	77.1
Thrombus in the right ventricle	0	0
Venous ultrasound of the limbs (n = 28)		
Site		
Lower limb	26	92.9
Upper limb	2	7.1
Degree of extension		
Proximal thrombosis	8	28.6
Distal thrombosis	6	21.4
Extensive thrombosis	14	50
Location		
Tibial	5	17.9
Popliteus	13	46.4
Femoral	7	25
Iliac	1	3.6
Other	2	7.1
CT Pulmonary angiography (n = 88)		
Site		
Left EP	7	8
Right EP	23	26.1
Bilateral PE	58	65.9
Location		
Truncular	14	15.9
Segmental	18	20.5
Subsegmental	9	10.2
Segmental and sub-segmental	47	53.4
Massive pulmonary embolism	12	13.6

Table 4. Treatment of venous thromboembolic disease.

Variables	Effective (n = 106)	Percentage (%)
Compression stockings	65	61.3
Enoxaparin	103	97.2
Rivaroxaban	81	76.4
Acenocoumarol	7	6.6
Fluindione	2	1.9
Streptokinase	8	7.5

thrombolytics in 7.5% of patients. Anticoagulation switched heparin therapy with direct oral anticoagulants, Rivaroxaban in 76.4% of patients or vitamin K antagonists, such as Acenocoumarol and Fluindione, in 8.5% of patients.

The short-term complications of thrombolysis reported were bleeding in 25% of patients and shock and death in 12.5% of patients. The factors associated with the administration of thrombolysis were arterial hypotension ($p < 0.001$) and massive PE ($p < 0.001$). They were no significant association between electrocardiographic and echocardiographic parameters and thrombolysis.

4. Discussion

To describe the therapeutic modalities of VTE in an emergency center in Yaoundé, Cameroon, we conducted a cross-sectional study at the Yaoundé Emergency Center.

Swelling and pain in the lower limb were the main signs of DVT, while dyspnea and tachycardia were the most common signs of PE. Walbane *et al.* in Mali in 2015 found similar results for PE with tachycardia and dyspnea found respectively in 100% and 95.24% of patients [6].

The main cardiovascular risk factors identified were arterial hypertension, overweight, and type 2 diabetes. Prolonged bed rest was the most found risk factor for VTE. A study conducted in the intensive care unit of the Yaoundé Central Hospital by Etoundi *et al.* in 2015 found that cardiovascular risk factors, particularly hypertension, were the most frequent and found in 54.43% of patients [7]. These factors lead to vascular fragility and/or stasis, which promote thrombosis formation [11].

The prominent electrical abnormalities found were the S1Q3 aspect and the right bundle branch block. Coulibaly and al. found comparable results in Mali, with the S1Q3 appearance and right bundle branch block found in 18.91% and 14.8% of patients, respectively [12]. These results show the interest of the ECG, a simple and accessible means of diagnosis, in the diagnostic approach of pulmonary embolism. On transthoracic ultrasound, right cavitary dilatation and pulmonary arterial hypertension were the preeminent abnormalities, present in 60% and 77.1%, respectively, of patients with PE. Soumaoro and al., in a study conducted in Mali in 2006, found right cavitary dilatation in 40.8% of cases [7]. Indeed, the presence of a clot in the pulmonary arterial territory leads to an in-

crease in pulmonary arterial pressure and, therefore, in the afterload in the right cavities, resulting in the dilation of these cavities [13].

In our study, isolated PE (73.6%) was the dominant type of VTE, followed by DVT (17%), the two being associated in 9.4% of patients. These results agreed with those found by Coulibaly *et al.*, *i.e.* 60.9% isolated PE, 37.9% isolated DVT and in disagreement with the results of Etoundi *et al.*, where isolated DVT was predominant [7] [12] [14]. The place of our study can explain this difference, and it is a reference hospital center for the management of emergencies in Yaoundé. It, therefore, mainly receives patients with serious pathologies, with life-threatening consequences such as PE.

PE was bilateral in the majority of our patients, as in the work of Walbane and al., who found 61.9% of bilateral PE [6]. In agreement with the literature, the lower limb was the prominent localization of DVT, *i.e.* 92.9% against 7.1% for the upper limb. Involvement of the upper limb is rarer in DVT, representing approximately 10% of cases [15] [16].

Regarding VTE management, LMWH was used in almost all cases, mainly relay oral anticoagulants. Similarly, for Coulibaly and al., heparin therapy was the most used therapeutic means found in 98.8% of patients [12]. These results are explained by the availability of heparin and the difficulties of access to other modalities such as thrombolysis in low-income countries such as sub-Saharan African countries [17] [18]. A retrospective study from 2006 to 2016 on VTE at the Abidjan Cardiology Institute found that VKAs (89%) were the most prescribed therapeutic class to patients after VTE [19]. This difference observed in our study is explained by the fact that oral anticoagulants are recent molecules increasingly prescribed in our countries. Indeed, unlike vitamin K antagonists, the latter does not require regular monitoring of the INR. Thus, their prescription has increased for several years [20].

Thrombolysis was administered in 7.5% of patients. The only molecule used was Streptokinase. This rate is lower than that found by Pessinaba and al. in 2018 in a cardiology department in Togo, which had shown a rate of administration of thrombolysis of 21.6%, all based on Streptokinase [21]. This difference could be explained by the recent commissioning of the Yaoundé emergency center, which dates from 2015, and the cost (38.000FCFA ≈ 57.93USD for one dose) and relative availability of Streptokinase. The factors associated with the performance of thrombolysis were arterial hypotension and the presence of a massive PE, following the recommendations on the indications for thrombolysis [22]. The evolution after thrombolysis was favorable, returning home in 87.5% of patients. The mortality rate was 12.5%, similar to that found by Pessinaba and al. and caused mainly by the persistence of the state of shock after thrombolysis [21].

5. Limitations to Study

This study has some limitations. The main weakness of this study is its small

sample size. Nevertheless, our study has the advantage of being one of the pioneers aiming to evaluate the management of VTE in our context, especially the use of thrombolysis.

6. Conclusion

Management of venous thromboembolic disease in the Yaoundé Emergency Center is mainly based on low molecular weight heparin administration. Thrombolysis is achieved in only 7.5% of cases, particularly in patients with hypotension or massive pulmonary embolism.

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Authors' Contribution

Conception and design: Chris Nadège Nganou-Gnindjio, Jacqueline Ze Minkande.

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Approval of the final manuscript: All the authors.

Availability of Data and Materials

The datasets used for this study are available from the corresponding author on request.

Ethical Approval and Consent to Participate

The study was approved by the Institutional Ethical Review Board of the University Yaoundé I (Cameroon). All the participants read and signed informed consent before their inclusion in the study.

Competing Interest

The authors declare that they have no competing interests.

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