AMSER Case of the Month
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22 year-old-female presenting with worsening SOB

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Patient Presentation

HPI: 22 year-old-female with a PMH of IBS, annular pancreas, and iron deficiency anemia presented to the ED with a five day history of fevers, generalized malaise, N/V, and new nonproductive cough. Experienced acute worsening SOB over the past 24 hrs. Denied hx of DVT/PE, hx of blood clotting disorders, recent travel, or any sick contacts. Pt became hypoxic to the low 80s and required 2L O2.

Social Hx: Vaping THC and nicotine every day since 2018

Vitals: Afebrile, HR 118, RR 22, BP 121/72

PE: Not in acute distress; Equal breath sounds bilaterally without wheezing or rales; Abdominal tenderness to palpation in RLQ
Pertinent Labs

CBC:
- WBC: **12.54**
- Neutrophils: **88%**

Other:
- Lactic Acid: 1.2 (wnl)
- COVID-19 negative
- Viral respiratory panel negative
- MRSA negative
- Legionella antigen negative
- S pneumoniae antigen negative

CMP:
- Unremarkable
What Imaging Should We Order?
Select the applicable ACR Appropriateness Criteria

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<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
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<tbody>
<tr>
<td>Radiography chest</td>
<td>Usually Appropriate</td>
<td>★</td>
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<tr>
<td>US chest</td>
<td>May Be Appropriate</td>
<td>O</td>
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<tr>
<td>CT chest with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>★★★</td>
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<td>CT chest without and with IV contrast</td>
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This imaging modality was ordered by the ER physician.
Findings (labeled)

Bilateral, lower lobe predominant patchy airspace opacities with peripheral sparing (arrows)

Positive spine sign with lower lobe predominant airspace opacities
A CT abdomen and pelvis with contrast was also ordered by the ER physician due to pt’s RLQ abdominal pain.
Findings (unlabeled)
Findings: (labeled)

Lung bases showed bilateral ground-glass opacities with subpleural sparing (arrows), formations of arcade-like bands of consolidation (pink lines), and areas of reversed halo sign or atoll sign (blue circle).

(No acute process in the abdomen or pelvis)
Pt was started on broad-spectrum IV antibiotics, but did not improve clinically and a CT chest with contrast was ordered.
Findings: (labeled)

Worsening of bilateral ground-glass opacities in the lower lobes (arrows)
Differential Dx (based on imaging):
E-cigarette or Vaping Product Use Associated Lung Injury (EVALI)
Infection
Connective tissue disease
Diffuse alveolar hemorrhage
Given the characteristic imaging findings and clinical picture, the patient was started on IV Solumedrol for treatment of a most likely diagnosis of EVALI.

**Further pertinent work-up to r/o other differentials:**
Echocardiogram: unremarkable  
HIV: negative  
ANCA: negative

After 2 days of steroid treatment, pt showed rapid clinical improvement and was weaned down to room air. Repeat CXR showed significant improvement of bilateral lower lobe opacities!
Final Dx:
E-cigarette or Vaping Product Use Associated Lung Injury (EVALI)
E-cigarette or Vaping Product Use Associated Lung Injury (EVALI)

Background:
- E-cigarettes are battery-powered devices that aerosolize substances, such as flavors, THC, and/or nicotine for inhalation.
- First introduced to the U.S. in 2007 with increased use among adolescents in the past few years.
- In 2019, the CDC issued a health advisory due to cases emerging of severe pulmonary disease associated with e-cigarette usage i.e. EVALI
- More than 2800 pts admitted to hospital due to EVALI and 68 reported deaths (as of Feb 2020).
- Vitamin E acetate has been the most recognized agent associated with EVALI (used as a diluent in THC-based cartridges).

Presentation:
- Wide range of symptoms, from respiratory (cough, chest pain, SOB) to gastrointestinal (abdominal pain and N/V).
E-cigarette or Vaping Product Use Associated Lung Injury (EVALI)

Diagnosis:

• Imaging plays a crucial role in the initial detection of EVALI.
• Hx of e-cigarette use during 90 days before symptom onset.
• Diagnosis of exclusion, so other possible causes of lung injury should be ruled out.

Imaging Findings:

• Many patterns of lung injury have been reported with EVALI→ hypersensitivity pneumonitis, diffuse alveolar hemorrhage, acute eosinophilic pneumonia, organizing pneumonia
• Several studies have reported that the most common imaging findings thus far are bilateral, lower lobe predominant ground-glass opacity and consolidation with areas of subpleural sparing.
E-cigarette or Vaping Product Use Associated Lung Injury (EVALI)

Below are characteristic features of organizing pneumonia, one of the patterns of lung injury seen in EVALI.

**Reversed halo sign or atoll sign:** Central ground-glass opacity surrounded by a denser consolidation in crescentic shape.

**Arcade-like sign:** Curved bands of parenchymal consolidation with thickening of the interlobular septa.

**Treatment:**
- Supportive care and possible high dose corticosteroid. Encourage vaping cessation.

**Prognosis:**
- Relatively good, but can be a fatal disease. Long-term complications and risk of recurrence have yet to be established.
References:


