

Bilateral Upper Lobe Collapse Secondary to Vaping

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INTRODUCTION

Vaping and electronic (e-cigarette) use have been marketed as a “healthier” nicotine product as well as a smoking cessation tool.^{1,2} These products have been especially popular in younger populations, even as young as middle school-aged, and their use has been increasing over the past several years. There are many well-described pulmonary manifestations associated with e-cigarette or vaping product use-associated lung injury (EVALI), many of which are some degree of organizing pneumonia.^{3,4} This commonly is seen as ground glass opacities to focal consolidation in various locations on computed tomography (CT) scans. EVALI also has been associated with other organ system dysfunction including the cardiovascular (CV) and immune systems.⁵ Pneumothoraxes and/or lung collapse were observed less commonly.^{6,7} When these findings were seen, they predominately were seen unilaterally.⁸ In this case, we described a patient with bilateral upper lobe collapse secondary to EVALI.

CASE REPORT

A 23-year-old male with past medical history of asthma and remote substance abuse presented with a new onset of seizures. Initial history was provided by Emergency Medical Services (EMS) and family members. The patient was lying in bed vaping and talking on the phone when he spontaneously began experiencing seizures. It was unknown how long the patient was convulsing prior to being found by his family. Midazolam was administered by EMS upon their arrival, which halted the seizures. When the patient arrived in the emergency department, he was tachycardic (134 BPM), tachypneic (RR 25), and hypoxic, requiring a non-rebreather mask to maintain appropriate oxygen saturations. He was afebrile.

Physical exam was pertinent for altered mental status and inability to follow commands, subcostal retractions, and diffuse rhonchi on respiratory auscultation. A rapid arterial blood gas showed respiratory acidosis. The patient was intubated for airway protection. Initial laboratory results showed a leukocytosis of 19.4 cells per microliter and a creatinine of 1.69 milligram per deciliters. Electrocardiogram showed sinus tachycardia and post intubation chest x-ray showed collapse of bilateral upper lobes (Figure 1). Computed tomography (CT) of the brain was unremarkable. CT chest confirmed bilateral upper lobe collapse (Figures 2 and 3).

The patient appeared to meet criteria for sepsis on admission. However, no infectious etiology was identified. This included blood cultures, cerebral spinal fluid cultures, and viral tests for human immunodeficiency virus, hepatitis, COVID-19, and influenza A and B. As a result, the patient was diagnosed with systemic inflammatory response syndrome (SIRS). The patient was extubated one day after intubation.

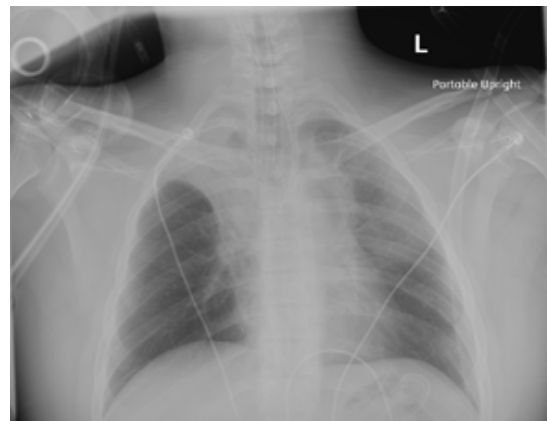


Figure 1. Anterior-posterior x-ray showing bilateral upper lobe collapse.



Figure 2. Coronal view of bilateral upper lobe collapse.

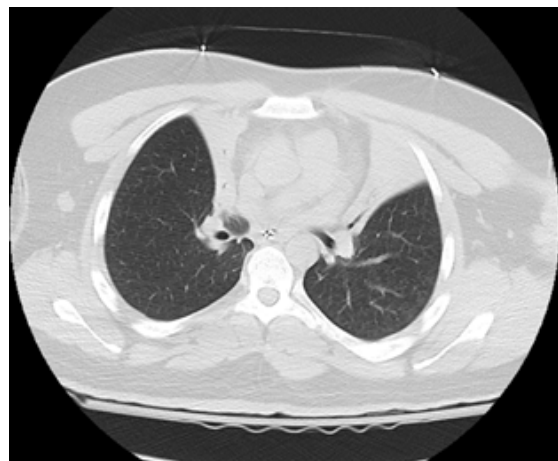


Figure 3. CT scan of bilateral upper lobe collapse.

Electroencephalogram was unremarkable for active seizures. The patient was treated with levetiracetam and was free of seizure activity for the remainder of his hospitalization. The patient's renal function improved with intravenous fluids and the patient was discharged on day five of admission. Given the patient's extensive workup and the unusual pattern of injury, it was concluded that his bilateral upper lobe collapse/atelectasis was secondary to vaping use.

Keywords: vaping, lung injury, e cigarettes

DISCUSSION

EVALI is well-described with manifestations ranging from more benign with centrally located organizing pneumonia, to more severe with diffuse alveolar damage, which typically requires intensive care and ventilator support.^{3,4} Respiratory failure secondary to vaping/e-cigarette use can be difficult to determine early in the course, as the acute presentation can be similar to that of respiratory viral infections.⁴ This difficult diagnosis is especially pertinent in patients who require ventilator support and cannot provide a history of present illness, as seen in our patient. With increased vaping use being associated with more severe injuries and illness,³ physicians should have a high index of suspicion of vaping/e-cigarette use in younger patients who present with respiratory failure.

EVALI likely will continue to be a diagnosis of exclusion, and this was seen in our patient, who required an extensive workup. The exact mechanism of EVALI remains elusive, but is suspected to be related to the vast number of chemical agents found in the smoking products.⁹ This finding further emphasized the need for cessation and patient education.

CONCLUSIONS

In the presented case, an ostensibly rare complication of vaping use, bilateral upper lobe collapse/atelectasis, was described. Given our patient's young age and lack of prior lung injury and comorbidities, the differential diagnosis remained broad, thus necessitating an extensive work-up. EVALI is a diagnosis of exclusion and requires a high degree of suspicion. With more younger patients using vaping products, it is likely that lung injuries will continue to be seen. Cessation and education of these products should be a continued discussion between patient and physician.

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