
Diagnostic and Therapeutic Considerations in a COPD, COVID-19, and Renal Insufficiency Patient Developing Pulmonary Embolism: A Clinical Challenge

Eissa Mhanna*

Senior Consultant in Cardiology, Helios Klinikum Gotha, Gotha, Germany

*Corresponding author: Eissa Mhanna, Senior Consultant in Cardiology, Helios Klinikum Gotha, Gotha, Germany.

E-mail: eissamh1382@hotmail.com

Received: February 18, 2025; **Accepted:** March 01, 2025; **Published:** March 15, 2025

Introduction

Chronic obstructive pulmonary disease (COPD) is a significant cause of morbidity and mortality worldwide. There is mounting evidence suggesting that COPD patients are at increased risk of severe COVID-19 outcomes. This case highlights the complexity of managing patients with severe COPD and COVID-19 infection, particularly in the presence of additional comorbidities such as renal insufficiency.

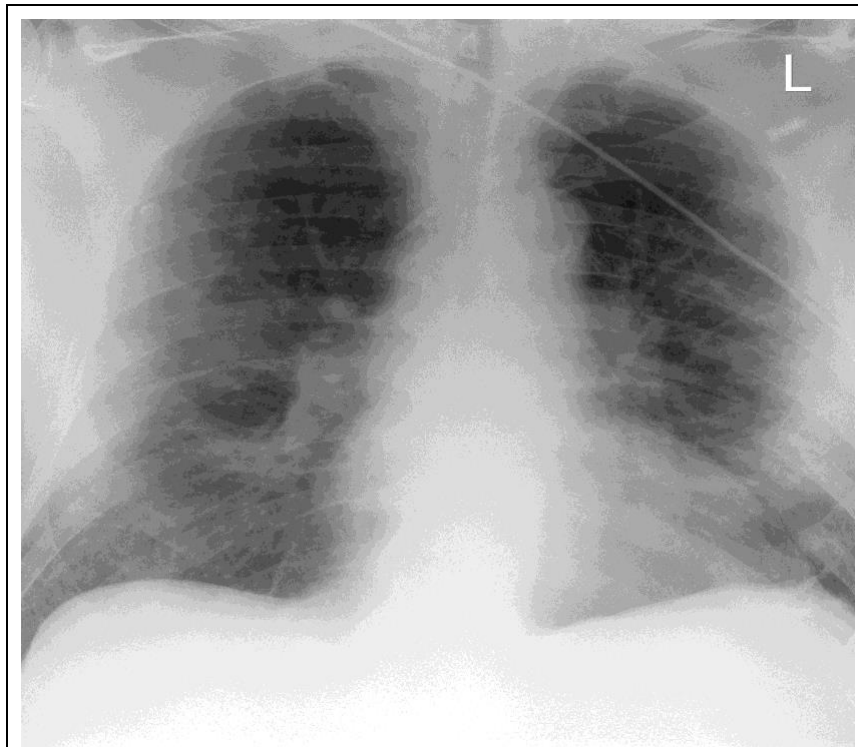
Case Presentation

A 74-year-old male with known severe COPD, arterial hypertension, insulin-dependent diabetes mellitus, and renal insufficiency was admitted to the intensive care unit with symptoms of progressive dyspnea, general weakness, loss of appetite, and hemoptysis. Physical examination revealed tachypnea, fever, oxygen saturation of 74% in room air, bilateral crackles in lung auscultation, heart rate of 90 beats per minute, and blood pressure of 150/76 mmHg.

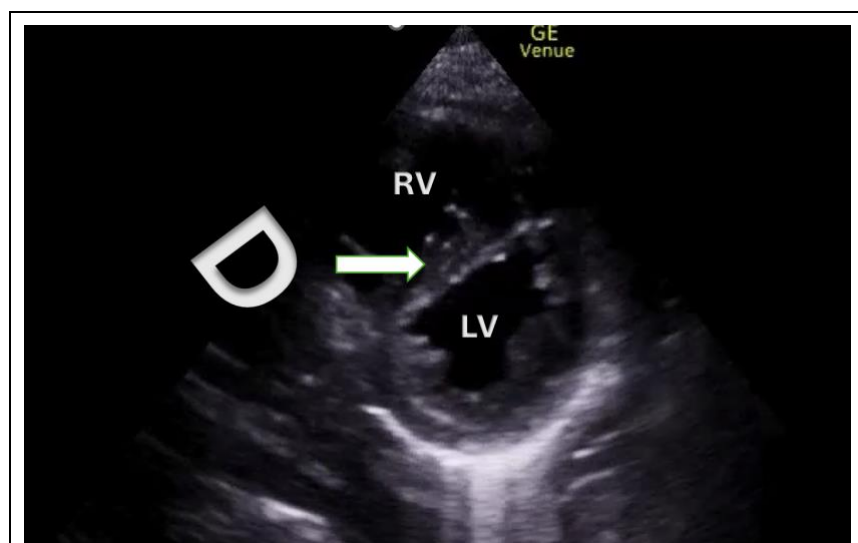
Initial investigations included a chest X-ray, which revealed bilateral infiltrations. Laboratory tests indicated the presence of an infection, renal insufficiency, and COVID-19. Echocardiography showed no pathological findings. The patient was diagnosed with an exacerbation of severe COPD, COVID-19 infection with a bacterial superinfection, and prerenal renal failure. Treatment included antibiotic and inhalation therapy. Thromboprophylaxis was initiated with unfractionated heparin (UH) 7500 IE twice daily, and noninvasive ventilation (NIV) was started as respiratory support.

Despite one week of intensive therapy, there was no significant clinical improvement. A CT chest without contrast was performed but provided no additional information beyond what was seen on the chest X-ray. Renal function improved after one week, reaching a glomerular filtration rate (GFR) above 30 ml/min. However, the thromboprophylaxis dose was not adjusted accordingly. A few days later, the patient's respiratory condition rapidly deteriorated, accompanied by hemodynamic instability. Bedside echocardiography revealed right heart dilation with the D-sign and an estimated systolic pulmonary artery pressure (SPAP) of 75 mmHg, indicative of a pulmonary embolism.

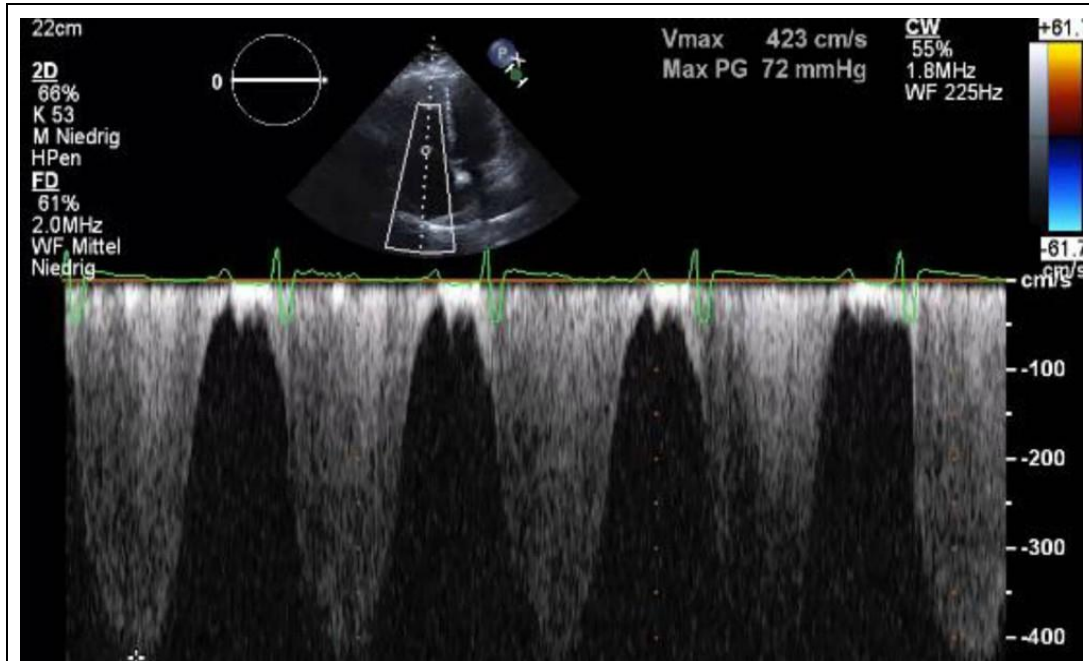
Therapeutic anticoagulation was initiated, and a CT chest confirmed the presence of bilateral central pulmonary embolism, likely due to inadequate thromboprophylaxis following the improvement in renal function. Given the patient's clinical deterioration, hemodynamic instability, and high risk of bleeding, the decision was made to proceed with local mechanical fragmentation of the embolism, along with reduced dose thrombolysis. Clinical improvement was observed gradually in the following days, and echocardiography revealed reversible signs of right heart strain. The patient was subsequently discharged home two weeks later.



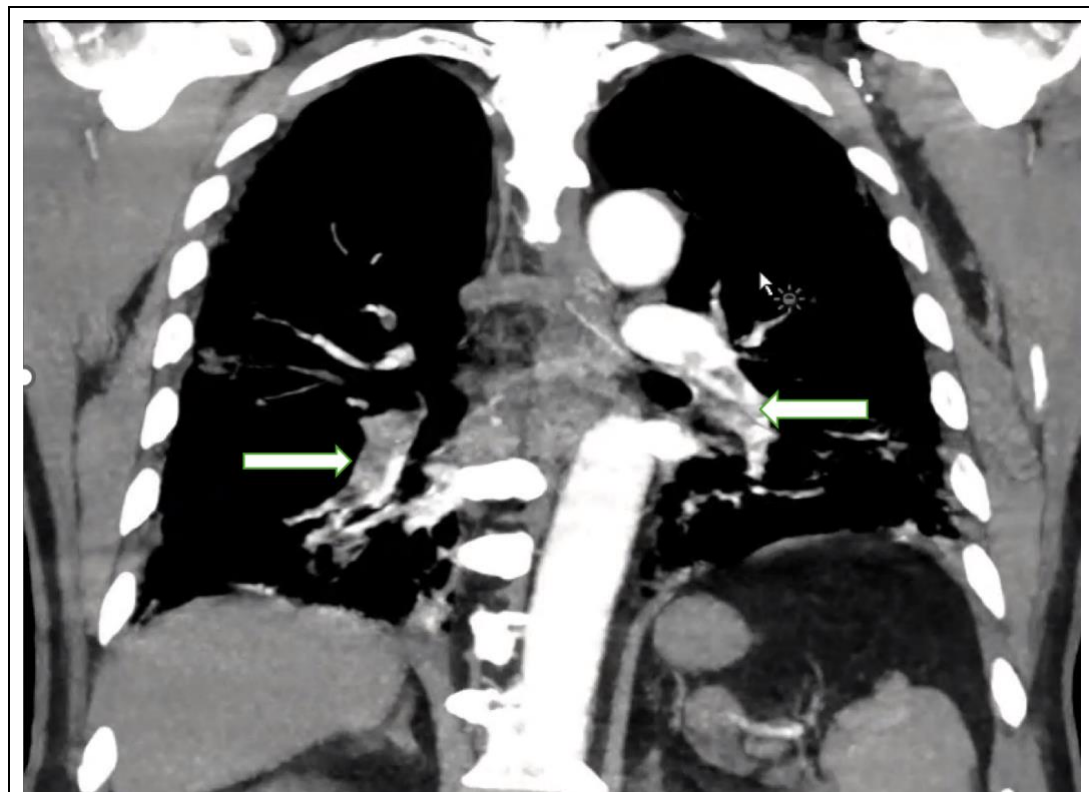
Chest X-Ray shows bilateral infiltration.



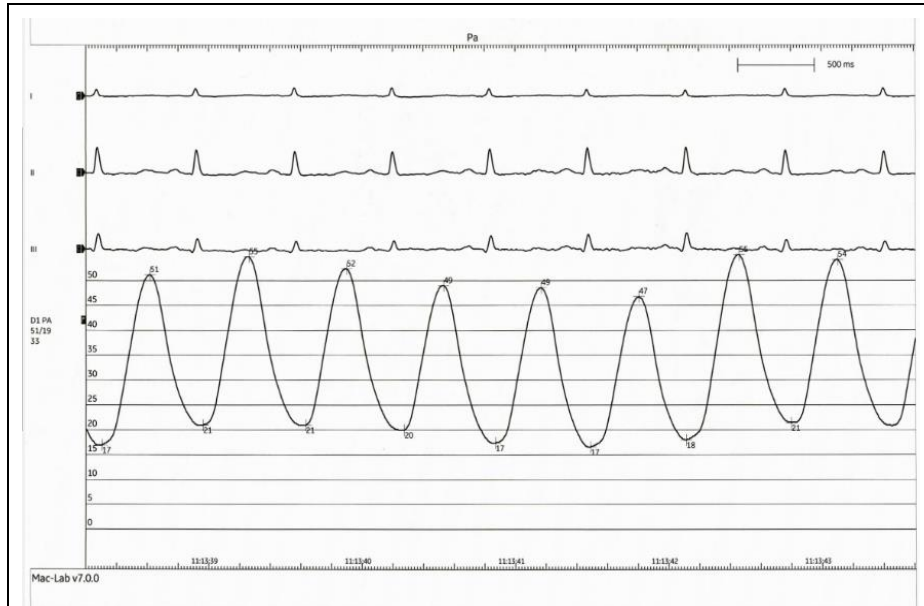
The D-Sign (white arrow) in echocardiography is a specific finding that indicates right ventricular overload (RV: right ventricle, LV: left ventricle).



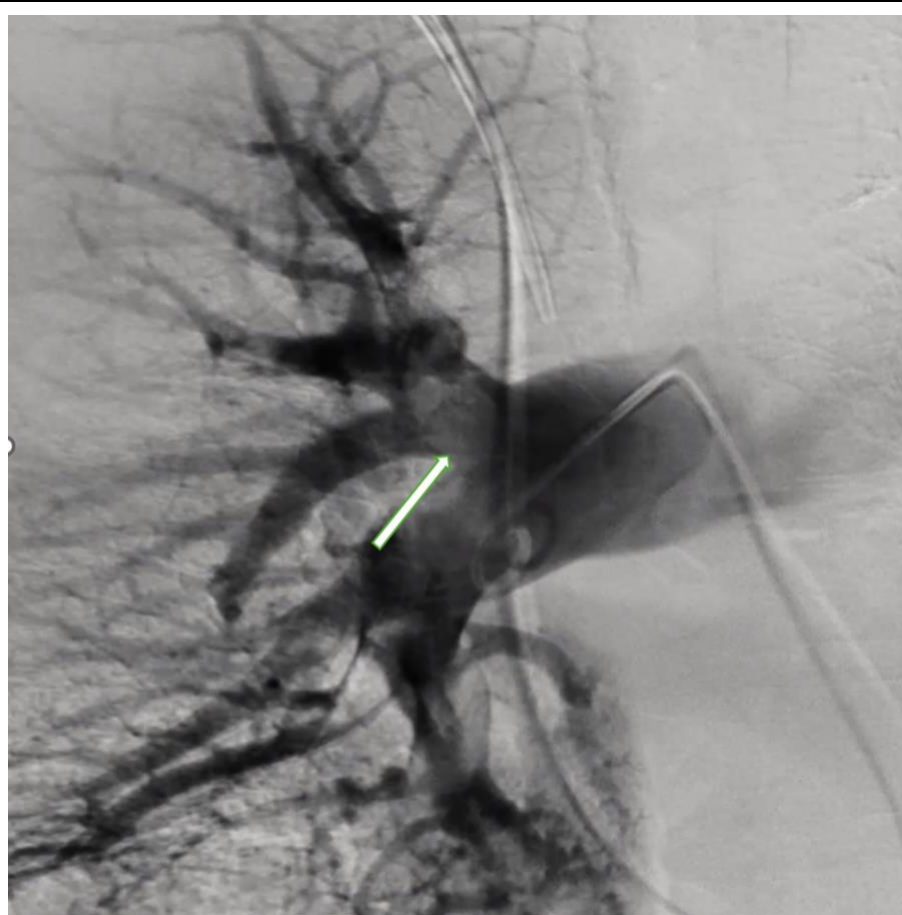
The estimated systolic pulmonary artery pressure (sPAP) using echocardiography (approximately 75 mmHg).



CT chest scan showing bilateral pulmonary embolism (white arrows).



Elevated mean pulmonary artery pressure (mPAP) detected during right heart catheterization.



A pulmonary angiogram shows filling defects (arrow).

Discussion

This case underscores the complexities involved in managing patients with severe COPD and concurrent COVID-19 infection. The combination of these conditions, along with additional comorbidities, significantly heightens the risk of complications such as pulmonary embolism. The delay in adjusting the thrombosis prophylaxis dosage highlights the critical need for continuous monitoring and timely intervention.

The selection of diagnostic imaging is critical in the therapeutic management of critically ill patients. Initial imaging modalities, such as chest X-ray and CT chest, provide essential diagnostic and management information. However, the timing and choice of imaging techniques should be carefully considered to minimize unnecessary exposure and prioritize clinically relevant findings.

In this case, echocardiography was instrumental in evaluating the patient, allowing for the timely identification of right heart strain and the subsequent diagnosis of pulmonary embolism. As a non-invasive, bedside tool, echocardiography offers real-time insights into cardiac function, making it invaluable in the ICU setting. It facilitates rapid decision-making and guides therapeutic interventions, especially in hemodynamically unstable patients.

Conclusion

Timely identification and management of complications in patients with severe COPD and COVID-19 infection are crucial. This case emphasizes the need for individualized treatment plans and the importance of adjusting therapeutic interventions based on evolving clinical conditions. The role of diagnostic imaging, particularly echocardiography, is critical in guiding treatment decisions and monitoring patient progress in the ICU.

Note: Videos related to this article can be found online at: <https://www.cardiologycasereportsjournal.org/archive/Diagnostic-and-Therapeutic-Considerations-in-a-COPD-COVID-19-and-Renal-Insufficiency-Patient-Developing-Pulmonary-Embolism-A-Clinical-Challenge.html>

REFERENCES

1. Nikhil T. Awatade, Peter AB Wark, Andrew SL Chan, et al. The Complex Association between COPD and COVID-19.
2. Manuel Monreal, Conxita Falgá, Reina Valle, et al. Venous thromboembolism in patients with renal insufficiency: findings from the RIETE Registry.
3. Viviana Aursulesei, Irina Iuliana Costache. Anticoagulation in chronic kidney disease: from guidelines to clinical practice.