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CASE REPORT

Allergic bronchopulmonary aspergillosis with endobronchial signs: Two cases

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ABSTRACT

Allergic bronchopulmonary aspergillosis with endobronchial signs: Two cases

Pulmonary aspergillosis may be classified under three categories depending on whether the patient is atopic or immunocompromised: invasive, chronic necrotizing, and allergic bronchopulmonary aspergillosis (ABPA), which is an immunological pulmonary disorder caused by hypersensitivity to Aspergillus spp., manifesting with poorly controlled asthma. ABPA is diagnosed using major and minor criteria. Herein, we present two ABPA cases with endobronchial signs on bronchoscopy. Asthmatic 31-year-old male and 59-year-old female patients were admitted with dyspnea and bilateral rhonchi. Total IgE levels were elevated. Peripheral eosinophilia was also present. Chest computed tomography revealed consolidated areas, peribronchial micronodules, ground-glass appearance, and increased nodular densities. Bronchoscopy showed brownish-yellow membranes on the bronchial mucosa of these patients. Aspergillus spp. growth was observed in bronchial lavage culture. ABPA is a curable disease only if diagnosed correctly. Notwithstanding the large number of cases reported to date, we aimed to emphasize the importance of bronchoscopic examination in endobronchial fungal infections.

Key words: *ABPA; Aspergillus spp.; bronchoscopy; endobronchiai view*

ÖZ

Alerjik bronkopulmoner aspergilloz ve endobronşiyal belirtiler: İki olgu

Pulmoner aspergilloz, hastanın atopik ya da immünsupresif olmasına göre üç sınıfa ayrılır; invaziv, kronik nekrotizan ve alerjik bronkopulmoner aspergilloz (ABPA). ABPA, kötü kontrollü astımlı hastalarda Aspergillus türlerine karşı aşırı duyarlılık gelişmesiyle oluşan immünolojik bir akciğer hastalığıdır. ABPA tanısı minör ve majör tanı kriterleri ile konulur. Burada endobronşial bulguları olan iki ABPA olgusunu sunuyoruz. Astım tanılı 31 yaşında erkek ve 59 yaşında kadın hastanın nefes darlığı yakınması ve fizik muayenede bilateral ronküsleri mevcuttu. Periferik eozinofili ve total IgE seviyeleri yüksek saptandı. Toraks bilgisayarlı tomografisinde konsolidasyon, peribronşial mikronodüller, buzlu cam opasiteleri ve nodüler dansiteler izlendi. Bronkoskopide her iki hastanın da bronş mukozasında kahverengi-sarı membranlar görüldü. Bronş

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lavajı kültüründe Aspergillus spp. üremesi oldu. ABPA, tanısı doğru koyulduğu takdirde tedavi edilebilir bir hastalıktır. Bugüne kadar çok fazla sayıda ABPA olgu sunumu mevcut olup, biz bu makalede endobronşial fungal enfeksiyonlarda bronkoskopik incelemenin önemine dikkat çekmeyi amaçladık.

Anahtar kelimeler: *ABPA; Aspergillus spp.; bronkoskopi; endobronşiyal görünüm*

INTRODUCTION

Aspergillus spp. is a fungus with ubiquitous presence, which is identified in soil, water, and some organic matter (1). Despite its extensive prevalence and everyday inhalation of spores, only a portion of the population experiences clinical disease, which is dependent on the body's immune response (2). Pulmonary aspergillosis is divided into the following categories;

i) Invasive pulmonary aspergillosis (IPA),

ii) Chronic necrotizing aspergillosis (CNA),

iii) Allergic bronchopulmonary aspergillosis (ABPA) (1). IPA usually occurs in immunocompromised patients, CNA is observed in patients who are immunocompromised or have chronic lung disease, and ABPA relates to hypersensitivity reaction caused by *Aspergillus* residing in the bronchial tree in asthmatic patients (3). Endobronchial aspergilloma (EBA) is a rare disease and an unusual presentation of pulmonary aspergillosis (1,2). In most patients with endobronchial fungal infection (EBFI), bronchoscopic examination correlates with the radiographic findings (4). Bronchoscopic findings in EBFI vary from mild mucosal inflammation to central airway obstruction (5). Bronchoscopic descriptions of airway lesions include mass lesions, yellowish-white or reddish polypoid lesions, fragile mucosa, plaques, and ulcerative lesions. Bronchial washing, brushing, and bronchial lavage or biopsy are required to confirm the exact diagnosis (4).

ABPA is often reported in patients with cystic fibrosis (CF) and uncontrolled asthma (6).

We present two cases of ABPA with typical bronchoscopic endobronchial appearance, as determined by biopsy and culture. Flexible bronchoscopy may be required to examine the endobronchial appearance and collect bronchoscopic material, both of which are helpful in the diagnosis of ABPA.

CASE REPORT

Case 1

A 31-year-old male with asthma was investigated for persistent pneumonia and mediastinal lymphadenopathy, without any definitive diagnosis. He suffered from dyspnea. Bilateral rhonchi and scattered fine crackles were present on physical examination. The peripheral eosinophil count was 1000/mm^3, total IgE was 4239 kU/L, and pollen sensitivity was detected in the prick test. All potential causes of eosinophilia were investigated and ruled out. Chest x-ray and thoracic computed tomography (CT) revealed peribronchial enlargements in the central regions, increased patchy densities extending towards central bronchovascular structures, consolidated areas, peribronchial micronodules,

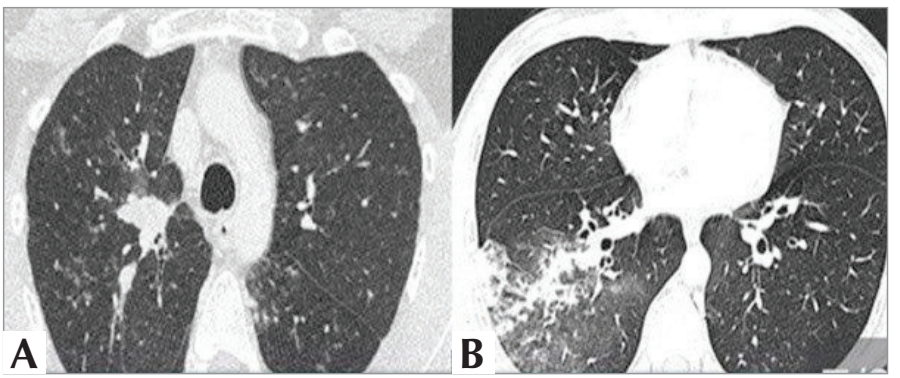


Figure 1. (A). Peribronchial enlargements in the central regions, consolidated areas, peribronchial micronodules, ground-glass appearance in the upper lobe of right lung. **(B).** Consolidation areas in the posterior segment of the right upper lobe.

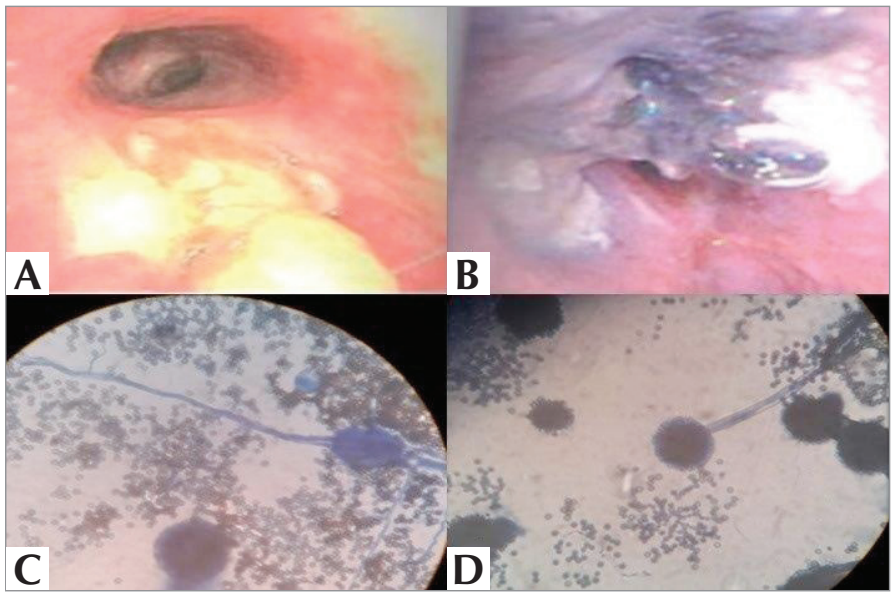


Figure 2. (A). Brownish-yellow membranes in right upper lobe segments. **(B).** Brownish-black membranes on the bronchial mucosa. **(C-D).** Light microscopy of bronchial lavage culture showing typical Aspergillosis's sporulating structures.

Table 1. Diagnostic criteria of ABPA

Major Criteria	Minor Criteria
• Asthma or cystic fibrosis • Radiographic features consistent with ABPA • Positive *Aspergillus* skin test • Central bronchiectasis • Total IgE >1000 IU/mL • Serum precipitating antibody against *Aspergillus fumigatus* • Blood eosinophil count > 500 cell/L • Elevated specific IgE and/or IgG against *Aspergillus fumigatus*	• Yellow brownish sputum • Positive culture for *Aspergillus* • Type 4 hypersensitivity reaction to *Aspergillus fumigatus*

ground-glass appearance in the upper lobe of the right lung and increased thickness of interlobular septae in bilateral upper lobe (Figure 1a). Bronchoscopy showed brownish-yellow membranes in the right upper lobe segments (Figure 2a). Cytological analysis of the biopsies revealed eosinophilia and chronic inflammation. *Aspergillus*-specific IgE was four positive in blood and *Aspergillus fumigatus* growth was present in bronchial lavage culture (Figure 2c).

Case 2

A 59-year-old female with asthma was recently admitted to our hospital with dyspnea. Physical examination revealed fine crackles and sibilant rhonchi on both sides. Radiology demonstrated severe consolidation areas in the medial segment of the right middle lobe, bilateral posterior segments of upper lobes, and posterior segment of the lower segment; centrilobular millimetric opacities and tree-in-bud appearance in right upper lobes and basal segments of right lower lobes (Figure 1b). She had an increased total IgE level of 2124 kU/mL and peripheral eosinophilia in the blood. Bronchoscopy was performed showing brownish-black membranes on the bronchial mucosa (Figure 2b). On cytological analysis of biopsies, prevalent eosinophilia leukocytes, polymorphonuclear leukocytes, and fibrous structures with crystal that was birefringent (doubly-refracting) were observed. *Aspergillus*-specific IgE was two-plus positive in blood and *Aspergillus niger* growth was observed in bronchial lavage culture (Figure 2d).

With these findings, it was determined that these cases had ABPA, and methylprednisolone and voriconazole therapies were started. Within six months, we stopped the medication as the patients started to get better gradually.

DISCUSSION

The most typical type of aspergillosis, invasive pulmonary aspergillosis, affects those who have certain risk factors. Glucocorticoid therapy, immunosuppressive medication, hematologic malignancy, hematopoietic stem cell transplantation, neutropenia, and neutrophil dysfunction are the main risk factors. Symptoms include cough and shortness of breath. Because of immunosuppression, fever does not typically accompany IPA. Sputum culture may grow *Aspergillus* spp. in more than one-third of the patients. Patients with IPA have solid micro-nodules surrounded by a halo of ground-glass attenuation suggesting bleeding on thoracic computed tomography, which is known as the 'halo sign' (6). Although CNA does not impact arteries, it can damage the lung parenchyma in moderately immunocompromised patients with chronic lung disease or systemic disease (4,6). Because there was no hemoptysis, fever, or weight loss, our patients' complaints differed from those of CNA patients. In contrast to IPA, our patients were asthmatic and had the same complaints, but they were not immunocompromised. 'Halo sign' didn't exist on radiology. Similarly, our cases had positive *Aspergillus* culture of bronchial lavage fluid. Given these factors, we did not consider IPA in our cases.

ABPA is caused by a hypersensitivity reaction to the antigen of *Aspergillus* in patients with asthma or cystic fibrosis, resulting in increased mucus production in the airways, which leads to the obstruction of the bronchi and dilatation of the airway lumen (7). Diagnosis is based on major or minor criteria (Table 1). Thick yellow-brownish mucoid sputum may contain *Aspergillus* hyphae and the large airways may be occluded by impacted mucus and hyphae in ABPA (8). Agarwal et al. described that the airways demonstrate bronchial wall inflammation consisting of eosinophils, lymphocytes, and plasma cells (9). Bronchoscopy was performed on 14 ABPA patients in one study, and nine patients had an obstruction and bronchial mucosal alterations. This mucosa was partly of black-brownish appearance. In four of the 26 patients, *Aspergillus* spp. was identified either in the sputum culture or via cytological examination. The researchers concluded that positive culture and cytology supported the diagnosis of ABPA, however, these were insufficient for a conclusive diagnosis (10). Our patients developed dyspnea due to poorly managed asthma and were being monitored. Bronchoscopy was performed in both patients, and mucosal changes, positive culture, and meaningful cytological findings for *Aspergillus* were found. A rare one, *A. niger,* grew in the second case, whereas the most common one, *A. fumigatus* grew in the first.

ABPA may be a curable disease when diagnosed correctly. Bronchoscopic findings, bronchial washing culture, and cytological examination are important for diagnosis although major and minor diagnostic criteria are described. Flexible bronchoscopy may be required to examine the endobronchial appearance and collect bronchoscopic material, both of which are helpful in the diagnosis of ABPA. We believe that bronchoscopy should be performed for making a definitive diagnosis of ABPA.

CONFLICT of INTEREST

The authors have no conflict of interest to declare.

AUTHORSHIP CONTRIBUTIONS

Concept/Design: MÖ, DK

Analysis/Interpretation: MÖ, DK

Data acqusition: MÖ, DK

Writing: MÖ, DK

Clinical Revision: MÖ, DK

Final Approval: MÖ, DK

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