



Subcutaneous Emphysema, Pneumomediastinum and Spontaneous bilateral Pneumothoraces in Asthma

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Abstract

We present a case of severe asthma exacerbation which was complicated by spontaneous bilateral pneumothoraces (SBPT), pneumomediastinum (PM) and subcutaneous emphysema; all developing subsequent to one another. Despite prompt treatment on recognition of these complications, our patient had poor outcome. Diagnosis needs CT chest as clinical exam and chest x ray is not high yield with subcutaneous emphysema.

Introduction

Severe asthma exacerbation is a relatively common condition requiring admission to the intensive care unit. SBPT, PM and subcutaneous emphysema are rare but potentially fatal complications of severe asthma exacerbation that are rare in the medical literature. Severe air flow obstruction can lead to over distension of alveoli and their rupture which can cause pneumothorax. Pneumomediastinum is described as the presence of gas or free air within the mediastinum. Spontaneous pneumomediastinum arises as a result of sudden increase in intra-alveolar pressure (asthma, Valsalva maneuver, cough, emesis, barotraumas) resulting in the rupture of marginal alveoli and subsequent tracking of air along bronchi, interstitial and vascular support tissues into the mediastinum [1]. The air may pass below the skin and may flow towards the neck and the face, leading to subcutaneous emphysema [2].

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Case Presentation

A 59 year old female with multiple sclerosis, seizures, depression and asthma presented to the emergency department with a 5 days history of shortness of breath and wheezing. She denied chest pain, fever or productive cough. She was admitted to the ward and started on scheduled nebulized albuterol and oral prednisone. Her symptoms progressively worsened requiring intubation and transfer to the intensive care unit. She was started on volume controlled mechanical ventilation. She had diminished breath sounds bilaterally with faint wheezing. Chest x-ray was normal. Oral prednisone was changed to intravenous methylprednisolone and inhaled bronchodilators were continued. She was noticed to have high peak inspiratory pressures ~ 60-70 cm H₂O which came down to the 50's after sedation with Propofol. Arterial blood gas revealed a respiratory acidosis and hypoxemia. Few hours later, she was noticed to have worsening subcutaneous emphysema. A computed tomography (CT) of the chest was performed which showed PM and BPT (Figure 1). The patient remained hemodynamically stable and chest tubes were placed bilaterally. Flexible bronchoscopy was also performed to rule out intubation induced tracheal injury. Respiratory acidosis and hypoxemia improved gradually but she continued to need ventilation due to her low GCS of 3-5. Lumbar puncture showed no evidence of Intracranial infection. Magnetic resonance imaging of head showed extensive disease burden from multiple sclerosis. There was no evidence of seizures on electroencephalogram. After prolonged hospitalization, patient was compassionately extubated at family's request and she passed away in few hours.

Discussion

Patients with SBPT may present with various clinical symptoms from a mild dyspnea to cardiopulmonary failure [3]. Depending on the tension physiology, these conditions may lead to rapid respiratory failure and decreased cardiac output, especially when complicated by pulmonary barotrauma during mechanical ventilation [4,5]. Peak and plateau airway pressures measured through the ventilator circuit are generally extremely high. Lung auscultation is limited by the presence of subcutaneous emphysema. Subcutaneous emphysema severely limits chest x-rays

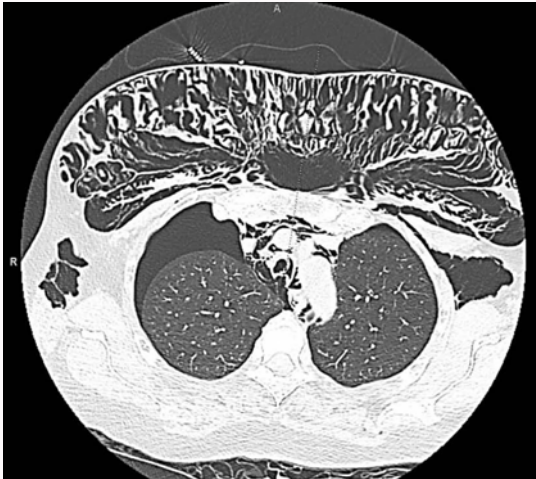


Figure 1: CT chest showing moderate right and trace left pneumothoraces, extensive pneumomediastinum in the chest and tracking into the neck and severe subcutaneous emphysema in the chest wall bilaterally tracks into the neck and bilateral axilla.

diagnostic utility to diagnose pneumothorax. CT scan is more sensitive for small pneumothoraces and pneumomediastinum especially with subcutaneous emphysema. Prompt decompression of both pleural spaces with tube thoracostomy is frequently needed for clinically significant pneumothorax. Mechanical ventilation can also be challenging in the presence of severe airflow obstruction with associated intrinsic positive end expiratory pressure. The concurrence of bilateral pneumothorax, pneumomediastinum, subcutaneous emphysema, and asthma is rarely observed, it may obviously progress to death. These complications should be considered in the differential diagnosis. Misdiagnosis and delayed treatment can lead to tension pneumothorax and death [6]. The clinician's suspicion is the most important starting point in the diagnosis, and a timely diagnosis and the appropriate treatment may prevent mortality and morbidity [3]. PM and SBPT have been reported in the literature separately but a combination of PM, SBPT and subcutaneous emphysema have been rarely reported. In our review we could find only two such case reports both indifferent situations [1,7]. SBPT is also frequently related to chronic obstructive pulmonary disease [8]. There are studies showing that this complication is more frequent in males [9] as in our case.

Learning Points/Results

Severe asthma exacerbation can have life threatening complication of PM, pneumothorax and subcutaneous emphysema and these can

happen concurrently. These should be kept in mind as differential diagnoses for patients who have having worsening hypoxia. Extremely high airway pressures measured through the ventilator circuit should trigger consideration of these complications in patients with airway disease such as asthma and COPD. Immediate diagnosis and intervention is needed to improve patient's outcome. Misdiagnosis and delayed treatment can lead to tension pneumothorax, and the patient's death. Chest X ray and physical exam can be of little help when subcutaneous emphysema develops. CT chest would be test of diagnosis. Urgent decompression with chest thoracostomy tube is indicated for clinically significant pneumothorax.

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