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UNMASKING PULMONARY ARTERY PSEUDOANEURYSM: AN UNCOMMON CULPRIT OF PULMONARY HAEMORRHAGE

General Medicine

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ABSTRACT

Pulmonary artery pseudoaneurysms (PAPs) are rare vascular anomalies that can lead to life-threatening pulmonary haemorrhage. We report a case of a 23-year-old chronic smoker presenting with haemoptysis and subsequently diagnosed with a left pulmonary artery pseudoaneurysm. This report highlights the clinical features, diagnostic challenges, and management of this rare entity.

KEYWORDS

Pulmonary artery pseudoaneurysms, haemoptysis, vascular anomalies, infectious diseases, malignancies

INTRODUCTION

Pulmonary haemorrhage is a critical condition that can arise from various etiologies, including infectious diseases, malignancies, and vascular anomalies. Among these, pulmonary artery pseudoaneurysms (PAPs) are a rare yet significant cause, with an estimated incidence of approximately 0.007% for pulmonary artery aneurysms (PAAs) or PAPs. (1) PAPs can lead to catastrophic outcomes such as massive haemoptysis, making prompt diagnosis and management essential.

The pathophysiology underlying PAPs often includes defects in the vessel wall or trauma, leading to the accumulation of blood outside the vessel lumen. This report provides an account of an unusual presentation of pulmonary haemorrhage due to PAP, emphasizing the diagnostic approach and treatment strategies.

Case Presentation

A 23-year-old male chronic smoker (10 pack-years) was admitted to the emergency department with a three-day history of blood-streaked sputum that progressed to approximately 100 mL of fresh blood production in the past 24 hours. The patient also recounted a single episode of vomiting. Notably, he had a history of recurrent haemoptysis events, although there were no significant comorbidities reported.

Upon physical examination, the patient was conscious, oriented, and afebrile. He exhibited stable vital signs: pulse of 78 beats per minute, blood pressure of 136/90 mm Hg, and oxygen saturation of 98% on room air. Routine laboratory tests revealed a haemoglobin level of 12.1 g/dL, total leukocyte count of 10,600 cells/mm^3, and platelet count of 105,000 cells/mm^3, with all other biochemical parameters, including liver and renal function tests, within normal limits. Coagulation tests including prothrombin time were also normalized.

Auscultation of the chest revealed crepitations localized to the left upper zone. A chest X-ray showed haziness in the left upper zone. Subsequent computed tomography (CT) of the chest demonstrated peri-bronchial soft tissue with ground-glass opacities present in the left upper lobe, with interlobular septal thickening resulting in a “crazy paving” pattern without apparent consolidation.

To further evaluate the situation, the patient underwent ultrasound of the abdomen and pelvis, which returned normal results. A transthoracic echocardiogram indicated a well-functioning left ventricle with an ejection fraction of 60%. Microbiological evaluations—including sputum tests for acid-fast bacilli (AFB) and fungal smear— were negative. An upper gastrointestinal endoscopy revealed a third-degree hiatal hernia and corpus gastritis, while a CT pulmonary angiogram showed no filling defects.

Bronchoscopy was performed as an additional investigative step, revealing bleeding localized to the left upper lobe. Bronchoalveolar lavage (BAL) was conducted, and samples were sent for further analysis. Because of ongoing haemoptysis, repeat contrast-enhanced CT scans was done which revealed a consolidative area in the apicoposterior segment of the left upper lobe, adjacent ground-glass opacities, and scattered nodules throughout the left lung. Importantly, a 5 mm x 4 mm enhancing area within the consolidation suggested a pseudoaneurysm arising from a segmental branch of the left pulmonary artery, indicating pulmonary haemorrhage secondary to the pseudoaneurysm.

A repeat bronchoscopy demonstrated hemosiderophages in BAL fluid; cultures urged the identification of only normal flora. A second CT pulmonary angiogram suggested blood supply from bronchial arteries to the pulmonary arteries, highlighting a hypertrophied intercostobrachial trunk on the right and a common bronchial trunk.

Given the diagnosis of a pulmonary artery pseudoaneurysm, the patient underwent trans arterial embolization (TAE) of the bronchial arteries and the pseudoaneurysm through a retrograde puncture of the right femoral artery. Following the procedure, bronchoscopy indicated no endobronchial lesions, and BAL analysis for Mycobacterium tuberculosis was negative. The patient was subsequently discharged on a regimen of amoxicillin/clavulanate and tranexamic acid, with additional supportive care.

DISCUSSION

Pulmonary artery pseudoaneurysms (PAPs) are rare vascular malformations that may lead to significant morbidity and mortality, especially upon rupture, which carries a mortality rate exceeding 50%.(2) The pathophysiology of PAPs often involves structural weaknesses in the vasculature, resulting from trauma, procedures, infections, or inflammatory diseases that compromise vascular integrity.(3) In this case, the patient's chronic smoking behaviour may have contributed to the increased susceptibility to vascular damage.

The Main Etiological Categories For PAPs Include:

1. **Trauma**: Direct thoracic injuries can result from blunt or penetrating trauma, often leading to the formation of pseudoaneurysms.
2. **Iatrogenic Causes**: Medical procedures, particularly those involving the thoracic cavity, can inadvertently damage vascular structures, leading to PAP development. Examples include Swan-Ganz catheter insertions and lung biopsies. (4)
3. **Infectious Processes**: Lung infections, including tuberculosis, lung abscesses, and septic emboli, have been implicated in the development of PAPs. (5)
4. **Vascular Disorders**: Conditions such as atherosclerosis or systemic vasculitis can compromise vessel integrity, catalysing pseudoaneurysm formation. (6)

The clinical manifestation of PAPs can vary based on their size, location, and whether they have ruptured. Symptoms typically include chest pain, haemoptysis, and occasionally signs of pulmonary embolism or respiratory distress. Interestingly, many cases remain asymptomatic until found incidentally during imaging for unrelated conditions, illustrating the importance of considering vascular abnormalities among differential diagnoses in patients presenting with haemoptysis. (7)

Traditionally, surgical management for PAPs has included lobectomy; however, recent advances in interventional radiology have tilted the

management paradigm towards trans arterial embolization (TAE).(8) TAE is now favoured due to its minimally invasive nature, efficacy in achieving rapid hemostasias, and ability to preserve lung parenchyma.(9-10) The goal of TAE is to occlude the feeding vessels to the pseudoaneurysm while preventing retrograde flow by addressing both the direct and efferent vascular sources.

While we encountered a favourable outcome with TAE in our patient, it is imperative to recognize that continued research and clinical reviews are necessary to establish robust guidelines for the management of PAPs, given their rare nature and potential for catastrophic haemorrhage.

CONCLUSION

This case exemplifies the complexities involved in diagnosing and managing a pulmonary artery pseudoaneurysm, particularly in a young chronic smoker. The findings underscore the necessity of vigilance for vascular anomalies in patients with haemoptysis and the importance of emerging minimally invasive techniques like TAE for effective treatment. Further studies are warranted to develop comprehensive guidelines for managing this unusual but potentially fatal vascular condition.

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