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CHALLENGES IN THE DIAGNOSIS OF ALLERGIC BRONCHOPULMONARY ASPERGILLOSIS: A CASE REPORT

Abbas A[1,3], *, Wasagu IM[1], Abubakar AG[1], Hassan IM[1], Dankiri NA[1], Umar Z[1], Umar BB[1], Kamba HS[1], Umar FK[2], Maiyaki AS[1,3]

[1] Department of Internal Medicine, Usmanu Danfodiyo University Teaching Hospital, Sokoto.

[3] Department of Internal Medicine, Usmanu Danfodiyo University, Sokoto

[2] Department of Radiology, Usmanu Danfodiyo University Teaching Hospital, Sokoto.

***Corresponding author's email:**
aminuab@gmail.com

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Abstract

Allergic Bronchopulmonary Aspergillosis (ABPA) is a complex condition that often presents challenges in diagnosis in patients with a history of asthma. We present a young female with a one-month history of cough and shortness of breath, initially suspected to be an asthma exacerbation. Despite treatment with low-dose corticosteroids and antibiotics, her symptoms persisted, prompting further investigation. Sputum cultures were negative, and a GeneXpert test ruled out Mycobacterium tuberculosis. Lung function tests indicated reduced airflow, while a computed tomography scan revealed hyperattenuating areas in the right middle lobe and anterior left upper lobe, dilated bronchi, and a thick-walled cavity in the right lower lobe. The diagnosis of ABPA was complicated by overlapping symptoms with asthma, the absence of definitive serological markers, and the potential impact of previous treatments on inflammatory responses. This case illustrates the need for a comprehensive evaluation and highlights the importance of recognizing the diagnostic criteria for ABPA. A multidisciplinary approach is essential for timely and accurate diagnosis of ABPA in patients with asthma, ensuring appropriate management and improved patient outcomes

KEY WORDS

INTRODUCTION

Allergic Bronchopulmonary Aspergillosis (ABPA) usually is seen in patients that have asthma or cystic fibrosis though can occur not in these(Flood-Page, 2018). It is an inflammatory process resulting from a complex immune reaction to the fungus *Aspergillus fumigatus* in the lungs.(Asano et al., 2018) The prevalence of ABPA considerably varies among patients with asthma, ranging from 1% to 28% (Bouali et al., 2023; Nagar et al., 2022; Greenberger et al., 2013). ABPA is a condition observed in some asthmatics exposed to the mold *Aspergillus*. It involves bronchial inflammation, eosinophilic pneumonia, and impaired fungal clearance due to an abnormal T-helper 2 (Th2) immune response (Asano et al., 2018; Wang et al., 2016; Leonardi et al., 2016). This Th2 response leads to significant inflammation and the production of specific IgE and IgG antibodies, contributing to symptoms like mucus plugging (Leonardi et al., 2016; Fukutomi et al,. 2016). Persistent fungal presence and a maladaptive immune response can result in complications such as bronchiectasis and severe respiratory issues if left untreated (Akuthota et al., 2024). Factors like vitamin D deficiency may also play a role, especially in cystic fibrosis patients (Holsclaw et al., 2007).

ABPA can develop in individuals regardless of age or gender, primarily affecting patients with poorly controlled asthma, though some may be asymptomatic and diagnosed through screening (Asano et al., 2018; Saxena et al., 2015).

The diagnosis of ABPA relies on clinical, serological, and radiological features. Special criteria exist for patients with cystic fibrosis (CF) and allergic bronchopulmonary mycosis (ABPM) due to symptom overlap (Fukutomi et al., 2016; Asano et al., 2021; Agarwal 2010). Key diagnostic investigations include Aspergillus skin tests, sputum cultures, peripheral eosinophilia, total serum immunoglobulin E (IgE), and specific IgE and IgG for *A. fumigatus* (Wang 2018). These tests help diagnose and monitor treatment efficacy; significant reductions in IgE levels can indicate improved symptoms, while increases may signal exacerbations (Asano et al., 2013; Leonardi et al., 2016; Rodriguez et al., 2005). Lung function tests assess disease severity, and sputum cultures, although not diagnostic for ABPA due to potential colonization, help identify azole resistance. Radiologically, central bronchiectasis and mucus impaction, particularly high attenuation mucus, are characteristic findings supporting the diagnosis of ABPA ((Fukutomi et al., 2016; Rodriguez et al., 2005).

CASE REPORT

A young female presented with a one-month history of cough and shortness of breath. Initially, the cough was episodic and predominantly nocturnal, but it progressed to a

persistent daily occurrence, producing sputum that changed from whitish to yellowish mucoid without any hemoptysis. The cough did not vary with position, and the patient denied any history of smoking or exposure to dust, fumes, or chemicals. She reported that her dyspnea, also present for the past month, was noted at rest and worsened with exertion; there were no symptoms of orthopnea or paroxysmal nocturnal dyspnea. Additionally, she experienced dull right-sided chest pain rated at 3 out of 10, without any known relieving or aggravating factors.

The patient had no history of wheezing, chest tightness, fever, weight loss, night sweats, or symptoms indicative of acid peptic disease. She was diagnosed with bronchial asthma in childhood and managed with occasional follow-up, using inhaled and oral salbutamol as needed. Although she experienced exacerbations about a year ago, she had not required hospitalization for asthma. Since the onset of her current symptoms, she had tried low-dose corticosteroids and antibiotics, including co-amoxiclav, azithromycin, and co-trimoxazole, but noted no significant improvement. Her inhaler was switched to an inhaled corticosteroid-formoterol combination, though she had been using it with poor technique.

On examination, the patient was afebrile, with stable vital signs: a respiratory rate of 22 breaths per minute, oxygen saturation of 98% on room air, a pulse rate of 88 beats per minute, and a blood pressure of 110/70 mm Hg. She showed no signs of pallor, jaundice, or cyanosis, and there was no significant lymphadenopathy, digital clubbing, or edema. Lung examination revealed equal chest expansion, normal tactile vocal fremitus, and resonant percussion notes. Auscultation disclosed rhonchi in both lung zones and crackles in the right midzone. Neurologically, she was fully conscious and oriented, with no signs of meningeal irritation.

Investigations included sputum cultures, which showed no growth, and a sputum GeneXpert test that was negative for Mycobacterium tuberculosis. Lung function tests revealed a pre-bronchodilator FEV1 of 65%, FVC of 91%, and an FEV1/FVC ratio of 0.61 while post-bronchodilator values improved, showing FEV1/FVC ratio of 0.75, FEV1 at 82% and FVC at 93%. Complete blood count results were within normal limits, with a white blood cell count of 9.49 x 10^9/L and hemoglobin at 11.5 g/dL. Renal function tests and liver function tests also returned normal values.

A computed tomography scan of the chest (Figure 1) demonstrated hyperattenuating areas in the right middle lobe. It also revealed a small thick-walled cavity in the right lower lobe measuring 18.6 x 17.4 mm, along with dilated bronchi exhibiting hyperdense endobronchial mucus that gave a "finger-in-glove" appearance. Centrilobular nodules and tree-in-bud densities due to dilated obstructed bronchioles were noted in the right lung field.

Given the clinical presentation, imaging findings, and lack of response to standard asthma management, the diagnosis of Allergic Bronchopulmonary Aspergillosis

(ABPA) was suggested. She was managed for the ABPA and is currently asymptomatic.

DISCUSSION

This case of Allergic Bronchopulmonary Aspergillosis (ABPA) underscores the complexities and challenges in diagnosing this condition in patients with a history of asthma. ABPA can mimic other pulmonary diseases, making accurate diagnosis essential yet difficult (Greenberger et al., 2013; Leonardi et al., 2016).

Diagnostic Criteria Challenges

Several diagnostic criteria for ABPA exist, including the Rosenberg–Patterson and ISHAM criteria, which rely on a combination of clinical, serological, and radiological features (Bachert et al., 2009). Presence of high attenuation mucus impaction is considered pathognomonic feature (Asano et al., 2021; Agarwal 2010). In this case, the patient's presentation with chronic cough, shortness of breath, and sputum production initially suggested an asthma exacerbation. However, the presence of specific features—such as the yellowish mucoid sputum, crackles on auscultation, and radiological findings—raised suspicion for ABPA (Rodriguez et al., 2005).

The patient's sputum cultures were negative, and the GeneXpert test did not detect *Mycobacterium tuberculosis*, which helped rule out other infections. Nonetheless, the absence of definitive serological markers, such as elevated specific IgE to *A. fumigatus*, complicated the diagnosis. In cases where patients have been previously treated with corticosteroids or antibiotics, as seen here, the typical inflammatory markers may be blunted making it difficult to meet the diagnostic criteria for ABPA (Holsclaw et al., 2007).

Overlap with Other Conditions

Another challenge in diagnosing ABPA arises from its symptom overlap with other conditions, mainly in patients with a history of asthma. For instance, asthma itself can cause cough, wheezing, and dyspnea, leading to potential misdiagnosis or delayed recognition of ABPA (Fukutomi et al., 2016; Leonardi et al., 2016). The patient's previous exacerbations and reliance on bronchodilators may have contributed to an underappreciation of the evolving nature of her condition.

Furthermore, the patient’s imaging findings, including the presence of a thick-walled cavity and hyperdense mucus, while suggestive of ABPA, could also be interpreted in the context of other pulmonary conditions such as bronchiectasis or chronic obstructive pulmonary disease (COPD) (Bouali et al., 2023; Nagar et al., 2022). This overlap necessitates careful consideration of the patient’s full clinical picture, including history and response to treatment.

Importance of Multidisciplinary Approach

Given these complexities, a multidisciplinary approach is vital for effective diagnosis and management. Collaboration between pulmonologists, allergists, and radiologists can enhance the diagnostic process, allowing for a comprehensive evaluation of the patient's condition. Additionally, repeat testing for specific IgE and further imaging may be warranted if initial tests do not yield conclusive results (Greenberger et al., 2013).

CONCLUSION

This case highlights the diagnostic challenges associated with ABPA in patients with a history of asthma. The reliance on diverse diagnostic criteria, the overlap of symptoms with other respiratory conditions, and the potential effects of prior treatments complicate the identification of ABPA. Awareness of these challenges is crucial for clinicians to ensure timely and accurate diagnosis, ultimately improving patient outcomes.

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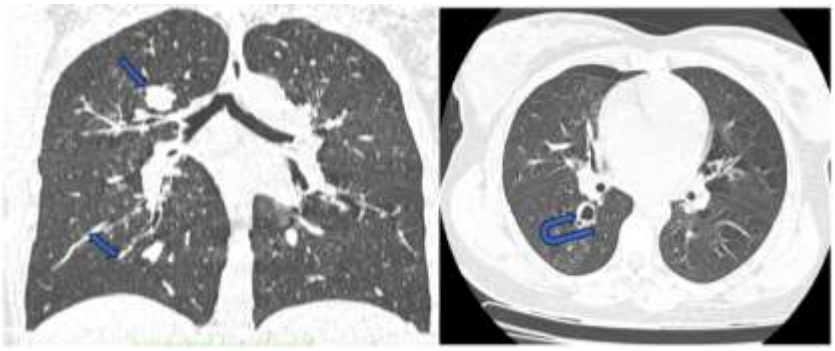

Figure 1: Computed tomographic images of the chest demonstrating hyperattenuating areas in the right middle lobe. It also revealed a small thick-walled cavity in the right lower lobe measuring 18.6 x 17.4 mm (Curved arrow), along with dilated bronchi exhibiting hyperdense endobronchial mucus that gave a "finger-in-glove" appearance (Left- Right Arrow).