

# Right ventricular failure due to subacute massive pulmonary embolism

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## ABSTRACT

We present a clinical case of right heart failure secondary to subacute pulmonary embolism, which was managed in our semi-intensive care unit. The case is accompanied by interesting iconography, including electrocardiogram, echocardiogram, ventilation-perfusion, pulmonary scintigraphy, and chest angio-computed tomography.

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## Introduction

Pulmonary embolic disease has a broad array of clinical presentations. Subacute massive pulmonary embolism occurs insidiously over weeks, has a high mortality rate, and may be less amenable to systemic thrombolysis. It is associated with a high likelihood of the development of pulmonary hypertension. The subacute presentation makes it difficult to diagnose, leading to treatment delays and poor clinical outcomes. Echocardiography is the initial screening tool to detect an increase in right ventricular afterload and its consequences, right ventricular dilatation, and dysfunction. We present a case of right heart failure secondary to subacute pulmonary that was managed in semi-intensive care with the need for inotropic support with dobutamine associated with diuretic therapy with a high dose of furosemide and intravenous unfractionated heparin.

## Case Report

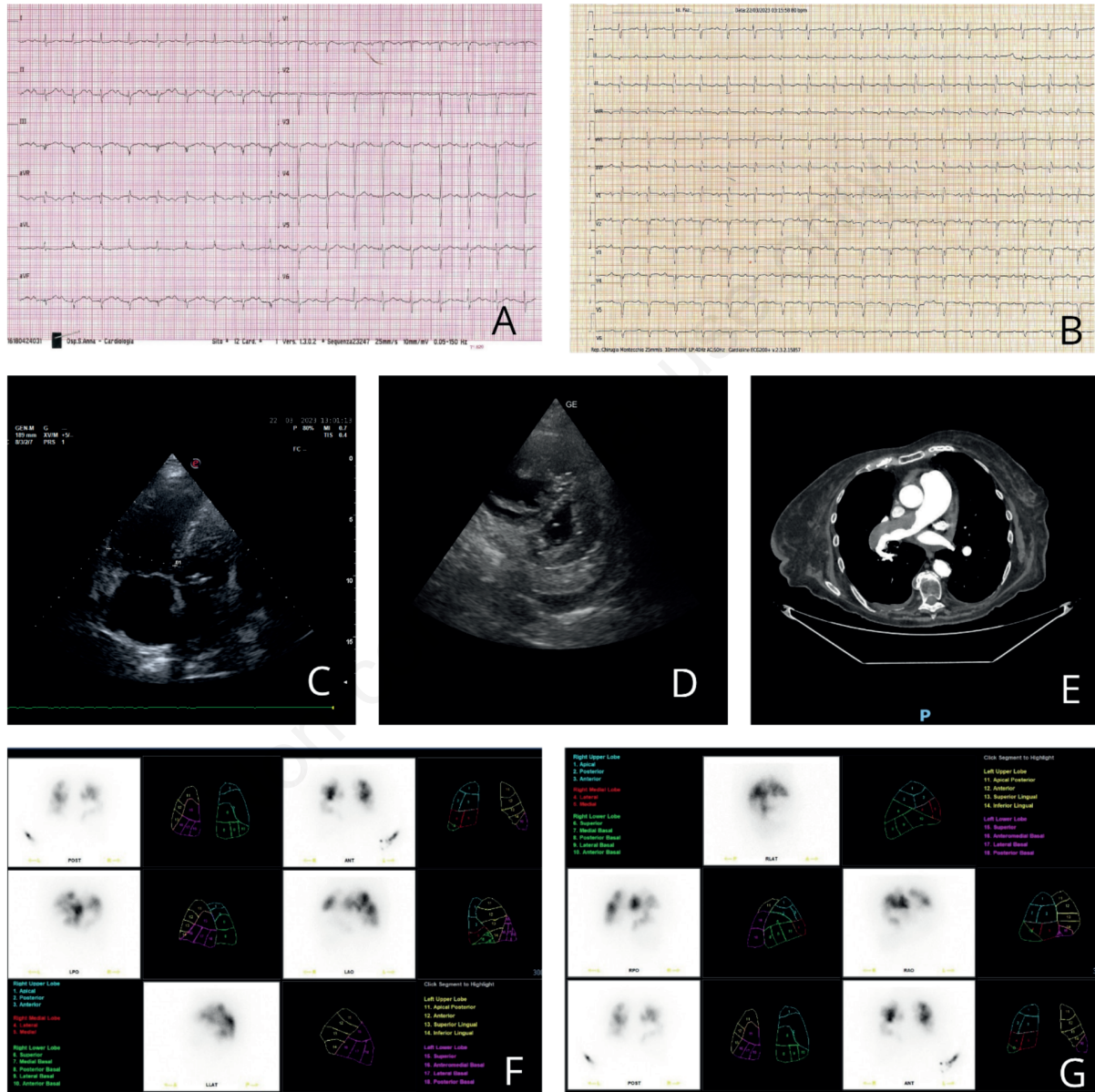
We report the case of an 83-year-old woman affected by hypertension and hypercholesterolemia. Approximately 2 months before hospitalization, she presented the onset of dyspnea on exertion, and she performed a cardiological evaluation with an electrocardiogram (ECG) (Figure 1A) showing sinus tachycardia and left axial deviation and an echocardiogram showing preserved left ventricular ejection fraction and signs of mild pulmonary hypertension. Due to the worsening of the dyspnea associated with significant lower limb edema and oliguria, the patient was then hospitalized. The ECG on admission (Figure 1B) showed a right axis deviation with an S1Q3T3 pattern. Laboratory tests showed a significant worsening of renal function (4 mg/dL) and a marked increase of N-terminal pro-B-type natriuretic peptide (40048 pg/mL). Focused cardiac ultrasonography showed severe right ventricle dilation/hypokinesia with a D-shaped left ventricle and elevated peak tricuspid regurgitant velocity (>2.8 m/s) (Figure 1C and D, Video 1).

Due to altered renal function, which contraindicated the use of contrast media, a lung perfusion scintigraphy was performed, which was highly suggestive of pulmonary embolism (Figure 1F and G). Anticoagulant treatment with

intravenous unfractionated heparin was immediately started, and since the patient was initially hemodynamically unstable, she was managed in intensive care with the need for inotropic support with dobutamine and a high dose of furosemide. There was progressive clinical and hemodynamic stabilization and improvement in renal function, which allowed the performance of computed tomography scan with contrast media showing marked dilatation of the pulmonary artery with multiple filling defects, in particular, in the right branch with eccentric thrombotic remodeling suggestive of a chronic embolism (Figure 1E).

### Discussion and Conclusions

Pulmonary embolic disease has a broad array of clinical presentations. Subacute massive pulmonary embolism occurs insidiously over weeks, has a high mortality rate, is less susceptible to systemic thrombolysis, and is most frequently associated with the development of pulmonary hypertension.<sup>1,2</sup> Echocardiography is the initial screening tool to detect an increase in afterload as well as its consequences for right ventricular dilatation and dysfunction.<sup>3</sup>



**Figure 1.** A) Electrocardiogram (ECG) performed approximately 2 months before hospitalization, which showed sinus tachycardia and left axial deviation; B) ECG performed on admission showing a right axis deviation with an S1Q3T3 pattern; C) bedside echocardiographic evaluation showing severe right section dilation; D) parasternal short axis showing D-shaped left ventricle and enlarged right ventricle; E) chest computed tomography showing marked dilatation of pulmonary artery with filling defect in the right branch due to thrombosis with evident eccentric remodeling suggestive of a chronic embolism; F,G) lung perfusion showing multiple parenchymal perfusion defects most evident on the middle lobe, the apical segment of the lobe superior on both sides, the apical segment of the right lower lobe and lingular. The exam is very suggestive of a pulmonary embolism.

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*Online supplementary material:*

*Video 1. Focused cardiac ultrasonography showing severe right ventricle dilation/hypokinesia with D-shaped left ventricle, moderate-severe tricuspid regurgitation, and elevated peak tricuspid regurgitant velocity (>2.8 m/s).*