

Bilateral Pneumothorax, Subcutaneous Emphysema, Pneumomediastinum and Pneumopericardium Complicating an Asthma Attack: A Case Report

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Received: January 30, 2020; **Published:** February 25, 2020

Abstract

The association of a pneumothorax a pneumomediastinum, a pneumopericardium and subcutaneous emphysema is a rare complication of asthma. The main clinical signs are dyspnea and the perception of subcutaneous emphysema. This usually benign association requires a symptomatic treatment and monitoring. We report the case of a 19-year-old asthmatic female patient who presented to the emergency department with an acute shortness of breath and puffiness of the chest triggered by sneezing. The chest computed tomography (CT) confirmed the diagnosis of pneumothorax, pneumomediastinum, pneumopericardium and subcutaneous emphysema. The immediate treatment consisted of a thoracic tube for then days. The follow-up was good and the patient was discharged with an adapted treatment of her asthma.

Keywords: *Subcutaneous Emphysema; Pneumothorax; Pneumomediastinum; Pneumopericardium; Asthma*

Introduction

Pneumothorax, pneumomediastinum, pneumopericardium and subcutaneous emphysema are all known complications of thoracic traumatism, inhalation of foreign bodies or asthma attacks. The association of all of them at the same time is a rare condition which can be fatal if not managed rapidly. We report the case of the association of a spontaneous subcutaneous emphysema pneumomediastinum, pneumopericardium and bilateral pneumothorax complicating an asthma attack.

Patient and Observation

A 19-year-old female patient with familial atopy and a medical history of allergic rhino-conjunctivitis was admitted to the emergency department with acute respiratory failure. The beginning of the symptoms goes back to 2 days prior to her admission after a massive exposure to house dust. The patient presented an abrupt installation of an episode of sneezing, rhinorrhea and nasal obstruction associated to a nocturnal spasmodic cough. She also had thoracic oppression, wheezing and expiratory dyspnea. The evolution was marked by the appearance of cervical swelling, following an effort of sneezing. The swelling rapidly increased reaching the anterior chest wall. The clinical examination found a respiratory rate at 24 cycles per minute, a heart rate at 86 beats per minute, oxygen saturation at 95%. Crackling-feel was found to the touch of the lower cervical region as well as the upper anterior region of the chest related to subcutaneous emphysema. Pulmonary auscultation found bilateral wheezing. The chest radiograph showed a left apical pneumothorax with gas surrounding the heart related to a pneumopericardium and a sign of continuous diaphragm related to a pneumomediastinum, and soft tissue cleavage related to subcutaneous emphysema (Figure 1).



Figure 1: Chest X-ray shows left apical pneumothorax with gas around the heart and linear gas outlining the mediastinum, associated to subcutaneous emphysema.

The chest CT scan showed a bilateral pneumothorax predominant on the left with pneumomediastinum, pneumopericardium and subcutaneous emphysema (Figure 2).

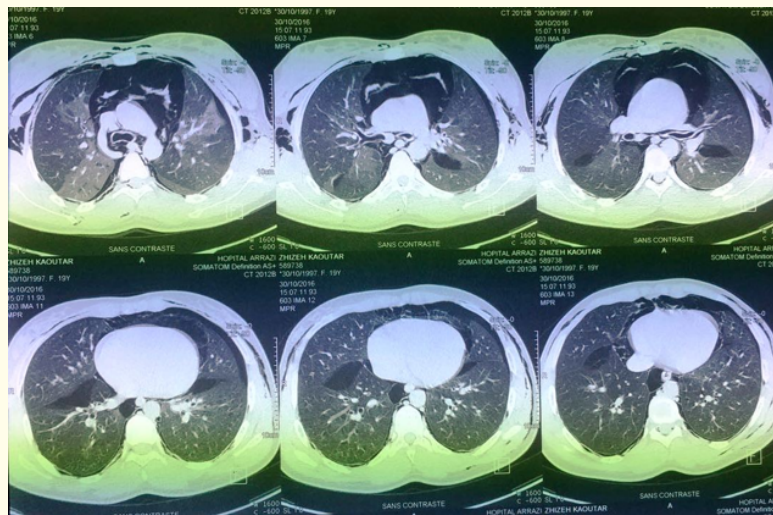


Figure 2: Chest CT scan showing a bilateral pneumothorax with pneumomediastinum, pneumopericardium and subcutaneous emphysema.

A chest tube (an 18 F Joly drain) with continuous aspiration was put in the 4th left intercostal space (Figure 3). In addition to rest and oxygen therapy, the patient was put under β_2 adrenergic, oral corticosteroids 60 mg/day, combination of long acting β_2 adrenergic and inhaled corticosteroids, nasal corticosteroids and analgesic treatment.



Figure 3: Thoracic tube in the 4th intercostal space.

The clinical and radiological follow-up (Figure 4) was good with a complete disappearance of the wheezing, the subcutaneous emphysema, the pneumomediastinum, the pneumothorax and the pneumopericardium within 10 days following the patient's admission in our department.

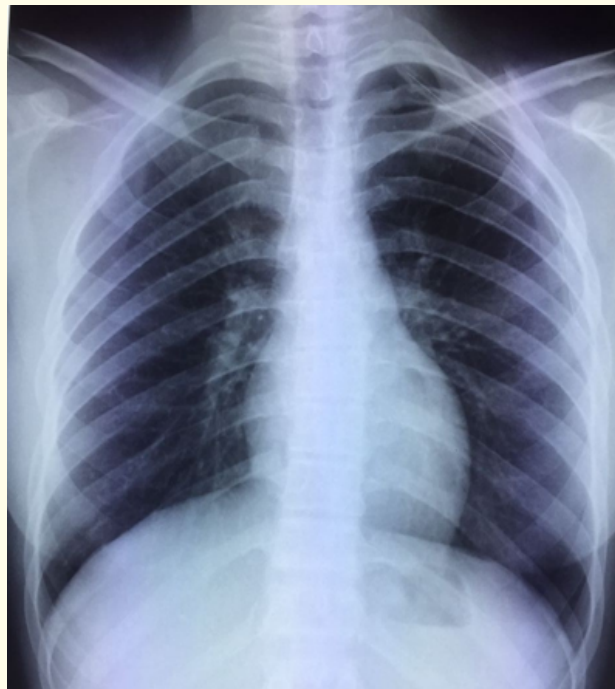


Figure 4: Regression of subcutaneous emphysema, pneumomediastinum, pneumopericardium and pneumothorax.

Discussion

Separately, pneumomediastinum, pneumopericardium and pneumothorax are a known complications of asthma attacks. The association of all of them at the same time is a condition that has not been described frequently in the literature. Spontaneous pneumomediastinum, most often abrupt in onset, is preferentially found in young adult males with a slender morphotype [2].

The clinical presentation varies according to the intensity and chronicity of the air leak. The key sign to the diagnosis at the physical examination is subcutaneous emphysema. It is usually localized on the left side of the thorax and the anterior cervical region. The clinical exam may also find the pathognomonic Hamman's sign of pneumomediastinum which is a crunching, rasping sound, synchronous with the heartbeat [1] and the pathognomonic water mill sound of a pneumopericardium described in 1844 by Bricheteau [3]. In this condition, it is crucial to look for signs of hemodynamic or circulatory failure. In our case, the clinical examination found a hemodynamically stable patient with a positive Hamman sign.

The chest X-ray is usually sufficient to confirm the subcutaneous emphysema by showing the presence of gas in the soft tissues, which should be looked for carefully, especially in the supraclavicular fossa. It can also reveal a pleural detachment suggestive of a pneumothorax, a clear border molding the mediastinal silhouette indicating the presence of a pneumomediastinum or a thin gas border that highlights the cardiac contours indicating the presence of a pneumopericardium [3]. Our patient's chest X-ray showed subcutaneous emphysema in the upper chest and neck, associated with pneumothorax, pneumomediastinum and pneumopericardium.

The particularity of our observation is the associated pneumopericardium. It is a rare condition which origin is most often traumatic, iatrogenic or infectious. There are a few rare cases of spontaneous pneumopericardium where no etiology has been found [3]. It may be completely asymptomatic and its imagery inconclusive as in our case. Rarely, the pneumopericardium may cause some degree of compression, which may lead to a tamponade [3].

The natural progression leads towards a recovery during the following 48 to 96 hours with complete disappearance of the clinical and radiological signs. Complications are exceptional, however cases of compressive pneumomediastinum with a tamponade requiring surgical drainage have been described [1]. The therapeutic management of our patient consisted of thoracic drainage by an 18F Joly drain in the 4th left intercostal space with continuous suction, strict rest, oxygen therapy at 6 l/min and medical treatment. The clinical and radiological follow-up was good with disappearance of the wheezing, the subcutaneous emphysema, the pneumomediastinum, the pneumothorax and the pneumopericardium in during the 10 days following the patient's admission.

The pathophysiology behind this condition is poorly defined and the most often reported hypothesis in the literature is that of endobronchial hyper-pressure with a closed glottis [1]. A pressure gradient occurs during hyperpressure phenomena in the alveoli close to the vascular septas on the periphery of the lobules (Macklin effect). Their rupture causes interstitial emphysema which travels along the septas, reaching the mediastinum via the hilum and/or the triangular ligament and then the cervical subcutaneous, pericardial or retroperitoneal spaces. The triggering factors are Valsalva maneuvers, coughing, parturition, vomiting efforts, asthma attacks, physical exercise, cocaine inhalation, chemotherapy (Bleomycin) and diabetic keto-acidosis [4]. In our patient's case, the asthma attack and the sneezing effort were incriminated in the occurrence of the pneumomediastinum in our patient. However, cases of compressive pneumomediastinum with tamponade board requiring surgical drainage have been described [5].

Conclusion

The association of a pneumomediastinum, a pneumopericardium and a pneumothorax during an asthma attack is a very rarely described condition. The clinical examination and chest X-ray most often provide the diagnosis. The treatment approved by most authors is based on a medical treatment that is strictly symptomatic with a usually good clinical and radiological follow-up.

Conflicts of Interest

The authors do not declare any conflict of interest.

Author's Contributions

All authors contributed to the conduct of this work and to the writing of the manuscript. All authors have read and approved the final version of the manuscript.

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Volume 9 Issue 3 March 2020

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