

Case Report

Pneumomediastinum and Subcutaneous Emphysema Complicating Acute Exacerbation of Bronchial Asthma

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Introduction

Pneumomediastinum otherwise known as mediastinal emphysema refers to the presence of air within the mediastinum while subcutaneous emphysema refers to the presence of air in the subcutaneous tissue and this may involve the face, neck or trunk [1]. The term, pneumomediastinum, was introduced into medical literature by Hamman in 1939 [2]. Both conditions are relatively uncommon but important complications of bronchial asthma. The first definitive case of asthma complicated by subcutaneous emphysema was reported in a child in 1850 even though Laennec, as early as 1819, had recognized symptoms and signs of subcutaneous emphysema [3]. Extravasations of air in extra-pulmonary tissues may also manifest as pneumopericardium or pneumothorax and may as well complicate, apart from asthma, perforation or rupture of oesophagus (Boerhaaves syndrome), rupture of trachea or main bronchi, or conditions resulting in raised intrathoracic pressure [Valsalva manoeuvre as in vaginal delivery, weight lifting, vomiting, strenuous exercise], following paraquat intoxication, dental procedures, blunt or penetrating trauma or soft tissue infection. It may also complicate gastrointestinal instrumentation such as endoscopy, colonoscopy and laparoscopic surgery [4].

We present an index case of pneumomediastinum and subcutaneous emphysema complicating an acute exacerbation of asthma in a young male Nigerian in order to sensitize clinicians about the occurrence of this rare complication of bronchial asthma in our environment. The pathophysiologic mechanisms and treatment approach are also reviewed in the light of current literature.

Case Report

A 21 year old male Nigerian student and a known asthmatic presented to the Emergency Department of Federal Medical Centre, Abeokuta, southwestern Nigeria with a 10 hour history of cough productive of whitish sputum, increasing difficulty with breathing, wheezing and neck pain. He was diagnosed asthmatic at the age of eleven and had been admitted on a few occasions for acute exacerbations in the prior ten years. He had salbutamol tablets regularly.

At this index presentation, he was noted to have subcutaneous swelling and crepitus over the neck and upper anterior chest region, bilateral and polyphonic rhonchi with prolonged expiratory phase. He had a respiratory rate of 36 cycles per minute, pulse rate of 120 beats per minute and a blood pressure of 120/80mmHg. Other systems were essentially normal. The chest radiograph showed low set hemidiaphragms and bilateral basal emphysema in keeping with the known asthmatic state. In addition, there was a linear lucency in the region of the left border of the heart as well as areas of lucency in the subcutaneous tissue of the neck and region of the left side of the chest wall respectively (see figure 1A and 1B).

Laboratory findings including electrolyte levels were within normal limits.

On the basis of the history, examination and radiological findings, a diagnosis of acute exacerbation of bronchial asthma with pneumomediastinum and subcutaneous emphysema was made.

He was admitted into the male medical ward and treatment offered included administration of salbutamol inhaler, parenteral hydrocortisone, aminophylline and augmenting as well as humidified oxygen by nasal prongs. He made remarkable improvement with resolution of the initial symptoms about 48 hours after admission. He was discharged after 5 days of admission on seretide inhaler and remained in stable clinical state thereafter.

Discussion

Subcutaneous emphysema is a rare complication of acute severe asthma that may occur in association with spontaneous pneumomediastinum, pneumopericardium or pneumoperitoneum. Spontaneous pneumomediastinum arises as a result of sudden rise in intra-alveolar pressure (asthma, Valsalva manoeuvre, 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. The itinerant molecules of air may get to the pleural, pericardial, peritoneal space or the soft tissues of the face, neck or upper

trunk causing subcutaneous cervico-facial emphysema. This escape of air out of the alveolar spaces results in ventilation-perfusion mismatch and consequent abnormality of oxygenation of arterial blood. Other causes of extravasations of air into extra-pulmonary structures include rapid ascent to the water surface after diving, dental extraction, adenoid-tonsillectomies, trombone playing, bowel perforation, paraquat intoxication, arthroscopy and strangulation of the neck from hanging [4,5,6].

Whereas subcutaneous emphysema causes crepitus on palpation of the affected body region, pneumomediastinum characteristically gives a positive Hamman sign (crunching or clicking noise heard synchronously with the heart beat on auscultation and best heard in the left lateral decubitus position) when it is clinically significant [2]. In this index case, there were clinical and radiological evidence for the subcutaneous emphysema but only a radiological evidence for the pneumomediastinum. The symptom of neck pain in this patient is an unusual presentation. Newcomb and Clarke similarly reported neck pain in 2 of 18 patients with spontaneous pneumothorax [7]. It may be due to similar presence of extra-vasated air in the epidural space [8].

Management of this condition is largely conservative. However, administration of high concentration of oxygen may enhance faster absorption of air from extra-pulmonary tissues while needle aspiration and/or surgical decompression may be useful if mediastinal structures are compressed [2,9].

Conclusion

Extra-pulmonary extravasations of air manifested as subcutaneous emphysema and pneumomediastinum in this index case constitute a rare but very important complication of acute exacerbation of bronchial asthma and which is amenable to conservative management. This case report raises awareness of its occurrence in Nigerian Africans in order to enhance a high index of suspicion and appropriate management in the emergency room.

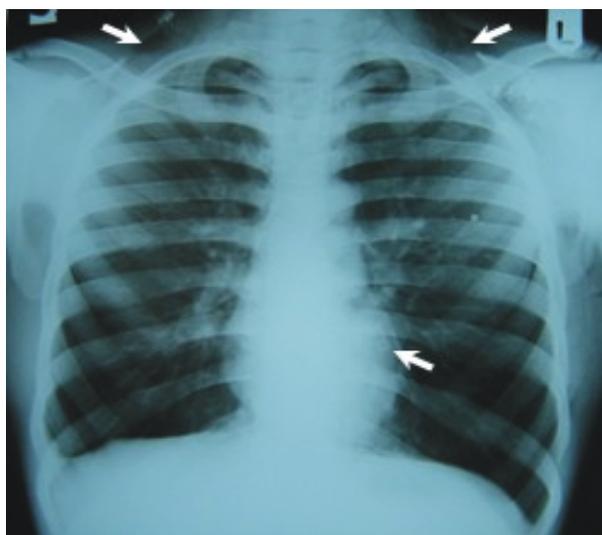


Figure 1A: Plain chest radiograph demonstrating pneumomediastinum (linear lucency in the region of the left border of the heart).

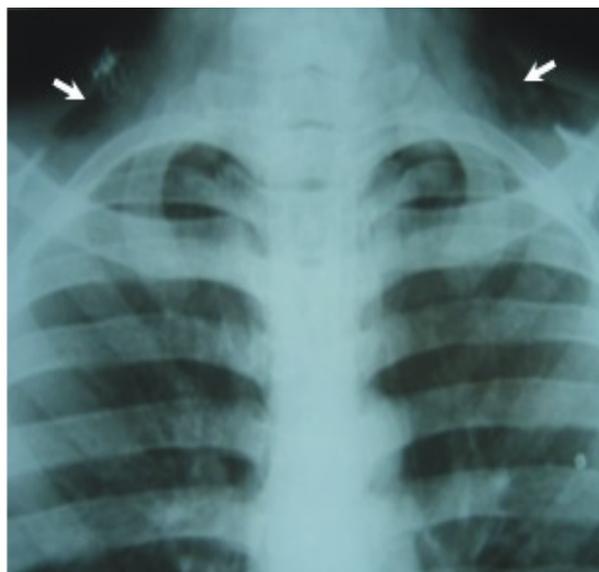


Figure 1B: Plain chest radiograph demonstrating subcutaneous emphysema in the lower region of the neck.

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