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Allergic Bronchopulmonary Aspergillosis: A Case Report

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Abstract:
Allergic Bronchopulmonary Aspergillosis (ABPA) is an inflammatory disease of the lower airways characterized by a complex immune response directed against a fungus of the Aspergillus *genus. It occurs in chronic airway diseases such as asthma and cystic fibrosis. It is a rare, severe, and underdiagnosed condition. This article presents the case of a 56-year-old patient, poorly managed asthmatic for 30 years, with partial control of symptoms. His medical history dates back 2 months, with a progressive onset of increasingly frequent and successive asthma attacks, requiring frequent visits to the emergency department for nebulization. The radiological assessment confirmed the presence of bilateral proximal bronchiectasis. The diagnosis of ABPA was made according to the 2020 modified ISHAM criteria. Long-term corticosteroid therapy was prescribed under strict monitoring. The outcome showed improvement in dyspnea, asthma control, and a significant improvement in respiratory function.*

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I. Introduction:

Allergic bronchopulmonary aspergillosis (ABPA) is a pulmonary disorder that often occurs in patients with asthma or cystic fibrosis (CF) and is characterized by a hypersensitivity response to the allergens of the fungus *Aspergillus fumigates*. It is part of the spectrum of pulmonary aspergillosis and eosinophilic pneumonias, and primarily occurs in patients with chronic respiratory diseases such as asthma, cystic fibrosis, rarely chronic obstructive pulmonary disease (COPD), and exceptionally in healthy individuals **(1)**. ABPA is associated with the production of specific antibodies (IgE and IgG) against *Aspergillus*, leading to acute exacerbations of asthma, dyspnea, cough, and typical radiological signs such as pulmonary infiltrates and bronchial dilatation. Diagnostic recognition is based on clinical, biological, and radiological criteria, and treatment of ABPA relies on systemic corticosteroids and management of respiratory symptoms. **(1-2)**

II. Patient And Observation:

Patient aged 56, sailor for 30 years, with no toxic habits. A poorly managed asthmatic for 30 years (ACT GINA score of 16: partially controlled asthma), on salmeterol + fluticasone (250/25 µg, 2 puffs twice daily). A history of personal atopy consisting of rhinitis with allergic congjunctivitis without familial atopy.

Timeline: The history of the disease dates back 2 months, with the gradual onset of increasingly frequent and successive asthma attacks, requiring frequent visits to the emergency department for nebulization at least twice a week, along with worsening dyspnea one week before hospitalization and a sensation of chest tightness, without worsening of bronchorrhea, without the expectoration of bronchial casts or hemoptysis, evolving in the context of afebrile status and preserved general condition.

III. Clinical Findings

Examination upon admission to the hospital

The clinical examination revealed a patient in relatively good general condition, overweight (BMI= 29 kg/m2), afebrile at 36°C, normotensive, normocardic, tachypneic at 24 cycles/min with an oxygen saturation in room air (SpO2: 92%) suprasternal retractions, and bilateral diffuse wheezing on pleuropulmonary auscultation. The rest of the physical examination was unremarkable.

Radiological and biological assessment

The chest X-ray revealed, in a slightly distended chest, the presence of finely circumscribed alveolar images in the lower thirds of both lung fields, along with rail-like images in the bilateral lower thorax (Figure 1). A chest computed tomography (CT) scan showed on the parenchymal windows, dilatation of the proximal

bronchi in the bilateral middle and lower lobes, with a signet ring appearance and some mucoid impactions (Figure 2), which appeared densely on the mediastinal windows (Figure 3).

After stabilizing the patient, a biological work-up was performed, revealing an eosinophilia of 1200/mm³. Given the strong suspicion of ABPA, a total IgE test was requested and returned elevated at 1542.9 IU/ml, followed by specific IgE levels for Aspergillus fumigatus, which also returned positive at 1.4 kUA/L. Aspergillus serology was negative, and skin tests were not available at our facility.

Endoscopic assessment: The flexible bronchoscopy revealed diffuse inflammation at the level of the second degree, with some mucous secretions but no bronchial casts. The search for *Aspergillus* in the bronchial aspirates was negative. The bronchoalveolar lavage was nonspecific.

Positive Diagnosis and Severity Assessment

The diagnosis of ABPA was made according to the modified ISHAM 2020 and Asano 2021 criteria (Figure 4). To assess the severity of this condition in our patient, plethysmography was performed, revealing severe obstructive ventilatory dysfunction with a Tiffeneau index of 63 and a FEV1 of 52%, which was non-reversible with beta-2 agonist and without a significant diffusion capacity for carbon monoxide (DLCO). Cardiac evaluation showed good biventricular function with preserved left ventricular ejection fraction, and no signs of pulmonary arterial hypertension (PAH). Arterial blood gas analysis did not reveal hypoxemia.

Therapeutic intervention

The treatment was based on oral corticosteroids over 8 weeks, starting with 0.5 mg/kg/day for 2 weeks, followed by a gradual taper of 5 mg per week over 6 weeks, combined with adjuvant therapy and hygienic-dietary measures. The asthma maintenance treatment was adjusted to include high-dose inhaled LABA + ICS. The patient was offered vaccination against influenza, pneumococcal infections, and COVID-19 to prevent the risk of superinfection and exacerbation, as well as respiratory physiotherapy in case of bronchial congestion. Additionally, the importance of changing his job was highlighted, as he worked in a damp environment exposed to mold.

Follow-up and outcome:

The evolution after 4 weeks of treatment with good therapeutic adherence was marked by an improvement in dyspnea, with asthma becoming controlled, as reflected by an ACT score of 22 compared to 16. The clinical examination showed an SpO2 of 97% on ambient air with the disappearance of wheezing.

At the end of the treatment (8 weeks), asthma remained controlled, with a reduction in eosinophilia to 600/mm³ from 1200/mm³ and a slight decrease in total IgE to 1184 IU. There was a significant improvement in respiratory function, with moderate non-reversible obstructive ventilatory dysfunction and a FEV1 of 64%.

After one year of follow-up with regular consultations, our patient has not experienced any exacerbations, and his asthma remains controlled.

IV. Discussion

Allergic bronchopulmonary aspergillosis (ABPA) is an inflammatory disease caused by immune reactions triggered against *Aspergillus fumigatus*, which colonizes the airways of patients, particularly those with asthma or cystic fibrosis, as in the case of our patient who had asthma. The factors promoting the onset of ABPA are numerous: genetic factors, mucus abnormalities, biochemical properties of *Aspergillus* antigens, and the extent of bronchial and tissue destruction. These factors are interrelated, and their relative importance varies across different patient populations (3).

It is estimated that there are approximately five million cases of ABPA worldwide, with 3 to 13% occurring in asthmatic individuals (4). The clinical presentation resembles that of corticosteroid-dependent, uncontrolled asthma, although it can also affect 19% of well-controlled asthmatics. The search for a history of or the presence of bronchial casts remains a highly suggestive sign of the disease (5).

The most common radiological manifestations are transient and fleeting pulmonary opacities and bronchiectasis (6).

In our patient, the diagnosis was suspected based on the background of uncontrolled asthma and the presence of proximal bronchiectasis with mucoid impactions that were spontaneously dense on thoracic CT.

The diagnosis of ABPA relies on numerous clinical, biological, and radiological criteria, first described in 1977 by Rosenberg and Patterson. Subsequently, these criteria were modified and simplified: the ASANO 2021 criteria and the modified ISHAM 2020 criteria (7).

In our case, the patient had asthma as a mandatory predisposing condition, with total and specific IgE levels exceeding the thresholds set by the modified ISHAM 2020 criteria, along with eosinophilia and bronchiectasis on thoracic CT, which allowed us to confirm the diagnosis.

Applying the ASANO 2021 criteria, our patient met 6 out of 10 criteria, which also supports the diagnosis.

Oral corticosteroids are the cornerstone of ABPA treatment. They help reduce bronchopulmonary inflammation. The combination with antifungal therapy is indicated in corticosteroid-dependent asthmatic patients and during ABPA exacerbation recurrences, particularly to reduce the long-term side effects of corticosteroid therapy. The primary antifungal used is itraconazole (8).

Until recently, no randomized controlled trials had evaluated the efficacy of inhaled amphotericin B in the treatment of ABPA. Case series have reported efficacy in treating ABPA in asthma and in cystic fibrosis (9-10).

Treatment with omalizumab has led to improvements in respiratory function, a reduction in the number of exacerbations, and corticosteroid sparing in several case series. Currently, no recommendations can be made (7-11).

The prognosis of ABPA depends on the number of exacerbations, the dependency on treatment (corticosteroids or antifungals), and the development of complications: bronchiectasis, atelectasis, and decline in respiratory function, as well as the onset of fibrosis and chronic respiratory failure in the long term, not to mention complications related to corticosteroid and/or antifungal treatment, which require close monitoring throughout the therapy (7)

V. Conclusion

Allergic bronchopulmonary aspergillosis is a non-invasive form of aspergillosis that affects only the airways in predisposed patients, often asthmatics. It is an underdiagnosed condition that progresses with exacerbation episodes, which can lead to corticosteroid dependence. This diagnosis should be considered in any case of asthma that is difficult to control despite well-managed maintenance therapy. Early diagnosis helps prevent many complications, most of which are irreversible, such as bronchiectasis, fibrosis, and respiratory failure.

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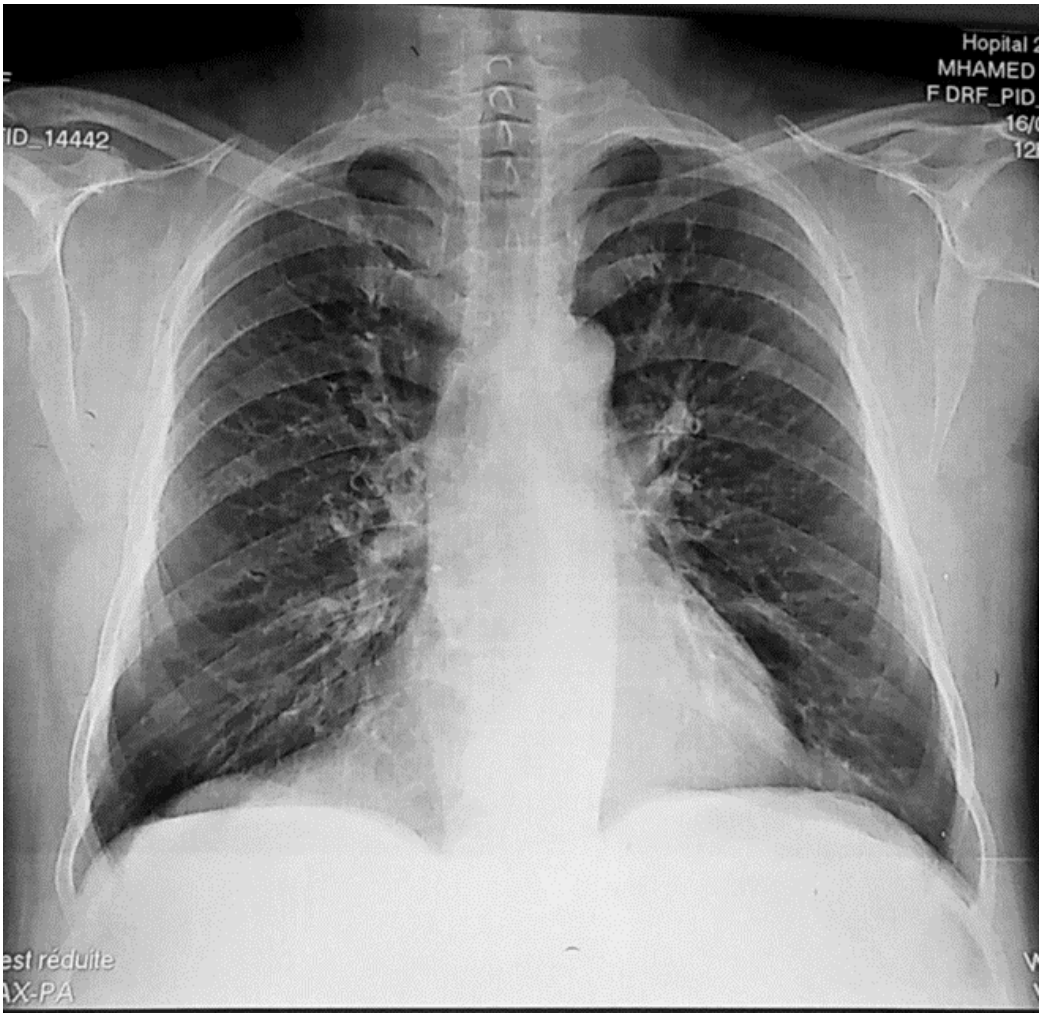

Figure 1: Chest X-Ray Showing, On A Slightly Distended Thorax, The Presence Of Finely Circumscribed Alveolar Images In The Lower Thirds Of Both Lung Fields, Along With Rail-Track Images In The Right Lower Thoracic Region.

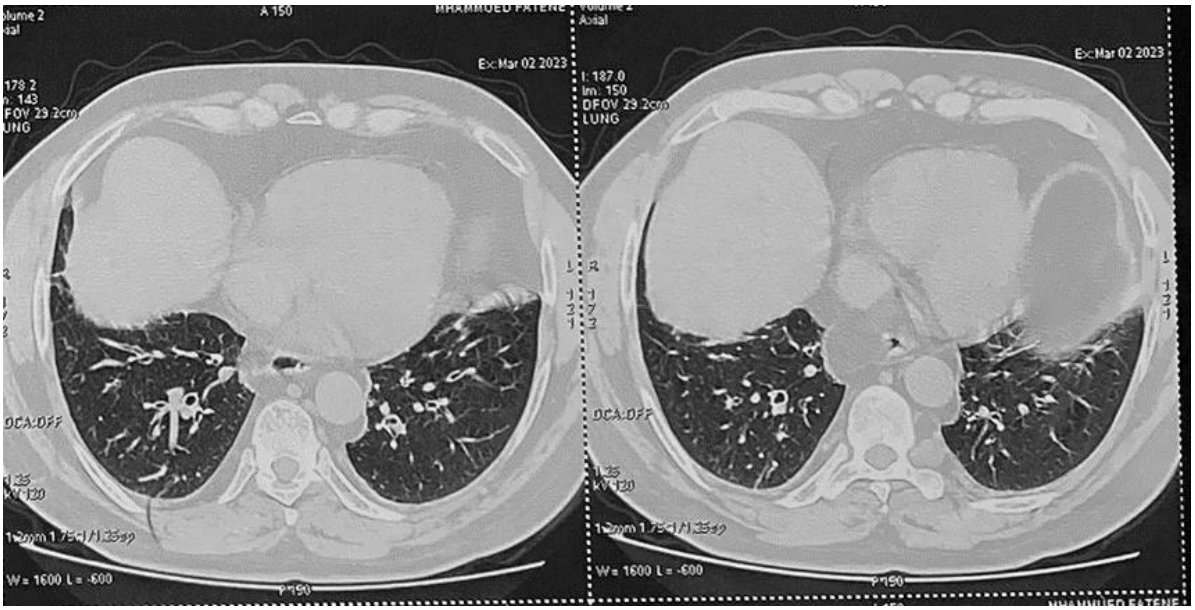

Figure 2: Ct Scan Of The Chest In Axial Slices Showing, At The Parenchymal Windows, Bilateral Proximal Bronchiectasis In The Middle And Lower Lobes With A "Tram-Track" Appearance And Some Mucoid Impactions.

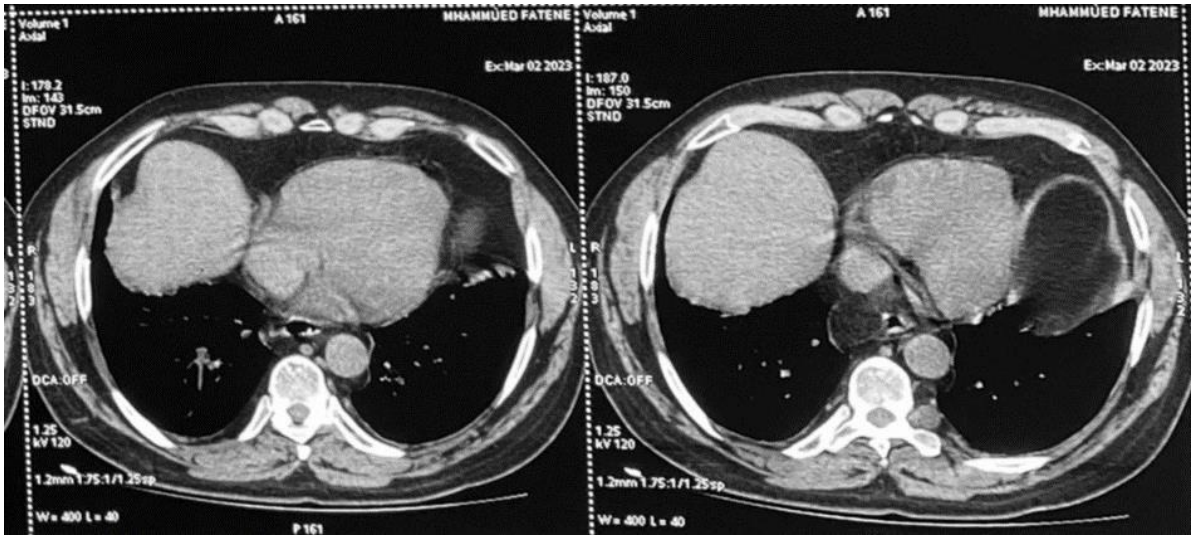

Figure 3: Ct Scan Of The Chest In Axial Slices Showing, At The Mediastinal Windows, Spontaneously Dense Mucoid Impactions.

ISHAM modifiés 2020	Asano 2021
Condition prédisposante *(obligatoire)* Asthme, mucoviscidose, BPCO	Critères *(au moins 6 présents)* 1. Asthme ou antécédent d'asthme
Critères majeurs *(tous doivent être présents)* 1. IgE sp > 0,35 kUA/L ou test cutané positif à *A. fumigatus* en lecture immédiate 2. IgE totales ≥ 500 kUI/L	2. Éosinophilie sanguine > 0,5 G/L 3. IgE totales ≥ 417 kUI/L 4. Test cutané positif en lecture immédiate ou IgE sp ≥ 0,35 kUA/L pour une moisissure filamenteuse
Critères mineurs *(au moins 2 présents)* 1. Précipitines anti-*A. fumigatus* positives ou IgG > 27 mgA/L 2. Bronchectasies sur le scanner thoracique 3. Éosinophilie sanguine > 0,5 G/L	5. Précipitines ou IgG spécifiques contre une moisissure filamenteuse 6. Culture positive d'un examen mycologique des expectorations ou d'un lavage bronchique 7. Présence d'hyphes fongiques dans les moules bronchiques 8. Bronchectasies centrales sur le scanner 9. Présence ou antécédents de moules bronchiques au niveau des bronches proximales, sur un scanner ou une endoscopie bronchique, et/ou expectoration de moules bronchiques 10. Mucus hyperdense dans la lumière bronchique sur le scanner

Figure 4: Table Illustrating The Modified Isham 2020 And Asano 2021 Criteria For Diagnosing Abpa (Allergic Bronchopulmonary Aspergillosis) In Our Patient.