

Air in the Chest: An Uncommon Cause of Pneumomediastinum

Hritani R^{1*}, Zaghlo R¹, Abidian MM¹ and Memoli JSW²

¹Department of Internal Medicine, Medstar Georgetown University Hospital Medstar, Washington Hospital Center, USA

²Department of Internal Medicine, Section of Pulmonary, Critical Care, and Respiratory Services, Medstar Washington Hospital Center, USA

Abstract

Introduction: Spontaneous pneumomediastinum (SPM) is air in the mediastinum that is not related to trauma, surgery, or other medical procedures. Some unusual causes have been reported which are important to highlight when more common causes are excluded.

Case report: A 34-year-old male with HIV admitted to the MICU for management of metabolic encephalopathy and acute kidney injury (AKI) in the setting of sepsis. His vitals were normal, and his oxygen saturation was 98% on room air. Head computed tomography (CT) was negative but showed evidence of retropharyngeal soft tissue gas that might be extending from the chest. Chest x-ray showed pneumomediastinum and subcutaneous emphysema in the axillary regions. A CT of the chest and neck confirmed the findings. Contrast-enhanced esophagram and esophagogastroduodenoscopy (EGD) ruled out esophageal perforation. Upper airways were intact by fiberoptic laryngoscopy exam. He was managed conservatively. Patient remained hemodynamically stable with stable respiratory status. His mental status improved significantly with management of his sepsis. Upon further evaluation of his history, he admitted to drug abuse and his urine toxicology screen was positive for Amphetamines. His SPM was attributed to Amphetamines.

Discussion and conclusion: Amphetamines and some of their derivatives such as Ecstasy are common illicit drugs. Few cases have reported the possible relation between SPM attributed to Amphetamines or Ecstasy. Effects can vary from asymptomatic pneumomediastinum to significant and potentially life-threatening complications. A suggested mechanism is airway necrosis due to vasoconstriction of airway wall vessels after local exposure through inhalation or aspiration. It can also be due to barotrauma after deep inhalation and breath holding. A high index of suspicion for illicit drug-induced SPM should be maintained in young, healthy patients without history of trauma. The chest radiograph is widely available and should be carefully reviewed in patients with recreational drug use.

Keywords: Ecstasy; Pneumomediastinum; Spontaneous

Introduction

Spontaneous pneumomediastinum (SPM) is defined as air in the mediastinum that is not related to trauma, surgery, or other medical procedures. It is usually precipitated by high intrathoracic pressure such as coughing spells, vomiting, labor or Valsalva maneuvers. Pulmonary disease and smoking may predispose individuals to this condition [1]. SPM is a rare reason for hospital admissions with estimated incidence rate of 1 per 3400 of emergency department visits [2]. We are reporting a unique case report of SPM induced by illicit drug intoxication after ruling out other possible causes. Only a few case reports in the medical literature highlighted such association with some interesting mechanisms suggested.

Case Study

A 34-year-old male with history of untreated HIV was brought into the hospital after he was found down with altered mental status and shortness of breath.

On presentation, his vitals were within normal limits including an oxygen saturation of 98% on room air. Initial labs were consistent with sepsis, ultimately attributed to Methicillin-sensitive *Staphylococcus aureus* (MSSA) bacteremia. He also had severe acute kidney injury (AKI) complicated by uremia and metabolic acidosis from rhabdomyolysis. Given his altered mental status and critical metabolic derangements, he was admitted to the intensive care unit (ICU) for close monitoring and further management.

Patient had a computed tomography of his head (CT) for altered mental status, which showed retropharyngeal soft tissue gas possibly extending from the chest, but no acute intracranial findings were noted. His chest x-ray showed hyperlucency in the mediastinum suggesting

pneumomediastinum as well as subcutaneous emphysema in the axillary regions (Figure 1). A CT of the chest and neck confirmed the diagnosis of large pneumomediastinum as seen on the x-ray (Figure 2).

Further work up with contrast-enhanced esophagram and esophagogastroduodenoscopy (EGD) showed no evidence of esophageal perforation. Upper airways examined by fiberoptic laryngoscopy deemed to be intact. Given the patient hemodynamic stability and no apparent source lesions identified on extensive work up, thoracic surgical intervention was unnecessary, and patient was treated with conservative management and close monitoring. Patient remained stable. His mental status improved significantly with management of his sepsis. His AKI and rhabdomyolysis resolved with fluid resuscitation without the need for hemodialysis. He had a transthoracic and transesophageal echocardiography which were negative for any vegetations from MSSA bacteremia. Patient was started on Fluconazole empirically for candidal esophagitis given his AIDS with CD4 count of 68.

Further history was obtained from the patient once he was more

***Corresponding author:** Hritani R, Department of Internal Medicine, Medstar Georgetown University Hospital Medstar, Washington Hospital Center, USA, Tel: +1-904-629-3253; E-mail: rama.hritani@gmail.com

Received October 21, 2018; **Accepted** October 29, 2018; **Published** October 31, 2018

Citation: Hritani R, Zaghlo R, Abidian MM, Memoli JSW (2018) Air in the Chest: An Uncommon Cause of Pneumomediastinum. J Clin Case Rep 8: 1184. doi: 10.4172/2165-7920.10001184

Copyright: © 2018 Hritani R, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

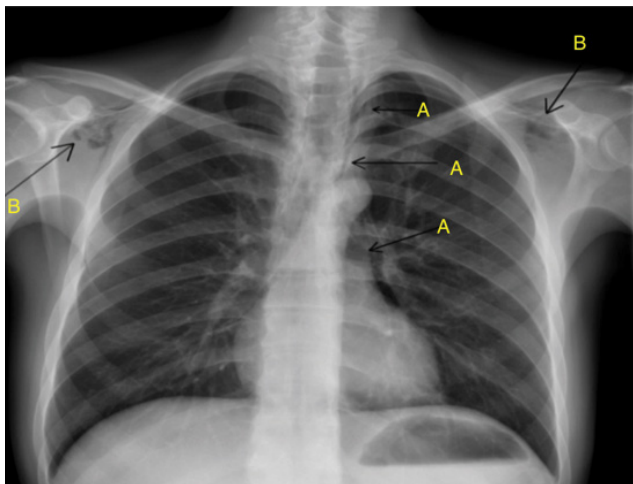


Figure 1: (A) Chest X-Ray showing pneumomediastinum; (B) Soft tissue gas in the axillary regions.

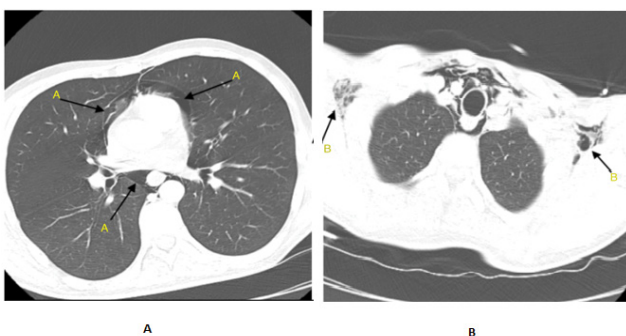


Figure 2: (A) Chest CT showing extensive pneumomediastinum; (B) Same chest CT with subcutaneous emphysema and without evidence of oesophageal perforation.

awake and alert. He admitted to using illicit drugs prior to presentation and denied any preceding trauma. His urine toxicology screen was positive for Amphetamines. Based on the abovementioned facts and unremarkable investigation results, a final diagnosis of spontaneous pneumomediastinum induced by Amphetamine was made. Unfortunately, patient decided to leave the hospital against medical advice a few days later and did not come back to the clinic for follow up. Of note, his vitals were stable on the discharge day.

Discussion

Pneumomediastinum occurs when excessive positive airway pressure causes over inflation and rupture of alveoli as well. Alveolar air subsequently dissects along a pressure gradient from the lung parenchyma into the mediastinum. This can occur during common situations such as asthma exacerbations or minor trauma. Symptoms include dyspnea, chest pain, or neck discomfort. Furthermore, crepitus or Hamman's sign are found on physical examination in most patients [3].

Amphetamines and some of their derivatives, such as Ecstasy (known as 3,4-methylenedioxy-methamphetamine [MDMA]) are common illicit drugs that are abused for their effects of euphoria and increased sense of well-being [4]. Some well-known side effects include psychosis, convulsions, cerebral infarction, coma, and death [4], which

are mostly due to overactivation of the central and sympathetic nervous systems [5].

Only a few cases have been reported showing the possible relation between spontaneous pneumomediastinum (SPM) caused by Amphetamines or Ecstasy use. Reported effects of amphetamines and MDMA vary from asymptomatic pneumomediastinum to significant and potentially life-threatening complications, including hyperpyrexia, rhabdomyolysis, hepatitis, ARDS, ketoacidosis, as well as disseminated intravascular coagulation resulting in acute renal failure [6-9]. Other cases have described severe airway necrosis and barotrauma after Ecstasy Inhalation resulting in acute pneumomediastinum and cardiac arrest [10].

Ecstasy can be crushed and snorted, and presumably this type of administration would increase the risk of pneumomediastinum because of the Valsalva manoeuvre involved [6]. A case of SPM was reported in a patient who was repeatedly blowing a whistle during an eight-hour dancing session [7].

A clear pathophysiology of how Amphetamines cause spontaneous pneumomediastinum remains unclear. It is unlikely a direct drug effect based on the known pharmacological effects of the drug. Some suggest that the mechanism could be a toxic effect of the "carrier" with which the drug is mixed. Given the illicit nature of this drug, the purity of the drug is known to differ widely [6].

Others have implicated airway necrosis due to vasoconstriction of airway wall vessels after local exposure through inhalation or aspiration of an acidic preparation containing the vasoconstrictor, MDMA [10]. A bronchoscopy was done in one case which showed extensive tracheal and bronchial inflammation, as well as necrosis without macroscopic airway rupture. Airway biopsies were done showing widespread necrosis, neutrophil infiltration, and crystals. The same crystals were also found in the bronchial aspirate and mini-bronchoalveolar lavage (BAL) fluid which though to be the carrier [10].

Usually surgical treatment is not necessary in patients with pneumomediastinum. In most cases, observation and monitoring are enough to evaluate spontaneous healing. Small pneumothoraces can resolve with oxygen therapy. However, when large pneumothoraces are detected, tube thoracostomy is mandatory to prevent tension pneumothorax [8]. In a review study published in *Annals of The Royal College of Surgeons of England*, they had a total of 56 patients presenting with pneumomediastinum who were identified over a 5-year period. Six of these patients had a history of ecstasy use in the hours prior to presentation. All of them were managed conservatively with resolution of their SPM [2]. Like our case, conservative treatment was adequate for healing.

Conclusion

Although SPM is mostly a self-limited condition, observation is necessary until the symptoms and radiographic changes improve. Other etiologies of SPM should be ruled out first especially when history of trauma is unknown. The history is always a key component in the diagnosis, especially in a young, healthy patient, as ecstasy abuse should be considered. As chest radiographs are widely accessible and mediastinal air is easily recognizable, the chest radiograph should be included and carefully reviewed in the diagnostic workup of patients with recreational drug use. Esophageal rupture or perforation should be excluded prior to deciding on conservative management, particularly in the setting of retching or increased abdominal pressure.

References

1. Macklin CC (1939) Transport of air along sheaths of pulmonic blood vessels from alveoli to mediastinum: Clinical implications. *Arch Intern Med* 64: 913-926.
2. Mihos P, Potaris K, Gakidis I, Mazaris E, Sarras E, et al. (2004) Sports-related spontaneous pneumomediastinum. *Ann Thorac Surg* 78: 983-986.
3. Stull BW (2008) Spontaneous pneumomediastinum following ecstasy ingestion and sexual intercourse. *Emerg Med J* 25: 113-114.
4. Mutlu H, Şilit E, Pekkaşali Z, Incedayi M, Başekim Ç, et al. (2005) "Ecstasy" (MDMA)-induced pneumomediastinum and epidural pneumatosis. *Diagnostic Interv Radiol* 11: 150.
5. Ricaurte GA, McCann UD (2005) Recognition and management of complications of new recreational drug use. *Lancet* 365: 2137-2145.
6. Marasco SF, Lim HK (2007) Ecstasy-associated pneumomediastinum. *Ann R Coll Surg Engl* 89: 389-393.
7. Pittman JA, Pounsford JC (1997) Spontaneous pneumomediastinum and ecstasy abuse. *J Accid Emerg Med* 14: 335-336.
8. Önal Ö, Hasdıraz L, Oğuzkaya F (2015) A rare cause of spontaneous pneumomediastinum: Ecstasy ingestion. *Turk Toraks Derg* 16: 198.
9. Yeşil O, Onur Ö, Güneysel Ö (2008) The danger we could not foresee: Extacy JAEM 4: 14-19.
10. Van Den Kerckhove E, Roosens L, Siozopoulou V, Verbrugghe W, Aerts J, et al. (2017) Airway necrosis and barotrauma after ecstasy inhalation. *Am J Respir Critical Care Med* 196: 105-106.