Cardiogenic Shock in An Otherwise Healthy Young Adult
Kirsten Kenny PA-S, Cindy Rossi MHS, PA-C
Quinnipiac University Physician Assistant Program

Introduction

- Cardiogenic Shock (CS) is the condition in which the heart is unable to sustain an efficient cardiac output leading to hypotension and organ hypoperfusion.  
- There is no clear diagnostic criteria, rather it is based off of a collection of subjective and objective findings as well as clinical suspicion.  
- CS is a condition associated with high mortality of ~50-60%.  
- Approximately 80% of all cases have acute myocardial infarction (AMI) as the causative agent.  
- Other etiologies include myocarditis, acute decompensated heart failure, and thyroid disorder.  
- Non-MI related cardiac shock is associated with higher mortality and 30-day readmission rates compared to MI associated cases and seen in younger, female patients.  
- Management of CS may involve therapies like fluid resuscitation, catecholamines, and mechanical support devices like balloon pumps depending on etiology.  
- An obvious gap remains in treatment protocols for non-AMI associated cardiogenic shock.

Image 1. Bilateral Pulmonary Edema

Case Description

Initial Brief History

- A 32-year-old male who denies past medical history presents with nausea/vomiting and headache secondary to alcohol and marijuana use.  
- Had been drinking alcohol at friend’s house previous night.  
- Reports 8 episodes non-bloody, non-bilious vomiting beginning at 3am. Has headache and dizziness with ambulation.  
- Drinks ½ pint of tequila, 1 “cup” of rum, and smoked 1-2 marijuana joints. Denies other drug and over-the-counter medication use. Drank a Gatorade but no other intake.  
- Drinks approximately 1-2 drinks/day around 3-4 times/week.  
- Not COVID vaccinated.  
- Social history: denies other recreational drug use. Reports only consuming personal supply of alcohol and marijuana.  
- Past medical history, surgical history, allergies noncontributory. No daily medications.  
- Family history: sister, alive, cardiac surgery at 18 for “clot removal.”  
- Medical history: smoker, past smoke 10-20 cigarettes/day for 5 years. No daily medications.  
- Social history: denies other recreational drug use. Reports only consuming personal supply of alcohol and marijuana.  
- Past medical history, surgical history, allergies noncontributory. No daily medications.  
- Family history: sister, alive, cardiac surgery at 18 for “clot removal.”  
- Physical Examination:
  - Vital: Temperature of 36.6 degrees Celsius, 114 beats per minute.  
  - Respiratory: 24 breaths per minute.  
  - Blood pressure: 118/66mmHg, pulse oximetry of 95% on room air  
  - Skin: No rash, warm, dry. Capillary refill < 2 seconds.  
  - Ears, Nose, Throat: Most mucous membranes.  
  - Respiratory: No rhonchi, wheeze, rales. Slight tachypnea.  
  - Neck: Soft, non-tender, nondistended. No bruit heard.  
  - Cardiovascular: Tachycardic. No murmurs, gallops, or rubs.  
  - Gastrointestinal: Soft, non-tender, nondistended abdomen. No rebound guarding. Negative Murphy’s.  
  - Neurologic: Alert and oriented to person, place, time. Moves all extremities equally.

Initial Physical Exam

- On examination, patient is tachycardic and tachypneic. Mental status is oriented to three.
- No physical findings consistent with myocarditis.
- No changes in findings from initial for other body systems.

Figure 2. Initial Complete Blood Count Results

<table>
<thead>
<tr>
<th>White Blood Cell Count</th>
<th>Hemoglobin</th>
<th>Hematocrit</th>
<th>Platelet Count</th>
<th>Neutrophil Percent</th>
<th>Lymphocyte Percent</th>
<th>Monocyte Percent</th>
<th>Eosinophil Percent</th>
<th>Basophil Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.4</td>
<td>16.3 g/dL</td>
<td>48.5%</td>
<td>126 Thou/μL</td>
<td>80.4%</td>
<td>9.6%</td>
<td>8.8%</td>
<td>0.0%</td>
<td>0.3%</td>
</tr>
<tr>
<td>23.4</td>
<td>16.3 µg/dL</td>
<td>48.5%</td>
<td>126 Thou/μL</td>
<td>80.4%</td>
<td>9.6%</td>
<td>8.8%</td>
<td>0.0%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

Differential Diagnosis

Pulmonary Embolism
- Acute Coronary Syndrome
- COVID-19
- Community Acquired Pneumonia
- Aspiration Pneumonia

Aspiration Pneumonia

Acute Decompensated Heart Failure

Case Presentation

Mr. D, a 32-year-old male, presented to the emergency department in severe respiratory distress. His past medical history included past smoke 10-20 cigarettes/day for 5 years with occasional alcohol use. He was denied any significant family or social history. On examination, he was tachycardic and tachypneic. Vital signs included temperature of 36.6 degrees Celsius, blood pressure of 118/66mmHg, and pulse oximetry of 95% on room air. Physical examination revealed no physical findings consistent with myocarditis. No changes in findings from initial for other body systems.

Cardiomegaly likely secondary to myocarditis

Acute Reduced Ejection Fraction Heart Failure (HFrEF) (resolved)

Cardiogenic Shock: New York Heart Association (NYHA) Stage IV, Society for Cardiovascular Angiography and Interventions (SCAI) cardiogenic shock stage C (resolved)

Acute Hypoxic Respiratory Failure (resolved)

Final Diagnosis

- Cardiomyopathy likely secondary to myocarditis
- Tachycardia
- Acute Reduced Ejection Fraction Heart Failure (HFrEF) (resolved)
- Cardiogenic Shock: New York Heart Association (NYHA) Stage IV, Society for Cardiovascular Angiography and Interventions (SCAI) cardiogenic shock stage C (resolved)
- Acute Hypoxic Respiratory Failure (resolved)

Outcome

- Swan-Ganz catheter placed with findings consistent with cardiogenic shock.
- Patient admitted to ICU.
- Started on milrinone drip 0.125mg/kg/min and furosemide with clinical improvement. Metoprolol titrated 25mg BID added.
- Work-up for etiology including cardiac MRI and bloodwork had findings consistent with myocarditis.
- Ventricular function improved and patient was discharged home on carvedilol (switched from metoprolol).
- Discharge plan included gentle uptitration of 90-day guideline-directed medical therapy with ventricular function re-evaluation and potential ICD placement.

Discussion

- Majority of CS arise as complications of cardiac etiologies, specifically AMI.  
- Non-AMI CS tends to be seen in younger patients and has poorer clinical outcomes compared to AMI cardiogenic shock.
- CS requires quick clinical management and initial resuscitation to protect end organs from further hypoperfusion and cell death.

- This case demonstrates the time-sensitive nature of cardiogenic shock and how quickly a patient’s status can diminish.
- Given that non-AMI cardiogenic shock patients tend to be female and younger, CS should be in the differential for all acutely decompensating patients regardless of cardiac history or age.
- Research must continue to explore the management of initial resuscitation and subsequent stages as there are no uniform therapy guidelines.

Resources