

Epidemiological and Clinical Profile of Pulmonary Embolism in the Cardiology Department of CHU Ignace Deen in Conakry

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Abstract

Pulmonary embolism (PE) is defined as the sudden, partial or total obliteration of the pulmonary arteries or their branches by an embolus, most often fibrinocruoric. It plays a significant role in the morbidity of cardiovascular diseases in our context, and is manifested by a variety of entities. Our aim in this study was to describe the epidemiological, clinical and evolutionary aspects of pulmonary embolism in the Cardiology Department of the Ignace Deen National Hospital. We conducted a prospective descriptive study from June 1 to November 30, 2023. Variables studied included sociodemographic, clinical and evolutionary data. Pulmonary embolism accounted for 8.77% of hospitalizations for all cardiovascular conditions in the department. The mean age of our patients was 60.2 ± 16.2 , with a 53% female predominance (sex ratio M/F = 0.8). The risk factors most frequently found in our patients were obesity (33%) and prolonged bed rest (13%). Patients with a high mortality risk represented 47% of the sample. The diagnosis was confirmed in all patients by thoracic angioscan, and the location was bilateral in 66% of cases, with proximal involvement confirmed in 20% and distal involvement in 13.3%. The immediate outcome was favourable in the vast majority of our patients (73.3%), but we recorded 20% complications and one death, giving a case-fatality ratio of 6.7%. Although our study was limited by its small sample size and limited duration, it nevertheless highlighted the importance of the morbidity and evolutionary characteristics of pulmonary embolism in this department. An in-depth, extended study in other hospital departments and structures would therefore provide more robust data on the characteristics of this condition in our context.

Keywords

Pulmonary Embolism, CHU, Ignace Deen, Cardiology

1. Introduction

Pulmonary embolism (PE) is defined as the sudden, partial or total obliteration of the pulmonary artery or one of its branches by an embolus, most often fibrinocruciate [1]. It is the third most common cardiovascular emergency after myocardial infarction and stroke, with a high mortality rate, estimated at between 30% and 40% in the absence of treatment [2]-[4]. It is a frequent pathology whose incidence increases with age [5]. In the general population, the incidence is 100 - 200 per 100,000 inhabitants [6]. In France, the incidence of venous thromboembolism as a principal diagnosis is 85.5 per 100,000 inhabitants, with pulmonary embolism accounting for 61.7% [7]. In Africa, frequencies vary from country to country: in Chad in 2021, it was 12.1%, and 26.4% in Benin in the same year [8] [9]. In 2017 in Togo, the frequency was 3.1%, and 1.21% in Mali in 2018 [10] [11]. Mbaye A. *et al.* in Senegal in 2016, reported 222 cases of venous thromboembolic disease, including 148 cases of deep vein thrombosis and 74 cases of pulmonary embolism [12]. In Guinea, Sylla I.S. *et al.* in 2019 reported 4.2% pulmonary embolism [13]. The clinical polymorphism of this pathology and the lack of accessibility to diagnostic means in our context impact the adequate management of these patients. We conducted this study with the aim of describing the epidemiological, clinical, therapeutic and evolutionary characteristics of patients hospitalized in the cardiology department for pulmonary embolism.

2. Methods

Study design

This was a prospective, descriptive study conducted in the cardiology department of the Ignace Deen University Hospital Center, over a period of six (6) months from June 1 to November 30, 2023.

Selection criteria

All patients hospitalized for PE diagnosed by chest CT angiography during the study period were included in this study. Patients who did not have a chest CT angiogram and/or venous Doppler ultrasound of the lower limbs were excluded. Thoracic CT angiography was performed immediately in patients who had high clinical probabilities assessed by the revised Geneva score and after measuring positive D-Dimers, sometimes with venous Doppler ultrasound of the lower limbs, in patients who had low and intermediate clinical probabilities.

Study variables

Our study variables were qualitative and quantitative. They include data:

Epidemiological (age, sex, pathological history, risk factors for venous thromboembolism), clinical (revised Geneva score, reasons for consultation, signs of

shock, signs of right heart failure “edema of the lower limbs, hepatojugular reflux, spontaneous turgor of the jugular veins, hepatomegaly”).

Paraclinics:

- The level of D-Dimer;
- Cardiographic ultrasound (dilation of the cardiac chambers, paradoxical septum, pulmonary arterial hypertension, intracavitary thrombus);
- venous Doppler ultrasound of the lower limbs;
- Thoracic CT angiogram (location, topography).

Therapeutics:

- Anticoagulants;
- Thrombotic.

And progressive (duration of hospitalization, complications, intra-hospital mortality).

The clinical probability of PE was assessed by the revised Geneva score.

Item	Points
Age > 65 ans	+1
History of deep venous thrombosis or pulmonary embolism	+1
Surgery or fracture of lower limbs in the previous month	+1
Active cancer	+1
Hemoptysis	+1
Heart rate between 75 - 94 bpm	+1
Heart rate between ≥ 95 bpm	+2
Spontaneous calf pain	+1
Deep venous signs	+1
Clinical probability	
Low (Clinical probability of pulmonary embolism < 10%)	0 - 1
Intermediate (Clinical probability of pulmonary embolism: 30% - 40%)	2 - 4
High (Clinical probability of pulmonary $\geq 70\%$)	≥ 5

Embolism severity score: was assessed according to the Simplified Pulmonary Embolism Severity Index Score (sPESI) and allowed us to predict 30-day mortality. The patients were divided into 3 classes in ascending order of severity.

Predictive variables	Points
Age > 80 years	+1
Cancer	+1
Chronic heart failure or chronic respiratory pathologies	+1
Heart rate ≥ 110 bpm	+1
Systolic blood pressure < 100 mmHg	+1
Oxygen arterial saturation < 90%	+1

Interpretation:

sPESI = 0, EP de bas risque (mortalité à 30 jours = 1%),

sPESI = 1, EP intermédiaire,

sPESI > 1, EP de haut risque (mortalité à 30 jours = 10%).

3. Results

Of the 171 patients hospitalized during the study period for various cardiovascular conditions, 15 were confirmed cases of pulmonary embolism, *i.e.* a prevalence of 8.77%, with women predominating at 53% (8/15), *i.e.* a sex ratio (M/F) of 1.14. The age group most affected was 51 - 70 years (40%), with a mean age of 60.2 ± 16.2 and extremes of 30 - 82 years. The most common thromboembolic risk factors were obesity (33.3%) and prolonged bed rest (13.3%) (**Table 1**). More than half (66.5%) of patients had a revised intermediate Geneva score. Symptoms were dominated by dyspnea (100%), followed by chest pain (73.3%) and edema of the lower limbs (46.6%). Signs of right heart failure were edema of the lower limbs (46.6%), turgidity of the jugular veins (40%) and hepatomegaly (6.6%) (**Table 2**). In terms of mortality risk, 26.6% of our patients had high severity, the majority had intermediate severity and 6.6% had low severity (**Table 3**). D-dimer tests were positive in 11 patients (73.3%). Thoracic angioscan showed bilateral involvement in 10 patients (66.7%) and proximal involvement in 3 (20%). The echocardiographic signs of right ventricular dysfunction observed were respectively: right ventricular dilatation in all our patients (100%), pulmonary hypertension in 12 patients (80%) and paradoxical septal defect in 6 (40%). Venous Doppler ultrasound of the lower limbs revealed 13% cases of associated deep vein thrombosis.

Table 1. Epidemiological characteristics and risk factors for venous thromboembolic disease.

Age group (Year)	Workforce	Percentage (%)
30 - 50	5	33.4
51 - 70	6	40
≥71	4	26.6
Mean age: 60.2 ± 16.2 with extremes of 30 - 82 years		
Type		
Female	8	53
Male	7	47
VTE risk factors		
Obesity	5	33.3
Prolonged bed rest	2	13.3
Recent surgery	2	13.3
Taking oral contraceptives	1	6.7
Active cancer	1	6.7
None identified risk facto	4	26.66

Table 2. Distribution of patients according to clinical characteristics.

Symptoms	Workforce	Percentage
Functional signs		
Dyspnea	15	100
Chest pain	11	73.3
MI edema	7	46.6
Cough	6	40
Hemoptysis	3	20
Physical signs		
Tachycardia	10	66.7
Edema of the lower limbs	7	46.6
Hepatomegaly	6	40
Jugular vein turgidity	1	6.6
B2 splinter in the lung focus	1	6.6

Table 3. Distribution of patients according to clinical probability and mortality risk of pulmonary embolism.

Variables	Workforce	Percentage (%)
Clinical probability		
Low	1	6.6
Intermediate	10	66.7
High	4	26.6
Mortality risk (sPESI score)		
SPESI = 0	1	6.6
SPESI = 1	7	46.7
SPESI > 1	7	46.7
Total	15	100

Table 4. Distribution of patients according to paraclinical characteristics.

Variables	Workforce	Percentage (%)
D-dimers (ng/ml)		
>500	11	73
ETT		
Dilatation of the VD	15	100
PAH	12	80
Paradoxical septum	6	40
VD dysfunction	3	20
IT	1	6.7
Thrombus	1	6.7

Continued

Venous ultrasound	2	3
TVP		
Thoracic angioscan		
Bilateral EP	10	66.7
Proximal EP	3	20
Distal EP	2	13

Thoracic angioscanner showed 66% bilateral involvement, with proximal involvement in 20% of patients and distal involvement in 13.3% (Table 4). In terms of management, all patients (100%) received oxygen therapy and initial anticoagulant treatment with low-molecular-weight heparin Enoxaparin. Thrombolysis was performed in 3 patients (20%). Two patients (13%) had received anti-vitamin K therapy after initial heparin therapy. The direct oral anticoagulants prescribed were: Rivaroxaban in 13 patients (86.6% and Apixaban in 1 (6.7%) (Table 5). The outcome was favorable in 11 patients (73.3%), but we recorded 20% complications and one death, for a case-fatality ratio of 6.7% (Figure 1).

Table 5. Distribution of patients according to treatment.

Treatment	Frequency	Percentage
Oxygen therapy	15	100
Enoxaparin	15	100
Rivaroxaban	13	86.6
Thrombolysis	3	20
VKA	2	13.3
Apixaban	1	6.7

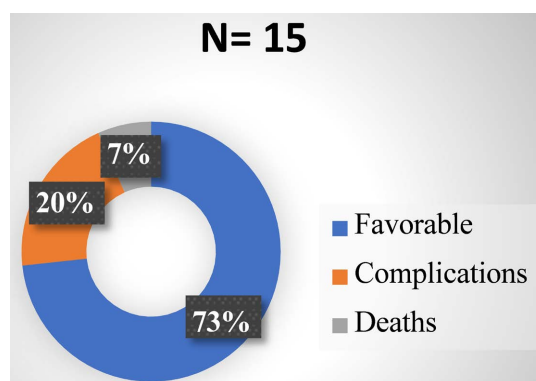


Figure 1. Distribution of patients according to evolution.

4. Discussion

The hospital prevalence of pulmonary embolism in our series was 8.77%, significantly lower than that reported by Keita AS *et al.*, who found a hospital frequency

of 55% in their study [14]. This low rate in our result could be explained by the small sample size and short duration of the study, or by the non-confirmation of certain cases of suspected pulmonary embolism that were not included in the study. The prevalence of this condition in our developing countries is probably underestimated due to difficulties in accessing diagnostic facilities. The mean age was 60.2 ± 16.2 years. The most affected age group was 51 - 70 (40%), with a mean age of 60.2 ± 16.2 . Our result is similar to that of M. Mean *et al.*, in “la revue médicale suisse” in 2019, who pointed out that the majority of patients with pulmonary embolism are over 65 years of age [15], and a study carried out in Morocco, in which the authors also demonstrated the existence of a maximum peak in pulmonary embolism from the age of 65 [16]. This result can be explained by the multiplicity of thromboembolic risk factors acquired with age, such as immobilization, obesity, hospitalization for cardio-respiratory diseases, surgical procedures, neoplastic processes, neurological pathologies and genetic risk factors [16]. We noted a 53% predominance of women, with a sex ratio of 1.14. We compared this result with those of certain authors (Samama *et al.* and Traoré *et al.*), who also found a predominance of women. Predominantly female, with 54% and 56% respectively [17] [18]. Thromboembolic risk factors were dominated by obesity (33%) and prolonged bed rest (13%). Our results are comparable to those of P. Zabsonre *et al.*, who found similar results in their study [19]. Clinical manifestations in our patients were dominated by the classic signs of pulmonary embolism, such as dyspnoea (100%), chest pain (73.3%) and tachycardia (66.7%), with some patients showing right-sided signs such as edema of the lower limbs (46.7%), turgidity of the jugular veins (40%) and hepatomegaly (6.6%). These results are close to those of Keita AS *et al.*, who also reported a symptomatology consisting of dyspnoea (95%), basithoracic pain (86.3%) and cough (27.5%) [14]. Symptomatology in pulmonary embolism is rarely absent, although the clinical picture is not always specific. 26% of our patients presented with hemodynamic instability, indicating a severe form of pulmonary embolism. Delay in diagnosis and appropriate management favours severe forms and progression to complications, including death. Cardiac ultrasonography helped to orient the diagnosis by showing indirect signs such as dilatation of the right cavities, pulmonary hypertension and the paradoxical septum. Our results concur with those of Pessinaba S. *et al.*, who found the same echocardiographic findings of right chamber dilatation (75%), paradoxical septum (58.3%) and pulmonary hypertension (52.6%) [10]. The combination of a high clinical probability and signs of acute pulmonary heart disease on cardiac echocardiography lends support to the diagnosis of pulmonary embolism. Also, the discovery of proximal venous thrombosis in a patient with suspected pulmonary embolism leads to the conclusion of thromboembolic disease, and the patient should be treated accordingly. On the other hand, the absence of acute lung disease or venous thrombosis does not rule out the diagnosis of pulmonary embolism. Diagnostic confirmation by thoracic angioscan was performed in all our patients (100%). Our result is identical to that of D. Metz *et al.*, who reported the

same frequency in their study [20]. Thoracic angioscanner revealed bilateral involvement (66%), with proximal involvement in 20% of patients and distal involvement in 13.3%. This result is similar to that of D. Metz *et al.*, who reported bilateral involvement in 85% of patients with pulmonary embolism [21]. This is a key tool in the diagnosis of pulmonary embolism. According to the literature, sensitivity and specificity vary from 70% to 90%, and even 90% to 96%. All patients had received heparin therapy, a standard treatment for pulmonary embolism. Direct oral anticoagulants were prescribed in 86.6% of cases. In some patients (13%) with contraindications to direct oral anticoagulants, vitamin K antagonists were prescribed as relay therapy. Thrombolysis was performed in 3 patients (20%). The choice of relay oral anticoagulant treatment depends on the risk of bleeding and the patient's condition. The majority of our patients (73.3%) had a favorable outcome. However, we recorded 20% complications and one death, giving a case-fatality ratio of 6.7%. This result is comparable to that of Pessinaba S. *et al.* who reported an in-hospital death rate of 13.7%, while the immediate outcome was favorable in 86.3% [10].

5. Conclusion

Our study is limited by its short duration and small sample size. We were able to demonstrate that pulmonary embolism represents the third most common cardiovascular emergency in the morbidity of the cardiology department. Elderly patients and women are the most affected. The presence of classic signs of pulmonary embolism in all patients underlines the importance of rapidly evoking the diagnosis in view of confirmation by imaging and appropriate therapeutic management. Early management of modifiable risk factors for venous thromboembolism, such as obesity and prolonged bed rest, could help prevent this condition. Preventive anticoagulation in frail bedridden patients is recommended as part of the prevention of venous thromboembolic disease. Further, more extensive studies in health facilities could provide a clearer picture of the epidemio-clinical characteristics of this condition in our context.

Conflicts of Interest

The authors of this article declare no conflict of interest in relation to their work.

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