

Use of Electronic Cigarette or Vape Associated with Massive Hemoptysis: Case Report

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ABSTRACT

Vaping involves the use of a device to deliver aerosolized substances to the lungs, its popularity continues to increase; However, because it is a new drug delivery system, there is little evidence about its safety and long-term use. We present the case of a 37-year-old man, with a history of vaping with cannabis oil and tetrahydrocannabinol (THC), who presented with a hemoptoic cough. A diagnosis of lung injury associated with electronic cigarettes or vaping (EVALI) is made, visible by chest CT, as well as by angiotomography of the pulmonary arteries. The patient developed massive hemoptysis and hypovolemic shock, which made it necessary to perform a right lower lobectomy. There are reports in the literature associated with this case, however, no one was found that associated it with massive hemoptysis and/or the need to perform lobectomy.

Keywords: Electronic cigarette, E-cigarette, vaping, Massive hemoptysis, EVALI, lobectomy.

INTRODUCTION

An electronic cigarette is a battery-operated device that vaporizes a liquid solution in order to simulate smoking without burning tobacco (1).

Electronic cigarettes or vaping devices arrived in the United States in 2003 (1) and the United Kingdom market in 2007 and have since grown in popularity, now having 3.6 million users in the United Kingdom, this corresponds to approximately half of the conventional cigarette smokers (2).

Despite being believed to be safer than smoking, vaping poses significant health risks. The perception of its safety has led many non-smokers to start vaping (2), becoming prevalent in approximately 3.2% of the United States population, especially among young people.

In this report we talk about a review of the various publications that exist on vaping, to which severe cases of acute lung disease or VAPI have been attributed (1,3,4), highlighting that it is important to make this clinical case known. since it corresponds to another presentation of the disease, as it is massive hemoptysis and its management.

CLINICAL CASE

37-year-old male, with a positive smoking history of 2.5 packs/year, for the last 10 years, vaping nicotine and cannabis. He was admitted to the emergency room after two days of evolution with hemoptoic expectoration. Hemodynamically stable, admission laboratories showed leukocytes of $13.7 \times 10^3/\text{mL}$, neutrophils 76.7%, hemoglobin 16.4 g/dL, platelets $281 \times 10^3/\text{mL}$, negative cultures.

The chest CT on admission showed a ground-glass pattern in the right basal region (Figure 1, 2), with an apparent lesion in the lobar pulmonary artery, so an angiogram of the pulmonary arteries was performed, where the lobar pulmonary artery with tortuous dilations was evident in the right lower lobe. in its branches, which correspond to the bleeding site valued in Tac. The patient remained under medical management for 2 days, with subsequent massive hemoptysis (390 ml in one hour), with hemodynamic instability, so it was decided to transfer him to the operating room, performing right muscle-sparing thoracotomy, more than 60% were observed. of the parenchyma of the right lower lobe involved and color changes, extremely dilated right lower pulmonary vein 2.5cm in diameter, with bleeding of 2 liters that is not limited to transfixive stitches, so it was decided to perform lower lobectomy.



Figure 1: Chest CT.

The pathology report concluded diffuse alveolar damage associated with recent diffuse alveolar hemorrhage. no granulomas or vasculitis were observed.

On the fifth postoperative day, flexible bronchoscopy was performed, showing the bronchial tree, the upper lobe being patent, the intermediate bronchus with normal mucosa, the bronchus for the middle lobe with a decrease in lumen of approximately 50%, a healing area was seen without evidence of dehiscence of the stump or fistula., bronchial lavage was taken from the bronchus for the middle lobe, without evidence of relevant findings.

The patient progressed adequately in the following postoperative days, and it was decided to discharge him home on the tenth day.

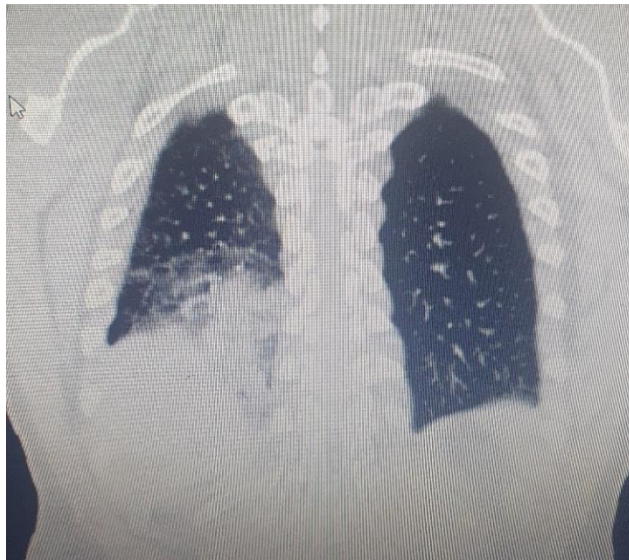


Figure 2: Chest CT. Ground-glass pattern in the right basal region.

DISCUSSION

Vaping, as mentioned above, has become very popular. Electronic cigarettes, also called e-cigarettes, use solutions presented in different flavors that contain nicotine, but there are also preparations of tetrahydrocannabinol (THC) oil, cannabis oil, butane hashish in oil, among others.

In 2018, nicotine or flavor vaping in a sample of eighth through twelfth grade students in the United States was 9.7% and 25%, respectively (3).

Analyzing the substances contained in electronic cigarettes, vitamin E oil was found to be one of the main substances, which is known as a cause of severe inflammatory reaction in the lung parenchyma when inhaled, another is diacetyl-2,3 butanedione that is used commonly in the food industry as a flavoring and is now being used as a flavoring in vaporizer cartridges (1).

It should be noted that the FDA approved the use of Diacetyl for gastrointestinal consumption, but there are no regulations for its use in inhaled tobacco or electronic cigarettes (1). Another liquid found in vaporizers is cobalt, which is known to cause giant cell interstitial pneumonitis (3).

Another theory is that the transfer of metal ions to the hot alloy coils in the devices within the vaping solutions may contribute to lung toxicity by causing thermal injury directly to the respiratory epithelium (1,5).

We found in the literature reports of acute lung disease that are attributed to the use of electronic cigarettes.

An example is reported by Evans in his article carried out in London (2021) with the case of a 38-year-old man, without comorbidities, with a history of increasing vaping with the intention of reducing cigarette consumption, around 10 ml per week of "totally wicked Red Label - blackcurrant" vaping oil, adding approximately 2 ml of oil to each serving. The patient presented with a headache, to which was added cough with frank hemoptysis and dyspnea. On medical examination, the patient was hypoxic with a need for supplemental oxygen, tachypneic, and on auscultation, thick crackles were most evident in the right hemithorax (2).

Similarly, a series of 53 cases of severe lung disease associated with vaping in the Wisconsin and Illinois Department of Health Services described 98% of patients with respiratory symptoms, 81% with gastrointestinal symptoms, and 100% of them with azithromycin), without notable improvement (1).

Another characteristic described corresponds to imaging studies, since it has been observed that chest CT mostly shows predominantly ground glass opacities, often with areas of lobar or subpleural preservation (1).

Given the increasing cases, the Center for Disease Control and Prevention (CDC) awarded the term "EVALI" to help doctors identify and report this condition; Leaving as the definition of a "confirmed case" the patient who reports use of electronic cigarettes and related products in the 90 days prior to symptoms, who presents pulmonary infiltrates in imaging studies and which cannot be attributed to another cause (6). The United Kingdom adopted a similar case definition but shortened the exposure to 30 days (3).

Likewise, the term "probable case" arises as a patient who, in addition to having confirmed case criteria, has an infection confirmed by culture or PCR but the presentation of the respiratory disease cannot be explained by said infection (6).

In January 2020, 2,668 cases were reported in the United States, with 60 deaths as a result of EVALI. The outbreak caused various lung diseases, including organizing pneumonia, diffuse alveolar damage and hypersensitive pneumonitis (2,3); other sources report 20 to 30 deaths in the past year, attributable to VAPI (1).

In his study, D'Antonoli (2020) reported seven radiological variants in the EVALI classification: organizing pneumonia, acute lung injury, lipoid pneumonia, hypersensitive pneumonitis, acute eosinophilic pneumonia, diffuse alveolar hemorrhage, and interstitial giant cell pneumonia. Another important fact to highlight about our patient is the presence of massive hemoptysis, which required aggressive surgical management. As main diagnoses in the literature, Bronchiectasis, neoplasias, post-tuberculosis sequelae and idiopathic bleeding are described as the most frequent causes of hemoptysis in Europe (8).

Acute hemoptysis after excessive consumption of inhaled substances in vaping is one of the least frequent consequences, among the symptoms known in EVALI, being 11% in the series of cases that currently exist, standing out as mild and self-limited (7,9).

Regarding histopathology, patterns of lung injury have mostly been found ranging from acute fibrous pneumonitis, diffuse alveolar hemorrhage or organizing pneumonia usually accompanied by bronchiolitis (1,10).

There is no established treatment plan in EVALI, however, clinical improvement has been reported with high doses of systemic steroids, one scheme is methylprednisolone 0.5-1 mg/kg/day for 5 to 10 days (1,5).

The prospective cohort study from Intermountain Healthcare in Utah included 60 patients, of whom 33 patients were admitted to an intensive care unit, 10 of whom were ventilated. 54 patients were treated with antibiotics and 57 with steroids and oxygen. According to the treating physicians, steroid therapy was the therapy that led to rapid improvement of symptoms (11).

As a treatment for hemoptysis, there is also no consensus. In a randomized study by Ori Wand et al, investigated tranexamic acid (TXA), an anti-fibrinolytic drug, nebulized for hemoptysis, demonstrating promising results, however it excluded patients with massive hemoptysis (12).

CONCLUSIONS

The use of electronic cigarettes represents a growing and worrying health problem, since there are no regulatory standards that prohibit it, nor is there an appropriate guide for the diagnosis and management of the diseases it can cause. The variety of clinical presentations and their similarity to other respiratory diseases represent a challenge for doctors, and although the EVALI definition helped us identify this pathology, we are still far from fully understanding the disease. Another important part is knowing the minor frequent variants, such as in this case the presence of massive hemoptysis, since it warns us of complications and encourages us to search for possible new treatments.

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