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Case Report

Endovascular management of a pulmonary artery pseudoaneurysm secondary to mucormycosis: A case report ☆

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ABSTRACT

The development of pulmonary artery pseudoaneurysm (PAP) secondary to pulmonary mucormycosis (PM) is exceedingly rare. Without immediate intervention, PAPs can result in life-threatening hemorrhage as these weakening vessels are prone to rupture. To avoid such an occurrence, procedures that restrict blood flow to the vulnerable region are typically performed. The present case study details the effective employment of endovascular coil embolization in treating a patient with PAP due to pulmonary mucormycosis.

Introduction/Background

Pulmonary artery pseudoaneurysm (PAP) is a rare complication that can occur due to various conditions, including trauma, infection, neoplasm, congenital anomalies, and iatrogenic factors [1]. Common infectious causes recorded in literature include tuberculosis, lung abscess, or aspergillosis. On the other hand, PAP caused by pulmonary mucormycosis (PM) is particularly rare, with only a few reported cases in the literature. PM is a severe, invasive fungal infection that commonly affects immunocompromised patients and can cause a wide range of pulmonary and extrapulmonary complications, resulting in fatal consequences [2,3].

A PAP occurs when the vessel wall develops a localized outpouching that is at risk of rupture due to fibrous tissue replacing the vessel wall. One of the most common and perhaps important symptoms of PAP is hemoptysis, which can be life-threatening, especially when it occurs in the pulmonary circulation. Diagnosis can be challenging, especially if patients present with nonspecific symptoms. Computed tomography (CT) pulmonary angiography is typically used to diagnose PAP and determine the underlying cause as it can identify the presence and location of the PAP, and evaluate

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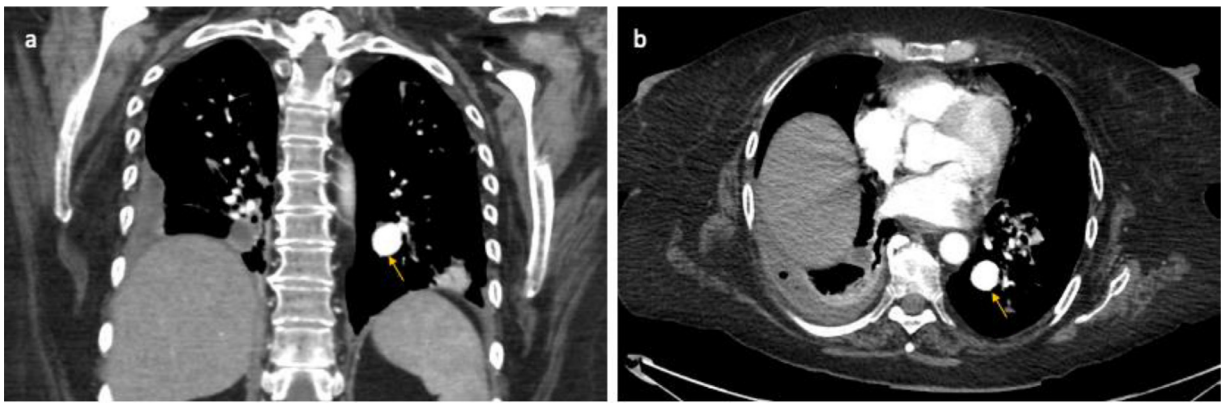

Fig. 1 – Coronal CT image (A) and contrast-enhanced CT (B) 6 days before embolization display a 2-cm aneurysm in the lower lobe of the left lung (yellow arrows). A cavitary lesion in the right lower lobe was also noticed, suspicious of a newly emerging aneurysm.

its size, shape, and relation to the adjacent vessels. Moreover, CT pulmonary angiography can provide information on the underlying pathology and associated complications [1,4].

Treatment of PAP aims to prevent rupture and may include surgical resection, endovascular embolization, or a combination of both. Endovascular embolization is becoming more commonly used as the first-line treatment option for PAP due to its minimally invasive nature and low risk of complications. The goal of endovascular coil embolization is to block blood flow to the fragile area, occluding the rapidly worsening pseudoaneurysm and preventing vessel rupture [4].

In this report, we describe a case of PAP caused by PM successfully treated with endovascular coil embolization.

Case presentation

A 52-year-old female arrived at our hospital with a chief complaint of chest pain and dyspnea. Her past medical history (PMHx) included hypertension and systemic lupus erythematosus (SLE). She was recently treated for pneumonia and discharged from the hospital 3 months ago. On admission, a CT scan of the chest showed an aneurysm within the lower lobe of the left lung. (Fig. 1) Further investigation discovered the patient's PMHx of PM with recurrent pneumothoraces and no history of TB or recent travel. The patient was immediately referred to interventional radiology for vascular embolization.

As shown in Figures 2A–C, under sonographic guidance, an arterial access was gained to the left femoral vein following an advancement of a 6 French pigtail catheter, which outlined a 20 mm x 20 mm x 22 mm left lower lobe posterior pseudoaneurysm. The pigtail catheter was exchanged for a 5 French angled tapered glide catheter over exchanged length Bentson guidewire and advanced to the associated pulmonary artery segment. The offending branch to the aneurysm of interest was then accessed using a high-flow microcatheter (Boston Scientific, MA) with the aid of a shapeable guidewire. Once the microcatheter was successfully coiled into the pseudoaneurysm to facilitate proper coiling, coil embolization was performed using 2 Ruby soft microcoils (Penumbra, Alameda, CA). Additional pulmonary angiogram was performed to confirm appropriate embolization and proper flow through the vessels (Fig. 2D). The patient was stable postoperative and discharged soon after. Follow-up CT with contrast 4 months later revealed a stable embolization coil with no residual abnormalities (Fig. 3).

Discussion

Though uncommon, PM is a life-threatening fungal infection, which is often seen in immunocompromised patients. Patients with a history of autoimmune disorders like ours are at higher risk of developing PM from mucormycosis infection as their immune system is insufficient in preventing fungal angioinvasion, thereby allowing rapid progression and dissemination to other organs with the lungs being the most prominent location. PM has a high mortality rate, ranging from 40% to 76% [5]. Complications associated with PM include progressive subcutaneous emphysema, Pancoast syndrome, bronchial perforation, fatal hemoptysis, and PAP [6]. As aforementioned, even though PAP is a rare complication of PM, the consequences of PAP can be fatal, emphasizing the need for timely diagnosis and management. Management of PAP may vary, depending on the underlying etiology, the size and location of the lesion, and the patient's clinical status. Treatment options include medical management, surgical resection, and endovascular embolization. Medical management includes antifungal therapy and supportive care [7]. Surgical resection is a definitive treatment option but is associated with significant morbidity and mortality, particularly in critically ill patients. Endovascular embolization is an alternative treatment option that is less invasive and has lower complication rates than surgical resection [1,7,8]. The aim of embolization is to occlude the pseudoaneurysm sac and prevent blood flow to the weakened area, thus reducing the risk of rupture and controlling bleeding. The choice of embolic material depends on the size and location of the pseudoaneurysm, with detachable coils being the most commonly used [9]. The use of vascular embolization with coils has been reported in

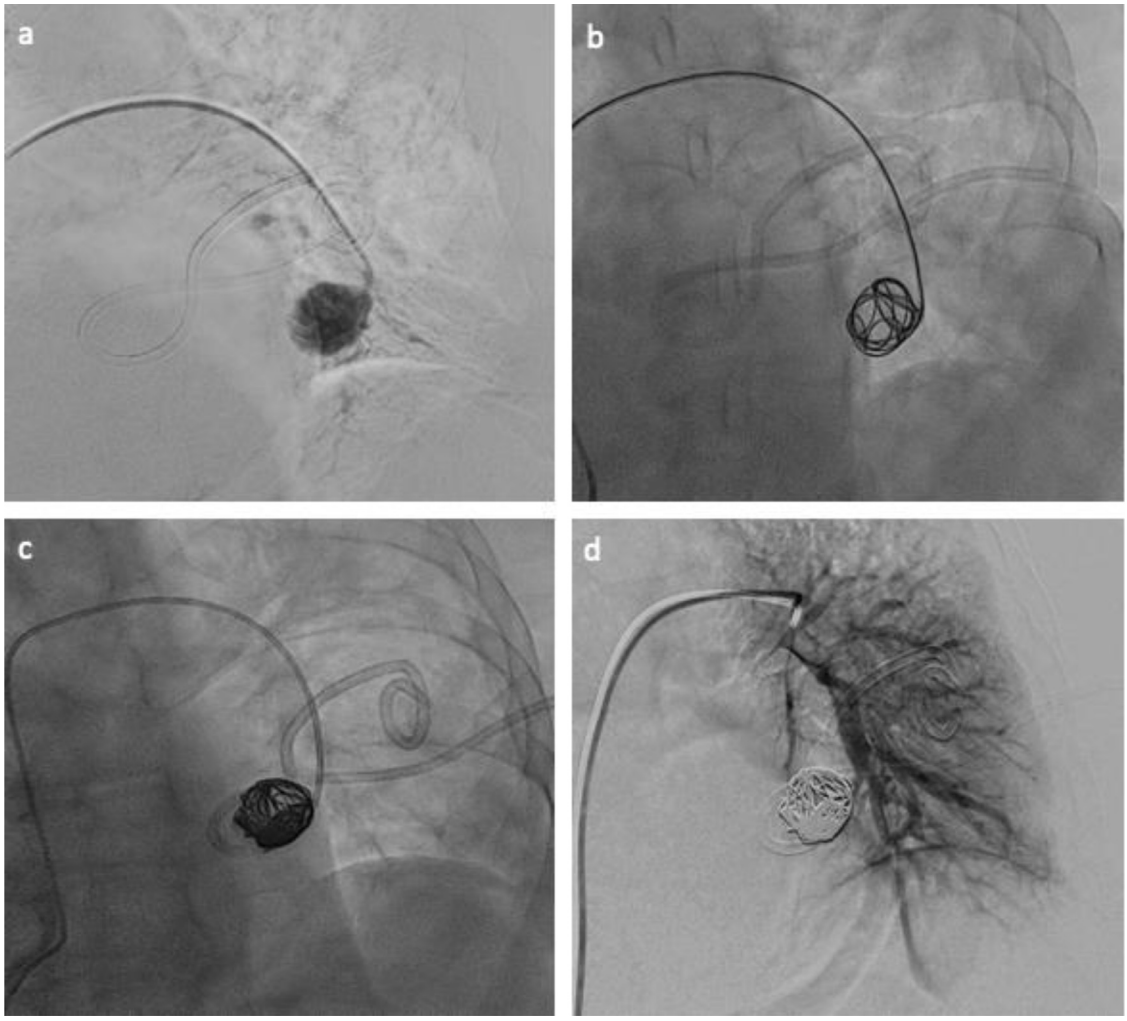

Fig. 2 – (A–D) Intraoperative angiogram was obtained during the PAP embolization. The aneurysm of interest was precisely located (A). With the aid of a guidewire and a microcatheter, a microcoil was gently negotiated into the pseudoaneurysm (B, C). After the microcatheter was retracted, an additional angiogram was obtained to ensure the microcoil was appropriately packed with no significant flow observed (D).

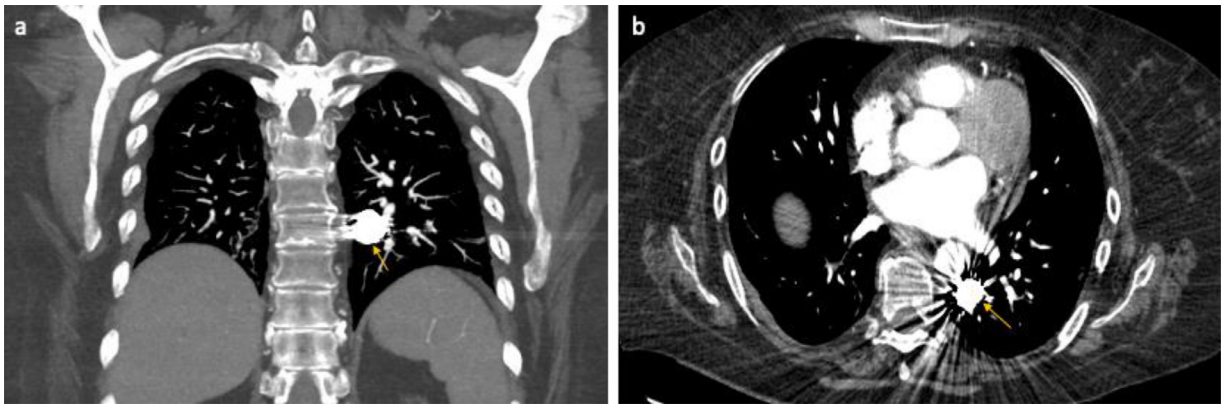

Fig. 3 – Contrast-enhanced CT images (A, B) show an embolization coil (yellow arrows) in the parenchyma of the medial left lower lobe 4 months after the procedure. No evidence of pulmonary embolism, acute consolidation, or abnormal lesion was found.

the cases of PAPs secondary to tuberculosis and aspergillosis, but limited data is currently available for PM [10,11].

Conclusion

PAP secondary to PM is a rare condition with limited reference in the literature. Therefore, treatment protocols for this condition have not been well-defined, however, endovascular embolization is one of the best available treatment options for PAP due to its low risk and minimally invasive nature. This method of treatment was successful for our patient. Future clinical research would be helpful to evaluate the risks and outcomes, especially long-term, associated with coil embolization in the management of PAPs secondary to PM.

Patient consent

Written informed consent for the publication of this case report was obtained from the patient.

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