Case report of thoracoscopic resection for broncholithiasis with severe obstructive pneumonia

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Abstract

Broncholithiasis is a rare disease characterized by bronchial erosion or distortion due to hilar or parenchymatous calcification. When a broncholith has no mobility and there is a risk of major bleeding if removal is attempted, surgical intervention is required. Most operations for broncholithiasis are performed via a thoracotomy, and bronchial lithotripsy under complete video-assisted thoracoscopic surgery has been reported only rarely. We have experienced a case of broncholithiasis with severe obstructive pneumonia that was treated successfully by video-assisted thoracoscopic surgery. Thoracoscopic surgery is an effective treatment for broncholithiasis because it is minimally invasive and aids smooth recovery after surgery. When the adhesion between the pulmonary artery and the bronchus is highly advanced, it is advocated to cut them together using an endostapler.

Keywords Broncholithiasis · Video-assisted thoracoscopic surgery · Obstructive pneumonia

Introduction

Broncholithiasis is a rare disease. Surgery in most cases is performed via a thoracotomy, and bronchial lithotripsy under complete video-assisted thoracoscopic surgery (VATS) has been reported only occasionally [1]. Here we describe a case of broncholithiasis with severe obstructive pneumonia that was treated successfully by VATS.

Case report

A 56-year-old male was admitted to a local hospital because of persistent high fever. He was diagnosed as having pneumonia in the right lung and received antibiotic treatment. Although his high fever gradually improved, there were calcified lesions which persisted even after treatment. Therefore, he was referred to our hospital for further examination and treatment of the calcified lesions. There was no apparent history of

pulmonary tuberculosis or foreign body aspiration. Chest computed tomography (CT) at admission to the former hospital showed calcification of the paratracheal lymph nodes and consolidation of the right middle lobe (Fig. 1a, b). Chest CT on admission to our hospital demonstrated a calcified lesion at the orifice of the middle lobe bronchus and bronchiectasis of the distal middle lobe bronchus. The middle lobe was destroyed due to severe pneumonia (Fig. 1c). Laboratory findings showed improvement of inflammation, but an interferon-gamma release assay for tuberculosis (T-SPOT, Oxford Immunotec Limited, Oxon, UK) was positive. Bronchoscopy demonstrated a white hard nodule in the right middle lobe bronchus (Fig. 1d), and specimens from bronchial washing using a bronchofiberscope revealed no mycobacteria. Removal of calcified nodule under bronchofiberscopic observation was attempted, but because the nodule had no mobility, removal was abandoned. Therefore, VATS middle lobe lobectomy was carried out via 3 ports (access port, 4th intercostal space (IS) on the anterior axillary; camera port, 7th IS on the mid-axillary line; assist port, 6th IS at the lower edge of the scapula). All surgical procedures were performed while viewing a monitor via a thoracoscope without a mechanical wound retractor. Due to severe obstructive pneumonia, adhesions between the middle lobe and surrounding tissues were highly advanced (Fig. 2a). Although the hypertrophic scar around the pulmonary artery and the bronchus was also very hard

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Fig. 1 Chest CT at admission to the former hospital showed calcification of the paratracheal (a) and hilar lymph nodes and consolidation of the right middle lobe (b). Chest CT on admission to our hospital demonstrated bronchiectasis of the distal middle lobe bronchus. The middle lobe was destroyed due to severe pneumonia (c). Bronchoscopy demonstrated a white hard nodule in the right middle lobe bronchus (d)

(Fig. 2b), it was possible to accomplish middle lobectomy under complete VATS. Because one branch of the middle lobe pulmonary artery adhered tightly to the middle lobe bronchus and could not be detached, the middle lobe bronchus and the branch of the pulmonary artery were cut together using an endostapler, after cutting the distal wall of the middle lobe bronchus and removing the broncholith (Fig. 2c–f). The bronchial stump was not reinforced. Histopathological examination of the resected lung revealed inflammatory changes with bronchiectasis. Mycobacteria were not detected in the right middle lung. Pathological examination of the broncholith was not performed. The postoperative course was good and chest drainage tube was removed on postoperative day 2. The patient was discharged on the 9th postoperative day. There was no recurrence of pneumonia at 24 months after the operation.

Discussion

Broncholithiasis is a rare disease characterized by bronchial erosion or distortion due to hilar or parenchymatous calcification, and usually has an infectious etiology. It accounts for 0.1–0.2% of all lung diseases and about 0.8% among patients with hemoptysis or bloody sputum [2, 3]. *Mycobacterium tuberculosis* is the most common

worldwide cause of broncholithiasis [2, 3]. Although no apparent history of tuberculosis was evident in our patient and observations using bronchofiberscope revealed no mycobacteria in the specimens from bronchial washing, multiple peribronchial calcified lymph nodes with a positive result of the interferon-gamma release assay for tuberculosis suggested that a previous tuberculosis infection was the cause of broncholithiasis.

Asymptomatic broncholithiasis usually requires no treatment, but symptomatic cases require bronchoscopic removal or surgery [1–4]. When a broncholith is completely free in the bronchus without inflammation or hemorrhage, it can be removed bronchoscopically, but when broncholith has no mobility and there is a risk of major bleeding upon removal, surgical intervention is required [1, 2, 5]. The indications for surgical treatment of broncholithiasis are (1) persistent or massive hemoptysis; (2) irreversible complications such as pneumonia, pulmonary suppuration, or bronchiectasia; (3) accompanying lung cancer; or (4) bronchoesophageal or aorto-tracheal fistula. Because this patient developed obstructive pneumonia with bronchiectasia, surgical treatment was performed. Cryotherapy and laser lithotripsy have been reported as alternate procedures for broncholith removal [6, 7]. The effectiveness and safety of these methods have been reported [6, 7], and these methods may be considered for treatment before performing surgery in cases of fixed broncholith.

Fig. 2 Due to severe obstructive pneumonia, adhesions between the middle lobe and surrounding tissues were highly advanced (a) and the hypertrophic scar around the pulmonary artery and the bronchus was also very hard (b). After cutting the distal wall of the middle lobe bronchus (c), broncholith was removed (d, e). The middle lobe bronchus and the branch of the pulmonary artery were cut together using an endostapler (f). Asterisk, right middle lobe; number sign, diaphragm; white arrow head, middle lobe bronchus; white arrow, hypertrophic scar around the pulmonary artery and the bronchus

For surgical treatment of broncholithiasis, less invasive procedures such as thoracoscopic surgery and segmentectomy have been reported in recent years, aiming for minimally invasive treatment [1, 3]. In addition, removal of broncholith through the incised bronchial wall without any lung resection has been reported [2, 4, 8]. However, most surgical treatments for broncholithiasis have been performed via a thoracotomy, and bronchial lithotripsy under complete VATS has been reported only occasionally [1]. Because broncholithiasis often complicates infections such as pneumonia or lung abscess, adhesions around lung tissue and hilar structures may become severe, and vascular management then becomes difficult and dangerous. Moreover, because broncholithiasis often causes hemoptysis, there is a risk of bleeding during surgery [1–3]. In VATS, it is difficult to control bleeding in comparison with thoracotomy; therefore, there is a tendency to choose the latter. However, with advancements in technology and improvement in equipment, VATS can be safely performed even in challenging cases [9]. At our institution, 95% of lung cancer surgeries are performed using thoracoscopy and we have employed advanced techniques for thoracoscopic surgeries. We assumed that in this patient, VATS can be safely performed as we have sufficient experience in managing intraoperative complications such as severe adhesions and bleeding. Therefore, we chose to use VATS in this case. VATS has local

magnifying ability, which is beneficial for identification of intraoperative vessels and delicate delamination of adhesion. Thoracoscopic surgery is beneficial for the treatment of broncholithiasis because it is less invasive and less painful and aids smooth recovery after surgery. When adhesion between the pulmonary artery and the bronchus is highly advanced, as it was in this case, it is useful to excise them together using an endostapler.

Conclusion

Thoracoscopic surgery is beneficial for the treatment of broncholithiasis because it is less invasive and aids smooth recovery after surgery.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Statement of human rights All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964

Helsinki Declaration and its later amendments or comparable ethical standards. For this type of study, formal consent is not required.

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