

CASE REPORT

Carcinoembryonic Antigen Elevation in Bronchial Foreign Body Patients Initially Misdiagnosed as Lung Cancer

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ABSTRACT

Background: We report a case of chronic bronchial foreign body complicated by recurrent pulmonary infection with hemoptysis, initially misdiagnosed as lung cancer after laboratory tests revealed markedly elevated carcinoembryonic antigen levels.

Methods: Laboratory examination, contrast-enhanced chest CT scan, electronic bronchoscopy, and ultra-thin bronchoscopy were performed, confirming a bronchial foreign body (chili pepper skin). Symptoms resolved after removal of the foreign body (chili pepper skin) via electronic bronchoscopy.

Results: Carcinoembryonic antigen levels were significantly elevated. Chest CT scan revealed a high-density nodular shadow and calcification foci in the right lower lobe. Ultrathin bronchoscopy demonstrated a bronchial foreign body (chili pepper skin) visible in the basal segment of the right lower lobe. Pathological examination of bronchial tissue from the right lower lobe showed no tumor cells.

Conclusions: It is necessary to pay attention to the calcification of the trachea and the differential diagnosis of lung cancer, especially when the level of carcinoembryonic antigen is increased.

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KEYWORDS

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INTRODUCTION

Lung cancer is a malignant tumor originating from the bronchial mucosa or glands of the lungs. It ranks among the fastest-growing malignant tumors in terms of incidence and mortality, posing one of the greatest threats to public health and life [1]. Notably, when patients experience recurrent infections accompanied by blood in sputum, high vigilance for the possibility of lung cancer is warranted. This report details a case of chronic bronchial foreign body complicated by recurrent pulmonary infections and hemoptysis. Laboratory tests revealed markedly elevated carcinoembryonic antigen (CEA) levels. Due to symptom similarity, the patient was mis-

diagnosed with lung cancer.

CASE PRESENTATION

A 59-year-old male was admitted for recurrent pulmonary infections and blood-streaked sputum. His medical history revealed five episodes of recurrent pulmonary infections and blood-streaked sputum over the past year. Prior to admission, his carcinoembryonic antigen (CEA) level measured 35.18 µg/L (normal range < 5.0 µg/L) at another hospital. He subsequently received intermittent anti-inflammatory treatment, but his symptoms did not improve significantly. Consequently, he presented to our hospital's Department of Respiratory Medicine.

On admission, physical examination was unremarkable, and complete blood count showed no significant abnormalities. The chest contrast-enhanced CT scan showed a high-density lesion in the right lower lobe accompanied by obstructive pneumonia (Figure 1A - B). The patient's clinical manifestations combined with elevated CEA and imaging findings were highly suspected to be lung cancer. Therefore, we decided to perform bronchoscopy to further clarify the nature of the lesion. Electronic bronchoscope showed normal manifestation (Figure 1C), but the chest contrast-enhanced CT scan showed a high-density lesion in the right lower lobe accompanied by obstructive pneumonia (Figure 1D), so we changed to the ultrathin bronchoscope to examine the lesions. After clearing surface secretions, an irregular, elongated mass was observed completely blocking the right lower lobe bronchus. Repeated attempts to remove the foreign body tissue using biopsy forceps were unsuccessful due to its large size. Consequently, we employed carbon dioxide cryotherapy to freeze the foreign body. Ultimately, the foreign body tissue was excised, restoring patency to the right lower lobe bronchus. Examination revealed the obstructing foreign body to be a chili pepper skin (Figure 1F). Subsequently, biopsy needles were used to aspirate tissue from the perilesional area. Rapid on-site evaluation (ROSE) showed no tumor cells (Figure 1F). The definitive diagnosis was therefore a bronchial foreign body (chili pepper skin) in the right lower lobe bronchus. Postoperatively, the patient's pulmonary infection was controlled, and CEA levels normalized at 2 weeks (2.15 µg/L).

DISCUSSION

Bronchial foreign bodies refer to acute or chronic respiratory diseases caused by accidental inhalation of foreign objects into the bronchi [2]. They are most commonly seen in children under 5 years old and elderly individuals with cerebrovascular disease, while being relatively rare in adults. If not diagnosed and treated promptly, they may lead to atelectasis, pneumonia, bronchiectasis, or even asphyxia, posing a serious threat to life [3]. Therefore, bronchial foreign bodies represent

a respiratory emergency that is extremely easy to overlook. If not promptly removed, bronchial foreign bodies can cause recurrent symptoms of infection, including coughing, sputum production, and fever. Clinical manifestations range from asymptomatic to life-threatening massive hemoptysis [4]. Diagnosis requires integrating medical history (a history of foreign body aspiration is crucial), imaging studies (chest X-rays may reveal opaque foreign bodies, while CT scans provide clearer visualization of the foreign body's location and associated pulmonary changes), and bronchoscopy-the "gold standard" for both diagnosis and treatment [5,6]. Bronchoscopy allows direct visualization of the foreign body and precise removal [7].

Bronchial foreign bodies have a low incidence in healthy adults, and without a precise history of choking, clinical symptoms lack specificity and often go unnoticed, leading to misdiagnosis as other chronic respiratory diseases such as COPD, asthma, or even lung cancer. Delayed diagnosis may cause severe airway damage, including asphyxia or death. Therefore, early detection and prompt intervention are crucial to alleviate respiratory symptoms [8,9]. Bronchial foreign bodies are frequently misdiagnosed as lung cancer, primarily due to overlapping imaging features [10]. Both conditions may present with atelectasis, obstructive pneumonia, and pulmonary masses. In this case, chronic inflammation from prolonged foreign body retention resulted in irregular density shadows in the hilar region on CT, mimicking typical central lung cancer imaging [11]. Additionally, nonspecific symptoms like cough and hemoptysis further complicated differential diagnosis. Herein, we report a case of bronchial foreign body mimicking lung cancer with markedly elevated CEA. The right lower lobe basal segment bronchus was completely obstructed by a neoplasm, initially misdiagnosed as lung cancer. Bronchoscopy and removal of the neoplasm revealed it was caused by a foreign body (chili pepper skin). Following removal of the bronchial foreign body (chili pepper skin), the patient's pulmonary infection resolved, and CEA levels normalized within two weeks.

Bronchoscopy was originally designed as a safe and effective tool to assist in removing foreign bodies or tissue for examination [12]. During bronchoscopy, one can directly visualize bronchial structures, stones, foreign bodies, granulation tissue, bronchial strictures, edema, and other pathological lesions. Reports indicate that in adult bronchoscopy, its incidence accounts for approximately 0.1% to 0.2% of all pulmonary diseases. Prior to the 1970s, rigid bronchoscopes were considered the surgical choice [13,14]. With technological advancements, flexible bronchoscopes-assisted by specialized flexible instruments-can now remove distal foreign bodies, expanding the scope of bronchoscopic interventions in peripheral airways. They increasingly enhance the success rate of identifying and removing foreign bodies, replacing rigid bronchoscopes as a mature, highly applied technique. Flexible bronchoscopy is now the

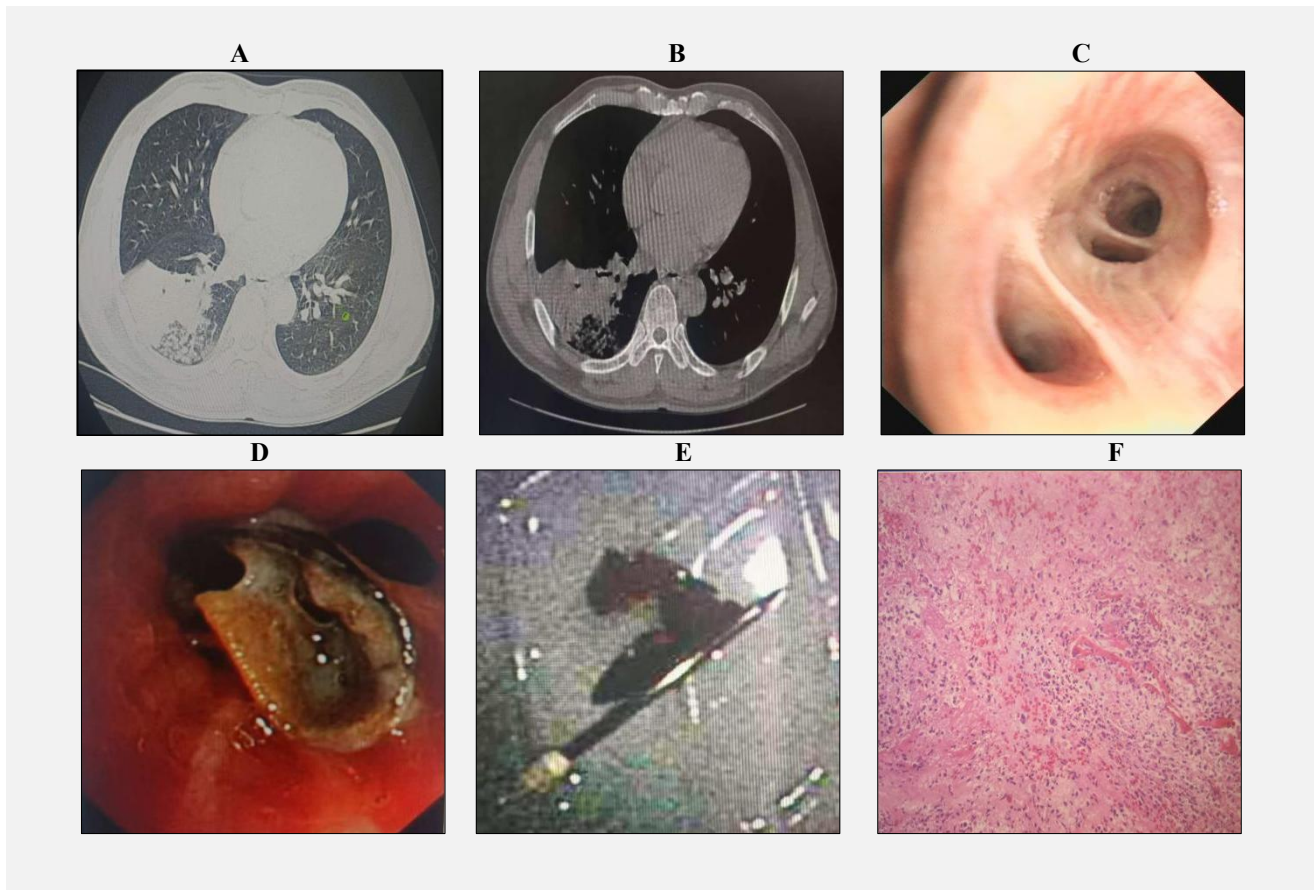


Figure 1. Patient imaging and histological results.

The enhanced chest CT revealed a high-density lesion in the right lower lobe accompanied by obstructive pneumonia (Figure 1A - B). Electronic bronchoscopy showed normal findings (Figure 1C). Ultra-thin bronchoscopy magnification revealed a brown, wrinkled, sharply-edged bronchial foreign body in the basal segment bronchus of the right lower lobe, leading to a diagnosis of bronchial foreign body (Figure 1D). Following removal of the obstructing material, histological examination confirmed the foreign body as a chili pepper skin (Figure 1E). Postoperative pathological analysis revealed no tumor cells (Figure 1F).

preferred method for diagnosing pulmonary diseases and removing foreign bodies or stones.

In certain cases, based on the patient's history of choking and combined with findings from chest CT scans, bronchial foreign bodies can be identified, providing a method to accurately assess the location and approximate shape of the foreign body to some extent. However, imaging findings for foreign bodies are often non-specific and easily confused with lung cancer. In this case, the patient presented with recurrent infections accompanied by blood-streaked sputum, elevated CEA levels, and poor response to anti-inflammatory and expectorant therapy. We strongly suspected that the pulmonary nodular lesion obstructing the trachea represented a tumor lesion related to lung cancer. However, rigid bronchoscopy revealed the neoplasm to be a foreign body (chili pepper skin) completely obstructing the right lower lobe bronchus. This case underscores that imaging may fail to distinguish between foreign bodies or stones and pulmonary neoplastic lesions, leading to

clinical misdiagnosis. Notably, elevated CEA provides strong support for lung cancer in patients with certain solid lesions. Elevated CEA levels may correlate with multiple factors, including various malignancies such as colorectal cancer, as first identified by Gold and Freedman in 1965. However, non-malignant conditions like hepatitis and bronchitis can also cause elevation [15]. Furthermore, studies by Molina et al. on tumor markers indicate that CEA alone exhibits low diagnostic sensitivity for lung cancer, particularly non-small cell lung cancer.

The lesson learned from this patient's case is that we initially interpreted the high-density areas on the chest CT scan as neoplastic lesions, based solely on the patient's denial of a history of choking during meals and the significantly elevated CEA levels, without considering the possibility of a bronchial foreign body. Patients with markedly elevated CEA levels and a high suspicion of malignancy require bronchoscopy for pathological diagnosis.

CONCLUSION

CEA is not the sole marker for lung cancer. Patients with recurrent pulmonary infections, hemoptysis, and calcification of tracheal lesions should be evaluated for bronchial foreign bodies and differentiated from lung cancer, particularly those presenting with recurrent pulmonary infections and hemoptysis.

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Ethical Approval:

This study was approved by the ethics committee of Hebei Petrochina Central Hospital. All procedures performed in studies were in accordance with the ethical standards. Informed consent was obtained.

Declaration of Generative AI in Scientific Writing:

This paper exclusively utilizes PubMed as the sole source for literature retrieval; all other content is original work by the authors.

Declaration of Interest:

No conflicts of interest.

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