

ECMO To An Asthmatic's Rescue

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Introduction

Asthma is a disease of chronic airway inflammation, bronchial hyperresponsiveness, and airflow obstruction. Patients with exacerbation of their asthma commonly present with symptoms of chest tightness, shortness of breath, wheezing, and cough. The severity of a patient's symptoms and clinical findings should allow for quick stratification and appropriate management. Patients with severe exacerbation may present with hypercapnia, acute respiratory distress, and hypoxemia and require intensive care unit (ICU) level of care. Near-fatal asthma (NFA) is a life-threatening condition caused by acute respiratory failure and is the most severe clinical presentation of asthma. We present a case of NFA exacerbation in the setting of a viral infection that required life sustaining veno-venous extracorporeal membrane oxygenation (VV ECMO).

Clinical Presentation

- 20-year-old male with a past medical history only significant for moderate persistent asthma and allergic rhinitis presented with shortness of breath.
- The patient's asthma was previously well controlled on montelukast, fluticasone-salmeterol, and albuterol but recently remained off maintenance therapy due to lack of affordable insurance.
- On arrival, patient was found to be in respiratory failure with SpO₂ of 86% on room air, increased work of breathing with accessory muscle use, and tachycardic.
- Chest X-Ray on admission shown in Figure 1.
- Initial management with albuterol, methylprednisolone, and magnesium sulfate provided temporary relief. Infectious work-up was underway and returned positive for rhinovirus.

- ICU the patient became increasingly hypoxic on maximum settings of high flow nasal cannula.
- Patient was subsequently intubated with significantly elevated airway resistance >70 cmH₂O/L/s and peak inspiratory pressures ranging 50-60 cmH₂O.
- Arterial blood gas after intubation shown in Table 1.
- Given the patient's rapid decline and inability to appropriately ventilate, it was determined that emergent VV ECMO would be the next appropriate treatment.
- After several days on VV ECMO, the patient continued to improve with eventual decannulation and extubation on day 7 without further complications.
- Chest X-Ray after VV ECMO shown in Figure 2
- Arterial blood gas after VV ECMO shown in Table 2.
- Several months after discharge, the patient has remained stable on previous asthma regimen without further exacerbations.

Figure 1

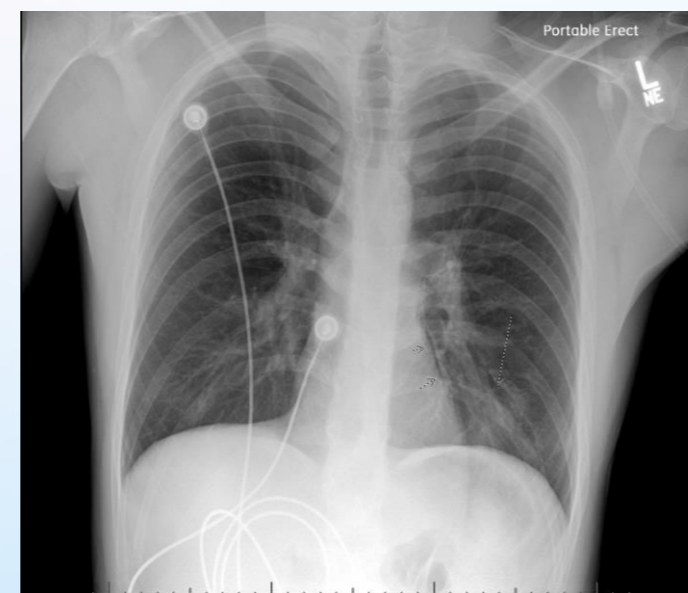


Figure 2

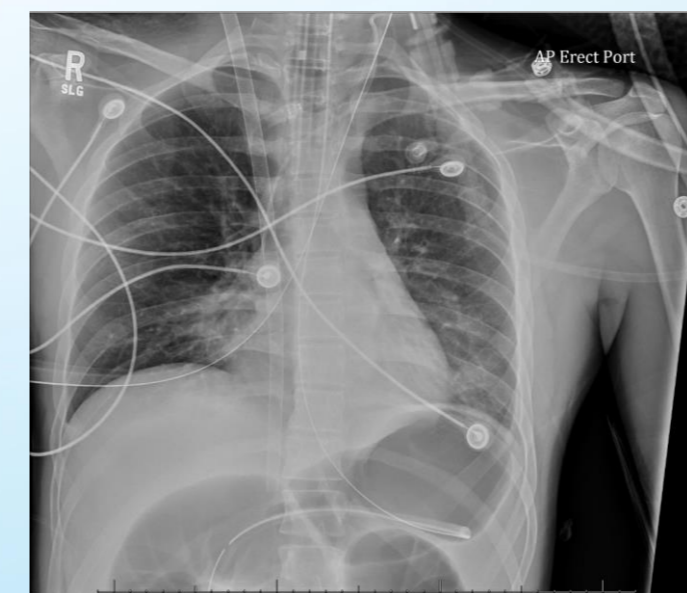


Table 1

pH	pCO ₂ (mmHg)	pO ₂ (mmHg)	HCO ₃ (mEq/L)	sO ₂ (%)
7.05	103	110	22	96

Table 2

pH	pCO ₂ (mmHg)	pO ₂ (mmHg)	HCO ₃ (mEq/L)	sO ₂ (%)
7.48	35	90	25	95

Discussion

This case highlights the various clinical presentations of asthma. Asthma can be treated successfully with as needed inhalers on end of the spectrum compared to the need for mechanical ventilation. The reported mortality rate in patients who require ventilator assistance is over 8%. This is likely because mechanical ventilation can further worsen lung mechanics, create barotrauma, and contribute to dynamic hyperinflation. Fortunately, our case highlights that VV ECMO can serve as an alternative and provide adequate gas exchange and prevent lung injury when mechanical ventilation is not sufficient. Our case serves to add to the growing body of NFA successfully saved by VV ECMO.