Case Report

Navigating the challenges of asthma exacerbation in the presence of a mediastinal mass

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Abstract

Mediastinal masses can mimic asthma by compressing the airway and causing wheezing, making emergency differentiation between true asthma and pseudo-asthma challenging. Airway management in such cases is critical, as intubation may precipitate severe airway or cardiovascular collapse. This case highlights a 14-year-old boy with a known history of asthma who presented with respiratory distress. Despite standard asthma treatments including nebulization, IV hydrocortisone, and magnesium sulfate, his condition deteriorated. Chest imaging revealed a widened mediastinum and opacities in the right lower lung zone.

Following intubation and paralysis, ventilation became nearly impossible and required manual bagging. Bronchoscopy revealed no airway obstruction up to the carina, and multiple attempts to bypass the mass—including ETT repositioning, unilateral intubation, and administration of sugammadex—were unsuccessful. The patient eventually succumbed despite resuscitative efforts. This case underscores the importance of suspecting mediastinal pathology in asthma-like presentations. Standard emergency protocols may not be appropriate, and alternative airway strategies, such as awake fiberoptic intubation, avoiding paralytic agents, and utilising extracorporeal membrane oxygenation (ECMO) or distal jet ventilation, should be considered. Early recognition and individualised airway management are crucial to avoid fatal outcomes.

Keywords: *Mediastinal mass, Asthma mimicker, Emergency airway management, airway obstruction*

INTRODUCTION

Asthma exacerbations are frequently encountered in the emergency care setting and are characterized by dyspnoea, cough, and wheezing. However, when a mediastinal mass coexists with asthma, its compressive effect on the tracheobronchial tract can produce wheezing, which may be indistinguishable from symptoms of asthma exacerbation[1]. In emergency settings, managing asthma exacerbation alongside a mediastinal mass poses significant challenges, particularly in securing the airway to prevent respiratory collapse. This is further complicated by the potential for airway and cardiovascular compression during intubation in the presence of such masses. Although there is a growing body of research on the perioperative management of mediastinal masses, there is a paucity of literature on the acute management of these cases in emergency settings, especially when they coexist with asthma.[2,3]

CASE PRESENTATION

A 14-year-old male with a history of childhood bronchial asthma who was previously hospitalized for asthma exacerbation secondary to lung infection was found to have an incidental mediastinal mass and right cervical and supraclavicular lymphadenopathy. A contrast-enhanced computed tomography (CECT) scan was planned for staging.

The patient presented two days later to the emergency department with worsening cough and dyspnea. Upon arrival, his vital signs were within normal limits, except for tachycardia (pulse rate of 125 beats per minute) and tachypnoea (respiratory rate of 30 per minute). Physical examination revealed generalized wheezing and rhonchi, with reduced air entry in the right lower lung zone. A right lateral neck mass, measuring 20 cm by 10 cm, was noted. A chest radiograph showed a widened mediastinum with right lower zone opacities (Figure 1).

Despite aggressive medical management, including nebulizer therapy with ipratropium bromide, salbutamol, and budesonide and intravenous treatment with hydrocortisone, terbutaline, and magnesium sulfate, the patient's condition deteriorated. He became lethargic and displayed signs of respiratory distress, with the use of accessory muscles for breathing. Intubation was deemed

necessary for impending respiratory failure. Given the presence of the large neck mass, the anaesthetic team was consulted for potentially difficult intubation. Pre-medications included 50 mg ketamine, 50 mg propofol, and 50 mg rocuronium. The patient was successfully

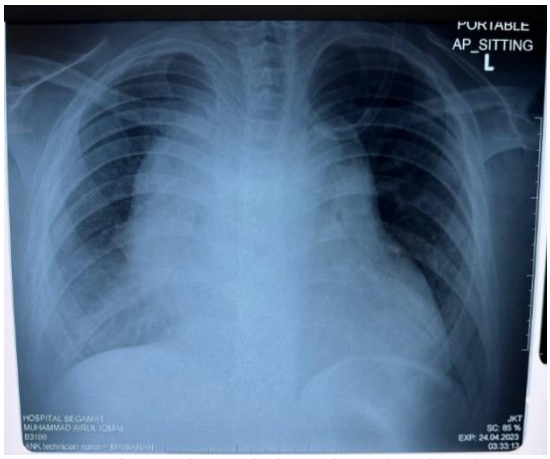

Figure 1: A chest radiograph showed a widened mediastinum with right lower zone opacities

intubated on the first attempt with a size of 7.0 mm endotracheal tube (ETT). However, ventilation was difficult, and manual bagging was required to maintain oxygen saturation. A post-intubation chest radiograph revealed homogenous opacity in the left lung (Figure 2). The ETT was exchanged for a larger 8.0 mm tube in an attempt to bypass the mediastinal mass but failed to improve oxygenation, with saturation decreasing to 60–62%.

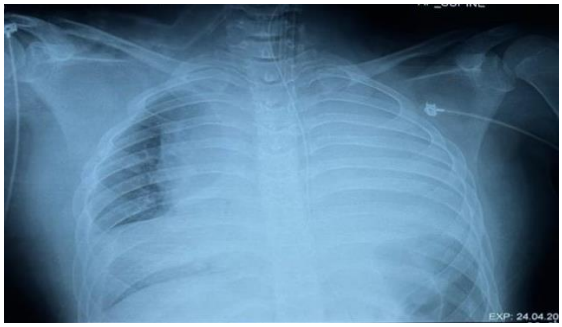

Figure 2: A post-intubation chest radiograph revealed homogenous opacity in the left lung

DISCUSSION

Asthma exacerbations and mediastinal masses can present with overlapping clinical features, such as wheezing and dyspnoea. However, it is essential to consider other potential causes, such as tracheobronchial compression due to a mediastinal mass, when wheezing persists despite treatment. In this case, the patient's lack of improvement with standard asthma management, along with the clinical findings of a large mediastinal mass, suggested significant tracheobronchial compression. This highlights the importance of considering differential diagnoses in patients with persistent wheezing.

The acute management of airways in patients with mediastinal masses is challenging, particularly in the context of asthma exacerbation. Strategies to secure the airway may need to deviate from standard protocols. One critical approach is to assess the patient's preferred position, as respiratory distress may worsen in the supine position. Many authors advise avoiding the use of muscle relaxants and paralytic agents as pre-medications for intubation [3-6]. This strategy can help maintain spontaneous ventilation as much as possible. If the use of muscle relaxants is necessary, manual assisted ventilation should first be performed to ensure that positive-pressure ventilation is possible, and only then can a short-acting muscle relaxant be administered.

While awake fibreoptic intubation is considered the safest option in many cases of mediastinal masses, it was not employed here because of the urgency of the situation. This technique preserves spontaneous breathing and allows direct visualization of the airway, which could help assess the level of compression. Additionally, advanced techniques such as distal jet ventilation may be beneficial in bypassing the obstruction, although these methods were not available in this case[2].

In cases of refractory respiratory failure where conventional ventilation fails to provide adequate oxygenation, extracorporeal membrane oxygenation (ECMO) may be considered. ECMO has been successfully used in patients with severe respiratory failure, including those with tracheobronchial compression due to mediastinal masses. It provides a means to oxygenate and ventilate the patient while bypassing the obstructed airway, potentially serving as a bridge to recovery or definitive surgical intervention [7-8].

Another advanced strategy for improving oxygenation in patients with severe respiratory compromise is prone positioning. Although primarily used for acute respiratory distress syndrome (ARDS), prone positioning has demonstrated significant benefits in improving oxygenation by enhancing ventilation–perfusion matching and reducing ventilator-induced lung injury. This positioning could theoretically aid patients with mediastinal compression by improving lung compliance and potentially alleviating some of the effects of airway obstruction[9-10]. While the use of prone positioning specifically in patients with mediastinal masses is less well established, the potential benefits of optimizing oxygenation in the

presence of obstructed airways make it a valuable adjunctive treatment for refractory respiratory failure.

Despite the use of sugammadex to reverse neuromuscular blockade, the patient's airway obstruction did not resolve, underscoring the complexity of airway management in such cases. Bronchoscopy confirmed the absence of upper airway obstruction, suggesting that the mediastinal mass was responsible for the patient's deteriorating respiratory status.

CONCLUSION

Asthma exacerbations are common in the emergency department, but the presence of a mediastinal mass can complicate diagnosis and airway management. Emergency care providers must consider differential diagnoses, such as tracheobronchial compression, when treating patients with persistent wheezing. This case highlights the challenges in managing asthma patients with concurrent mediastinal masses and underscores the need for tailored airway management strategies, including careful planning for intubation and ventilation. Despite advancements in perioperative care for patients with mediastinal masses, more research is needed to guide the acute management of these patients in the emergency setting.

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REFERENCES

1. Alexander, J., & John, D. “A Pitfall of Wheezing – A Large Mediastinal Mass Presenting as Persistent Wheezing: A Case Report,” *PubMed Central*, vol. 14, 2022.
2. C.M. Ku, “Anaesthesia for Patients with Mediastinal Masses,” in *Principles and Practice of Anaesthesia for Thoracic Surgery*, P. Slinger (ed.), 2011, pp. 201–210.
3. Robie, G.P., “Mediastinal Tumors—Airway Obstruction and Management,” *PubMed*, vol. 3, no. 4, 1994.
4. Talha, R.A.S., “Mediastinal Cancer,” January 2023.
5. Tan, L.P.H., et al., “Anaesthetic Management of Patients Undergoing Mediastinal Mass Operation,” *EICA Group*, 2022.
6. Hammer, G.B., “Anaesthetic Management for the Child with a Mediastinal Mass,” *Paediatr Anaesth*, 2004.
7. Combes, A., Hajage, D., & Capellier, G. (2012). *Extracorporeal membrane oxygenation for severe acute respiratory failure*. *The Lancet Respiratory Medicine*, *1*(1), 47-56.
8. Sadeghi, M., Khatami, A., & Razzaghi, R. (2019). *Extracorporeal membrane oxygenation in refractory respiratory failure due to mediastinal mass*. *Journal of Critical Care*, *52*, 184-189.
9. Mekontso-Dessap, A., & Brochard, L. (2015). *Prone positioning in acute respiratory failure*. *Current Opinion in Critical Care*, *21*(4), 385-389.
10. Guérin, C., Reignier, J., & Richard, J. C. (2013). *Prone positioning in patients with moderate and severe acute respiratory distress syndrome: A randomized controlled trial*. *JAMA*, *309*(12), 1238-1248.