Imaging Findings of Vaping Associated Lung Injury

Jeffrey P. Kanne, M.D.
Jacob Sechrist, M.D.
Seth Kligerman, M.D
Howard Mann, MB.BCh.
Travis S. Henry, M.D.
Introduction

• Increasing reports of vaping-associated acute lung injuries across the United States

• As of October 22th, 2019
  – >1600 reported cases\(^1\)
  – 34 Fatalities
  – Primarily affecting males and patients under 35 years old

\(^1\)CDC Statement. https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html#latest-outbreak-information
Introduction

• Not associated with one specific e-cigarette or vaping liquid
• Approximately 80% of patients report vaping marijuana-derived products (THC oil, CBD oil)
• Pathophysiology unclear
Case Definition

• Confirmed
  – Use of e-cigarette or dabbing in 90 days prior to symptom onset
  – Opacities on chest radiograph or ground-glass opacities on chest CT
  – Negative infection on initial work-up
  – No evidence in medical record of alternative plausible diagnosis
Case Definition

• Probable
  – Use of e-cigarette or dabbing in 90 days prior to symptom onset
  – Opacities on chest radiograph or ground-glass opacities on chest CT
  – Infection identified via culture or PCR but clinical team believes not sole cause of lung injury OR minimum criteria to exclude infection not met and clinical team believes infection not sole cause of lung injury
  – No evidence in medical record of alternative plausible diagnosis
Typical Presentation

• Progressive shortness of breath over about a week
• Hypoxia
• Nausea and vomiting
• Leukocytosis with neutrophilia
• Elevated ESR
• Mild elevation in AST/ALT

Imaging Patterns

- Organizing pneumonia
- Acute eosinophilic pneumonia
- Acute lung injury
- Hypersensitivity pneumonitis
- Diffuse alveolar hemorrhage

Organizing Pneumonia

- Bilateral consolidation and ground-glass opacity
- Peripheral and perilobular
- Air bronchograms
- Subpleural sparing in many cases associated with vaping
Organizing Pneumonia
Organizing Pneumonia
Acute Eosinophilic Pneumonia

- Basal predominant, symmetric ground-glass opacity, consolidation, or both
- Septal thickening
- Small pleural effusions
Acute Eosinophilic Pneumonia
Diffuse Alveolar Damage

• Extensive ground-glass opacity, consolidation, crazy-paving with gravitationally dependent predominance

• Traction bronchiectasis and reticulation during organizing phase
Diffuse Alveolar Damage
Hypersensitivity Pneumonitis

- Symmetric upper- and mid-lung-predominant ground-glass opacity
- Poorly-defined centrilobular nodules
- Mosaic attenuation with expiratory lobular air trapping
Hypersensitivity Pneumonitis
Diffuse Alveolar Hemorrhage

• Centrilobular or confluent lobular ground-glass opacities
• Occasional consolidation, especially peripherally
• Relative subpleural sparing often present
Diffuse Alveolar Hemorrhage
Summary

• The exact cause of vaping-associated lung injury remains unclear
• THC-containing compounds are implicated in most cases
• Most patients develop an organizing pneumonia pattern of lung injury
• Less common patterns include DAD, acute eosinophilic pneumonia, and diffuse alveolar hemorrhage