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(CASE REPORT)

Concomitant aspergillosis and pulmonary tuberculosis in an immunocompetent patient: A case study

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Abstract

Complex pulmonary infections pose a major clinical challenge, especially in patients with risk factors such as smoking, chronic lung diseases, or immunosuppression. Among these infections, tuberculosis (TB) and pulmonary aspergillosis are two commonly encountered respiratory conditions, but their association in the same clinical presentation remains relatively rare.

The tuberculosis-aspergilloma co-infection, although less common, raises complex questions regarding therapeutic and diagnostic management. Clinical symptoms, such as cough, dyspnea, and chest pain, are common to many respiratory infections, making early diagnosis challenging without a thorough examination. Indeed, specialized diagnostic methods, such as chest computed tomography (CT) and bronchoscopy with analysis of bronchial aspirate, are often required to identify these multiple infections.

The case presented in this article illustrates the importance of a comprehensive diagnostic approach to simultaneously identify two severe respiratory infections, tuberculosis and aspergilloma, in a 61-year-old patient. Prompt and appropriate management is essential to improve the patient's prognosis. Long-term follow-up is necessary to monitor pulmonary complications and the progression of the infection.

Keywords: Aspergilloma; Pulmonary Tuberculosis; Itraconazole; Anti-Tuberculosis Treatment; Prognosis

1. Introduction

Pulmonary tuberculosis (TB) is a serious infection that leads to long-term sequelae. Patients typically present constitutional symptoms such as fever, night sweats, and weight loss, in addition to cough and hemoptysis [1]. Pulmonary lesions resulting from a tuberculosis infection increase the risk of fungal infection, particularly aspergillosis, which manifests as an aspergilloma in cavitary lesions. The aspergilloma may sometimes go unnoticed as it can resemble a tuberculous infection. Furthermore, co-infection with an aspergilloma and tuberculosis is rare [2].

2. Case Presentation

This article presents the clinical case of a 61-year-old patient, a former chronic smoker, who was hospitalized due to progressive dyspnea, chest pain, and persistent cough. On clinical examination, the patient displayed moderate respiratory distress with wheezing and bilateral crackles. His oxygen saturation was 89% on room air, and his heart rate was 92 beats per minute.

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A chest X-ray (Figure 1) revealed a hydro-aerial level in the middle third of the left hemithorax, and a chest CT scan (Figure 2) showed a peripheral fluid collection with a hydro-aerial level in the emphysematous lung, associated with mediastinal lymphadenopathy, suggesting superinfection of an emphysema bulla. Laboratory results were significant for a normal white blood cell count at $8.3 \times 10^3/\mu l$ with an elevated C-reactive protein level of 277 mg/l (0–5). An HIV test was negative.

A bronchoscopy was performed in the hospital setting after the initial sputum tuberculosis tests came back negative, and analysis of the bronchial aspirate simultaneously detected Mycobacterium tuberculosis and Aspergillus (positive galactomannan antigen), confirming a co-infection of tuberculosis and pulmonary aspergillosis. As part of the assessment, an arterial blood gas test revealed moderate type I respiratory failure with a PaO_2 of 65.2 mmHg.

Treatment was tailored for each condition, with an antifungal (itraconazole) for aspergillosis and an anti-tuberculosis regimen consisting of isoniazid, pyrazinamide, ethambutol, and rifampicin (4 drugs in the initial treatment phase). The duration of tuberculosis treatment is typically six months, with the initial phase lasting two months and the continuation phase lasting four months. The posology for these medications included: isoniazid 5 mg/kg/day, pyrazinamide 25 mg/kg/day, ethambutol 15 mg/kg/day, and rifampicin 10 mg/kg/day.

For aspergillosis, the patient was started on itraconazole at a dose of 200 mg per day for a total duration of 6 months.

Oxygen therapy was also administered due to severe dyspnea, along with a COPD maintenance treatment combining LABA and LAMA. Additionally, the patient underwent surgical treatment in the form of a bullectomy, as the emphysema bulla contributed to the patient's respiratory failure and symptoms. The surgery was aimed at removing the large bulla, which helped alleviate compression on the surrounding lung tissue.

After two months of treatment, the patient showed significant clinical improvement with reduced dyspnea and chest pain. Follow-up radiological exams revealed partial resolution of the pulmonary lesions, although residual scarring remained.

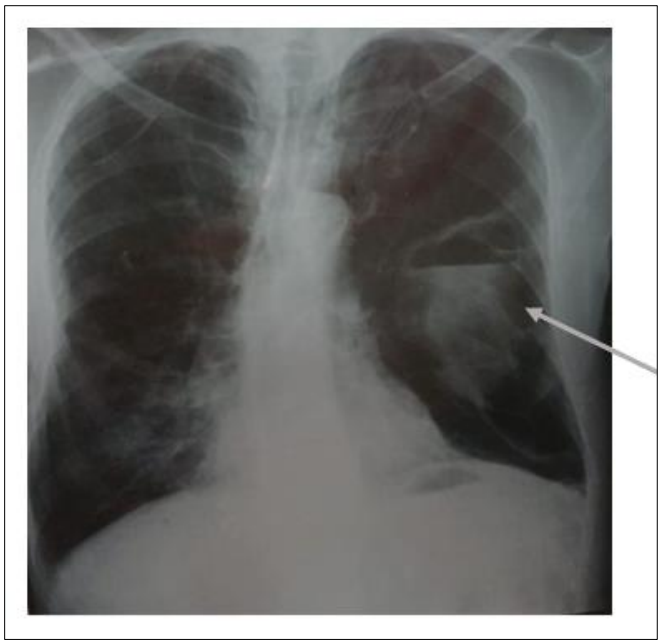

Figure 1: A chest X-ray of the patient revealed an opacity in the middle third of the left hemithorax with a watery appearance, topped by hyperlucency, forming a hydro-aerial level

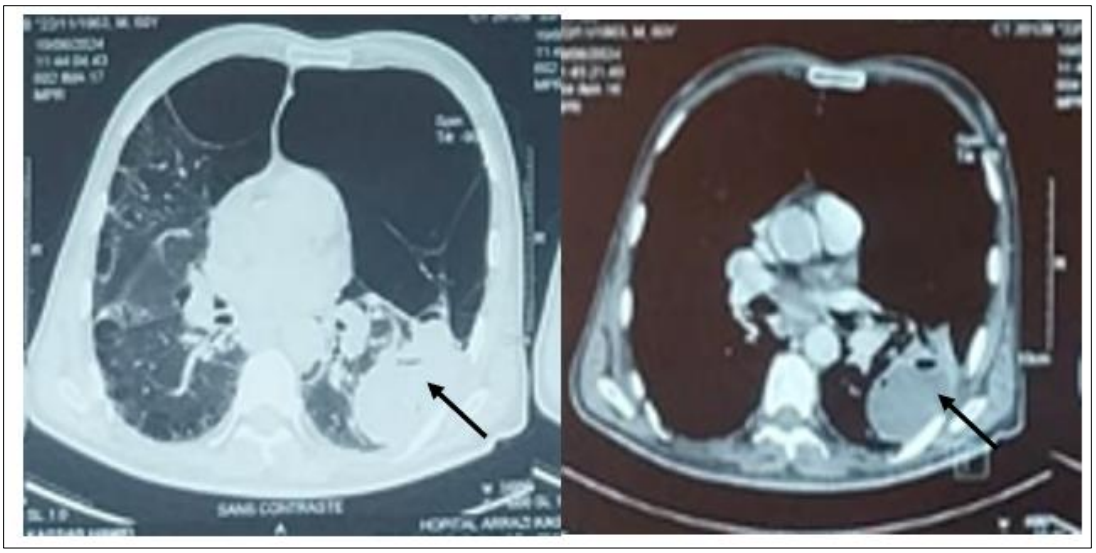

Figure 2 The chest CT scan shows a peripheral fluid collection with a hydro-aerial level (HAL) in the emphysematous lung

3. Discussion

The co-infection between aspergilloma and tuberculosis (TB) presents a complex clinical challenge, combining two severe and potentially fatal pulmonary conditions. Aspergilloma, or 'fungal tumor,' is a pulmonary infection caused by Aspergillus fumigatus, an opportunistic fungus that primarily colonizes pre-existing pulmonary cavities, often as a consequence of previous tuberculosis (TB) [3]. Tuberculosis, on the other hand, is a chronic bacterial infection caused by Mycobacterium tuberculosis, which can damage lung structures, creating an environment conducive to fungal colonization [4].

The pathophysiology of the co-infection between aspergilloma and tuberculosis is based on the interaction between chronic pulmonary inflammation induced by M. tuberculosis and fungal colonization by Aspergillus fumigatus [4]. Tuberculosis, by causing cavitary lung lesions, creates spaces in the lungs where Aspergillus spores can develop and form an aspergilloma. The latter is often observed in patients with a history of tuberculosis, particularly in regions endemic to the disease [7].

The cavitary lesions formed by tuberculosis provide ideal areas for the implantation and proliferation of Aspergillus. The persistence of fungal cells in these cavities can lead to symptoms such as cough, hemoptysis, and dyspnea, which are also characteristic of active tuberculosis [6]. This co-infection can complicate diagnosis and clinical management, as the clinical signs are often similar to those of tuberculosis alone [3].

The diagnosis of the co-infection between aspergilloma and tuberculosis relies on a combination of clinical, radiological, and microbiological data. Chest X-ray and computed tomography (CT) are essential tools in identifying aspergilloma, which typically presents as a characteristic mass image known as the 'air crescent sign' [5]. CT also allows for the visualization of tuberculous cavities and the assessment of the extent of pulmonary tuberculosis.

Microbiological diagnosis relies on the culture of sputum or respiratory samples to identify Aspergillus and Mycobacterium tuberculosis. PCR testing for M. tuberculosis helps confirm the presence of the tuberculosis bacterium, while fungal cultures or PCR testing for Aspergillus can diagnose aspergilloma.

Biomarkers, such as galactomannan, are also used to detect fungal infection, although they are not specific and must be interpreted in the context of the patient's clinical situation [4].

The treatment of the co-infection between aspergilloma and tuberculosis requires a multidisciplinary and personalized approach. The standard anti-tuberculosis treatment, consisting of a combination of drugs such as rifampicin, isoniazid, pyrazinamide, and ethambutol, remains essential for controlling the tuberculosis infection. However, managing aspergilloma requires the addition of a specific antifungal treatment. Triazoles, such as itraconazole or voriconazole, are first-line drugs for treating pulmonary infections caused by Aspergillus.

In more severe or refractory cases, surgical intervention may be necessary to remove the aspergilloma, especially if the fungal mass is associated with frequent hemoptysis or worsening pulmonary function. Surgery may also be considered if the response to antifungal treatment is insufficient [3].

Management of the co-infection between aspergilloma and tuberculosis should focus on rigorous clinical follow-up of the patient. Regular assessments of pulmonary function, radiological examinations, and microbiological cultures are essential to evaluate treatment response and detect potential complications [4].

Prevention of co-infection primarily relies on effective control of tuberculosis, with early detection, appropriate treatment, and rigorous management of immunocompromised patients, who are more susceptible to opportunistic fungal infections. In tuberculosis-endemic regions, it is also crucial to raise awareness among healthcare professionals about the possibility of aspergilloma-tuberculosis co-infection in order to ensure early diagnosis and optimal treatment [5].

4. Conclusion

Co-infection with tuberculosis and aspergillosis presents a major clinical challenge, particularly in contexts where risk factors such as smoking are present. This case highlights the importance of early diagnosis, the use of advanced diagnostic techniques such as bronchoscopy and bronchial aspiration, and an integrated therapeutic approach to effectively treat these complex infections. Rigorous and prolonged follow-up remains essential to prevent residual complications and ensure complete recsovery.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

The present research work does not contain any studies performed on animals/humans subjects by any of the authors

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