**Case Report**

Surgical resection of a pulmonary artery pseudoaneurysm after middle lobectomy: Report of a case

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A case of surgical resection of a pulmonary artery pseudoaneurysm after middle lobectomy is reported. A 76-year-old man with lung cancer, interstitial pulmonary fibrosis, and pneumoconiosis was referred for surgical resection. Right middle lobectomy with lymph node dissection was successfully performed. Postoperatively, the patient did well until a sudden high fever developed on postoperative day eight. Antibiotic therapy was started for suspected acute pneumonia, but the low-grade fever did not improve. Contrast-enhanced computed tomography showed a bronchopleural fistula that caused a pulmonary artery pseudoaneurysm. Right lower lobectomy via posterolateral thoracotomy was performed to resect the pseudoaneurysm. The pulmonary artery stump was sutured by monofilament unabsorbable stiches. The bronchus stump was sutured interruptedly with a pedicle of intercostal muscles. The patient’s postoperative course following repeat thoracotomy was complicated, including exacerbation of interstitial pneumonia and tracheostomy. He is still in hospital, and weaning off the mechanical ventilator is being attempted.

**Key words:** pulmonary pseudoaneurysm, bronchopleural fistula, pyothorax

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**Introduction**

A bronchopleural fistula (BPF) is a major complication after lung surgery [1]. Several possible etiologies contribute to the development of BPF; ischemic change in the bronchial stump is one of the major factors [2], as well as stapling miss-fire. Once it occurs, it is difficult for clinicians to treat this intractable situation. A fatal situation may develop due to pyothorax, with severe inflammation involving the adjacent pulmonary artery, resulting in a pulmonary artery pseudoaneurysm (PAP). A rare case of surgical resection of a PAP after middle lobectomy is reported.

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deoxyglucose-positron emission tomography/CT scans. Clinical T2aN2M0 Stage IIIA disease was diagnosed. Pulmonary function tests were in the normal range, except for decreased diffusing capacity of the lung for carbon monoxide (%DLCO: 39.9%). Radiotherapy and chemotherapy were considered difficult for the patient due to his age and comorbidities. Thus, it was decided to operate after obtaining detailed informed consent.

Anterolateral thoracotomy was done at the fourth intercostal space. Right middle lobectomy and lymph node dissection (Node dissection 1a + #7 and #10 lymph node sampling) were performed. The bronchus was auto-sutured by Endo GIA™ Tri-staple™ purple 45-mm cartilage (Covidien Surgical, Norwalk, CT, USA). Fibrin glue and a piece of poly-glycolic acid sheet were applied to the bronchial stump, though no air leakage was seen from the bronchial stump. The patient’s postoperative clinical course was uneventful until sudden high fever appeared on the 8th postoperative day (POD). Emergent bronchoscopy did not identify an obvious BPF. Antibiotic therapy was started for suspected acute pneumonia, but the low-grade fever did not improve. On the 17th POD, contrast-enhanced CT indicated a PAP, likely due to inflammation of a BPF (Fig. 1a, 1b). Redo operation was performed via posterolateral thoracotomy. Fibrous adhesions and pleural effusions indicated pyothorax, and dehiscence of suture for the middle lobe bronchus and the PAP were identified (Fig. 2). Right lower lobectomy was necessary to resect the PAP because of the risk of rupture. The right main pulmonary artery was taped, and the stump of the pulmonary artery was sutured by monofilament unabsorbable stiches. The right intermediate trunk stump was sutured interruptedly with 3-0 Nylon in Overholt fashion. In addition, a pedicle of intercostal muscle was attached to the bronchial stump.

The pulmonary artery is dilated prominently (4a). The arterial wall is attenuated and totally necrotic. HE × 20 (4b). The muscle layer is completely lost and replaced by necrotic tissue and abscess. HE × 100 (4c). Intact portion of the pulmonary artery. The muscle layer is preserved. HE × 100 (4d).

Pathological findings showed a prominently dilated pulmonary artery (Fig. 3a); microscopically, the arterial wall was attenuated and totally necrotic (3b), and the muscle layer was completely lost and replaced by necrotic tissue and abscess.

The patient’s postoperative course following redo-thoracotomy was complicated, including exacerbation of interstitial pneumonia and pyothorax. He is still in hospital for nine months, and weaning off the mechanical ventilator is being attempted.
Discussion

A case of surgical resection of a PAP after middle lobectomy was described. PAP is a rare condition, and it has been described as a result of inflammation of the pulmonary artery; it is especially frequent as a complication after invasive medical procedures, such as vascular interventional procedures, [3], radiofrequency ablation therapy [4], endobronchial brachytherapy [5], and pulmonary resection [6-9]. On the other hand, it could also occur in association with progression of lung neoplasms [10]. There is no question in the present case that the BPF after middle lobectomy caused pyothorax, with severe inflammation to the adjacent pulmonary artery that resulted in PAP.

In previous reports, the patients usually presented with hemoptysis, pyrexia, shortness of breath, and chest pain [3-10] after the above-mentioned invasive procedures. It is not difficult for clinicians to diagnose these symptoms. The gold standard for diagnosis is contrast-enhanced CT, which is less invasive for patients than pulmonary angiography. Emergent treatment is essential for this critical situation; observation is not recommended because Soh et al [4] and Chawla et al [5] found that the patients developed shock due to massive hemotherax and hemoptysis from PAP rupture after invasive medical procedures. Treatment can be either surgical resection of the PAP, which usually requires pulmonary resection [9,10], or interventional radiology [5,7,8]. In the present case, the interventional approach seemed very difficult because the PAP was in an interlobar pulmonary artery; intra-aneurysmal embolization could have resulted in infarction of the lower lobe. Therefore, redo thoracotomy was chosen despite the high risk of exacerbation of interstitial pneumonia.

Needless to say, it is important for surgeons to avoid BPFs, which are a major complication after lung surgery [1]. Of the several possible etiologies contributing to the development of BPF, ischemic change in the bronchial stump is a major factor. In the present case, the BPF was likely caused by ischemic change in the bronchial stump after the lymph node dissection, because the bronchial arteries had to be divided due to the subcarinal lymph node swelling (12 mm in the short axis). Satoh et al [2] reported that the incidence of postoperative ischemic bronchitis (POIB) was 2.5% among 1015 patients undergoing lung resection. In that study, being a male, a smoker, having diabetes mellitus, having postoperative respiratory complications, and subcarinal lymph node dissection were significant factors related to POIB. In addition, this POIB happened even in the middle lobe. These factors were also important in the present case, except for diabetes mellitus. However, technical problems occurring during bronchial stapling must always be considered. Since the possibility of technical failures including stapling missfire could not be totally excluded, the videos of all initial middle lobectomy procedures were rechecked, but no obvious technical failures or stapling miss-fires were identified.

In conclusion, PAP should be recognized as a serious complication of BPF development, and it could happen even following right middle lobectomy. Surgeons should always pay great attention to the blood supply during bronchial resection.

Conflict of Interest

The authors have no personal conflicts of interest or outside support for this research.

References