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Case Report

Beyond allergens: A parasitic twist in asthma exacerbation – Case report

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Abstract

A 34-year-old female with a known history of bronchial asthma on regular inhaled therapy presented with acute worsening of respiratory symptoms. She reported progressive cough, wheezing, and dyspnoea over the preceding week. There was no history of recent travel, change in environment, or exposure to new allergens. On examination, she was hemodynamically stable, with an oxygen saturation of 92% on room air. Auscultation revealed bilateral, diffuse wheezing. Laboratory investigations showed normal total leukocyte counts; however, serum total IgE and absolute eosinophil counts were elevated. A chest radiograph demonstrated increased bronchovascular markings. Despite administration of intravenous corticosteroids, the patient's symptoms persisted without significant improvement. To further investigate a potential infective aetiology, high-resolution computed tomography (HRCT) of the chest was performed. The scan revealed bilateral lower lobe ground-glass opacities with mosaic attenuation, raising suspicion of small airway involvement or infection. Bronchoscopy with bronchoalveolar lavage (BAL) was subsequently undertaken to evaluate for intraluminal obstruction and to identify any occult infectious agents. Microscopic examination of the BAL fluid revealed motile larvae with morphological features consistent with *Strongyloides stercoralis*. The diagnosis was confirmed by polymerase chain reaction (PCR) testing. The patient was initiated on oral ivermectin therapy, which resulted in marked clinical improvement within a few days. She was discharged in stable condition with continued asthma management using inhaled corticosteroids and bronchodilators.
This case emphasizes the need for clinicians to consider parasitic infections as potential triggers in refractory asthma exacerbations, particularly when eosinophilia and elevated IgE are present despite standard therapy.

Keywords: Strongyloidiasis, Asthma, Acute exacerbation, Ivermectin, Parasitic infection.

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1. Introduction

Asthma is a chronic inflammatory disease of the airways, characterized by variable airflow obstruction, airway hyperresponsiveness, and recurrent episodes of wheezing, dyspnoea, chest tightness, and cough. It affects approximately 262 million individuals globally and continues to be a major cause of morbidity and a significant burden on healthcare systems.[1]

Acute exacerbations of asthma are frequently precipitated by viral or bacterial respiratory infections, exposure to environmental allergens or irritants, and suboptimal adherence to maintenance therapy. Although less frequently recognized, parasitic infections can also serve as important and underappreciated triggers, particularly in endemic areas.

Strongyloides stercoralis is an intestinal nematode endemic to tropical and subtropical regions, with sporadic cases reported in temperate zones, particularly among travellers, immigrants, and immunocompromised individuals.[2] Its unique autoinfection cycle allows chronic persistence within the human host. Chronic infection may lead to eosinophilic inflammation and immune dysregulation, potentially triggering pulmonary manifestations, including asthma-like symptoms.[3]

Despite these insights, strongyloidiasis remains underdiagnosed in asthma patients who present with atypical

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exacerbations or corticosteroid-refractory symptoms, especially in non-endemic regions. This case highlights the diagnostic importance of considering helminthic infection in patients with eosinophilic asthma unresponsive to standard therapy.

2. Case Presentation

A 34-year-old female with a known history of asthma presented to the emergency department with complaints of worsening respiratory symptoms over the past week. Despite strict adherence to her maintenance therapy—which included a combination of a long-acting beta-agonist (LABA) and an inhaled corticosteroid (ICS)—she reported a gradual increase in cough, wheezing, and shortness of breath. She denied recent travel, exposure to new environmental or occupational allergens, contact with ill individuals, or recent modifications to her medication regimen. Notably, she had not experienced previous asthma exacerbations of this severity, and no apparent precipitating factors could be identified. Her family history was positive for asthma in her maternal grandmother.

On presentation, the patient was in mild respiratory distress but remained hemodynamically stable and fully alert. Her vital signs were as follows: blood pressure 110/70 mmHg, heart rate 79 beats per minute, respiratory rate 23 breaths per minute, temperature 36.8°C (98.2°F), and oxygen saturation of 92% on room air. Physical examination revealed diffuse, bilateral wheezing on auscultation of the lungs. No crackles, stridor, or signs of upper airway obstruction were noted. There were no signs of cyanosis, digital clubbing, or peripheral edema. Cardiovascular and abdominal examinations were unremarkable, and no evidence of skin rash or parasitic skin manifestations (e.g., larva currens) was present.

Given her clinical history and examination findings, an initial diagnosis of acute severe asthma exacerbation was made. The patient was treated with nebulized bronchodilators and intravenous corticosteroids. However, her respiratory symptoms showed minimal improvement following initial management, prompting further investigation into alternative or coexisting aetiologies.

Laboratory investigations revealed a normal total white blood cell count of 9,870 cells/μL. However, the absolute eosinophil count was elevated at 1,320 cells/μL (13%), and serum total immunoglobulin E (IgE) levels were markedly increased, exceeding 2,500 IU/mL. Arterial blood gas (ABG) analysis on room air demonstrated a pH of 7.41, $PaCO_2$ of 39 mmHg, and PaO_2 of 74 mmHg, consistent with mild hypoxemia in the absence of hypercapnia or overt respiratory failure. Given the elevated IgE and eosinophil counts, allergic bronchopulmonary aspergillosis (ABPA) was considered as a differential diagnosis; however, Aspergillus-specific IgE and skin sensitivity tests were negative, effectively ruling out Aspergillus sensitization.

In light of the eosinophilia, elevated IgE levels, and inadequate clinical response to standard asthma therapy, a high-resolution computed tomography (HRCT) scan of the chest was performed. The imaging revealed bilateral lower lobe ground-glass opacities with areas of mosaic attenuation, suggestive of small airway involvement and raising suspicion for an underlying infectious or inflammatory process (**Figure 1**).

To further evaluate the possibility of an intraluminal obstruction or occult infection, flexible bronchoscopy was conducted. The airways appeared patent with no visual evidence of mucus plugging, mass lesions, or anatomical anomalies. Bronchoalveolar lavage (BAL) fluid was collected from the right middle lobe for microbiological, cytological, and parasitological analysis.

Microscopic examination of the BAL fluid revealed motile larvae with morphological features consistent with *Strongyloides stercoralis* (**Figure 2** and **3**). These findings were subsequently confirmed by polymerase chain reaction (PCR) testing for *S. stercoralis* DNA. A stool sample was also obtained and found to contain rhabditiform larvae, further supporting the diagnosis of strongyloidiasis.

The patient was promptly initiated on oral ivermectin at a dose of 200 μg/kg/day. Over the following days, she exhibited a significant and sustained clinical improvement, with resolution of wheezing and dyspnoea. Her oxygen saturation normalized, and she no longer required supplemental oxygen or systemic corticosteroids. She was discharged in stable condition with instructions for continued asthma management using inhaled corticosteroids and bronchodilators and was scheduled for follow-up in the outpatient clinic.

2.1. Methodology

This case report was prepared in accordance with CARE (CAse REport) guidelines to ensure completeness and transparency. The diagnostic and management process followed a structured day-wise protocol, as outlined below:

1. Day 1 (Emergency admission): Initial clinical assessment, vital signs, oxygen saturation measurement, chest radiograph, and initiation of nebulized bronchodilators plus intravenous corticosteroids.
2. Day 2: Laboratory investigations (CBC, eosinophil count, serum IgE), arterial blood gas analysis, and HRCT chest imaging.
3. Day 3: Flexible bronchoscopy performed; BAL fluid collected for microbiological, cytological, and parasitological testing.
4. Day 4: BAL microscopy revealed motile larvae consistent with *Strongyloides stercoralis*. PCR confirmed the diagnosis. Stool examination also revealed rhabditiform larvae.

5. Day 5 onwards: Oral ivermectin (200 µg/kg/day) initiated, leading to rapid symptomatic improvement. The patient was discharged in stable condition with scheduled follow-up.

All procedures were conducted following institutional protocols and appropriate infection control measures.

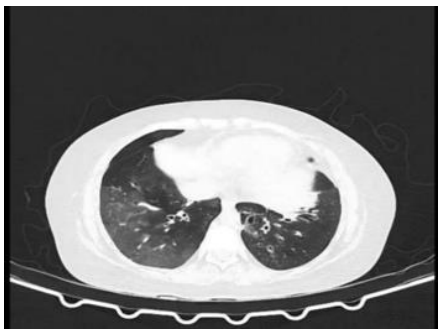

Figure 1: CT chest showing bilateral mosaic attenuation with GGOs thickened peripheral airways suggestive of air trapping

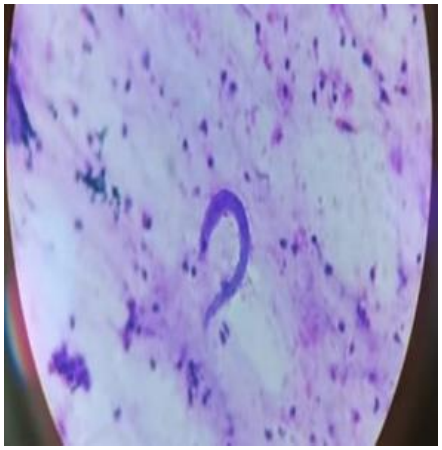

Figure 2: Strongyloides in BAL staining

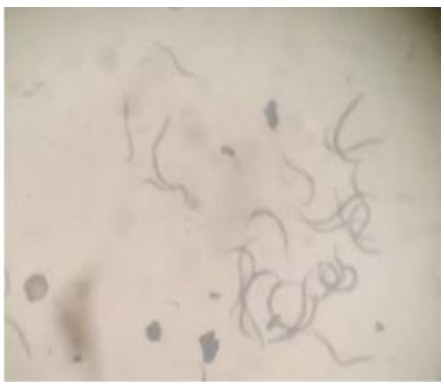

Figure 3: Strongyloides larvae in BAL

3. Discussion

This case underscores the importance of considering parasitic infections, particularly *Strongyloides stercoralis*, as contributors to asthma exacerbations in patients presenting with eosinophilia and poor response to conventional therapy.

Asthma is a globally prevalent disease affecting over 260 million individuals.[1] Exacerbations are typically triggered by viral infections, allergen exposure, or poor adherence, but parasitic infections are an emerging concern.[2,3] With increased globalization, reports of pulmonary strongyloidiasis are rising even in non-endemic settings.[4]

Previous literature demonstrates that strongyloidiasis can closely mimic allergic bronchopulmonary aspergillosis (ABPA), given shared features of eosinophilia and elevated IgE levels.[5,6] Direct case comparisons reveal that BAL microscopy and PCR are often decisive for differentiation.[10] Misdiagnosis may delay appropriate therapy. A systematic review by Buonfrate et al. reported that strongyloidiasis accounted for a significant proportion of unexplained asthma-like exacerbations in endemic regions.[7] Similarly, newer data suggest that up to 15–20% of eosinophilic asthma in endemic areas may be attributable to occult helminth infections.[8]

This case adds to existing literature by illustrating the diagnostic value of bronchoscopy and BAL in patients whose asthma exacerbation does not respond to corticosteroids, highlighting the importance of integrating parasitic evaluation early in the workup.

Bilateral ground-glass opacities and mosaic attenuation, though non-specific, should alert clinicians to atypical causes when conventional therapy fails.[9] Definitive diagnosis requires parasitological confirmation, with BAL microscopy and PCR being highly sensitive.[10]

Ivermectin remains the treatment of choice, with excellent efficacy.[11] Importantly, corticosteroid use in undiagnosed strongyloidiasis may precipitate hyperinfection syndrome, a potentially fatal complication.[12,13] This reinforces the need for pre-steroid parasitic screening in patients from endemic areas or those with unexplained eosinophilia. Early recognition and targeted therapy are therefore critical.

4. Conclusion

This case highlights the complex interplay between parasitic infections and asthma exacerbations, particularly in patients with eosinophilia and high IgE levels. Conventional asthma therapies remain central, but non-response should prompt clinicians to consider parasitic infections in the differential diagnosis.

5. Recommendations

1. Clinicians should maintain a high index of suspicion for helminthic infections in refractory asthma exacerbations, particularly in patients with eosinophilia or residence/travel to endemic areas.
2. In selected patients (e.g., with unexplained eosinophilia or high IgE), parasitic screening via stool microscopy, serology, or BAL PCR should be considered before prolonged corticosteroid use.

3. Prompt initiation of ivermectin therapy not only improves outcomes but also prevents progression to hyperinfection syndrome.
4. Interdisciplinary collaboration between pulmonologists, infectious disease specialists, and microbiologists is recommended for comprehensive evaluation and management.

6. Patient Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images, in accordance with ethical publication standards.

7. Ethical Considerations

The case was managed and reported following institutional ethical guidelines and CARE case report standards. No patient identifiers were disclosed.

8. Source of Funding

None.

9. Conflict of Interest

None.

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