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Case Report
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Spontaneous Pneumomediastinum Complicating Severe Asthma Exacerbation

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Abstract

Pneumomediastinum also known as mediastinal emphysema is a rare entity, characterised by presence of air in the mediastinal tissues. Although this condition is rare, in literature it has been described patients with severe asthma exacerbation can produce enough increase in intrathoracic pressure to produce this rare complication. Like pneumothorax, pneumomediastinum can be classified as spontaneous or secondary. In this case report we describe a young male patient with spontaneous pneumomediastinum (SPM) who presented to our emergency department in acute asthmatic attack with severe shortness of breath, chest tightness and pain, productive cough, wheezing and pain & swelling of base and right side of neck. Chest X-Ray and non-contrast CT confirmed diagnosis of SPM with subcutaneous emphysema (SE) of neck. The patient was managed conservatively without any surgical intervention and discharged on day 4 after complete resolution of SPM and SE of neck.

Keywords: *Spontaneous pneumomediastinum (SPM); Subcutaneous emphysema (SE)*

Introduction

Spontaneous pneumomediastinum (SPM) refers to presence of extra luminal air in the mediastinum in patients without obvious causative factors like previous surgery, thoracic trauma or any medical procedure causing viscous perforation. Patients with acute asthma exacerbation with severe bouts of coughing can sometimes produce abnormal increase in alveolar pressure leads to rupture of alveoli and leakage of air into the mediastinum. The air can tracks along the subcutaneous tissues to anterior chest wall and neck producing subcutaneous emphysema (SE). SPM is an uncommon condition. Clinical experts report SPM occurs predominantly in young male patients aged between 15-34 years. In our case study the patient was a 27 years old male known case of intermittent asthma not on any maintenance therapy presented with acute infective exacerbation of asthma found to have SPM with SE on clinical examination and chest imaging.

Case Report

A 27 years old male patient known case of intermittent asthma, not on any regular maintenance therapy presented to our Emergency Department (ED) with two days history of worsening cough with sputum, increasing shortness of breath, chest pain and tightness, diffuse wheezing with sharp right lower neck pain, swelling and decrease range of motion. He was not a smoker with no other medical or surgical past history and denied taking any illicit drug. He had never been hospitalised before for his asthma exacerbation, but last year he visited ED twice for his increase asthma symptoms and discharged from there after receiving bronchodilator nebulisation and oral corticosteroid. This time he was in acute respiratory distress with vital signs of oxygen saturation 93% on room air, heart rate 110 beats per min, respiratory rate 30 beats per min, blood pressure 122/58 mm Hg and temperature 370C. On physical exam, there was a palpable crepitus present in his right lower neck with bilateral diffuse ronchi all over chest as well as a positive Hamman's sign on cardiac auscultation. The patient was immediately connected to oxygen and blood samples were taken for routine tests including

blood gas analysis. A Chest X- Ray was performed that showed sharp lines of increased lucency along left heart border suggestive of pneumomediatinum in his left heart border as well as SE in his right lower neck (Figure1). The patient was managed in ED with bronchodilator nebulisation, intravenous corticosteroid and oxygen inhalation. After stabilising the patient a non-contrast CT Chest and Neck was performed to confirm pneumomediastinum and SE and to rule out underlying lung pathology (Figure 2, 3). The patient was admitted in intensive care unit for further care and management. He was put on bronchodilator nebulization, systemic corticosteroid as per latest clinical guidelines. Initially he received high flow oxygen which was titrated according to saturation and eventually completely weaned off. His cough, chest pain, shortness of breath, and neck pain significantly improved. We discharged the patient on day four with maintenance inhaled corticosteroid therapy along with a course of oral corticosteroid. He was given an outpatient chest medicine follow- up after five days.

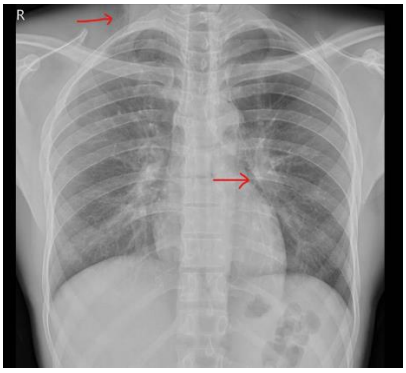

Figure 1: *Plain chest radiograph demonstrating pneumomediastinum (sharp line of increased lucency outlining left heart border - lower arrow) and subcutaneous emphysema (increased lucency visualized in right lower neck - upper arrow).*

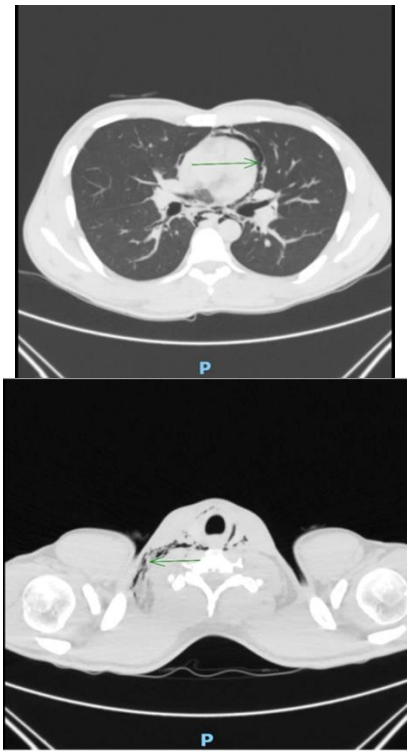

Figure 2 & 3: *Non- contrast CT of the chest and neck demonstrating pneumomediasinum, presence of sharp lines of increased lucency within the mediastinum(marked with green arrow) and subcutaneous emphysema (hypodense gas denoted by green arrow).*

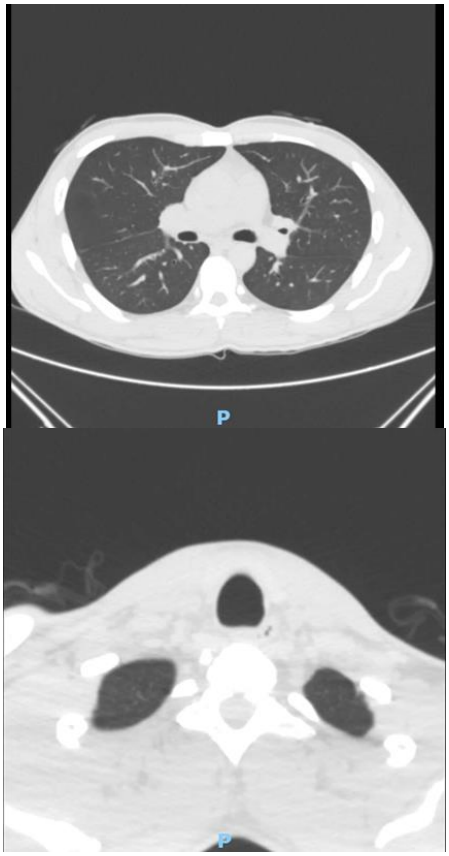

Figure 4 & 5: *Post resolution Thoracic CT scan images.*

Discussion

The present case highlights an uncommon complication of an acute asthma exacerbation. In severe asthma, pneumomediastinum and SE develop because of over dilatation of the distal airways due to the obstruction in the small airways causing abnormal rise in intra-alveolar pressure with severe coughing and deep forced full inspiration leading to alveolar rupture. Because of the intrathoracic pressure difference, the free air tracks from ruptured alveoli along peribronchial vascular sheaths toward the hilum of the lung. From there it extends proximally to enter mediastinal, subcutaneous, retropharyngeal, retroperitoneal, and even epidural areas. In our patient, air tracked from ruptured alveoli into mediastinal and subcutaneous structures in the neck. Other conditions like tracheal, bronchial or

esophageal rupture in association with chest trauma, iatrogenic injury, esophageal perforation (Boerhaave syndrome), the Valsalva maneuver (during child birth), positive pressure ventilation, barotrauma (diving, intubation), recreational drugs like cocaine inhalation, COPD, and interstitial lung disease have been described to cause pneumomediastinum [1-3]. Overall, SPM is a rare condition. Experts reported an incidence of 1 in 25000 with a male preponderance of 76% [4]. In pneumomediastinum the most common presenting symptom is central chest pain (60-100%) [4] Which is sudden and acute, usually retrosternal radiating to the neck or to the back [5,6]. Other frequent symptoms include severe dyspnea, cough, neck pain, hoarseness, emesis or dysphagia (if esophageal pathology). On physical examination, subcutaneous emphysema is frequently palpable in the neck. Pulsus paradoxus has been described in the absence of asthma. The normal area of cardiac dullness to percussion may be diminished [7,8]. Hamman's sign, mediastinal crunch or click heard on auscultation over the cardiac apex and the left sternal border synchronous with the heart beat is present on around 50% [9]. On rare occasions sufficient air under tension surrounds the heart to cause cardiac tamponade with signs and symptoms of increased breathlessness, cyanosis and hypotension. Presence of fever, sepsis, pleural effusion or empyema warrants secondary pneumomediastinum due to esophageal rupture, which can be detected by methylene dye test. Sometimes air from the rupture alveoli track to the visceral pleural leading to formation of sub pleural bullae, which can rupture and lead to secondary pneumothorax. The diagnosis of SPM is usually established with a plain chest radiograph showing lucent streaks, bubbles of air outlining mediastinal structures. In reported series Chest X-Ray can yield a diagnosis in almost 90% of cases [10]. Non-contrast CT scan chest confirm the diagnosis of SPM and SE in suspicious cases with an inconclusive chest X-ray. It also identify causative factors or secondary pathologies and helps in identifying missed pneumothorax in plain chest radiograph. In SPM; bronchoscopy, esophagoscopy or esophagography are not routinely required, unless an underlying pathology is suspected. SPM is generally a benign and self-limiting condition with good prognosis that responds to conservative therapy. High concentration of oxygen helps to absorb air quickly. Resolution of pneumomediastinum is usually achieved within two to five days in most asthma patients if treated with bronchodilators, systemic steroid oxygen therapy and other supportive care. Our patient responded well to the conservative treatment given. He was discharged on day four and asked to follow up in OPD after 5 days.

Conclusion

- This report demonstrate a case of SPM and SE as a complication of an asthma exacerbation, although rare yet important complication to keep in mind in these patients.
- Although these complications usually resolve with good asthma control and other supportive management, there is recurrence rate of 5%-10%.
- There is also the risk of spontaneous primary pneumothorax in SPM, so a high index of suspicion is warranted in asthmatic patients who present with chest, neck, and throat pain, along with severe dyspnea not responding to medical therapy.

Additional Information

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