IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 13, Issue 4 Ser.5 (July. – August. 2024), PP 56-58
www.iosrjournals.org

A Case Report Of Severe Asthma In A 33-Year-Old Male

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Abstract
This case report discusses a 33-year-old Saudi male with a history of poorly controlled asthma, who presented to the emergency department with exacerbation symptoms including shortness of breath and persistent cough. Despite a 10-year history of asthma and ongoing medication, the patient's condition worsened, necessitating an in-depth assessment and intervention. This case highlights the importance of a comprehensive, multidisciplinary approach in managing severe asthma, including detailed patient education, lifestyle modifications, and the need for regular monitoring. The outcome emphasizes the effectiveness of personalized care plans in improving long-term disease control and quality of life.

Date of submission: 11-08-2024 Date of acceptance: 21-08-2024

I. Introduction

Asthma is a prevalent chronic inflammatory disease of the airways characterized by episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or early morning. According to the World Health Organization (WHO), asthma affects approximately 262 million people worldwide and was responsible for 455,000 deaths in 2019 [1]. The condition is associated with significant morbidity, with studies indicating a rising prevalence, especially in developed countries [2].

Asthma's pathophysiology involves chronic inflammation leading to airway hyperresponsiveness, which in turn causes episodic airflow obstruction that is often reversible [3]. Common triggers include allergens, respiratory infections, physical exertion, cold air, and certain medications [4]. The variability in symptom severity necessitates a tailored approach to management, often involving a combination of pharmacological treatments and lifestyle modifications [5].

This case report presents a detailed account of a severe asthma exacerbation in a 33-year-old male, exploring the clinical presentation, management strategies, and outcomes. It underscores the need for vigilant monitoring and patient education in managing chronic asthma.

II. Case Presentation

A.A., a 33-year-old Saudi male, presented to the emergency department at AL Obead Hospital in Al Ahsa with a chief complaint of worsening shortness of breath and a persistent cough that had progressively intensified over the past week. These symptoms were accompanied by flu-like manifestations, which exacerbated his underlying respiratory condition. The patient has a significant medical history, having been diagnosed with bronchial asthma 10 years ago. Since his diagnosis, he has been on routine medication, including bronchodilators and inhaled corticosteroids. However, he admitted to occasional non-compliance with his medication regimen, attributing this lapse to his busy work schedule as a teacher. This non-compliance, coupled with environmental triggers such as exposure to dust mites, pet dander, and pollen—substances to which he is allergic—likely contributed to the current exacerbation. Notably, A.A. has no history of surgical interventions, and he does not report any known food or drug allergies.

A.A. is married with children, and despite his chronic condition, he maintains good family relationships and rapport with his co-workers. His daily life is somewhat restricted due to his respiratory limitations, which

prevent him from engaging in more vigorous physical activities. Nevertheless, he strives to lead a healthy lifestyle, adhering to a balanced diet and engaging in low-effort walking three times a week. He finds solace and strength in his faith, regularly engaging in prayer and Quran recitation, which help him manage the stress associated with his condition.

Upon arrival at the emergency department, A.A.'s vital signs were as follows: blood pressure was 130/80 mmHg, pulse rate was 110 beats per minute, respiratory rate was 24 breaths per minute, and his temperature was 37°C. His oxygen saturation was measured at 93%, indicating moderate hypoxemia, and his pain scale was reported at 2/10, primarily due to discomfort from the persistent cough and respiratory effort. The physical examination revealed a patient who was alert and oriented to time, place, and person, with intact cranial nerves and normal sensory and motor functions, indicating no neurological impairment. Musculoskeletal assessment showed that the patient's posture was normal, with adequate muscle tone and smooth joint movements; there were no visible deformities, signs of muscle atrophy, or weakness, suggesting that his general physical condition remained stable despite his chronic illness.

The respiratory examination was more concerning, as the patient exhibited increased effort in breathing, including the use of accessory muscles and visible nasal flaring—a sign of significant respiratory distress. Auscultation revealed bilateral wheezing across all lung fields, a hallmark of bronchoconstriction in asthma exacerbations. Percussion of the chest produced resonant sounds, consistent with hyperinflation of the lungs, a common finding in severe asthma where air trapping occurs due to narrowed airways. The cardiac examination was unremarkable, with normal heart sounds (S1 and S2) that were clear and regular, and no evidence of murmurs, rubs, or gallops. Peripheral pulses were symmetrically palpable, suggesting stable cardiovascular function. The gastrointestinal, renal, and integumentary systems were assessed and found to be within normal limits, with no significant findings that required immediate attention.

Table 1 shows the laboratory investigations were conducted to further assess the patient's condition. A complete blood count (CBC) revealed an elevated white blood cell (WBC) count of 10.94 x 10^3/uL, which, in the context of his clinical presentation, raised the possibility of an underlying infection or an exaggerated inflammatory response associated with his asthma exacerbation. The red blood cell (RBC) count, hemoglobin (HGB), and hematocrit (HCT) levels were within normal ranges, indicating that there was no significant anemia or polycythemia contributing to his symptoms. Arterial blood gas (ABG) analysis showed mild respiratory acidosis, with a pH of 7.32 and a PaCO2 of 48 mmHg, reflecting impaired gas exchange due to the bronchospasm and air trapping. The bicarbonate (HCO3) level was 22 mEq/L, which was within normal limits, indicating that the acidosis was primarily respiratory in origin. A chest X-ray was also performed, which showed hyperinflation of the lungs, a radiographic sign consistent with severe bronchial asthma due to reduced expiratory flow and air trapping. Importantly, there were no signs of infection, such as infiltrates, nor evidence of a pneumothorax, which could complicate the clinical picture.

Given the severity of his symptoms and the findings on examination and investigation, an aggressive management plan was implemented. The patient was started on Albuterol (Salbutamol) administered via a metered-dose inhaler (MDI) or nebulizer as needed to provide immediate relief from bronchospasm. Albuterol, a short-acting beta-agonist, acts by stimulating beta-2 adrenergic receptors in the airway smooth muscles, leading to bronchodilation and improved airflow. In addition to Albuterol, Ipratropium Bromide was administered as an anticholinergic bronchodilator to further alleviate bronchoconstriction by inhibiting acetylcholine receptors in the airway smooth muscles. To address the underlying inflammation, Prednisone was given orally as part of a corticosteroid regimen, with careful titration of the dose to minimize potential side effects such as hyperglycemia and fluid retention. Methylprednisolone, a more potent corticosteroid, was administered intravenously during the acute phase to provide rapid anti-inflammatory effects and stabilize the patient's condition. For long-term control, Montelukast, a leukotriene receptor antagonist, was introduced to block leukotrienes—potent inflammatory mediators that contribute to bronchoconstriction and airway edema.

In addition to pharmacological treatment, comprehensive nursing care was provided. Continuous monitoring of the patient's respiratory status, including oxygen saturation, respiratory rate, and lung sounds, was essential to assess the effectiveness of the treatment and to detect any early signs of deterioration. The patient was positioned to optimize lung expansion, and supplemental oxygen was administered to maintain adequate oxygenation levels. Education on trigger avoidance was a key component of the management plan, as the patient was advised to avoid known asthma triggers such as dust, pollen, and pet dander, and to minimize exposure to smoke and other air pollutants. Detailed instruction on the proper use of inhalers was provided, including techniques to ensure maximum drug delivery to the lungs. A personalized asthma action plan was developed in collaboration with the patient, outlining the steps to take during an asthma exacerbation, including when to seek emergency care.

The patient responded well to the treatment, showing significant improvement within 24 hours. His respiratory rate normalized, oxygen saturation improved to 97%, and wheezing diminished, indicating effective bronchodilation and reduction in airway inflammation. He was closely monitored for any signs of relapse during

his hospital stay. Upon discharge, the patient was advised to adhere strictly to his asthma management plan, including regular follow-up visits with his healthcare provider. He was also counseled on the importance of medication compliance, lifestyle modifications, and early recognition of exacerbation symptoms to prevent future episodes and to maintain better control of his bronchial asthma

Table 1 Laboratory and Diagnostic Examination (with analysis and interpretation):

Test	Result	Normal Range
WBC	10.94 10^3/uL	4.0-10.0 10^3/uL
RBC	5.43 10^6/uL	4.5-5.5 10^6/uL
HGB	15.4 g/dL	13-17 g/dL
HCT	46%	40-50%
Platelets	249 10^3/uL	150-450 10^3/uL
Sodium	139 mEq/L	136-145 mEq/L
Potassium	3.68 mEq/L	3.5-5.1 mEq/L
pH	7.32	7.35 to 7.45
PaCO2	48	35-45
HCO3	22	22-26
Test	**Analysis and Interpretation**	
chest X-Ray	It shows hyperinflation	

III. Discussion

This case illustrates the challenges associated with managing severe asthma, particularly in patients with a history of poor control. The patient's presentation, with significant respiratory distress and an elevated WBC count, suggests that infections or environmental triggers might have contributed to the exacerbation. The use of a combination of bronchodilators, corticosteroids, and patient education proved effective in stabilizing the patient.

Asthma is a complex and multifaceted disease characterized by airway inflammation, hyperreactivity, and structural remodelling [6, 7]. Its pathophysiology involves a delicate interplay between genetic factors and environmental triggers [8, 9]. Recent research has underscored the importance of innate immunity in asthma development, with key roles played by allergen properties, airway epithelium, and dendritic cells [8]. The immune response in asthma is primarily Th2-mediated, leading to IgE-driven inflammation. Environmental influences, particularly early childhood infections, are significant contributors to asthma onset [9]. Additionally, structural components such as airway smooth muscle and endothelium are actively involved in the inflammatory process [6]. Chronic changes in the airways may result in progressive airflow obstruction, challenging the notion of fully reversible airway obstruction [9]. Understanding these mechanisms is crucial for asthma management, including the use of anti-IgE therapies [8].

IV. Conclusion

This case report underscores the importance of a holistic approach to managing severe asthma, including timely medical intervention, patient education, and lifestyle modifications. Effective management requires a multidisciplinary approach that addresses both the acute and chronic aspects of the disease. By empowering patients with the knowledge and tools needed to manage their condition, healthcare providers can significantly improve patient outcomes and quality of life. Furthermore, this case highlights the importance of patient education and self-management in chronic asthma care. Despite the availability of effective treatments, asthma control remains suboptimal in many patients due to poor adherence to medication, lack of education, and failure to avoid triggers. The patient's improvement following a comprehensive management plan underscores the need for ongoing education and support for asthma patients to achieve better long-term outcomes.

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