

Percutaneous Stent-Graft Repair of a Mycotic Pulmonary Artery Pseudoaneurysm

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Abstract

Ruptured mycotic pulmonary pseudoaneurysm is a lethal complication. Emergent surgical repair is usually recommended, but still associated with a high mortality rate. We present a patient in whom mycotic pulmonary pseudoaneurysm was a complication after surgical lobectomy 2 weeks earlier. This patient had suffered from repeated massive hemoptysis. After emergent surgical repair of the ruptured pulmonary artery stump, another episode of massive hemorrhage occurred. The pulmonary arteriogram revealed a segmental stenosis and a large, wide-necked, lobulated pseudoaneurysm at the left proximal pulmonary artery. We deployed a balloon-expandable stent-graft (48 mm in length mounted on a 12 mm × 40 mm angioplasty balloon) across the stenotic segment and the neck of the pulmonary pseudoaneurysm. Hemostasis was achieved immediately and, under a 4-week antibiotic treatment, patient was transferred to a local hospital for medical care. This case report demonstrates the benefit of minimally invasive endovascular therapy in a critically ill patient. A literature review of the etiology and management of mycotic pulmonary pseudoaneurysm is included.

Key words: Pseudoaneurysm—Pulmonary artery—Stent-graft

Mycotic pseudoaneurysm of the pulmonary artery is rare but potentially lethal. It tends to grow rapidly, with the risk of rupture and death [1]. Most cases have been associated with infective endocarditis [1, 2]; occasionally they have been caused by direct vascular invasion from an adjacent pulmonary infectious process [3, 4], occurred postoperatively after corrective surgeries for congenital heart disease [5, 6], or resulted from intravenous drug abuse [7]. Surgical treatment is recommended whenever possible [2], but despite aggressive treatment the mortality rate still approaches 80% [4]. Only a few cases of simple pulmonary pseudoaneurysm treated by a percutaneous endovascular approach have been reported in the literature [8, 9]. We present the successful use of a stent-graft to exclude a mycotic pulmonary pseudoaneurysm in a critically ill patient.

Case Report

A 58-year-old man was admitted to our hospital with fever and pus discharge from a prior thoracotomy wound. He was suffering from lung

carcinoma (squamous cell type, stage T2N1M0) and had undergone left upper lobe lobectomy 2 weeks previously. Wound infection with empyema formation was diagnosed. Subsequent blood cultures were positive for *Stenotrophomonas maltophilia*. Despite antibiotic use, massive hemoptysis with loss of consciousness occurred 3 days after his admission. After emergent resuscitation the patient recovered consciousness but complicated with respiratory and renal failure. An emergent surgical repair of the pulmonary artery stump was performed with insertion of two chest tubes. Fever persisted and *Staphylococcus aureus* was cultured from the chest fluid later. He was further treated with vancomycin, meropenem, and metronidazole. The infectious process seemed gradually to come under control. Unfortunately, 8 days after the surgical repair another episode of massive hemoptysis occurred in which around 1500 ml of fresh blood was drained from the chest tubes within 24 hr. The patient was transfused with 4 units of whole blood due to his unstable hemodynamic status (the blood pressure dropped to 84/40 mmHg). Because of the high surgical risk and severe tissue adhesion noticed during the previous thoracotomy, percutaneous endovascular management was considered most beneficial for this patient. After detailed explanations to the patient and his family, written informed consent was obtained. The patient was sent to our angio-suite with stable vital signs the following morning.

With the patient under local anesthesia, a pulmonary arteriogram was performed via puncture of the right femoral vein. The arteriogram revealed a segmental stenosis (Fig. 1A) and a large, wide-necked, lobulated pseudoaneurysm at the left proximal pulmonary artery (Fig. 1B). For stent-graft deployment, a 10 Fr, 41 cm vascular sheath (Rosch-Uchida transjugular set, Cook, Bloomington, IN, USA) was inserted via the femoral route. Then, a 6–12 mm diameter, 48 mm long stent-graft (Jomed, Rangendingen, Germany) mounted on a 12 mm × 40 mm angioplasty balloon (Fox, Jomed, Beringen, Switzerland) was positioned across the stenotic segment and the neck of pseudoaneurysm. The stent was deployed smoothly by balloon inflation at 8 atm (Fig. 2A). The follow-up angiograms showed complete exclusion of the pseudoaneurysm without any residual pulmonary stenosis, although some nearby segmental branches were also excluded (Fig. 2B). The patient did not experience further episodes of bleeding after the procedure. The fever also subsided after 4 weeks of antibiotic treatment. Thereafter, he was transferred to a local hospital for respiratory care and regular hemodialysis. Unfortunately, the patient died during dialysis 5 months after the stent-graft placement. No follow-up images were obtained in our hospital after his discharge.

Discussion

Pulmonary artery pseudoaneurysm is an uncommon lesion. The mortality rate associated with rupture of pulmonary artery pseudoaneurysm is as high as 50%, secondary to aspiration and asphyxia

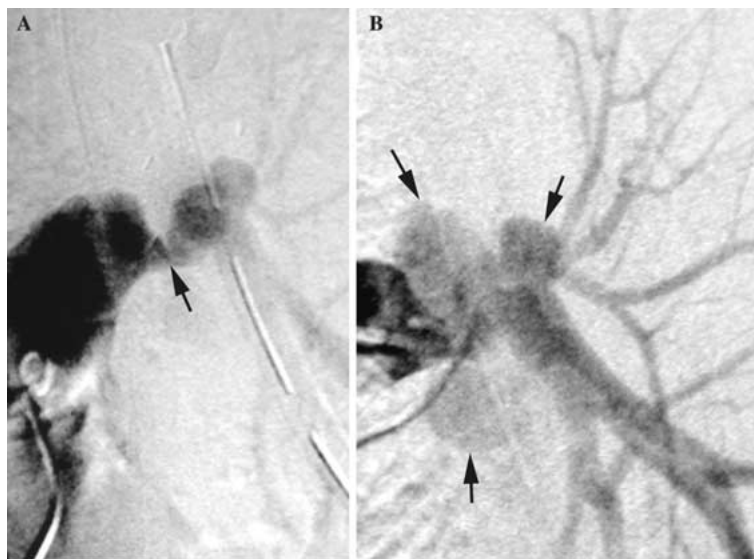


Fig. 1. **A** The pulmonary arteriogram revealed a segmental stenosis (arrow) at the left proximal pulmonary artery. **B** It also revealed a large, wide-necked, lobulated pseudoaneurysm (arrows) just distal to the stenotic portion of the pulmonary artery.



Fig. 2. **A** A 48 mm long stent-graft was positioned across the segment of the stenosis, straddling the neck of the pseudoaneurysm, and deployed smoothly by balloon inflation. **B** The follow-up angiograms showed complete exclusion of the pseudoaneurysm without any residual pulmonary stenosis, but with exclusion also of the nearby segmental arteries.

following intrapulmonary hemorrhage [10]. Bozkurt et al. recommended that surgical treatment should always be undertaken to prevent catastrophic consequences for large aneurysms [2]. However, treatment of distal aneurysms is difficult, may require pneumonectomy, and can be fatal. Poplausky et al. [10] used steel coils to embolize distal pulmonary artery pseudoaneurysms successfully with or without occluding the feeding artery in trauma patients. Wilson et al. [8] and Hannan et al. [9] reported successful treatment of a simple pulmonary artery pseudoaneurysm using a stent-graft in two pediatric patients. We present a successful experience with stent-graft treatment for a mycotic pulmonary artery pseudoaneurysm in an adult patient.

The advantages of endovascular therapy using a percutaneous stent-graft include the following: (1) it allows for patching the leak to stop the bleeding immediately, and (2) it is a minimally invasive procedure requiring only local anesthesia, thus avoiding the risks of general anesthesia or a surgical procedure. It is therefore of significant benefit for patients with high operative risks because of comorbidities [11]. However, the indication of stent-graft treatment for mycotic pseudoaneurysms may remain controversial. The ma-

major concern is the possible risk of infection of the graft-fabric. The principles of standard management suggest that stent-graft placement would be unlikely to succeed as a treatment option for mycotic pseudoaneurysms because exclusion rather than excision of the pathology may create closed-spaced infections [12]. Kwon et al. suggest that the infection should be cured or brought under control by antibiotic therapy before stent-graft placement [12]. However, in a critical emergency stopping life-threatening bleeding should be the first clinical consideration, as in our case. Some investigators have reported their successful experiences in treating active mycotic pseudoaneurysms with stent-graft and long-term antibiotic therapy [11, 12]. Semba et al. reported successful exclusion of a mycotic pseudoaneurysm in the descending thoracic aorta by deployment of a stent-graft in three cases. No complication of persistent bacteremia or delayed rupture were noted at median follow-up of 24 months [11]. Although limited reports are available up to date, combined endovascular stent-graft repair with long-term antibiotic therapy seems to offer significant advantages for such patients at high surgical risk, and can be a therapeutic alternative in critically ill patients.

In conclusion, stent-graft repair combined with long-term antibiotic therapy could be a valuable therapeutic alternative in critically ill patients with pulmonary mycotic pseudoaneurysm. Careful postoperative follow-up and infection control are required. Further study is warranted to evaluate the risk of chronic graft infection.

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