

Septic Pulmonary Embolism in a Patient with Infective Endocarditis and Post-Tricuspid Prosthetic Valve Replacement: A Case Report

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ABSTRACT

INTRODUCTION: Septic emboli migration originating from a prosthetic valve can cause embolic injury in various organs. Pulmonary embolism is one of the uncommon presentations.

CASE PRESENTATION: A 35-year-old male with a history of recurrent infective endocarditis and prosthetic tricuspid valve replacement ten years prior presented to the hospital with complaints of fever, chills, and fatigue. The patient suddenly developed dyspnea, hemoptysis, and chest pain during hospitalization. A thorax CT scan revealed multiple solid and cavitary nodules in both lungs, subpleural wedge-shaped opacities, pleural effusion, and contrast-enhanced pericardium, which were indicative of pulmonary septic embolism with pericarditis. Blood cultures were positive for *Staphylococcus aureus*. The patient was given oxygen supplementation, anticoagulants, and antibiotics. His symptoms improved, and he was discharged with continued antibiotics for thirty days.

CONCLUSION: Septic pulmonary embolism should be considered in patients with pulmonary embolism symptoms and a history of prosthetic valve replacement. Early recognition and appropriate management are vital for improving outcomes and reducing mortality.

Keywords: Endocarditis, Heart Valve Prosthesis, Pulmonary Embolism, Tricuspid Valve, Case Report.

INTRODUCTION

Pulmonary embolism (PE) is a well-known medical emergency, but Septic Pulmonary Embolism (SPE) is a relatively uncommon variant. SPE is a rare but severe complication associated with infective endocarditis, particularly in patients with prosthetic valve replacements. Compared to other

forms of embolism from infective endocarditis, such as those affecting the brain or extremities, SPE is less frequently encountered in clinical practice [1,2].

The clinical presentation of SPE can be nonspecific and varied, often mimicking other respiratory or infectious conditions. This can lead to misdiagnoses without proper history taking and physical

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examinations, particularly in patients with known risk factors [3]. The most significant risk factors for SPE include intravenous drug use, underlying cardiac conditions, and, notably, the presence of prosthetic valves, such as in this patient [4]. Chest computed tomography (CT) scans are essential for identifying septic emboli within the pulmonary vasculature [5].

SPE is a life-threatening condition with significant morbidity and mortality. Therefore, recognition, appropriate diagnosis, and management are essential for improving patient outcomes [3]. Here, we present a case report that aims to increase our awareness of SPE, particularly in patients with recognized risk factors. This case report was prepared in accordance with the CARE guidelines.

Written informed consent was obtained from the patient for publication of this case report and accompanying images, and institutional ethical approval was not required.

CASE PRESENTATION

A 35-year-old male with a history of recurrent infective endocarditis and mechanical prosthetic tricuspid valve replacement ten years prior presented to our hospital with complaints of fever, chills, and fatigue lasting for three days. He had previously undergone tricuspid valve replacement due to destruction of the valve caused by infective endocarditis. On examination, weak pulses in the extremities and Osler nodes on the hands and feet were observed. Based on his clinical presentation

and medical history, we suspected another episode of infective endocarditis. Blood samples were collected from two separate sites for culture, and broad-spectrum antibiotic therapy was started.

On the second day of hospitalization, the patient developed sudden dyspnea, hemoptysis, and sharp left-sided chest pain, exacerbated by breathing and coughing. Physical examination revealed decreased breath sounds with crackles at the base of the lungs. Laboratory findings included leukocytosis ($17,440/\text{mm}^3$) and elevated C-reactive protein (CRP) levels (219 mg/dL). Given these findings, we suspected a septic embolism due to infective endocarditis. Imaging studies were performed after stabilization. Echocardiography showed no vegetation on any of the valves. A thorax CT scan revealed multiple solid and cavitary nodules in both lungs, subpleural wedge-shaped opacities, pleural effusion, and contrast-enhanced pericardium, all of which were consistent with pulmonary septic embolism and pericarditis (Figures 1 and 2). Blood cultures were positive for *Staphylococcus aureus*.

The radiographic features observed in this case are consistent with septic pulmonary embolism.

The patient was diagnosed with septic pulmonary embolism secondary to infective endocarditis on a mechanical prosthetic tricuspid valve. He was treated with oxygen supplementation, intravenous levofloxacin 750 mg OD based on drug sensitivity results, and warfarin 2 mg OD. After 19 days of hospitalization, the patient's symptoms improved, and he was discharged with a 30-day course of

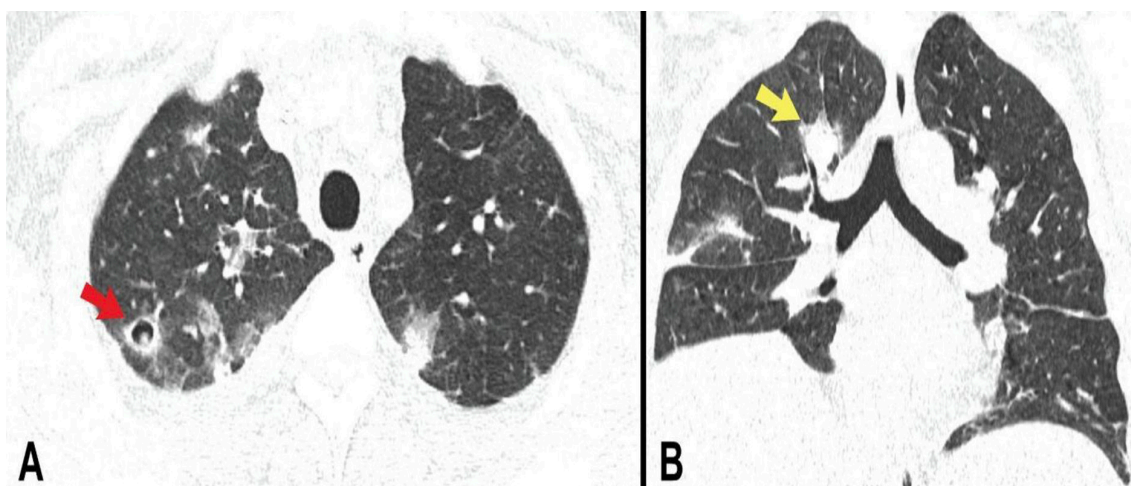


Figure 1: Axial thoracic CT images (lung window) showing: (A) a cavitary nodule in the right lung (red arrow) on the axial view; and (B) a solid nodule in the right lung (yellow arrow) on the coronal view.

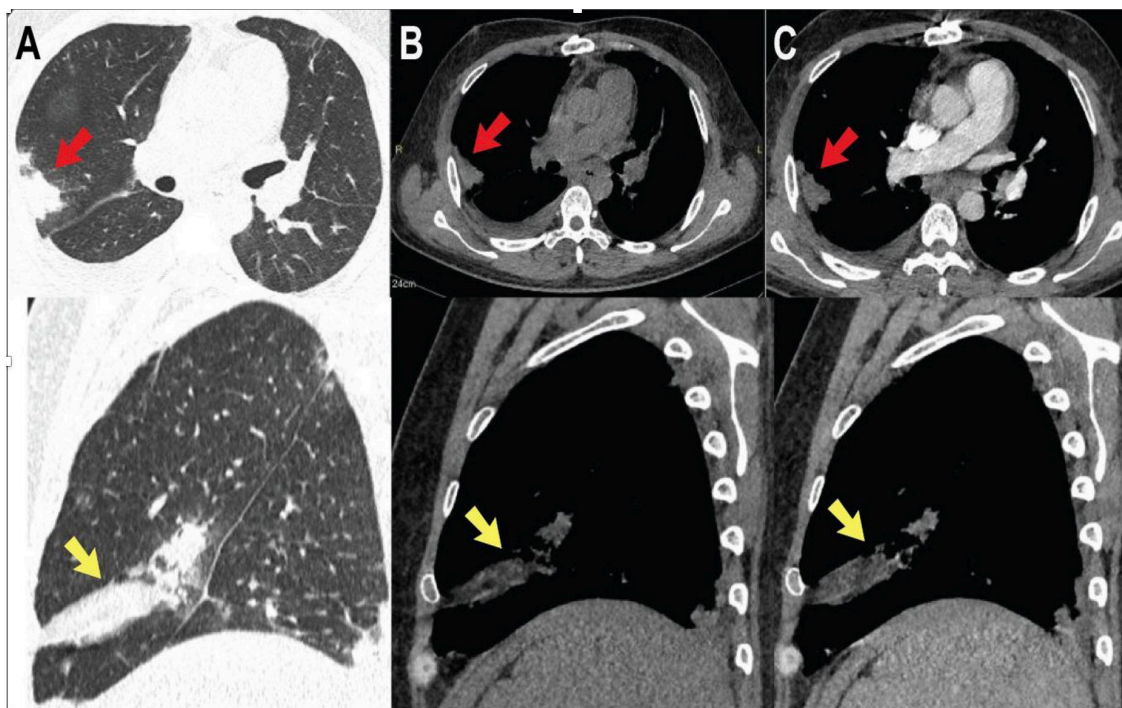


Figure 2: Thoracic CT images in the lung (A) and mediastinal (B, C) windows, displayed in axial (upper panels) and sagittal (lower panels) views, demonstrating subpleural wedge-shaped opacities in the right lung (red arrows) and left lung (yellow arrows).

antibiotics. The patient remained asymptomatic and stable on follow-up.

DISCUSSION

SPE is a rare and severe condition characterized by the embolization of infected material from a primary source, such as endocarditis, into the pulmonary vasculature [3]. Risk factors for SPE include underlying infections such as endocarditis and the presence of prosthetic heart valves, which can serve as a nidus for pathogen colonization and subsequent embolization. *Staphylococcus aureus* is the leading pathogen in this disease [6,7].

In this case, SPE likely occurred due to infection of the patient's mechanical prosthetic tricuspid valve. Prosthetic valves are particularly prone to infection, increasing the risk of septic embolization. The emboli, formed by bacterial aggregates, likely dislodged from the infected prosthetic tricuspid valve and travelled to the pulmonary circulation, leading to the patient's acute respiratory symptoms.

Diagnosing SPE involves a combination of history taking, physical examination, imaging studies,

and microbiological evidence. In this patient, the sudden onset of dyspnea, hemoptysis, and pleuritic chest pain, combined with his history of recurrent infective endocarditis and prosthetic tricuspid valve replacement, strongly suggested SPE [8]. The elevated leukocyte count and CRP levels supported an ongoing infection [9]. The patient was confirmed to have infective endocarditis based on the modified Duke's criteria, which include positive blood cultures for *Staphylococcus aureus*, a history of tricuspid prosthetic valve replacement, and the presence of fever, Osler nodes, and septic pulmonary infarcts [10]. A thorax CT scan, which revealed multiple solid and cavitary nodules, subpleural wedge-shaped opacities, and pleural effusion consistent with SPE, definitively diagnosed the patient [11]. Echocardiography can be used to evaluate the presence of vegetations. In this patient, transthoracic echocardiography (TTE) was performed and no vegetations were found, possibly because the vegetations had dislodged, causing the symptoms. Transesophageal echocardiography (TEE) could have provided a more detailed assessment of the valve and potentially identified vegetations that were not visible on TTE [3]. However, due to resource

limitations, TEE was not performed.

The differential diagnosis for SPE includes other causes of pulmonary embolism, such as thromboembolism, and infectious conditions like pneumonia or lung abscesses [5,12]. In this patient, the combination of clinical history, the presence of Osler nodes indicating endocarditis, and the imaging findings helped rule out other conditions. Unlike thromboembolism, which typically does not present with cavitary lung lesions, the CT findings in this patient were highly suggestive of septic emboli. Pneumonia and lung abscesses were considered due to the non-specific symptoms and potential as the primary source of embolization. However, the distribution of nodules and other characteristic CT findings, along with the presence of infective endocarditis, pointed toward SPE as the primary diagnosis [5,11].

Management of SPE involves addressing both the underlying infection and the embolic event. In this case, the patient was treated with intravenous antibiotics tailored to the *Staphylococcus aureus* identified in blood cultures, alongside supportive care with oxygen therapy and anticoagulation to prevent further embolic events [12,13]. The patient's gradual improvement and eventual discharge after 19 days of hospitalization reflect the efficacy of this approach. Continued antibiotic therapy was crucial to ensure the complete eradication of the infection, particularly given the risk of recurrence in patients with prosthetic valves [8,14].

This case report demonstrates several strengths in its clinical approach and reporting. The diagnosis of SPE was strongly supported by a comprehensive assessment that included clinical history, physical examination, laboratory data, and imaging studies. The timely identification of *Staphylococcus aureus* in blood cultures and the characteristic features observed in thoracic CT scans significantly contributed to diagnostic accuracy. However, certain limitations were also noted, particularly the absence of TEE, which might have provided a more definitive assessment of prosthetic valve vegetations, especially when transthoracic echocardiography TTE failed to detect them. Additionally, resource constraints limited access to advanced diagnostic tools that could have further enhanced diagnostic confidence. Despite these limitations, the case effectively highlights the importance of early recognition

and multidisciplinary management in patients with prosthetic valves presenting with respiratory symptoms.

CONCLUSION

SPE is a rare and severe condition characterized by the embolization of infected material from a primary source, such as endocarditis, to the pulmonary vasculature. Some of the risk factors for SPE include underlying infections such as endocarditis and the presence of prosthetic heart valves, which can serve as a nidus for pathogen colonization and subsequent embolization. *Staphylococcus aureus* is the leading pathogen of this disease. In this case, SPE likely occurred due to infection of the patient's mechanical prosthetic tricuspid valve. Prosthetic valves are particularly prone to infection and increase the risk of septic embolization. The emboli, formed by the bacterial aggregates, likely dislodged from the infected prosthetic tricuspid valve and travelled to the pulmonary circulation, leading to the patient's acute respiratory symptoms.

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