

Venous Thromboembolic Disease: Epidemiological, Diagnostic, Therapeutic and Outcome Aspects in a Series of 190 Cases Collected in the Cardiology Department of Idrissa Pouye General Hospital, Dakar, Senegal

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Abstract

Introduction: Venous thromboembolic disease (VTE) is a diagnostic and therapeutic emergency because of its acute morbidity and mortality and its chronic complications. Long considered uncommon in Africa, it is increasingly reported in hospital settings. The objectives of this study were to assess the management of VTE in the Cardiology Department of Idrissa Pouye General Hospital, describe its epidemiological and sociodemographic features, identify aetiological factors, and analyse diagnostic, therapeutic and outcome aspects. **Methods:** This was a retrospective, descriptive and analytical study conducted from 1 January 2019 to 31 December 2022 in the Cardiology Department of Idrissa Pouye General Hospital in Dakar. All patients hospitalised for VTE confirmed by imaging were included, either by venous Doppler ultrasound for venous thrombosis or by computed tomography pulmonary angiography for pulmonary embolism. Patients without documented diagnostic evidence were not included. Sociodemographic data, risk factors, clinical signs, complementary investigations, therapeutic modalities and in-hospital outcomes were collected from medical records. Statistical analysis was performed using Epi Info version 7.2.50 and R version 4.3.1, with statistical significance set at $p < 0.05$. **Results:** Among 2996 hospitalised patients, 190 cases of VTE were identified,

corresponding to a hospital prevalence of 6.34%. Isolated pulmonary embolism accounted for 48.9% of cases, isolated deep vein thrombosis for 41.1%, and combined deep vein thrombosis and pulmonary embolism for 10.0%. Mean age was 48.20 ± 16.79 years. Female sex predominated among patients with isolated deep vein thrombosis and isolated pulmonary embolism. The main risk factors were prolonged bed rest, long-distance travel, cancer, gynaeco-obstetric factors, physical inactivity, and obesity or overweight. Deep vein thrombosis mainly presented as a painful inflammatory swollen leg, whereas pulmonary embolism was dominated by dyspnoea, chest pain and tachycardia. Pulmonary embolism was bilateral in 77.27% of cases. Heparin therapy was used in 86.78% of patients, vitamin K antagonist bridging in 75.26%, and direct oral anticoagulants in 41.58%. **Conclusion:** VTE was a frequent condition among patients hospitalised in cardiology, with a predominance of isolated pulmonary embolism. Management relied mainly on diagnostic imaging and anticoagulation. A structured strategy for prevention, early diagnosis and improved access to anticoagulants is needed.

Keywords

Venous Thromboembolic Disease, Pulmonary Embolism, Deep Vein Thrombosis, Anticoagulation, Senegal

1. Introduction

Venous thromboembolic disease (VTE) comprises two closely related clinical entities: deep vein thrombosis (DVT) and pulmonary embolism (PE). It results from the formation of a thrombus within the venous system, most often in the lower limbs, which may migrate to the pulmonary circulation and become life-threatening [1]-[4]. VTE is therefore a diagnostic and therapeutic emergency because of its acute mortality, haemodynamic and respiratory complications, as well as its chronic sequelae, particularly post-thrombotic syndrome and chronic thromboembolic pulmonary hypertension [5]-[8].

Long considered less frequent in Africa, VTE is now increasingly reported in African hospital settings. This apparent increase may be related to the epidemiological transition, progressive population ageing, the growing burden of cardiovascular and metabolic risk factors, and the increasing frequency of cancer, surgery, prolonged immobilisation, and high-risk gynaeco-obstetric situations [9]-[13]. It may also reflect improved availability of diagnostic tools, particularly venous Doppler ultrasound and computed tomography pulmonary angiography.

Diagnosis remains challenging because clinical manifestations are non-specific. Clinical probability scores, such as the Wells or Geneva scores, guide the diagnostic approach but do not replace imaging [14]-[16]. From a therapeutic perspective, anticoagulation is the cornerstone of management. The introduction of direct oral anticoagulants has changed treatment strategies, although their cost still limits access in many resource-constrained settings [17]-[20].

In Senegal, hospital-based data remain necessary to better understand the local profile of VTE and improve its management. The general objective of this study was to assess the management of VTE in the Cardiology Department of Idrissa Pouye General Hospital. The specific objectives were to describe the epidemiological and sociodemographic characteristics, identify aetiological factors, and analyse diagnostic, therapeutic and outcome aspects.

2. Methods

This was a retrospective, descriptive and analytical study conducted over a four-year period, from 1 January 2019 to 31 December 2022, in the Cardiology Department of Idrissa Pouye General Hospital in Dakar. This is a level 3 hospital with a cardiac intensive care unit. Patient records were identified from the department's hospitalisation registers. All patients admitted during the study period with a diagnosis of venous thromboembolic disease were identified, and their medical records were then reviewed in the hospital archives using a standardised data collection form.

All patients hospitalised for VTE confirmed by imaging were included, either by venous Doppler ultrasound for venous thrombosis or by computed tomography pulmonary angiography for pulmonary embolism. Patients in whom diagnostic confirmation could not be established, those without computed tomography pulmonary angiography in cases of suspected PE, or without venous Doppler ultrasound in cases of suspected DVT, were not included.

The variables studied included sociodemographic data, namely age, sex, geographical origin, socioeconomic status, educational level and occupational sector. The VTE risk factors assessed were previous VTE, prolonged bed rest, long-distance travel, trauma, recent surgery, cancer, pregnancy, postpartum status, oestrogenic use and other situations associated with hypercoagulability or venous stasis. Cardiovascular risk factors, clinical signs, biological, electrocardiographic, echocardiographic and radiological data were also analysed.

Therapeutic data included the type of anticoagulation, possible thrombolysis and adjunctive treatments. In-hospital outcome was assessed according to favourable evolution, occurrence of complications or death. Data were entered using Epi Info version 7.2.50 and analysed with R version 4.3.1. Qualitative variables were expressed as percentages, and quantitative variables as mean $\pm$ standard deviation or median with ranges. Statistical significance was set at $p < 0.05$.

3. Results

During the study period, 2,996 patients were hospitalised in the Cardiology Department. Among them, 190 cases of VTE were identified, corresponding to an overall hospital prevalence of 6.34%. Isolated pulmonary embolism accounted for 93 cases, representing 48.9% of VTE cases; isolated deep vein thrombosis accounted for 78 cases, representing 41.1%; and combined DVT-PE accounted for 19 cases, representing 10.0% (**Figure 1**). The hospital prevalence was 3.10% for

isolated PE, 2.60% for isolated DVT and 0.63% for combined DVT-PE.

The overall mean age was 48.20 ± 16.79 years. It was 47.59 ± 15.24 years among patients with PE, 47.92 ± 18.86 years among those with DVT and 52.32 ± 15.21 years in patients with combined forms. Patients aged 31 - 40 years were the most represented among PE cases, whereas patients younger than 30 years predominated among DVT cases. Patients older than 60 years accounted for 21.5% of PE cases, 29.5% of DVT cases and 31.6% of combined forms (**Table 1**).

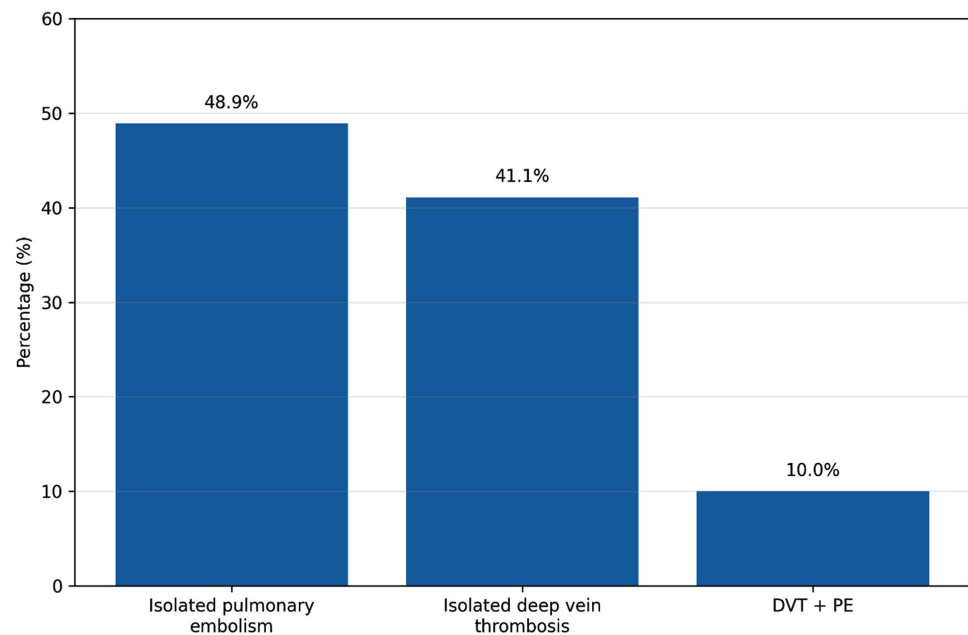


Figure 1. Distribution of patients according to VTE type (n = 190).

Table 1. Main epidemiological and sociodemographic characteristics.

Variable	Result	Comment
Patients hospitalised in cardiology during the study period	2,996	Source population
VTE cases	190	Hospital prevalence: 6.34%
Isolated pulmonary embolism	93 (48.9%)	Hospital prevalence: 3.10%
Isolated deep vein thrombosis	78 (41.1%)	Hospital prevalence: 2.60%
DVT + PE association	19 (10.0%)	Hospital prevalence: 0.63%
Overall mean age	48.20 ± 16.79 years	
Mean age in PE	47.59 ± 15.24 years	
Mean age in DVT	47.92 ± 18.86 years	
Mean age in DVT + PE	52.32 ± 15.21 years	
Female sex in DVT	73.0%	Male-to-female sex ratio: 0.36
Female sex in PE	51.6%	Male-to-female sex ratio: 0.93
Male sex in DVT + PE	52.6%	Male-to-female sex ratio: 1.11

Female sex predominated in DVT, accounting for 73% of cases, with a sex ratio of 0.36. In PE, female predominance was more moderate, at 51.6%. Conversely, combined DVT-PE forms were slightly more frequent in men. Most patients came from the Dakar suburbs. Socioeconomic status was most often middle level, and the informal sector represented a substantial proportion of occupational activity.

VTE risk factors were dominated by medical, gynaeco-obstetric, surgical and orthopaedic factors. Prolonged bed rest was particularly frequent in DVT. Long-distance travel was more frequent in combined DVT-PE forms. Cancer was more often observed in PE and combined forms. Gynaeco-obstetric risk factors were dominated by oestrogenic use, pregnancy, postpartum status and post-abortion status. The most frequent cardiovascular risk factors were physical inactivity and obesity or overweight (**Figure 2**).

Clinically, DVT mainly presented as a painful, inflammatory swollen leg, observed in 93.68% of cases, followed by local warmth, Homans' sign, tachycardia and reduced calf ballotement. In PE, functional symptoms were dominated by dyspnoea (79.09%), chest pain (65.45%) and cough (39.09%). Tachycardia was the most frequent physical sign. Computed tomography pulmonary angiography confirmed PE, which was mostly bilateral in 77.27% of cases, with proximal involvement in 44.54%. On echocardiography, pulmonary hypertension was observed in 66.2% of explored patients and right chamber dilatation in 30.7% (**Table 2**).

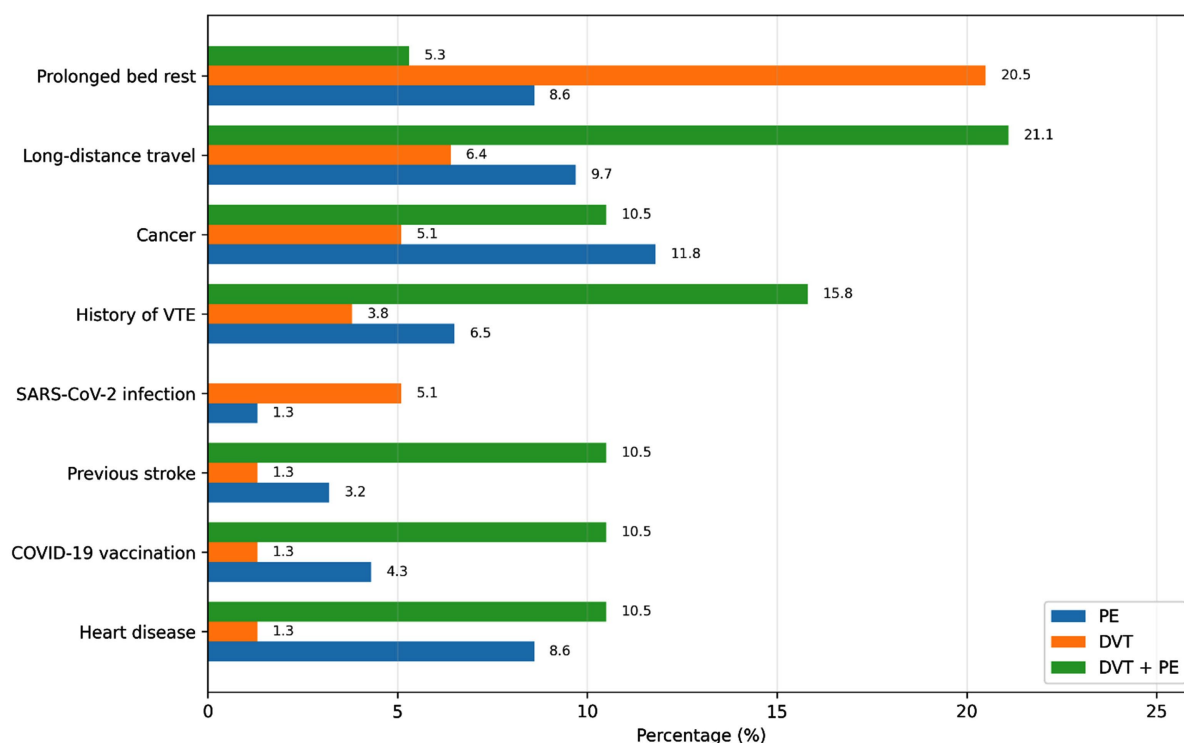


Figure 2. Main medical risk factors for VTE according to clinical presentation.

Table 2. Clinical and paraclinical diagnostic profile.

Type	Parameter	Result	Denominator/details
DVT	Painful inflammatory leg swelling	93.68%	n = 95
DVT	Local warmth	69.47%	n = 95
DVT	Homans' sign	47.37%	n = 95
DVT	High clinical probability	53.0%	Wells score
DVT	Intermediate clinical probability	42.0%	Wells score
PE	Dyspnoea	79.09%	n = 110
PE	Chest pain	65.45%	n = 110
PE	Cough	39.09%	n = 110
PE	Tachycardia	66.36%	n = 110
PE	Intermediate clinical probability	66.4%	
PE	Low clinical probability	21.8%	
PE	High clinical probability	11.8%	
PE	Bilateral PE on CT pulmonary angiography	77.27%	n = 110
PE	Proximal PE on CT pulmonary angiography	44.54%	n = 110
PE	Pulmonary hypertension on echocardiography	66.2%	n = 89
PE	Right-sided chamber dilatation	30.7%	n = 89

Therapeutically, 164 patients, or 86.78%, received heparin therapy, mainly low-molecular-weight heparin. Bridging with a vitamin K antagonist, mainly acenocoumarol, was performed in 143 patients, or 75.26%. Direct oral anticoagulants, mainly rivaroxaban, were used in 79 patients, or 41.58%, either as initial therapy or as bridging therapy. Heparin therapy alone was used in some pregnant patients (**Figure 3**) (**Table 3**).

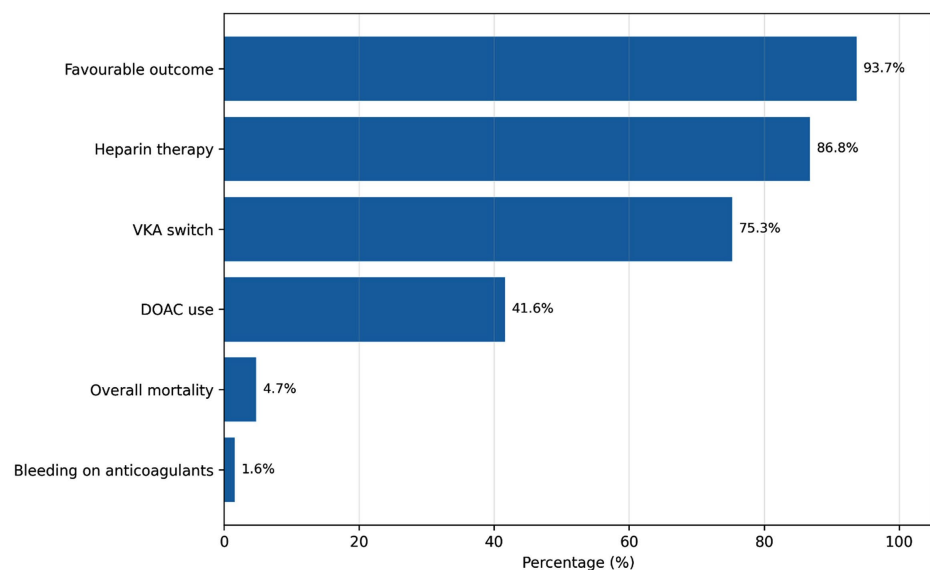
**Figure 3.** Therapeutic management and in-hospital outcome.

Table 3. Therapeutic and in-hospital outcome data.

Parameter	Number	Percentage	Comment
Heparin therapy	164/190	86.78%	Main initial treatment
LMWH among patients receiving heparin	163/164	99.4%	UFH: 1 patient
Switch to vitamin K antagonist	143/190	75.26%	Acenocoumarol in all cases
direct oral anticoagulant	79/190	41.58%	Rivaroxaban
DOAC as initial treatment	38/190	20.0%	
DOAC after VKA switch	41/190	21.57%	
Heparin therapy alone in pregnant women	8/190	4.21%	
Favourable outcome without complications	178/190	93.68%	
Bleeding on anticoagulants	3/190	1.58%	
Vascular gangrene requiring amputation	2/190	1.05%	
Overall mortality	9/190	4.73%	
Case fatality in PE	6/93	6.45%	
Case fatality in DVT	1/78	1.28%	
Case fatality in DVT + PE	2/19	10.52%	

PE: pulmonary embolism; DVT: deep vein thrombosis; VTE: venous thromboembolism; LMWH: low-molecular-weight heparin; UFH: unfractionated heparin; VKA: vitamin K antagonist; DOAC: direct oral anticoag

4. Discussion

This study confirms that VTE represents a substantial cause of hospitalisation in cardiology at Idrissa Pouye General Hospital, with an overall hospital prevalence of 6.34%. This frequency reflects both the real burden of the disease and the gradual improvement in diagnostic resources. It is consistent with recent African data showing that VTE is not rare in hospital settings, contrary to earlier assumptions [21]-[24].

The predominance of isolated pulmonary embolism in our series may be related to the cardiology-based recruitment of the department, which is more likely to receive patients presenting with respiratory or haemodynamic symptoms suggestive of PE. Isolated DVT may, in some contexts, be managed in internal medicine, vascular surgery or outpatient care, which may underestimate its true burden in a study limited to a cardiology department.

The mean age, lower than that often reported in European series, probably reflects the younger demographic structure of the Senegalese population. The substantial proportion of young patients highlights the importance of specific risk factors, particularly gynaeco-obstetric conditions, oestrogenic use, long-distance travel, immobilisation, trauma and surgery. The high representation of women among DVT cases is consistent with several African series and may be explained by exposure to hormonal and obstetric risk factors [23]-[26].

Clinical diagnosis remains challenging. In our series, DVT symptoms were dominated by a painful inflammatory swollen leg, whereas PE mainly presented with dyspnoea, chest pain and tachycardia. These signs are classical but non-specific, justifying the combined use of clinical probability assessment, laboratory testing and, above all, imaging. Venous Doppler ultrasound and computed tomography pulmonary angiography remain essential to confirm the diagnosis, characterise lesion extent and guide management [14]-[17].

Echocardiographic findings, particularly the high frequency of pulmonary hypertension and right chamber dilatation, underline the potential severity of PE and the importance of risk stratification. The use of the sPESI score helps identify patients at high risk of early complications and adapt in-hospital monitoring.

Therapeutically, anticoagulation was widely used, mainly with low-molecular-weight heparin followed by bridging to vitamin K antagonists. This strategy remains relevant in our context, particularly because of availability, clinical experience and relative cost. However, the use of direct oral anticoagulants in more than 40% of patients indicates an important shift in practice. Their ease of use is an advantage, but their cost remains a major barrier to wider use in resource-limited settings [18]-[20] [27]-[30].

The limitations of this study should be acknowledged: its retrospective and single-centre design, missing data, absence of systematic long-term follow-up and lack of detailed multivariable analysis. Despite these limitations, it provides useful data on the current profile of VTE in cardiology in Senegal and highlights the need to strengthen prevention, early diagnosis and access to anticoagulant therapy.

5. Conclusions

Venous thromboembolic disease was a frequent cause of hospitalisation in the Cardiology Department of Idrissa Pouye General Hospital between 2019 and 2022, with an overall hospital prevalence of 6.34%. Isolated pulmonary embolism was the most frequent form, followed by isolated deep vein thrombosis and combined DVT-PE. Patients were relatively young, with a high representation of women among DVT cases.

Risk factors were multiple and were dominated by medical, gynaeco-obstetric, surgical, orthopaedic and cardiovascular factors. Diagnosis was based mainly on venous Doppler ultrasound and computed tomography pulmonary angiography. Treatment was dominated by heparin therapy, bridging to vitamin K antagonists and increasing use of direct oral anticoagulants.

These findings highlight the need for a structured hospital strategy focused on prevention, early diagnosis, risk stratification and improved access to anticoagulants. Prospective multicentre studies with long-term follow-up are needed to better assess prognosis and recurrence.

Author Contributions

Conceptualisation: AAN and JSM; Formal analysis: GN; Writing - original draft:

NDG and AAN; Supervision: AAN and AK; Writing - review and editing: all authors.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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