Annals of Clinical and Medical Case Reports®

Case Report

ISSN 2639-8109 | Volume 14

Spontaneous Pneumomediastinum As A Rare Presentation of Diabetes: A Case Report

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Received: 10 Nov 2024
Accepted: 19 Dec 2024
Published: 26 Dec 2024
J Short Name: ACMCR

Keywords:

Pneumomediastinum; Pneumorrhachis; Subcutaneous emphysema; Diabetes

Citation:

Youssef Motiaa, Spontaneous Pneumomediastinum As A Rare Presentation of Diabetes: A Case Report. Ann Clin Med Case Rep® 2024; V14(11): 1-3

1. Abstract

Spontaneous pneumomediastinum is a rare condition characterized by the presence of air in the mediastinum in the absence of any traumatic or iatrogenic cause, typically occurring in healthy, non-pathological lungs. Vomiting is described as a triggering factor, with sudden intra-bronchial hyperpressure due to Valsalva maneuvers being the most commonly reported hypothesis. This case report describes an atypical complication of diabetic ketoacidosis, revealing previously undiagnosed diabetes through spontaneous pneumomediastinum as the mode of presentation. A young patient with a history of cocaine use presented with intractable vomiting and severe epigastric pain. Upon admission, the patient had tachypnea, dyspnoea, and tachycardia. A CT scan revealed interstitial emphysema with pneumomediastinum, pneumorrhachis, and subcutaneous emphysema. The patient was managed conservatively, with fluid replacement, insulin therapy, resulting in a significant improvement in his condition.

2. Introduction

Spontaneous pneumomediastinum is a rare condition [1] characterised by the presence of mediastinal emphysema in a healthy lung, in the absence of traumatic or iatrogenic cause. Vomiting has been identified as a potential trigger, although the exact mechanism remains unclear. The most commonly reported hypothesis, is the sudden intra-bronchial hyperpressure with a closed glottis, often resulting from Valsalva maneuvers. The prognosis is generally favorable [1]. Differentiating between primary and secondary causes of pneumomediastinum can be challenging for clinicians. The ideal approach involves ruling out secondary causes, such as Boerhaave syndrome. This rare complication of Diabetic KetoAcidosis (DKA) [2] was first described by Hamman in 1937 [3]. In this case, the authors report an unusual complication of diabetic ketoacidosis in a patient with previously undiagnosed Diabetes Mellitus.

3. Case Report

We present the case of a a 23-year-old patient with a history of cocaine use, who was admitted to the emergency department with persistent vomiting and severe epigastric pain. He had no other significant medical history. On admission, he was tachypneic with a respiratory rate of 32 breaths per minute, with an oxygen saturation of 98% on room air. He had a clear Kussmaul breathing. Chest examination revealed a long-shaped thorax and cervical crepitus. Hemodynamically, he had a blood pressure of 80/50 mmHg and a heart rate of 88 bpm. He was alert and oriented with no sensory or motor deficits. Laboratory tests showed elevated blood glucose levels and urine dipstick analysis revealed ketonuria, confirming the diagnosis of diabetic ketoacidosis (DKA). Further laboratory results showed leukocytosis 26,340/mm^3, high neutrophil count 23,522/mm^3, a C-reactive protein (CRP) level of 49 mg/L, and elevated lipase at 363 U/L. A CT Chest and Abdomen (Figure 1) showed interstitial emphysema associated with pneumomediasti-

num (A), pneumorrhachis (B), and subcutaneous emphysema (C). The patient was admitted to the Intensive Care Unit (ICU), he was started on treatment for DKA with intravenous fluids and insulin therapy, along with treatment for acute pancreatitis. The clinical course was marked by improvement, with correction of blood glucose levels and resolution of ketonuria. He was discharged from ICU after a 4-day admission.

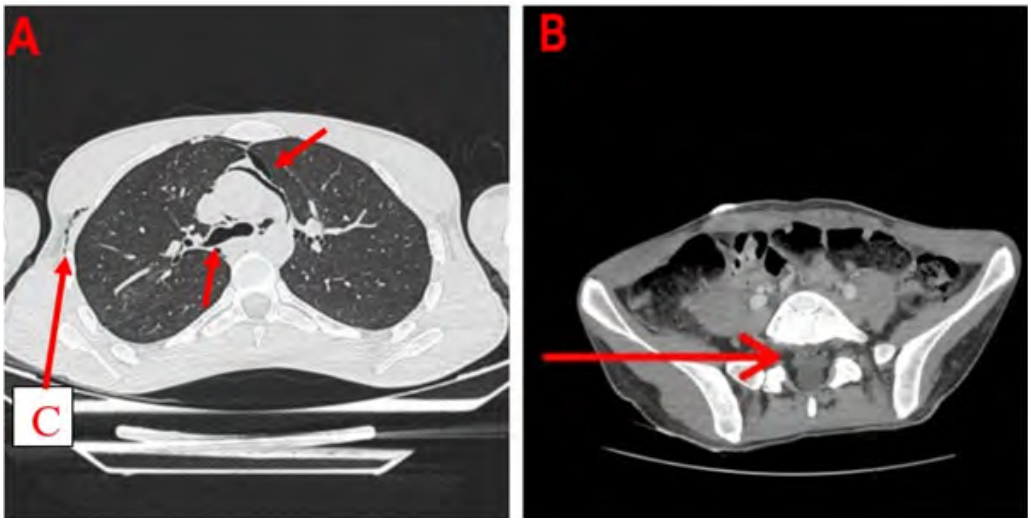

Figure 1: computed tomography showing a pneumomediastinum (A), with subcutaneous emphysema (C) and pneumorrhachis (B).

4. Discussion

Spontaneous pneumomediastinum is a rare condition [4] with a pathophysiological mechanism based on the Macklin effect [1]. It involves alveolar rupture due to a sudden increase in intrabronchial pressure from Valsalva maneuvers, creating a pressure gradient between the alveolar and interstitial spaces of the lung. When this alveolar rupture occurs in a pulmonary area near the hilum, air can travel along the septa to the mediastinum, resulting in pneumomediastinum. Alternatively, air may travel through the visceral pleura leading to pneumothorax, or spread to the submandibular and retropharyngeal spaces through the neural foramen to the epidural space, resulting in pneumorrhachis; a very rare complication first described in 1994 [5]. The relationship between spontaneous pneumomediastinum and diabetes remains unclear. It may be related to persistent vomiting associated with DKA, tachypnea due to acidosis, or a combination of both, which may increase the risk of pneumomediastinum [6]. Symptoms are usually benign [7], presenting as dyspnea in 26% to 58% of cases, cervical pain or odynophagia in about a quarter of patients, and subcutaneous emphysema in 42% to 68% of patients [7]. These symptoms often follow episodes of intrathoracic hyperpressure, such as impulsive coughing, intractable vomiting, defecation efforts, closed-glottis effort during labor, cocaine inhalation, or diabetic ketoacidosis. It is most commonly seen in young patients with type 1 diabetes, on insulin, with a mean age of 20 years (71%) and a male predominance [8]. This male predominance is likely due to differences in muscle mass, which may contribute to greater intrathoracic pressure in men. In cases of spontaneous pneumomediastinum associated with intractable vomiting, Boerhaave syndrome a spontaneous transmural rupture of the oesophagus should be excluded. The prognosis of spontaneous pneumomediastinum is generally favorable. Clinical examination may reveal Hamman's sign in 30% of patients [9]; a precordial crackling sound synchronous with the cardiac cycle. Hypoxia is usually not present despite dyspnea. Diagnosis is confirmed via chest X-ray. CT of the Chest confirms the diagnosis and can identify other potential air leaks such as pneumothorax, pneumorrhachis, pneumopericardium. In our case, subcutaneous emphysema was the initial manifestation of diabetes following intractable vomiting due to increased intrathoracic pressure. However, the patient also had another risk factor for spontaneous pneumomediastinum; the cocaine use. Typically, the causal relationship is suggested by a short interval between cocaine use and the onset of pneumomediastinum (a few seconds to a few hours) [10]. In our case however, cocaine use occured two days prior to symptoms which does not align with the typical timeframe.

Management of spontaneous pneumomediastinum includes rest and analgesia, with fraction of inspired oxygen (100% FiO2) to promote faster absorption of the air via the "nitrogen washout" mechanism [11]. Addressing any underlying factors is important. Antibiotic therapy is not recommended in the absence of pulmonary infection or mediastinitis. Radiological monitoring is not necessary, close clinical follow-up is sufficient. The prognosis is often favorable, but persistent symptoms or lack of improvement should raise the suspicion of esophageal rupture, and prompt further examinations such as esophagoscopy or bronchoscopy.

5. Conclusion

The presence of respiratory abnormalities in a patient who is vomiting should prompt investigation for possible alveolar rupture, which can present as pneumomediastinum, pneumopericardium,

or pneumorrhachis. The aetiological workup aims to rule out a primary cause, particularly esophageal rupture. Generally, the prognosis is favorable when these conditions are promptly addressed.

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