

Persistent Hypoxemia in a Young Patient: Beyond Pulmonary Embolism

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ABSTRACT

Pulmonary embolism is one of the leading causes of acute dyspnea and hypoxemia, yet its diagnosis becomes challenging when clinical findings and imaging studies are discordant. We report the case of a 35-year-old woman whose only relevant history was systemic hypertension, who presented with three months of progressive dyspnea, orthopnea and palpitations, a pO₂ of 56 mmHg, an oxygen saturation of 85% and polycythemia. Pulmonary computed tomography angiography showed no filling defects, whereas lung scintigraphy reported a high probability of pulmonary embolism. Transesophageal echocardiography identified an ostium secundum atrial septal defect with bidirectional shunting and severe tricuspid regurgitation, and right heart catheterization confirmed moderate precapillary pulmonary hypertension, a left-to-right shunt and a filling defect in the right pulmonary artery. The coexistence of an intracardiac shunt and pulmonary vascular disease creates a hybrid pathophysiological scenario that distorts both the clinical and the imaging presentation; in the setting of unexplained persistent hypoxemia, the diagnostic work-up must extend beyond pulmonary embolism.

KEYWORDS: atrial septal defect, ostium secundum, hypoxemia, pulmonary hypertension, intracardiac shunt, pulmonary embolism

ARTICLE DETAILS

Published On:
14 August 2026

Available on:
<https://ijmscrs.com>

I. INTRODUCTION

Pulmonary embolism is one of the leading causes of acute dyspnea and hypoxemia; however, its diagnosis can be complex when there is discordance between the clinical picture and imaging studies. In such scenarios it is essential to broaden the diagnostic work-up in order to consider alternative or coexisting etiologies. Among these are congenital heart diseases, in which patients often remain asymptomatic until middle age and present with symptoms arising from their complications.

II. CASE PRESENTATION

A 35-year-old female patient, whose only relevant history was systemic hypertension treated with an angiotensin II receptor antagonist, began her illness three months before

admission with dyspnea on moderate exertion and palpitations, progressing to dyspnea on minimal exertion and orthopnea, which prompted her to seek care at the emergency department. On admission, a pO₂ of 56 mmHg and an oxygen saturation of 85% were documented; laboratory studies showed polycythemia with unremarkable cardiac biomarkers. Physical examination revealed a split second heart sound at the pulmonary focus. The electrocardiogram showed sinus tachycardia without further abnormalities.

A. Diagnostic Work-Up

Given the initial suspicion of pulmonary embolism, pulmonary computed tomography angiography was performed and showed no filling defects. Transthoracic echocardiography demonstrated preserved left ventricular

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function with evidence of right ventricular dysfunction and overload. Because the suspicion persisted, lung scintigraphy was performed and reported a high probability of pulmonary embolism. The work-up was completed with transesophageal echocardiography, which identified an ostium secundum atrial septal defect with bidirectional shunting and severe tricuspid regurgitation. Finally, right heart catheterization confirmed the presence of moderate precapillary pulmonary hypertension, as well as a left-to-right shunt and a filling defect in the right pulmonary artery suggestive of pulmonary embolism.



Figure 1. Frontal-view angiogram showing findings of pulmonary hypertension and increased pulmonary flow, with enlargement of the pulmonary arch and a prominent right pulmonary branch. The course of an intracardiac guidewire is seen advancing from the inferior vena cava into the right atrium and crossing an interatrial defect into the left atrium.



Figure 2. Frontal-view pulmonary angiogram. Adequate opacification of the main pulmonary artery and of the branches of the left pulmonary artery is achieved through a pigtail catheter, with dilatation of the pulmonary arterial tree and no evidence of intraluminal filling defects.

III.DISCUSSION

Hypoxemia in precapillary pulmonary hypertension is usually explained by ventilation/perfusion mismatch and low cardiac output; however, when an intracardiac shunt such as

an atrial septal defect is present, it may also contribute to desaturation and to a complex clinical presentation. In this case, the coexistence of persistent hypoxemia, right ventricular overload and congenital heart disease produced a hybrid pathophysiological scenario in which the intracardiac shunt and pulmonary vascular disease reinforced one another and distorted both the clinical and the imaging presentation.

IV.CONCLUSIONS

When persistent hypoxemia is not explained by initial imaging findings, the diagnostic work-up should be broadened beyond pulmonary embolism to include a targeted search for intracardiac shunts. The integration of complementary studies — transesophageal echocardiography and right heart catheterization — allowed identification of the coexistence of an ostium secundum atrial septal defect and precapillary pulmonary hypertension, with direct implications for prognosis and therapeutic decision-making.

INFORMED CONSENT

Written informed consent was obtained from the patient for the publication of this case report and the accompanying images. A copy of the signed consent form is available for review by the Editor-in-Chief of this journal upon request.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest. This work did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

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