

CASE REPORT

Endobronchial fungal infection caused by *Candida albicans* with main bronchus obstruction: a case report

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Abstract

Endobronchial fungal infection (EBFI) is a rare form of pulmonary fungal infection that especially affects immunocompromised patients. Furthermore, EBFI resulting in obstruction of the main bronchus is extremely rare. With the development of bronchoscopic techniques, rare cases of EBFI have been reported. A 68-year-old female was referred to the Department of Pulmonology for confusion and obtundation. The patient was diagnosed with septic shock due to acute pyelonephritis followed by obstructive EBFI. We performed bronchoscopic biopsy and endobronchial aspiration for culture. Biopsy showed yeast-like fungus and *Candida albicans* grew in the culture. EBFI has been under-recognized because of difficulties in confirming the diagnosis. Endobronchial ultrasound-guided transbronchial needle aspiration and bronchoscopy are used to improve the diagnosis of thoracic infection, such as tuberculosis. The role of bronchoscopy in the diagnosis of infectious diseases of the trachea or main bronchi is expected to widen in the future.

INTRODUCTION

In many cases, fungal infections are caused by inhalation or inoculation of large amounts of fungi [1]. Fungal colonies specifically in the upper or lower respiratory tract are an important cause of infection in patients, such as those with chronic obstructive pulmonary disease [2]. In some cases, fungi can cause disease in healthy people, but in most cases, they are pathogenic to people with underlying disease, chemotherapy or those admitted to intensive care [3]. With the development of bronchoscopic techniques, rare cases of fungal infections in the bronchus have been reported [4]. Karnak *et al.* [5] reported 228 cases of endobronchial fungal disease, and only 14 cases were

caused by *Candida* species. Endobronchial fungal infection (EBFI) is an under-recognized entity. We describe a rare case of EBFI caused by *Candida albicans* obstructing a major bronchus.

CASE PRESENTATION

On November 6, 2018, a 68-year-old female patient was admitted to the emergency room with altered level of consciousness. At the time of admission, her blood pressure was 80/60 mm Hg, pulse rate was 112 beats/min, respiratory rate was 24 breaths/min and body temperature was 34.9°C. She had chronic kidney disease (stage 4) and an 18-year history of type 2 diabetes

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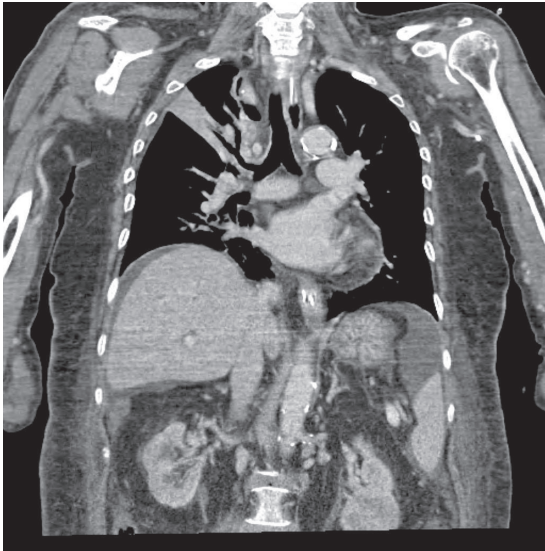


Figure 1: Coronal CT scan. Partial atelectasis in the upper lobe of the right lung and prominent wall thickening and enhancement in the proximal portion of the right upper lobar bronchus.

mellitus treated with insulin over the past 10 years. She had been admitted for acute pyelonephritis in February 2015, December 2016 and August 2018. Following the three admissions, she resided in a nursing hospital. The patient was a non-smoker and had no previous history of pulmonary disease. On admission, her blood results showed an elevated white blood cell (WBC) count (18990/uL), a low hemoglobin (8.3 g/dL) and normal platelets (317 000/uL). The patient's blood urea nitrogen level and serum creatinine (Cr) level were markedly elevated (160 mg/dl and 11.59 mg/dl, respectively). Despite fluid resuscitation and catecholaminergic therapy, the patient deteriorated and developed septic shock with metabolic acidosis (lactate: 5.9 mmol/L; blood pH: 6.965; and bicarbonate: 5.5 mmol/L). Urine microscopy showed many WBCs per high power field, and the urine dipstick test was positive for nitrite. She was transferred to a medical intensive care unit and received continuous renal replacement therapy and antibiotics at a dose adjusted for renal impairment (piperacillin/tazobactam 2.25 g every 6 hours). On November 23, 2018, the patient developed dyspnea, and a chest X-ray examination showed atelectasis in the upper lobe of the right lung.

Urine cultures showed more than 100 000/ml of *Escherichia coli*, but no bacteria grew in the blood culture. On November 23, 2018, chest computed tomography (CT) scan showed partial atelectasis in the right upper lobe (RUL) and prominent wall thickening and enhancement in the proximal portion of the RUL bronchus (Fig. 1). There was no evidence of other pulmonary diseases like bronchiectasis. On November 26, 2018, bronchoscopy showed inflammation of the RUL bronchus accompanied by necrosis (Fig. 2). Acid fast bacilli (AFB) stain, *Mycobacterium tuberculosis* (MTB) DNA detection with polymerase chain reaction (PCR) technique and the culture for MTB were all negative. Bronchoscopic biopsy showed fungal infection with necrosis and yeast-like fungus with positive periodic acid-Schiff (PAS) stain (Fig. 3).

Candida albicans grew from the endobronchial aspirate (WBC: >25; epithelial cell: <10). The EBFI was treated with one dose of intravenous fluconazole 400 mg for induction followed by 200 mg once daily by mouth. The patient's electrolyte imbalance

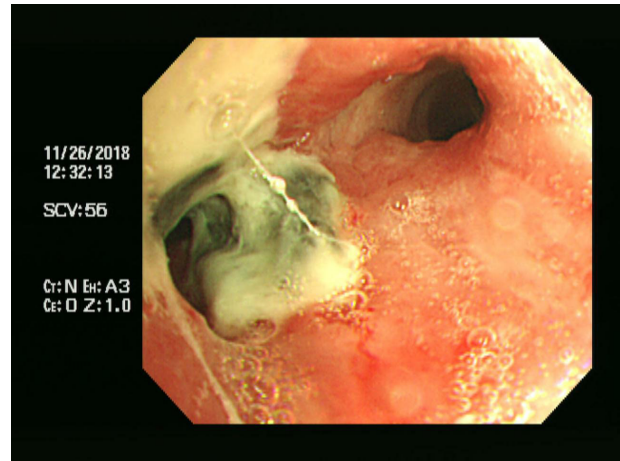


Figure 2: Bronchoscopic image. Inflammation of the right upper lobar bronchus accompanied by necrotic debris.

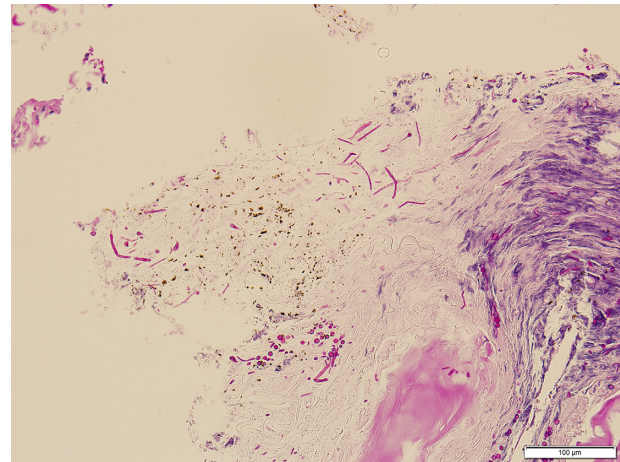


Figure 3: Long and branching filamentous form of fungi with budding around the edge of the necrotic debris. Pseudohyphae and budding yeast form were mixed. (PAS stain, x200).

and uremia worsened during hospitalization. We considered dialysis treatment, but the patient rejected it because of cost. She signed a do-not-resuscitate order and died on December 13, 2018.

DISCUSSION

We report a rare case of EBFI caused by *C. albicans* that resulted in atelectasis of the RUL with obstruction of the main bronchus. Diagnosis was made by identifying *C. albicans* in bronchoscopic biopsy tissue obtained through bronchoscopy and through culture of aspirated specimens. Pulmonary infections caused by *C. albicans* are associated with immune deficiency [6]. The patient in the present case had stage 4 chronic kidney disease, and the immune function of the patient may have been decreased because of her state of critical illness caused by acute pyelonephritis and septic shock, which can be susceptible to *Candida* infection. In addition, she had poorly controlled diabetes (HbA1c level 8.4% in November 2018), which led to decreased immune function, repeated pyelonephritis and fungal infection. No other systemic condition to account for immune suppression was identified in this patient.

Culturing *Candida* species in aseptically obtained specimens is considered the gold standard in the diagnosis of candidiasis. Recently, non-culture diagnostic tests, such as antigen, antibody or β -D-glucan detection assays and PCR, are also thought to be helpful [7, 8]. Often, invasive procedures may be required to obtain tissue, which could be unsafe in a severely ill patient [9].

Aspergillus infections account for ~10.8% of benign endobronchial and endotracheal lesions. Of the lesions due to *Aspergillus* infection, 36% result in critical stenosis and require interventional bronchoscopy [10]. However, EBFI has been under-recognized because it is difficult to diagnose [5]. Karakurt et al. [11] performed a prospective cohort study and demonstrated that EBFI is not rare. Flexible bronchoscopy and culture were performed on patients suspected to have EBFI. Fifty-three patients (69.7%) had positive cultures; 39 patients grew *Candida* species, of which 10 were *C. albicans*; and 7 patients grew *Aspergillus* species.

The diagnostic yield from endobronchial lesions is increasing due to improvements in bronchoscopic sampling techniques. Endobronchial ultrasound-guided transbronchial needle aspiration as well as bronchoscopy can be used to improve the diagnosis of thoracic infections, such as tuberculosis [12]. The role of bronchoscopy in the diagnosis of infectious diseases of the trachea or major bronchi is expected to increase in the future. On the other hand, it should be noted that over-zealous diagnosis can potentially lead to overuse of antibiotics and antifungal agents.

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CONFLICT OF INTEREST STATEMENT

None declared.

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ETHICAL APPROVAL

Not required.

CONSENT

The patient provided written informed consent for their information and images to be published.

GUARANTOR

Taeyun Kim.

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