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Case report

Intracavitary thrombus in the left ventricle and high-risk pulmonary embolism. A case report.

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ABSTRACT

Massive pulmonary embolism (PE) is a life-threatening condition typically requiring systemic thrombolysis. The presence of a left ventricular (LV) thrombus represents a relative contraindication due to the high risk of systemic embolization, requiring individualized management. We present a 73-year-old woman with a history of non-Hodgkin lymphoma in remission, severe LV dysfunction from chemotherapy and radiotherapy, permanent atrial fibrillation under apixaban, and stage 3 chronic kidney disease. She presented with progressive dyspnea, edema, and syncope. On admission, she presented with cardiogenic shock. Imaging confirmed massive bilateral PE and an LV intracavitary thrombus. Thrombolysis was contraindicated due to multiple high-risk factors: LV thrombus, ongoing anticoagulation, advanced age, and renal dysfunction. Management consisted of therapeutic anticoagulation with unfractionated heparin, vasopressor and inotropic support, and close monitoring, showing progressive clinical improvement. This case highlights the complexity of managing massive PE in cardio-oncology patients and underscores the need for individualized strategies when thrombolysis poses unacceptable risks.

Keywords: Thrombus; Left Ventricle; Cardiotoxicity; Contraindication; Thrombolytic Therapy (Source: MeSH-NLM).

RESUMEN

Trombo intracavitario en el ventrículo izquierdo y embolia pulmonar de alto riesgo. Reporte de caso.

La embolia pulmonar (EP) masiva es una afección potencialmente mortal que, generalmente, requiere trombólisis sistémica. La presencia de un trombo en el ventrículo izquierdo (VI) representa una contraindicación relativa debido al alto riesgo de embolización sistémica, lo que requiere un manejo individualizado. Presentamos el caso de una mujer de 73 años con antecedentes de linfoma no Hodgkin en remisión, disfunción ventricular izquierda grave por quimioterapia y radioterapia, fibrilación auricular permanente bajo apixabán y enfermedad renal crónica en estadio 3. Presentó disnea progresiva, edemas y síncope. Al ingreso, presentó shock cardiogénico. Las imágenes confirmaron una EP bilateral masiva y un trombo intracavitario en el VI. La trombólisis estaba contraindicada debido a múltiples factores de alto riesgo: trombo en el VI, anticoagulación en curso, edad avanzada y disfunción renal. El manejo consistió en heparina no fraccionada, soporte vasopresor e inotrópico y monitorización estrecha, mostrando una mejoría clínica progresiva. Este caso resalta la complejidad del manejo de la EP masiva en pacientes cardiooncológicos y subraya la necesidad de estrategias individualizadas cuando la trombólisis plantea riesgos inaceptables.

Palabras clave: Trombo; Ventrículo Izquierdo; Cardiotoxicidad; Contraindicaciones; Terapia trombolítica (Fuente: DeCS-BIREME).

Introduction

Massive pulmonary embolism (PE) is a cardiovascular emergency with high mortality and accounts for approximately 5-10% of all pulmonary embolism cases. In patients presenting with hemodynamic instability or shock, in-hospital mortality may exceed 25-30%. Current clinical guidelines recommend systemic thrombolysis as the first-line reperfusion strategy to restore pulmonary perfusion and reverse hemodynamic collapse unless contraindications are present. [1,2] However, the decision to administer thrombolysis must be individualized, as the presence of a left ventricular (LV) thrombus poses a significant risk of systemic embolization during fibrinolysis, making it a relative contraindication. Despite advances in reperfusion therapies, the coexistence of massive pulmonary embolism and intracavitary left ventricular thrombus remains a rare clinical scenario for which current guidelines provide no specific management recommendations. [3,4]

Cardiac dysfunction secondary to chemotherapy and radiotherapy is a relevant cause of heart failure with reduced ejection fraction (HFrEF), particularly in elderly cancer patients. Anthracyclines induce irreversible cardiotoxicity through oxidative stress and fibrosis, while thoracic radiotherapy promotes microvasculopathy and progressive heart failure. [5,6] These mechanisms promote intracavitary stasis, arrhythmias, and mural thrombosis, increasing the risk of embolic events.

The coexistence of severe ventricular dysfunction, radiation-induced cardiomyopathy, ongoing anticoagulation, and acute thromboembolic events poses a complex therapeutic dilemma in which the indication for thrombolysis requires an individualized risk-benefit analysis. The literature describes only a few cases of massive PE in patients with LV thrombi, underscoring the lack of clear recommendations in these high-mortality scenarios. [3,7]

Case report

A 73-year-old woman with a history of B-cell non-Hodgkin lymphoma treated with chemotherapy and thoracic radiotherapy in 2019, currently in remission, presented with severe left ventricular dysfunction and a left ventricular ejection fraction (LVEF) of 21% secondary to cardiotoxicity, documented by cardiac magnetic resonance imaging (CMR) in 2024, which also revealed an intracavitary thrombus in the left ventricle. She had permanent atrial fibrillation and was under apixaban treatment, and stage 3 chronic kidney disease.

She presented to the emergency department with a 15-day history of progressive dyspnea, paroxysmal nocturnal dyspnea, orthopnea, fatigue, lower extremity edema, and an unwitnessed syncope episode. On admission, the patient was hemodynamically unstable: blood pressure (BP) 77/49 mmHg, heart rate (HR) 114 bpm, respiratory rate (RR) 30 bpm, SpO_2 72%. Physical examination showed jugular vein distension, bilateral crackles, and irregular heart sounds.

Initial labs showed a creatinine level of 2.86 mg/dL, NT-proBNP of 30,947 pg/mL, and positive high-sensitivity troponins. Transthoracic echocardiography revealed dilated left chambers with an LVEF of 21% and severe right ventricular dysfunction, with estimated pulmonary artery systolic pressure >50 mmHg. A contrast-enhanced pulmonary CT angiography revealed bilateral filling defects, predominantly in the right lower segment, consistent with a diagnosis of massive PE **(Figure 1,2)**. Although pulmonary embolism typically produces obstructive shock due to acute right ventricular overload, in this patient, severe pre-existing left ventricular dysfunction contributed to a mixed shock state with both obstructive and cardiogenic components.

Given the presence of cardiogenic shock and severe biventricular dysfunction, systemic thrombolysis was ruled out due to a high bleeding risk, including advanced age, chronic kidney disease, and ongoing anticoagulation. Medical management consisted of therapeutic-dose unfractionated heparin, vasopressor and inotropic support, and close monitoring. The patient required vasoactive support with norepinephrine at 0.8 µg/kg/min and dobutamine at 5 µg/kg/min. Invasive hemodynamic monitoring was performed using a pulmonary artery catheter (Swan–Ganz catheter) to guide therapy. Electrocardiogram confirmed permanent atrial fibrillation, and chest X-ray revealed cardiomegaly and bilateral pulmonary edema.

Given the presence of cardiogenic shock and severe biventricular dysfunction, systemic thrombolysis was ruled out due to high bleeding risk, including advanced age, chronic kidney disease, and ongoing anticoagulation. Medical management consisted of therapeutic-dose unfractionated heparin, vasopressor and inotropic support, and close monitoring. An electrocardiogram confirmed permanent atrial fibrillation, and a chest X-ray revealed cardiomegaly and bilateral pulmonary edema.

During the first 72 hours of management, hemodynamic improvement allowed for the progressive withdrawal of vasoactive support once adequate perfusion parameters were achieved, including a cardiac output greater than 3.5 L/min, a cardiac index greater than 2.2 L/min/m^2, and central venous oxygen saturation above 70%. Serum biomarkers showed a progressive decrease in lactate and preservation of renal function, with no bleeding events or systemic embolic complications.

Discussion

Management of massive pulmonary thromboembolism focuses on the urgent restoration of pulmonary perfusion and cardiac output. Although systemic thrombolysis is the treatment of choice in the presence of obstructive shock, its use requires a rigorous assessment of hemodynamic risk, especially in contexts of relative contraindications such as the presence of an intracavitary thrombus in the left ventricle. [1-3]

Management of high-risk pulmonary embolism focuses on the rapid restoration of pulmonary perfusion and hemodynamic stability. High-risk or "massive" pulmonary embolism accounts for approximately 5-10% of all PE cases and is associated with an in-hospital mortality that may exceed 25-30%, particularly in patients presenting with hemodynamic instability or shock. [1-3] Current international guidelines recommend systemic thrombolysis

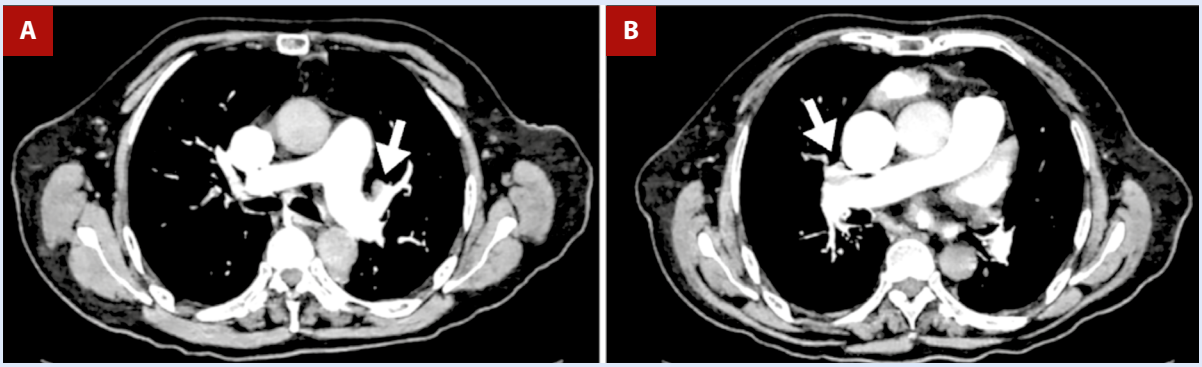

Figure 1. Axial slices of pulmonary CT angiography. **A)** Saddle-shaped filling defect (arrow) at the bifurcation of the left pulmonary artery. **B)** Central filling defect (arrow) in the proximal third of the anterior segmental branch of the right lower lobe.

as the first-line reperfusion strategy in these patients unless contraindications are present. [2,3]

This case illustrates a complex and rare clinical scenario in which the classic indication for thrombolysis is confronted with a critical finding: a left ventricular mural thrombus, associated with a high risk of systemic embolization with fibrinolytic therapy. Unlike atrial thrombi, which predominantly embolize to cerebral circulation, LV thrombi may have unpredictable systemic embolic patterns (splenic, cerebral, mesenteric, or renal), and their rupture can trigger a catastrophic event. [3,4]

Very few cases of thrombolysis in this setting are reported in the literature, with adverse outcomes in most, which supports the decision to avoid this intervention when diagnosed early. [8,9] Currently, there are no clinical studies or specific recommendations to guide management in patients with massive PE and concomitant ventricular thrombus; the guidelines address each condition individually and lack recommendations when both occur in the same patient. [4]

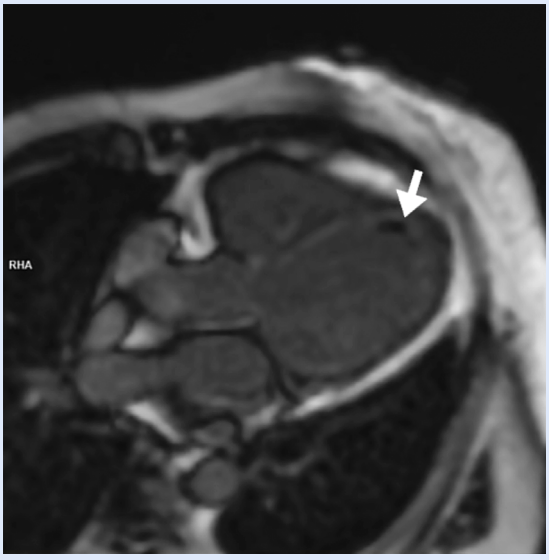

Figure 2. Cardiac magnetic resonance imaging showing a mural thrombus (arrow) adherent to the septal and anterior walls of the left ventricle at its mid-to-apical third.

In this patient, cardiotoxicity secondary to chemotherapy and radiotherapy explains the severe left ventricular dysfunction and thus facilitates a favorable environment for mural thrombus formation. Myocardial fibrosis, along with ventricular dilation, reduced intracavitary flow, and atrial fibrillation, created a chronic thrombogenic context rather than an isolated acute event. [5,6,10]

The contraindication to thrombolysis was not limited by the finding of the thrombus in the LV but was reinforced by the coexistence of multiple risk factors: advanced age, biventricular dysfunction, active anticoagulation, and renal failure. These risks also ruled out catheter-directed thrombolysis due to hemodynamic instability and extensive thrombotic burden.

Other reperfusion strategies were also considered, such as catheter-directed thrombolysis (CDT), veno-arterial extracorporeal membrane oxygenation (VA-ECMO), and surgical embolectomy. However, each option presented significant limitations: CDT involved endovascular manipulation with the risk of systemic embolization from the ventricular thrombus; the use of ECMO was ruled out due to severe comorbidities; and surgical embolectomy was considered a high surgical risk.

In this context, conservative management based on anticoagulation with unfractionated heparin, vasopressor and inotropic support, and close monitoring was chosen. Although systemic thrombolysis is recommended as first-line reperfusion therapy in patients with high-risk pulmonary embolism according to current international guidelines, for massive PE, this case highlights that when an unacceptable risk is present, individualized management is effective [2,6]

This case highlights the critical importance of an individualized, multidisciplinary strategy for managing massive pulmonary embolism in the context of a relative contraindication to thrombolysis. The presence of a left ventricular thrombus mandates a nuanced risk-benefit evaluation and underscores the pressing need for dedicated guidelines to navigate such complex clinical scenarios. Notably, our experience suggests that in highly selected patients, a conservative approach to therapeutic anticoagulation and advanced hemodynamic

support can be effective in this high-risk setting. These insights emphasize the pivotal role of tailored decision-making in cardio-oncology, where balancing therapeutic efficacy and procedural risks remains a significant challenge. This report has inherent limitations, including the absence of long-term follow-up and the retrospective nature of the clinical data available.

Ethical Considerations

This manuscript complies with national and international ethical guidelines for the publication of clinical cases, including the Declaration of Helsinki. Written informed consent was obtained from the patient for the publication of this case and the corresponding clinical images, ensuring respect for her privacy and confidentiality.

Author´s Contribution

NDLS: conceptualization, investigation, validation, writing-original draft. **AMJ, MV, MDAG:** data curation, project administration, software. **MRB:** resources, supervision, visualization. **DAG:** formal analysis, methodology, writing review & editing.

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