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Vaping and Acute Respiratory Distress Syndrome in Interventional Radiology

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Abstract

Vaping associated acute respiratory distress syndrome (ARDS) is a new consideration in the field of radiology with respect to tetrahydrocannabinol (THC) containing electronic nicotine delivery systems (ENDS). The appeal of ENDS product use was initially advertised as being superior to cigarettes because of the limited ingredients compared to the numerous carcinogenic elements found in cigarettes. ENDS products typically contain only four primary components including propylene glycol, vegetable glycerine, nicotine, and flavorants. In recent months, patients with a reported history of vaping have presented to the hospital with respiratory symptoms and demonstrate one of four computed tomography (CT) patterns including acute eosinophilic pneumonia, diffuse alveolar damage, organizing pneumonia, and lipoid pneumonia. The field of radiology is therefore identifying lung pathologies associated with vaping as the sole etiology, particularly in young patients. The different patterns of vaping associated lung pathology are reviewed in this article with the hope that treatment can be initiated after early image findings are identified and to guide treatment planning within the field of interventional radiology (IR).

opacification, pleural effusions, and eosinophilia [4]. Idiopathic diffuse alveolar damage is classically associated with disseminated groundglass opacification and honeycombing [2,4,11,13-16]. In contrast to the acute eosinophilic pneumonia and idiopathic diffuse alveolar damage patterns, organizing pneumonia is unique in that it is associated with potentially sporadic and migratory findings that include subpleural and peribronchovascular opacification [4]. Lipoid pneumonia is characterized by dependent consolidations within the lung parenchyma [4].

By identifying and correlating respiratory symptoms with particular CT image findings in patients who vape, early intervention may be initiated in an attempt to prevent progression towards ARDS [4,13,16]. When chest radiographs demonstrate dependent opacities in individuals with a vaping history, the early phase of ARDS should be considered [13,16]. ARDS classically presents in an early and late phase with the early phase typically illustrating basilar predominant dependent changes (Figure 1) [13,16].

Short Communication

Vaping induced ARDS is a severe form of lung injury that represents the feared complication of vaping use in otherwise healthy individuals with respiratory symptoms. ARDS is defined as lung injury associated with hypoxia, alveolar destruction, and hypercapnia [1-14]. The role of imaging with respect to the diagnosis of ARDS has historically been considered supportive rather than diagnostic, with emphasis instead placed on specific laboratory and clinical findings [11].

There are four CT patterns of lung injury that are currently affiliated with vaping which include acute eosinophilic pneumonia, diffuse alveolar damage, organizing pneumonia, and lipoid pneumonia [4]. All of these lung injury patterns are associated with an inciting inflammatory pneumonitis that progresses variably thereafter [4,5,8]. Acute eosinophilic pneumonia is characterized by scattered areas of groundglass



Figure 1: Early phase acute respiratory distress syndrome (ARDS) with basilar predominant, dependent changes.

The late phase is typically variable and can demonstrate nondependent ground glass opacification as opposed to the

aforementioned early phase dependent changes (Figure 2) [13,16].



Figure 2: Late phase acute respiratory distress syndrome (ARDS) with nondependent ground glass opacification.

Overall, the increased use of ENDS products is of growing concern given the association with the potential development of ARDS [3-5,8-9,13,15]. The pertinent history obtained from patients upon hospital admission and prior to surgical intervention in the field of interventional radiology (IR) should therefore include vaping history when assessing risk. Moreover, the increased use of ENDS products is resulting in increased identification of pulmonary manifestations from a product that was initially thought to be safe compared to cigarette smoking [3-5,8-9,13,15]. An ability to recognize vaping associated pulmonary findings is especially imperative within IR given potential requests for interventions such as pulmonary biopsy or lavage that may result from the misidentification of developing ARDS. The consideration of vaping induced lung disease in patients with known ENDS product use should therefore be considered by interventionalists prior to surgery and in order to ensure appropriate respiratory therapy for a pulmonary process that may appear similar to alternative neoplastic and infectious pulmonary etiologies.

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