HPI: 37 y/o M presents with acute hypoxic respiratory failure

Aishwarya Bhaskar, OMS-IV
Lake Erie College of Osteopathic Medicine

Timothy Mickus, MD Department of Radiology
Stephen Chang, DO Department of Radiology
Matthew Hartman, MD Department of Radiology
Allegheny Health Network, Pittsburgh, PA
Patient Presentation

• HPI: 37 y/o male presents to the ED in acute hypoxic respiratory failure s/p near drowning. Pt was found by EMS with a bounding pulse and agonal respirations.
• ROS: chest pain, increased work of breathing, nausea
• PMHx: none
• PSHx: none
• Family Hx: none
• SocHx: heavy alcohol use disorder
Patient Presentation

Pertinent physical exam findings:

• General: A & O x3, in acute distress
• HEENT: pupils 4 mm bilaterally, reactive
• Cardiovascular: tachycardic, chest wall concavity deformity
• Lungs: decreased breath sounds bilaterally, mild wheezing heard in left lower lungs
• Neuro: A & O x3, follows commands
Pertinent Labs

• Basic Metabolic Panel: elevated anion gap of 26 (3-10 mEq/L)
• Complete Blood Count:
  • Hb 13.4 (13.5 - 17.5 g/dL)
  • MCV 105.2 (80-94 fl)
  • Folate 2.3 (2.7-17 ng/mL)
• Toxicology: EtOH level 369
• Arterial blood gas:
  • pH 7.236 (7.35-7.45)
  • PaCO2 33.6 (38-42 mmHg)
  • HCO3 13.8 (22-28 mEq/L)
• Lactic acid: 4.4 (4.5-19.8 mg/dL)
What Imaging Should We Order?
Select the applicable ACR Appropriateness Criteria

<table>
<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><img src="radio.png" alt="Icon" /></td>
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<tr>
<td>CT chest without IV contrast</td>
<td>Usually Appropriate</td>
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<tr>
<td>CT chest with IV contrast</td>
<td>May Be Appropriate</td>
<td><img src="ct.png" alt="Icon" /></td>
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<tr>
<td>MRI chest without and with IV contrast</td>
<td>Usually Not Appropriate</td>
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<tr>
<td>FDG-PET/CT skull base to mid-thigh</td>
<td>Usually Not Appropriate</td>
<td><img src="mri.png" alt="Icon" /></td>
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These imaging modalities were ordered by the ER physician.
Findings (unlabeled)
Findings: (labeled)

- Low lung volumes
- Increased bibasilar interstitial markings
- Patchy, dependent areas of ground-glass opacity in both lungs, right greater than left
Final Dx:

Near-drowning non-cardiogenic pulmonary edema
Case Discussion

Epidemiology:

• Drowning is a leading cause of death in children
• Every year there are nearly 4000 fatal unintentional drownings and approximately 8000 nonfatal drownings
• More than 40% of drownings treated in ED require further hospitalization or transfer
• Among adolescents and adults, alcohol use is involved in
  • 70% of deaths associated with water recreation
  • Nearly 1 in 4 ED visits for drowning
Case Discussion

Pathology:

• Near drowning can be divided into 3 stages:
  • Stage 1: Acute laryngospasms after inhalation
  • Stage 2: Laryngospasms + water begins to enter stomach
  • Stage 3: Laryngospasms cease secondary to hypoxia and large amounts of aspirated water

• Pulmonary edema is thought to be secondary to direct hypoxic injury to the lungs

• Fluid aspiration then leads to acute lung injury
Case Discussion

Radiographic Findings:

• Radiographically we can see stages 2 and 3
• Looks comparable to other causes of non-cardiogenic pulmonary edema
• CXR:
  • Three basic patterns:
    1. CXR can be normal
    2. Increase in perihilar interstitial markings
    3. Generalized edema pattern
Case Discussion

Radiographic Findings:

• CT chest:
  • Ground glass opacities
  • “Crazy paving” appearance, with ground glass and interlobular septal thickening
  • Centrilobular nodularity may also be present
  • Complications include pneumomediastinum or pneumothorax in some patients
  • Fluid or debris can be seen in the trachea and central bronchi
    • “Sand bronchogram” in some patients with aspirated sand causing radiodensity in the affected airways
Case Discussion

Treatment:

• Restoring oxygenation: The patient was given CPR on the scene, later EMS provided bag-valve mask
• Correct hypoxic injury with respiratory support (high flow oxygen)
• Monitor acid base status, alveolar ventilation, gas exchange, perfusion, temperature, volume
• Monitor for signs of aspiration pneumonia, treat with Abx (this patient was found to have aspiration pneumonia a few days after admission and was given Unasyn)
References:


