

Hemoptysis in an Adolescent with EVALI

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Abstract

Vaping associated lung injury (EVALI) has increased in prevalence after first being noted in an outbreak among teenagers in 2019. Vaping involves the use of a heating device to aerosolize a product, typically nicotine or more recently, cannabinoids. Products that contain cannabinoids, such as CBD oil, are being used more as these products are easy to obtain and are typically less expensive. The clinical manifestations of EVALI are widespread and include respiratory symptoms as well as cardiogenic, gastrointestinal, and constitutive symptoms. EVALI rarely presents with hemoptysis as one of the main presenting symptoms, especially in an adolescent. This case will discuss EVALI with associated hemoptysis in a teenager secondary to vaping cannabinoid oil.

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To the Editor,

Vaping associated lung injury (EVALI) has increased in prevalence after first being noted in an outbreak among teenagers in 2019. Vaping involves the use of a heating device to aerosolize a product, typically nicotine or more recently, cannabinoids. Products that contain cannabinoids, such as CBD oil, are being used more as these products are easy to obtain and are typically less expensive. The clinical manifestations of EVALI are widespread and include respiratory symptoms as well as cardiogenic, gastrointestinal, and constitutive symptoms. EVALI rarely presents with hemoptysis as one of the main presenting symptoms, especially in an adolescent. This case will discuss EVALI with associated hemoptysis in a teenager secondary to vaping cannabinoid oil.

Electronic cigarette use in teenagers is an increasing public health concern that began after introduction of vaping in 2016 and later became recognized as a public health crisis. In 2019, e-cigarette or vaping product

use-associated lung injury (EVALI) was recognized as a unique disease entity. Individuals predominantly affected by EVALI are males (66%) who use tetrahydrocannabinol-containing (THC-containing) vapes (82%)¹. However, many EVALI patients report using both nicotine and THC products (43%)^{2,3}. EVALI typically presents with a pneumonia-like illness, progressive dyspnea and/or worsening hypoxemia, and does not usually include hemoptysis due to diffuse alveolar hemorrhage (DAH). We describe an adolescent patient with that developed DAH secondary to EVALI.

A 15-year-old Caucasian female with a history of anxiety, menorrhagia, and obesity presented with two-week history of hemoptysis and chest pain. She presented to urgent care multiple times for these symptoms and was treated for pneumonia which was non-responsive to repeated doses of antibiotic therapy. In the emergency department, chest x-ray was concerning for bilateral pulmonary edema. After transfer to the pediatric intensive care unit, repeat chest x-ray indicated bilateral rounded airspace disease. CT angiography of the chest was negative for pulmonary embolism but suggested a hypersensitivity reaction. Echocardiogram was unremarkable and UDS was negative. Rheumatology, hematology, and infectious disease workups were negative. Repeat CT indicated ongoing effusions but improved compared to previous CT. Hypersensitivity pneumonitis panel was obtained and negative. Bronchoscopy and bronchoalveolar lavage were performed and visualization revealed dilated submucosal capillaries. Results of the bronchoalveolar lavage showed hemosiderin laden macrophages in the right middle lobe indicative of DAH. It was later communicated that she vaped cannabinoid oil prior to the onset of these symptoms. She had previously only disclosed a history of daily nicotine vaping. This new information in combination with DAH was suggestive of EVALI. She was discharged with a course of oral corticosteroids and was sent home with resources to help with the cessation of vaping. She followed up in the pediatric pulmonology clinic the next week with resolution of symptoms and normal spirometry.

Vaping induced lung injury or EVALI typically is reported in males with presenting symptoms of worsening dyspnea and pneumonia like illness⁴. As of February 2020, the Centers for Disease Control and Prevention reported a total of 2807 hospitalized EVALI cases with 68 deaths.⁵ National and state data from patient reports and product sample testing show tetrahydrocannabinol (THC) containing e-cigarette, or vaping, products, played a major role in the outbreak⁴. Cannabidiol (CBD) oil has increased in popularity as a vaping agent. CBD oil is a concentrated solvent extract made from cannabis flowers or leaves. The flowers or leaves are dissolved in an edible oil and the solvents that are used can vary from organic solvents (ethanol, isopropyl alcohol) to harmful ones such as petroleum or butane⁵. CBD oil is not regulated by the FDA and can have unregulated amounts of THC as well as other additives. The association between vaping CBD oil and the lung injury it causes is not known but there are many hypotheses to its etiology including vitamin E acetate affecting alveolar surfactant, volatile chemical production, and oils¹. Vitamin E acetate is a known diluting agent and is known to cause severe inflammation in the pulmonary parenchyma³. Vitamin E acetate is thought to be the main causative agent of changes seen in EVALI but that remains undefined. The presentation with hemoptysis in this case is rare as only 11% of EVALI cases have been reported with associated hemoptysis⁵.

The criteria used for a case definition of EVALI include: use of an e-cigarette or related product within 90 days, lung opacities on chest imaging, exclusion of lung infection, absence of alternative diagnosis such as cardiac or neoplastic conditions⁴. In this case, the patient's lung imaging showed bilateral opacities and further evaluation did not indicate pulmonary embolism or hypersensitivity pneumonitis as a cause. Thorough workups with hematology, infectious disease and rheumatology were negative. Her diagnosis was likely delayed due to the history on admission of vaping only nicotine products and only once the bronchoscopy was performed, was the history of vaping CBD oil revealed. Her diagnosis of EVALI was supported with findings on bronchoalveolar lavage that revealed hemosiderin laden macrophages with negative cultures.

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