


# Neglected Foreign Body Aspiration Mimicking Lung Cancer Recurrence

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**Abstract:** Foreign body aspiration (FBA) occurs less frequently in adults than in children. Case reports of FBAs occurring in adults after lung surgery are not found in the literature, and this particular condition is often misdiagnosed. We report a case in which the patient was diagnosed after various events. A 56-year-old female patient had undergone robotic-assisted resection of the right upper lobe. The patient recovered well after the operation, with a slight irritant dry cough. Chest computed tomography (CT) examination of the patient showed no obvious abnormality early postoperatively. However, she developed intermittent cough and hemoptysis at six months. Repeat chest CT showed a soft tissue shadow near the bronchus in the lower lobe of the right lung. Cancer recurrence, surgery-related foreign body residue, lymphoid reactive hyperplasia, or other reasons was considered. Further examination revealed a piece of watermelon seed shell blocking the bronchial opening of the lower lung. This case highlights the importance of medical history, careful physical examination and fiberoptic bronchoscopic examination after lung cancer surgery due to lung cancer recurrence risk or FBA.

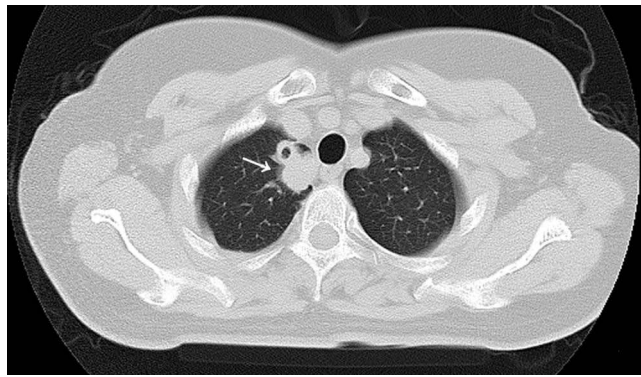
**Keywords:** foreign body aspiration, cancer recurrence, fiberoptic bronchoscopy, diagnosis

## Introduction

Although aspiration of a foreign body into the trachea and bronchus can occur in all age groups, it occurs most commonly in infants and young children.<sup>1,2</sup> Bronchial foreign bodies are uncommon in adults. Diagnosis of FBA is generally missed or delayed, and patients present later with chronic symptoms and complications such as cough, wheezing, obstructive pneumonitis, bronchiectasis and abscess secondary to recurrent pulmonary infections.<sup>3-6</sup> However, can we still make an accurate differential diagnosis when the above symptoms appear in a patient who has just undergone radical resection of lung cancer? We present an unusual case of intermittent cough with occasional hemoptysis in a patient who underwent robotic resection of the right upper lobe with a soft tissue shadow near the bronchus after six months. Although most doctors, especially radiologists, thought it was cancer recurrence, we found determined it to be a bronchial foreign body based on fiberoptic bronchoscopy.

## Case Report

The patient was a 56-year-old nonsmoking female. A 2.9-cm nodule in the right upper lobe was detected on a chest computed tomography (CT) scan (without contrast medium) during a health medical examination. She denied a history of tuberculosis exposure and history of any other disease except for well-controlled hypertension. The nodule was adjacent to the trachea and within a vacuolation (see [Figure 1](#)). The trachea and the branches of each lobe were unobstructed.

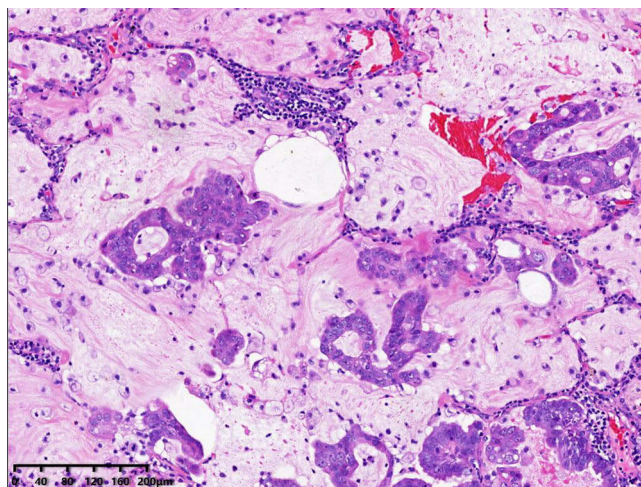


**Figure 1** Sixteen-slice CT examination of the lung window revealed a 2.9-cm nodule adjacent to the trachea and within vacuolation (see arrow).

After a comprehensive evaluation, she underwent robotic-assisted resection of the right upper lobe. The mass was found to be free of tracheal and mediastinal pleura. The operation was performed in accordance with conventional and standard lung lobectomy, with no special abnormalities. Before chest closure, the lymph node bed was oozing blood into the surgical field and a SURGICEL Absorbable Hemostat was placed in the lymph node bed beside the bronchus. There was no obvious tracheal/bronchial stenosis or hemorrhage on fiberbronchoscopy before chest closure.

Postoperative pathology showed infiltrating mucinous adenocarcinoma (see [Figure 2](#)) of the right upper lobe; the safe surgical margins of the bronchus were negative, and lymph node examination showed no cancer metastasis (KI67: 5–10%). The diagnosis was lung adenocarcinoma (T1cN0M0 stage IA3). After MDT discussion, the patient was considered to have a low risk for recurrence but that recheck should occur every six months. In the second week after the operation, the patient coughed intermittently with hemoptysis, which presented as a small amount of bleeding. She was diagnosed with a common inflammatory reaction after lung cancer surgery in some rural hospitals. She also thought so because her surgeon recommended a review approximately six months after surgery.

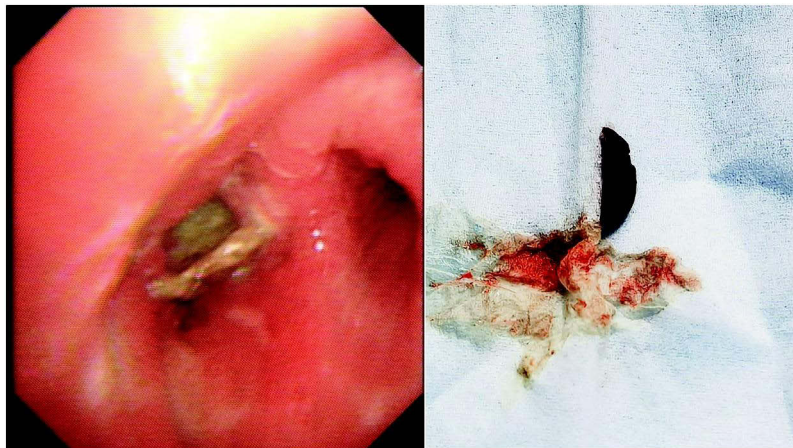
Chest CT (without contrast medium) performed again at six months after surgery showed a soft tissue shadow near the bronchus in the lower lobe of the right lung (see [Figure 3](#)), which compressed the bronchus. This was not detected on the chest CT of the patient in the early postoperative period. The patient underwent fiberoptic bronchoscopic exploration according to the surgeon's advice, though the radiologist recommended contrast CT for differentiate diagnosis. During the fiberoptic bronchoscopy, a piece of watermelon seed shell was found to be blocking the bronchial opening of the lower lung (see [Figure 4](#)). Following intrabronchial foreign body removal, the patient had recovered completely at



**Figure 2** Image of histologic diagnosis using hematoxylin and eosin staining (original  $\times 100$ ).



**Figure 3** A sixteen-slice CT examination of the mediastinal window revealed a soft tissue shadow near the bronchus (see arrow).

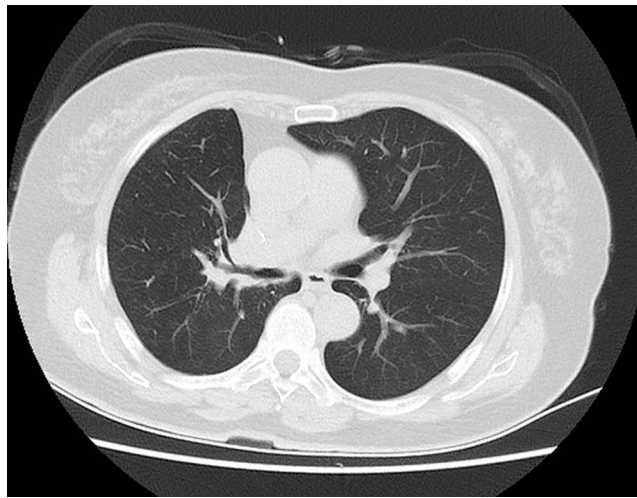


**Figure 4** A foreign body comprising a watermelon seed shell was found in the bronchial opening of the lower lung of the respiratory tract in flexible bronchoscopic view.

scheduled postoperative follow-ups. Six months after removal of the foreign body, the patient underwent a follow-up CT scan that no longer showed the soft tissue shadow (see [Figure 5](#)).

## Discussion

Lung cancer is the most common cancer worldwide and a leading cause of cancer mortality. Surgical complete resection can contribute to a favorable prognosis, especially for early-stage non-small-cell lung cancer (NSCLC).<sup>7,8</sup> Robot-assisted thoracoscopic surgery has been rapidly gaining popularity worldwide due to its minimal invasiveness. Increasing data show that robot-assisted lobectomy is safe and effective for treating patients with early-stage NSCLC. Despite complete surgical resection, which is considered to be the most appropriate choice of treatment for early-stage NSCLC, the recurrence rate of stage I NSCLC is 22–38%, and the 5-year survival rate is reported to be 55–80%.<sup>9–11</sup> Overall, recurrence following complete resection for early-stage non-small-cell lung cancer remains poorly understood and is multifactorial in nature.<sup>12</sup> For example, many genetic and microenvironmental factors are able to modify the cell cycle, inducing carcinogenesis and tumor growth.<sup>13</sup> Imaging plays a central role in the detection of lung cancer recurrence, and lung parenchymal recurrence after the surgical approach can be differentiated by CT. Locoregional recurrence occurs within the treated hemithorax and usually presents with nodules involving the resection staple line or the area that was completely dissected during the operation, as well as the bronchial stump, pleura, chest wall and lymph nodes.<sup>14</sup> Soft



**Figure 5** At 6 months after removal of the watermelon seed shell foreign body, the patient underwent a follow-up CT scan showing that the soft tissue shadow had disappeared and significant improvement with resolution of the right lower lobe bronchus.

tissue attenuating nodules near surgical clips on contrast-enhanced early postoperative evaluation may represent coexistence of hypervascularity and an inflammatory response. Follow-up with serial CT may be helpful to differentiate this state from locoregional recurrence. Enhanced interval growth of solid lesions on the resection staple line is suggestive of recurrence.

In this case, the patient was diagnosed with lung adenocarcinoma (T1cN0M0 stage IA3), presenting with intermittent cough and occasional hemoptysis. Her chest CT revealed a soft tissue nodule near the bronchus in the lower lobe of the right lung, compressing the bronchus. Since the tumor was found to be closely connected with the superior vena cava and the mediastinal pleura during the operation and a soft tissue nodule near the bronchus appeared suddenly on CT images, it was initially considered lung cancer recurrence. Postoperative symptoms such as cough and hemoptysis can also support the possibility of recurrence to a certain extent, though these symptoms are not specific for recurrence.

In addition, intraoperative pulmonary vascular damage cannot be ignored, such as the common trunk return of the upper and middle pulmonary veins or pulmonary venous malformation. The surgeon might mistakenly ligate or accidentally injure the pulmonary veins, resulting in poor residual pulmonary venous return and hemoptysis.

Another possibility is that the surgeon applies various hemostatic materials to the surgical wound to achieve postoperative hemostasis. There are many types of hemostatic products commonly utilized in the clinic, such as gelatin sponges and fibrin hemostatic agents. However, most of these hemostatic agents have shortcomings that cannot be overcome, with biocompatibility being a critical characteristic. The hemostatic material of the bronchial stump has poor biocompatibility and may not be absorbed after operation, or the hemostatic effect at the bronchial stump may not drain well, resulting in residual blood that is not absorbed. For example, SURGICEL Absorbable Hemostat used during the surgery in the current case might leave a surgeon-related foreign body that would be mistakenly diagnosed as a soft tissue shadow.

All of the above may be the reasons for the appearance of soft tissue shadows on postoperative CT review. Despite the distinction between the above diagnoses, radiologists recommend contrast-enhanced CT and PET-CT examinations.<sup>15</sup> We believe that they are still more inclined to pathological diagnosis, so we chose fiberoptic bronchoscopy while obtaining pathological materials. The result is that a tracheal foreign body was found during the bronchoscopy.

FBA occurs frequently in children who frequently place objects in their mouth. Risk factors in adults include alcohol consumption, drug abuse, convulsions, general anesthesia, trauma, mental retardation, and dental prostheses, which might lead to inhalation of various substances, and symptoms vary. FBA occurs in adults, accounting for less than 1% of procedures.<sup>16</sup> FBA in adults occurs most often in individuals with dysphagia or altered mental status. However, this patient did not report any altered mental state at the time of aspiration. The most common aspirated foreign bodies are food items and pieces of metal. Unless the foreign body is radiopaque, such as a tooth, piece of glass, or piece of metal, it is unlikely to be visible on

a radiograph.<sup>16</sup> Therefore, chest radiographs detect foreign bodies in only approximately 20% of cases.<sup>17</sup> FBA cases often mimic radiologic signs of lung diseases, such as recurring pneumonia, bronchiectasis, lung cancer, other lung infections, and lung cancer recurrence, as in this case. Therefore, the diagnosis of FBA begins with a patient history and clinical exploration, which can be strengthened by radiographic findings. A radiolucent foreign body should be suspected only based on secondary changes on chest CT, including segmental or lobar collapse, air retention, especially unilateral pulmonary hyperventilation luminal opacities, parabronchial soft tissue opacities, lobar-like or segmental inflammatory infiltrates after pulmonary obstruction, or other chronic pulmonary changes. These secondary imaging changes, however, are nonspecific and may also occur in patients without FBAs. This makes it difficult to rely on chest CT to diagnose bronchial FBA. Because of the high risk associated with ignoring FBA, bronchoscopy is often performed for definitive diagnosis and treatment, even when there is little suspicion or a questionable history. Regarding this patient, she reported that she had eaten watermelon seeds several times since the surgery, but she found nothing particularly unusual. We maintain that the patient must have had an abnormal cough at the time of the incident but that this may have been masked by intermittent coughing after the surgery.

## Conclusion

In conclusion, each lung cancer is different and requires the physician to possess a wide range of knowledge of the diagnosis options available, in addition to careful monitoring in order to adjust the treatment over time. A multidisciplinary approach, involving surgeons, radiation oncologists, pulmonologists and oncologists, is required to optimize the survival and quality of life of patients with lung cancer. Diagnosis of FBA is challenging, especially for adults after lung cancer surgery. CT imaging plays an important role in investigation of NSCLC recurrence, as it can accurately identify thoracic and extrathoracic relapse and also indicate predictive criteria. But as clinician should be aware of potential imaging pitfalls. Equally important is the collection of detailed medical history, the presentation of clinical symptoms, and reasonable and detailed postoperative follow-up examinations for cancer patients, such as fiberoptic bronchoscopy after surgery for lung cancer patients.

## Ethics Approval and Consent to Participate

This report complies with the guidelines for human studies and is in accordance with the Declaration of Helsinki. The ethics Review Committee of General Hospital of Central Theater Command of the Chinese people's liberation army general Hospital approved the use of clinical data of these patients in this study.

## Informed Consent for Publication

Written informed consent was obtained from the patient for the publication. The patient provided written informed consent to participate in this study.

## Author Contributions

All authors contributed to data analysis, drafting or revising the article, gave final approval of the version to be published, agreed to the submitted journal, and agreed to be accountable for all aspects of the work. These authors contributed equally to this work and should be considered as co-first authors: Lei Li, Meng-Jie Li and Liu Sun.

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## Disclosure

The authors report no conflicts of interest in this work.

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