



Successful removal of a broncholith using a cryo-probe under rigid bronchoscopy: A case report

Moe Ando¹  | Hideo Saka² | Yasuhiro Matsuo² | Shin Lee³ |
Tetsuji Morishita¹  | Kei Fujita³ | Akifumi Tsuzuku⁴

¹Department of General Internal Medicine, Matsunami General Hospital, Gifu, Japan

²Department of Respiratory Medicine, Matsunami General Hospital, Gifu, Japan

³Department of Hematology, Matsunami General Hospital, Gifu, Japan

⁴Department of Respiratory Medicine, Gifu Prefectural General Medical Center, Gifu, Japan

Correspondence

Moe Ando, Department of General Internal Medicine, Matsunami General Hospital, 185-1 Dendai, Kasamatsu, Hashima, Gifu 501-6062, Japan.
Email: moetoutca@gmail.com

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Abstract

Broncholithiasis is a rare condition in which lymph nodes, cartilage or inhaled material in the bronchi become calcified. Removal of the broncholith is indicated when it causes symptoms such as hemoptysis and obstructive pneumonia. Although there are various methods for removing broncholiths, no international recommendations exist. We report a case of safe removal of broncholiths using a cryo-probe under rigid bronchoscopy. A 72-year-old man presented with blood-tinged sputum for 5 months. Chest computed tomography (CT) revealed collapse of the middle lung lobe. Flexible bronchoscopy demonstrated broncholiths at the orifice of the middle lobe. We successfully removed the broncholiths with a cryo-probe under rigid bronchoscopy without any complications. Our experience suggests that removal of broncholiths can be safely and successfully performed using a cryo-probe under rigid bronchoscopy.

KEYWORDS

broncholith, cryo-probe, rigid bronchoscopy

INTRODUCTION

Broncholithiasis is a rare condition in which lymph nodes, cartilage, or inhaled material in the bronchi become calcified.¹ Although it can be asymptomatic, removal of the broncholith is required when it causes symptoms such as hemoptysis and obstructive pneumonia.¹ Most cases occur secondary to tuberculosis.²

Safe removal of broncholiths is extremely important because they can cause major bleeding.¹ Although various methods for removal of bronchial stones have been described, there are, so far, no international recommendations regarding this.² To the best of our knowledge, we report the first case of safe removal of broncholiths using a cryo-probe under rigid bronchoscopy.

CASE REPORT

A 72-year-old man was referred to us because of blood-tinged sputum over a period of 5 months. His medical

history included tuberculosis at the age of 10 years, and empyema at 16 years of age. He was a social drinker and ex-smoker (20-pack years).

At the time of his admission, there were no abnormal vital signs and no other abnormalities to note on physical examination. Chest computed tomography (CT) scan revealed collapse of the right middle lung lobe and calcified lesions that did not contact the pulmonary arteries (Figure 1). Flexible bronchoscopy demonstrated broncholiths at the orifice of the middle lobe and edematous changes in the surrounding mucosa (Figure 2). We successfully removed the broncholiths with a cryo-probe (2.4 mm: Erbe Elektromedizin GmbH, Tubingen, Germany) using rigid bronchoscopy without any complications. The largest broncholith measured 6 mm in diameter and more than 98% of it was made up of calcium phosphate. A cytology of aspirated sputum at the entrance of mid-lobe atelectasis showed no evidence of acid fast bacteria or fungi. No Mycobacterium tuberculosis was detected in the triple sputum specimens. Pathology of broncholith showed actinomycetes

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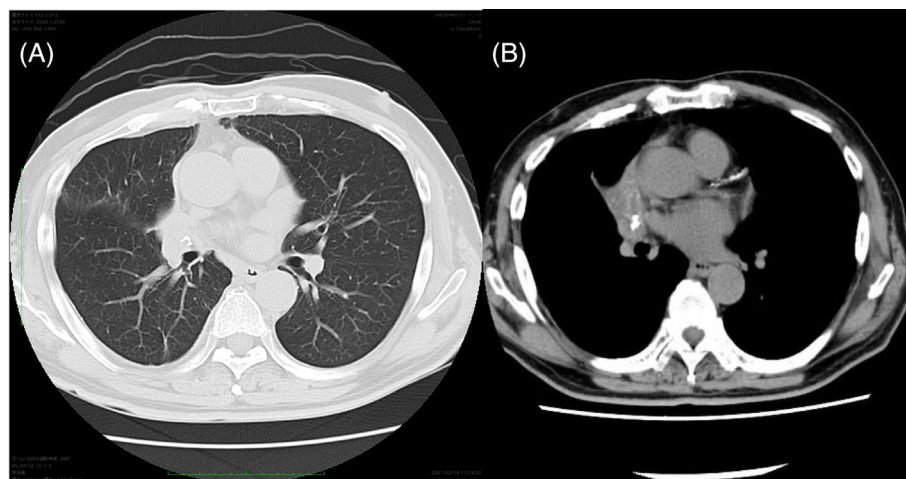


FIGURE 1 Chest computed tomography (CT). A plain CT scan revealed collapse of the right middle lung lobe (Panel A) and calcified lesions that did not contact the pulmonary arteries (Panel B).



FIGURE 2 Flexible bronchoscopy. Flexible bronchoscopy demonstrated broncholiths at the orifice of the right middle lung lobe and edematous changes in the surrounding mucosa.

in some parts. Histological examination of the bronchial mucosa and the bronchial wall attached to the removed bronchial stone showed inflammatory cell infiltration and haemorrhage. Although lung collapse persisted after the procedure, blood-tinged sputum disappeared. After 9 months, we performed a follow-up bronchoscopy and revealed it has no mucosal inflammation.

DISCUSSION

We present a case of successful removal of broncholiths using a cryo-probe under rigid bronchoscopy. This suggests that cryo-probes might play an effective role in the management of broncholithiasis.

Broncholithiasis is a rare disease that is usually caused by a calcification-producing process such as tuberculosis or histoplasmosis.³ While asymptomatic patients can be managed by observation alone, symptomatic disease requires surgery, or rigid or flexible bronchoscopic removal of the stones.¹ As a bronchial stone removal algorithm, endoscopic removal is possible when the stones are symptomatic but movable in the bronchus.⁴ The key to safe bronchoscopic removal is that the stones are not completely immobilized in the airway, and are not in contact with the pulmonary artery.⁴ There are multiple management options for bronchoscopic removal, including with the use of forceps, balloon catheters, a YAG laser and cryo-probes,² although there are no established recommendations. In this case, broncholiths eroded to the bronchial wall partially by flexible bronchoscopic observation.

Removal of broncholiths can be safely accomplished by both flexible and rigid bronchoscopy. The success rate of removing broncholiths by rigid bronchoscopy is between 67% and 87%, which is higher than that of flexible bronchoscopy (30%).⁵ In addition, rigid bronchoscopy allows 100% oxygenation and can reliably secure the airway in the event of massive hemoptysis.²

Cryotherapy is a technique that enables safe biopsy without tissue damage by repeated freezing and thawing. The overall risk of bleeding is lower than with other treatments due to the vasoconstricting and platelet-aggregating effects of the cryo-probe.⁵ A cryo-probe can also be used for destruction of endobronchial lesions when hyperthermia is contraindicated, such as in patients who require a high FiO₂. Cryotherapy-assisted removal of broncholiths can be performed with both rigid and flexible bronchoscopy, although previous reports recommended that capabilities for rigid bronchoscopy should also be available at the time of flexible bronchoscopy.

As for the bronchial stone component, no tuberculosis was found in cytology on the bronchial aspirate sputum or

in the triple sputum specimens. However, the patient had tuberculosis history and calcification of pleura and mediastinal lymph nodes was also prominent on CT, we hypothesized that calcification of lymph nodes caused by past tuberculosis infection had protruded into the bronchus. Actinomycetes were often seen as a stone component regardless of the cause, and it was unclear whether the bacterial infection induced the bronchial stones.

A limitation of this procedure is that rigid bronchoscopy cannot be performed at all institutions. Although complications with bronchoscopic removal of broncholiths are rare, some reports have described massive haemorrhage and respiratory failure. However, our experience suggests that endobronchial and transbronchial broncholiths can generally be removed via rigid bronchoscopy.

We report the first case of removal of broncholiths using a cryo-probe under rigid bronchoscopy. Rigid bronchoscopy has a higher success rate for broncholith removal and can more reliably secure the airway than flexible bronchoscopy. Removal of broncholiths using a cryo-probe with a rigid bronchoscope might be a safe and effective choice.

AUTHOR CONTRIBUTION

Moe Ando contributed to chart review, literature review and manuscript writing. Hideo Saka and Tetsuji Morishita helped with manuscript writing and interpretation. Shin Lee, Kei Fujita, Yasuhiro Matsuo and Akifumi Tsuzuku helped with data ascertainment, manuscript discussion and manuscript revisions. All authors gave final approval of the draft.

CONFLICT OF INTEREST

None declared.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

The authors declare that appropriate written informed consent was obtained for the publication of this manuscript and accompanying images.

ORCID

Moe Ando  <https://orcid.org/0000-0001-8146-1359>

Tetsuji Morishita  <https://orcid.org/0000-0002-7225-2819>

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