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CASE REPORT

Bronchial and Pulmonary Artery Embolization for Massive Haemoptysis with Rasmussen Aneurysm

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ABSTRACT

Massive haemoptysis remains a serious clinical emergency, often requiring urgent intervention to control bleeding. Rasmussen aneurysm, a rare vascular complication associated with chronic infections such as tuberculosis, is one of the causes of massive haemoptysis. Bronchial and pulmonary artery embolization have emerged as effective therapeutic strategies for controlling such haemorrhages. A 55-year-old male with a history of treated pulmonary tuberculosis presented with sudden onset of massive haemoptysis. Imaging studies revealed a Rasmussen aneurysm arising from a pulmonary artery branch. Bronchial artery embolization was first performed to control bleeding from the bronchial arteries, followed by pulmonary artery embolization to address the pseudoaneurysm. The patient showed immediate cessation of haemoptysis following embolization, with stabilization of his hemodynamic status. Post-procedure imaging confirmed the successful occlusion of the bleeding vessels. This case report discusses the role of embolization in massive haemoptysis with Rasmussen aneurysm.

KEYWORDS:

• Massive haemoptysis • Rasmussen aneurysm • Bronchial artery embolization • Pulmonary artery embolization • Interventional radiology

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INTRODUCTION

Massive haemoptysis is defined as the expectoration of more than 300-600 mL of blood within 24 hours and is a life-threatening condition that often requires urgent intervention.[1] One of the causes of massive haemoptysis is the presence of a Rasmussen aneurysm, a pseudoaneurysm formed in the pulmonary arteries in patients with chronic pulmonary infections like tuberculosis. The aneurysm is prone to rupture, causing catastrophic bleeding. In such cases, bronchial artery embolization (BAE) and pulmonary artery embolization (PAE) have become the gold-standard therapeutic interventions.[2] This case report describes a patient who presented with massive haemoptysis secondary to Rasmussen aneurysm, and was successfully treated with selective bronchial and pulmonary artery embolization, preventing further bleeding and avoiding surgical intervention.

CASE PRESENTATION

A 55-year-old male with a long-standing history of pulmonary tuberculosis (TB) presented to the emergency department with acute onset of massive haemoptysis. He had a history of recurrent mild haemoptysis over the past several months but had never experienced bleeding of this severity. He reported coughing up large amounts of blood over the last 12 hours and was in shock upon presentation with a blood pressure of 85/50 mmHg, a heart rate of 115 beats per minute, and a respiratory rate of 28 breaths per minute.On initial examination, the patient was in respiratory distress, tachycardic, and hypotensive. Physical examination revealed bilateral coarse crackles in the lungs, and no significant wheezing or stridor was noted. The patient was immediately stabilized with intravenous fluids and oxygen therapy.

A contrast-enhanced chest CT scan was obtained, which revealed a pseudoaneurysm in right lower lobe segmental pulmonary artery (approximately 12x7mm) consistent with a Rasmussen aneurysm. The rest of the lung parenchyma showed consolidations consistent with TB infection.Given the patient's life-threatening bleeding, an immediate decision was made to perform bronchial artery embolization (BAE) to control the haemorrhage. The procedure was done under localanaesthesia and conscious sedation in the interventional radiology suite. A 5-French catheter was introduced through the femoral artery, and selective angiography was performed to identify the bronchial arteries. Super selective angiography revealed a large, tortuous right bronchial artery with parenchymal blush. Embolization was performed with 250-300 micronpolyvinyl alcohol (PVA) particles to occlude the hypertrophied bronchial artery.[3] Further angiographic evaluation showed no parenchymal blush.

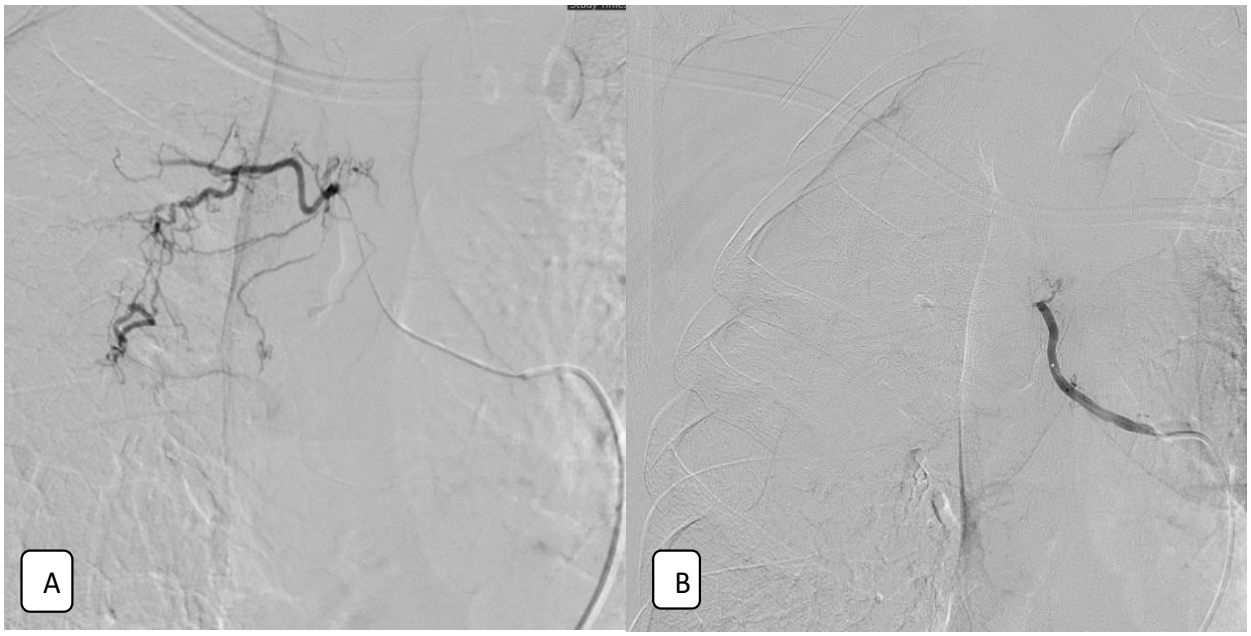

Figure 1:(A) Angiography image shows hypertrophied bronchial arteries **(B)** Post embolization complete occlusion of bronchial artery

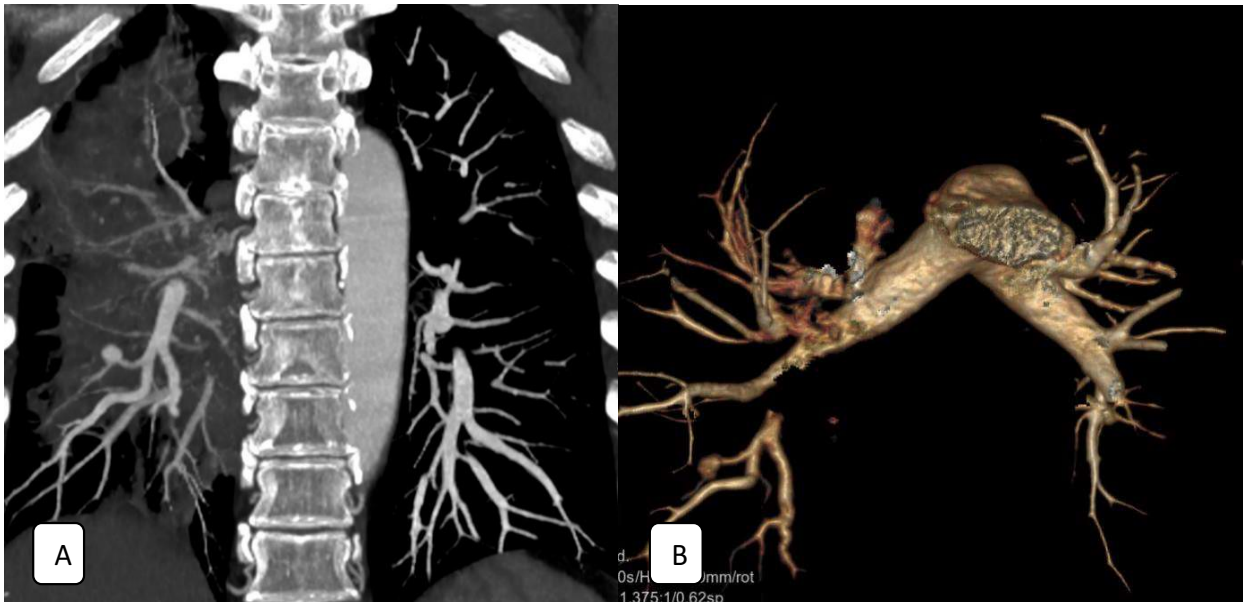

Figure 2:(A) CT coronal image shows pseudoaneurysm in right lower lobe pulmonary artery
(B) VR image shows pseudoaneurysm in right lower lobe pulmonary artery

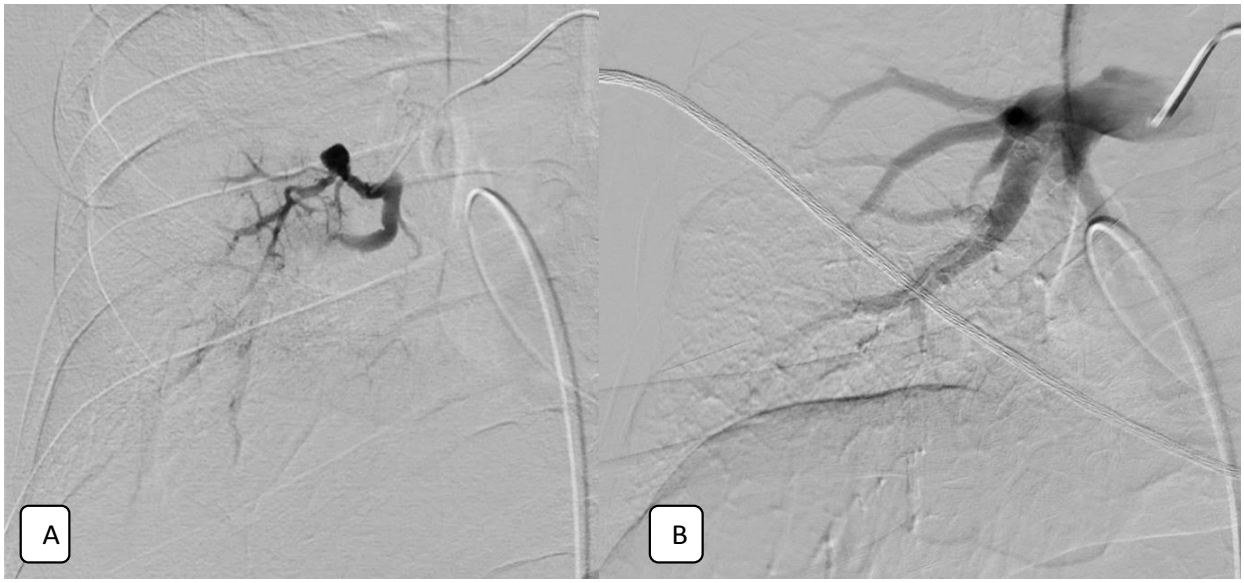

Figure 3: (A) Angiography image shows pseudoaneurysm in right lower lobe pulmonary artery
(B) Post glue embolization no filling of pseudoaneurysm

Through right femoral vein route pulmonary artery angiogram was performed. Angiography showed a pseudoaneurysm in right lower lobe segmental pulmonary artery consistent with a Rasmussen aneurysm. Super selective cannulation was done and embolization done with 33% N-butyl cyanoacrylate (NBCA) glue. The patient was closely monitored in the intensive care unit for 48 hours following the embolization procedure. Serial chest X-rays and a post-embolization CT angiogram confirmed complete occlusion of the pseudoaneurysm and no further bleeding. The patient's hemodynamic status stabilized, and he was gradually weaned off mechanical ventilation and intravenous fluids. The patient's haemoptysis resolved entirely, and he remained stable without recurrence of bleeding. He was discharged on post-procedural day 7 with instructions for close follow-up in the outpatient clinic.

DISCUSSION

Rasmussen aneurysm is a rare but serious complication of chronic pulmonary infections such as tuberculosis, leading to the formation of a pseudoaneurysm in the pulmonary arteries. The aneurysms form as a result of direct damage to the pulmonary vessels caused by the inflammatory process, leading to thinning of the arterial walls and an increased risk of rupture.[5] The rupture of a Rasmussen aneurysm can result in life-threatening massive haemoptysis, often requiring urgent intervention. Traditional surgical approaches for managing massive haemoptysis, such as lobectomy or pneumonectomy, are associated with significant morbidity and mortality. In contrast, pulmonary artery embolization has emerged as a highly effective, minimally invasive alternative that can provide rapid control of haemorrhage while preserving lung function.

The diagnosis of a Rasmussen aneurysm and its associated haemorrhage typically involves a combination of clinical, radiological, and endoscopic evaluations. CT Angiography (CTA) is the gold standard for identifying the source of bleeding, including Rasmussen aneurysms, and the involvement of bronchial or pulmonary arteries.[6] CTA can provide detailed images of the aneurysm and any vascular malformations, which are crucial for planning embolization. Bronchoscopy is used to identify the site of bleeding in the bronchial tree, as well as to assess the severity of the haemoptysis. Pulmonary Angiography can be performed in conjunction with embolization and provides real-time visualization of the blood vessels and the ability to target specific vessels.

Embolization is achieved by selective catheterization of the pulmonary arteries followed by the injection of embolic agents such as coils, particles,glue or gel foam.[7] The goal is to occlude the aneurysm and hypertrophied arteries without compromising the blood supply to the remaining healthy lung tissue. In our case, selective BAE combined with pulmonary artery embolization (PAE) effectively controlled the bleeding and avoided the need for surgical intervention.

ADVANTAGES OF EMBOLIZATION

- Minimally invasive: Compared to surgical resection or lobectomy, embolization is less invasive, carries lower morbidity, and can be performed quickly in an emergency setting.
- **Effective:** It can provide rapid control of bleeding, particularly in cases of catastrophic haemoptysis from Rasmussen aneurysms.
- **Repeatable:** Embolization can be repeated if bleeding recurs.

Complications of embolization includes infarction of lung tissue, infection and rebleeding.[8] Several studies have demonstrated the high success rate of pulmonary artery embolization in controlling haemoptysis due to Rasmussen aneurysms, with reported success rates of up to 90%. However, rebleeding remains a concern in some patients, especially in cases where collateral circulation is extensive. Therefore, follow-up imaging is critical to monitor for recurrence.

CONCLUSION

Bronchial and pulmonary artery embolization is an effective and life-saving intervention for managing massive haemoptysis due to Rasmussen aneurysm. This case demonstrates the critical role of interventional radiology in controlling catastrophic bleeding and preventing the need for more invasive surgical treatments. Early recognition, timely intervention, and close post-procedural monitoring are key to successful management and improved patient outcomes in these complex cases.

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