

Case Report

Vaping associated lung injury (EVALI) as an organizing pneumonia pattern- A case report

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ABSTRACT

Electronic cigarettes use or vaping is popular but has not been proven to be an innocuous substitute for traditional smoking. Several patterns of vaping-associated lung injuries have been reported. We report a case of a 43-year-old female patient, who presented with productive cough and an organizing pneumonia pattern on computed tomography (CT) scan. Recognizing the various CT scan patterns of vaping-associated lung injury is important to make a diagnosis because the cessation of vaping is an important step in the treatment.

KEY WORDS: Organizing pneumonia pattern, E-cigarette, Vaping - associated lung injury

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INTRODUCTION

Electronic cigarettes (e-cigarettes) are a type of Electronic Nicotine Delivery Systems (ENDS) with aerosolized nicotine or cannabis-based concentrates mixed with alcohol, glycerin, and flavoring agents and are increasing used as a substitute to tobacco smoking.^[1] Although considered a safer substitute to tobacco smoking, various patterns of vaping-associated lung injury have been identified.

CASE REPORT

Mrs. TR aged 43 is married with two children. Home maker by profession, she was first reviewed in the clinic in August 2017 with a smoking history of 5 pack years. She had quit smoking for the past 4 months. She was, however, vaping frequently about 4–5 times a day at a strength of 18 mg/dl in a 10 ml bottle. She came in for a routine health check.

She was clinically normal on examination, and her chest was clear to auscultation. She was normoxemic at rest and exercised at a gym three times a week for 8 min at each time (superslow technique). Her parents were both alive and well, aged 76 (mother) and 85 (father).

Spirometry revealed a forced vital capacity (FVC) of 2.34 L and forced expiratory volume (FEV) 1 of 2.07 L, and a computed tomography (CT) scan of the chest ordered was normal then. She had scoliosis with a mild concavity to the left. Routine blood profiles were all normal.

She presented next in October 2018 where she had remained off cigarettes but admitted to vaping more. The strength used by her dropped down to 12 mg/dl and further to 6 mg/dl, but her vaping increased in terms of number of drags and number of times in a day. A 10 ml bottle that

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would earlier suffice for about 10 days would now last for only 5 days. Her spirometry values remained normal, and a fresh CT chest was normal too.

She next presented to the clinic in September 2019 with complaints of a productive cough and cold, was extensively wheezing, and with disturbed sleep. She had now quit smoking for over 2 years, but was still vaping (3 mg/ml propylene glycol [PG] added) till 5 days prior. There was no use of marijuana on direct questioning. She was again normoxemic at rest (98%), but had bilateral rhonchi on auscultation.

Her CT ordered revealed multiple bilateral peribronchovascular dense bronchocentric opacities and bronchocentric areas of ground-glass attenuation [Figure 1]. Her FVC was stable at 2.48 L and FEV1 at 2.15 L (84% predicted). White blood cell counts were 7090, with 76% neutrophilia, hemoglobin 12.3, and normal platelet counts. Creatinine and liver enzymes were normal too. She was treated with a 5 day course of azithromycin and a week of inhaled budesonide + formoterol (400 + 6 mcg combination). Sputum routine and fungal cultures were sent – both turned in negative. She had quit vaping 5 days before presentation because of her symptoms.

Mrs. TR recovered, but slowly over the next 3 weeks. Her FVC in November 2019 was 2.35 L, FEV1 2.14 L, and diffusing capacity of the lungs for carbon monoxide (DLCO) 79.3%. Her fresh CT in November 2019 [Figure 2] reveals the complete resolution of the shadows. Interestingly, her lung function never dropped through her acute illness, and her DLCO remains reasonably well preserved. She has been counseled on complete vaping cessation. She has quite for the past 7 weeks now but has returned to smoking, although just 10 cigarettes in the past 10 weeks. She has been referred to a counselor for the same.

DISCUSSION

ENDS are devices that aerosolize nicotine or cannabis-based concentrates mixed with other solvents and flavoring agents and are marketed as an alternative to cigarettes. These are popularly known by various names such as e-cigarettes, vapes, vaporizers, vape pens, hookah pens,

e-pipes, cigalikes, e-hookahs, and tank systems. These ENDS were commercially introduced in the United States in 2007 and since then there has been an enormous surge in demand with approximately 288 models of ENDS with more than 15,500 flavors or so-called “juices” available by 2018.^[1]

The use of e-cigarettes or “vaping” has become popular among young adults as these have been marketed as safer alternatives to tobacco smoking despite the lack of adequate data on their safety.^[2] According to a study in the United States in 2016, 3.2% adults more than 18 years reported the regular use of e-cigarettes, whereas 15.3% of those more than 18 years have used an e-cigarette sometime in their lifetime.^[3,4]

The Centers for Disease Control, WHO issued a health advisory on August 30, 2019, regarding pulmonary disease associated with e-cigarette use, which states 215 possible cases of pulmonary illness and one confirmed death as of August 2019.^[5] The Indian Government has banned these totally as per an ordinance that came into force on September 18, 2019.^[6]

Based on the data collected by the Centers for Disease Control and Prevention and Food and Drug Administration as of October 15, 2019, majority of patients of e-cigarette, or vaping, product use associated lung injury (EVALI) reported using tetrahydrocannabinol-containing products which contains potentially harmful constituents such as Vitamin E acetate, medium-chain triglyceride oil, and other lipids. Inhalation of Vitamin E acetate, in particular, might impair lung function.^[7] The contents of the product used by our patients were vegetable glycerin, PG, nicotine, flavoring agent, and water.

The different patterns of lung injury have been reported with vaping, including hypersensitivity pneumonitis, diffuse alveolar hemorrhage, acute eosinophilic pneumonia, organizing pneumonia, lipoid pneumonia, and giant-cell interstitial pneumonia.^[1] Common imaging finding seen with vaping-associated lung disease is basilar predominant consolidation with ground glass opacities and subpleural sparing.^[8]

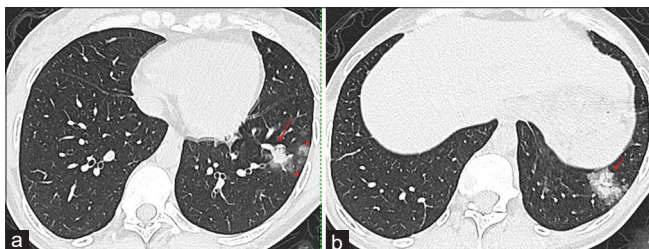


Figure 1: Computed tomography of the chest axial images (a and b) show focal areas of dense bronchocentric opacities (arrow) and bronchocentric ground-glass attenuation (arrowheads) in the lateral basal segment of the left lower lobe

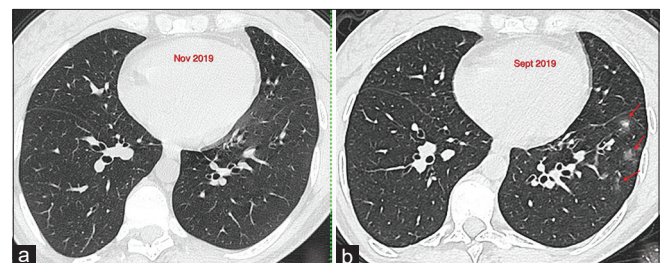


Figure 2: Computed tomography of the chest follow-up images (a – November 2019, b – September 2019) show the complete resolution of the bronchocentric areas of ground-glass opacities (arrow in b) in the left lower lobe

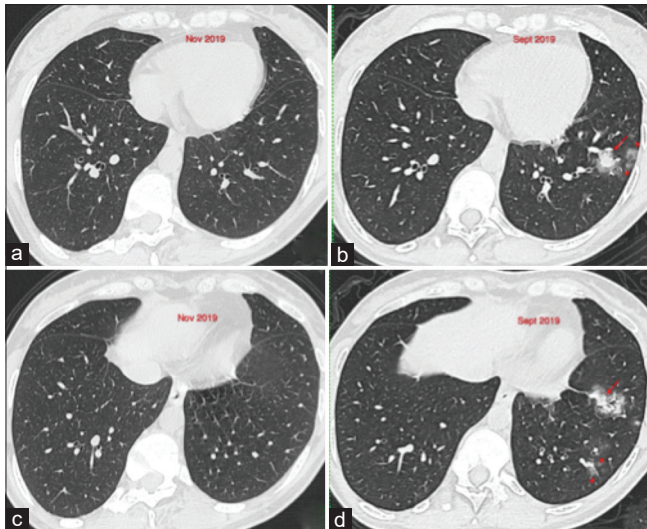


Figure 3: Computed tomography of the chest follow-up images (a and c – November 2019 and b and d – September 2019) show complete resolution of the dense bronchocentric opacities (arrow in b and d) as well as areas of ground-glass opacities (arrowheads in b and d) in the left lower lobe

Few case reports have been published in the literature describing the distinct imaging patterns of EVALI.^[2,8,9] The case report by Mantilla *et al.* shows multiple small pulmonary nodules in both lungs in a 27-year e-cigarette user. Another case report by Khan *et al.*, demonstrates bilateral discrete and confluent ground glass opacities and patches of consolidation in a 40 year female smoker, who switched to e-cigarettes just 1 month prior to presentation with acute symptoms. Both these patients responded well to steroids.^[2,9] In our case, focal areas of bronchocentric dense opacities and bronchocentric areas of ground-glass attenuation were seen in the left lower lobe at the time of acute presentation of symptoms, which resolved completely on treatment, as seen on a follow-up scan after 2 months [Figures 2 and 3].

CONCLUSION

There are limited clinical and imaging data available on vaping-associated lung injury. Recognizing the various CT scan patterns is important, which may give a clue to the

diagnosis and cessation of e-cigarettes leads to favorable outcomes and clinical improvement.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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