

Case Report

A Case of Total Arch Replacement and Lung Lobectomy for Infected Aortic Aneurysm Ruptured Into Lung

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Abstract

We report an extremely rare case of a 77-year-old woman who underwent total arch replacement and left upper pulmonary lobectomy for an *E. coli*-infected aortic aneurysm that ruptured into the lung, which was first suspected to be lung cancer. On the 6th postoperative day, she weaned off the respirator. However, because of interstitial pneumonia and disseminated intravascular coagulation (DIC), she was put to sleep 38 days postoperatively without leakage at the artificial vascular anastomosis or bronchopleural fistula.

Keywords: Infected aortic aneurysm; Operation; Rupture into the lung

Introduction

Infected aortic aneurysms are rare and carry a high risk of mortality [1]. Even rarer conditions are infected aortic aneurysms ruptured into the lungs, commonly due to *Staphylococcus*, *Streptococcus*, and

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Salmonella [2-6]. Such aneurysms have high morbidity and mortality and are known as mycotic aneurysms. We hereby report a surgically treated case of an infected aortic aneurysm ruptured into the lung.

Case Report

A 77-year-old woman, who had been taking oral steroids for autoimmune hepatitis, presented with fever, hoarseness, and hemoptysis. A plain computed tomography (CT) demonstrated a mass of 40 mm in the left upper lobe of the lung, which showed suspicion of lung cancer (Figure 1a). A transbronchial biopsy was performed for diagnosis, and then she presented with hemoptysis the next morning. An enhanced CT revealed a saccular aneurysm of the distal arch with a maximum diameter of 67 mm and hematoma formation around it (Figures 1b and 1c). She was diagnosed as having a ruptured infected aneurysm into the left upper lobe of the lung, and an urgent surgical approach was planned. Preoperative echocardiography did not show significant valvular disease or vegetation. Surgery was conducted through a median sternotomy combined with an anterolateral thoracotomy through the fifth intercostal space. The distal arch was severely adhered and fixed to the left upper lobe of the lung, and the descending aorta was not visible; therefore, we decided to resect the left upper lobe of the lung first on a heart-lung machine. Since the A³ pulmonary artery was close to the rupture site, we first dissected the A⁴ and A⁵ pulmonary arteries. Next, the superior pulmonary vein and the superior lobe bronchus were dissected to obtain a visual field, and finally, the A³ and A¹⁺² pulmonary arteries were dissected. The aorta was then clamped proximally between the brachiocephalic artery and the left common carotid artery and distally at the descending aorta, and the aneurysm and left upper lobe of the lung were resected en bloc. It was determined that the proximal arch could not be used as a proximal anastomosis site because of severe atherosclerotic changes. Hence, a total arch replacement was performed using a quadrifurcated graft soaked in 0.1% rifampicin with moderate hypothermic circulatory arrest and selective antegrade cerebral perfusion. (Figure 1d).

A 3.5-cm fistula was seen in the left upper lobe of the lung (Figure 2). Because lung inflammation was confined to the lobules surrounding the aneurysm and there was no inflammation in the background of the lung, we concluded that the findings were consistent with the rupture of an infected aortic aneurysm into the lung (Figure 3). *E. coli* was detected in bacterial cultures of the resected aneurysm wall. She weaned off the respirator on the 6th postoperative day. However, she was reintubated on the 16th postoperative day because of pneumonia and pulmonary congestion. CT suspected interstitial pneumonia, and steroid pulses were then administered, but her general condition gradually worsened, and she developed DIC and was put to sleep for 38 days postoperatively.

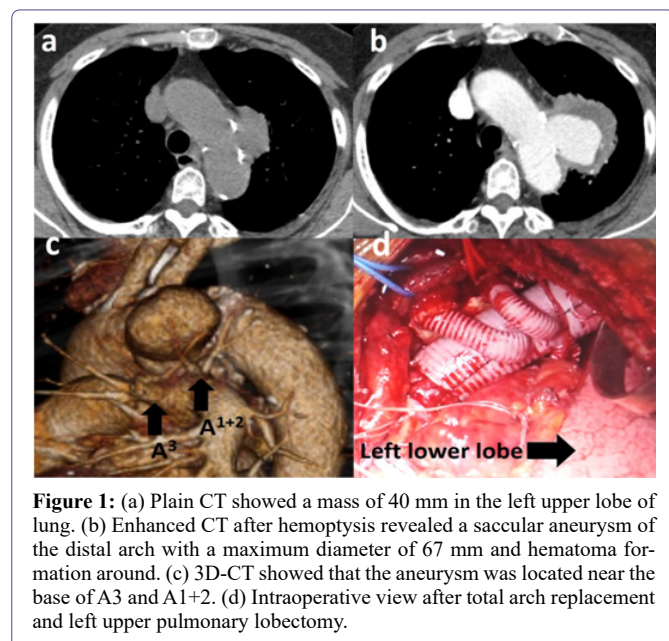


Figure 1: (a) Plain CT showed a mass of 40 mm in the left upper lobe of lung. (b) Enhanced CT after hemoptysis revealed a saccular aneurysm of the distal arch with a maximum diameter of 67 mm and hematoma formation around. (c) 3D-CT showed that the aneurysm was located near the base of A3 and A1+2. (d) Intraoperative view after total arch replacement and left upper pulmonary lobectomy.

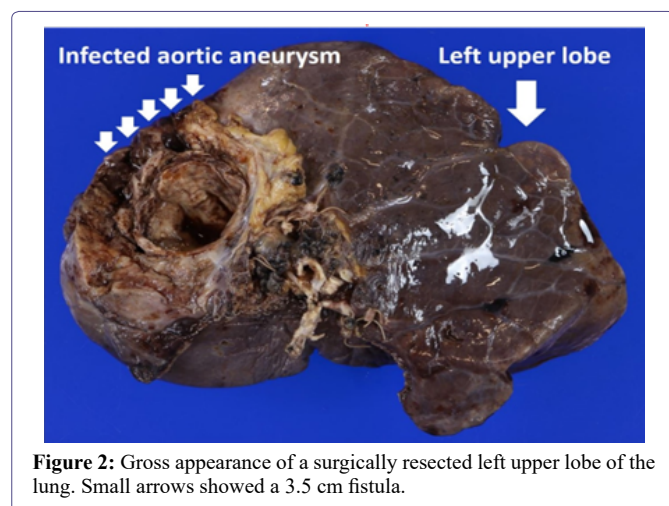


Figure 2: Gross appearance of a surgically resected left upper lobe of the lung. Small arrows showed a 3.5 cm fistula.

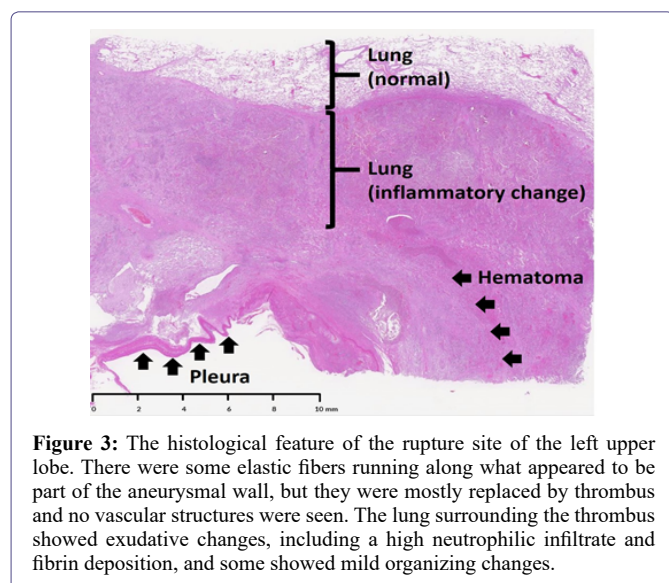


Figure 3: The histological feature of the rupture site of the left upper lobe. There were some elastic fibers running along what appeared to be part of the aneurysmal wall, but they were mostly replaced by thrombus and no vascular structures were seen. The lung surrounding the thrombus showed exudative changes, including a high neutrophilic infiltrate and fibrin deposition, and some showed mild organizing changes.

Discussion

A review of 963 patients with infected aortic aneurysms showed the mean age of patients was 69 years, and 73% were male; approximately 17% were in the thoracic aorta. The most common symptoms at onset were pain and fever (77% and 67%, respectively). 44% had a concomitant or recent infection, and 41% were immunosuppressed. The prognosis of infected aortic aneurysms is generally poor because of the high risk of rupture. Infection-related complications have been reported to be 21%, of which 46-70% were fatal.

There are few reports of intrapulmonary perforation of infected aortic aneurysms, and only two cases involved a pulmonary lobectomy, to our knowledge.

The first case was a 63-year-old woman who underwent successful resection of a tuberculous pseudoaneurysm of the descending thoracic aorta, which had ruptured, into the left upper part of the lung after a punch biopsy. She underwent Gore-Tex graft replacement of the descending aorta after a left upper lobectomy.

The second case was a 57-year-old man who was diagnosed to have a *Staphylococcus aureus*-infected aneurysm of the descending thoracic aorta and underwent a left lower lobectomy and Dacron graft repair of the descending thoracic aorta. Both patients had a good postoperative course, although our case died on the 38th postoperative day after a total arch replacement.

Traditional treatment for infected aortic aneurysms has been thoracotomy, partial or full cardiopulmonary bypass, open resection, and repair [7-8]. According to the above review, 60% of the cases were reported as open surgical repair and 40% as endovascular repair; however, it has been unknown about the cases that ruptured into the lung. When open thoracotomy is difficult due to a poor general condition, an endovascular approach may be the only option of intervention to save a life. For some time now, TEVAR (thoracic endovascular aortic repair) has been considered a palliative option in these situations or as another option to eventually bridge to open resection and cardiopulmonary bypass surgery once the patient has been appropriately treated with antibiotics. Although TEVAR was one of the options for this patient, we opted for open surgical repair for debridement of the infected lesion and to avoid the insertion of foreign objects into the infected site.

Conclusion

Infected aortic aneurysms are rare, and since the pathogenesis of aortic aneurysms varies according to the organisms causing the aneurysm and the location of the aneurysm, there is no standard treatment. Infectious aortic aneurysms ruptured into the lung, in particular, are very rare, so further clinical experience is warranted.

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