

## Treating Patients with Atypical Cardiac Presentations

Recognize & treat everyday cardiac complaints

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### Glossary Terms

**ACE inhibitor:** A medication that inhibits the angiotensin-converting enzyme. The result is the relaxation of smooth muscles, which can be found in arteries and arterioles, and lowering of blood pressure.

**BiPAP:** Bilevel positive pressure.

**Comorbidities:** Two or more coexisting medical conditions.

**Cortical failures:** Failure of cortical synapses that can be associated with stroke.

**CPAP:** Continuous positive airway pressure.

**Hydrostatic pressure:** A capillary pressure exerted against vessel walls. This pressure is driven from cardiac contractions (or blood pressure) and forces some water out of the plasma through the capillary wall and into the interstitial space.

**Hypokalemia:** Lower than normal potassium levels.

**Neuropathies:** A functional disturbance and/or pathological change in the peripheral nervous system.

**Orthopnea:** Difficulty breathing when lying in a supine position.

**Prodromal symptoms:** A symptom indicating an onset of a disease.

### Learning Objectives

- Discuss the contributing factors for a patient experiencing an atypical cardiac event.
- Describe various atypical presentations for patients who are suffering a myocardial infarction.
- Describe the currently accepted treatment for a patient suffering a myocardial infarction.
- Describe the basic pathophysiology of congestive heart failure (CHF) and discuss recent changes in prehospital therapy.
- Recognize the signs and symptoms of cardiogenic shock.

You're called to the residence of an 85-year-old female with mild dyspnea that increases with exertion. She's very weak and is accompanied by her daughter, who reports that she's been taking care of her. The daughter reports changes in mentation and increasing weakness over the past three days. She reports no fever, nausea, vomiting, diarrhea, chest pain or other remarkable symptoms.

The patient has a history of congestive heart failure (CHF) and dementia. Vitals include BP of 182/98, HR 104, RR 18 and SpO2 90% on room air. Auscultation of the lungs reveals coarse and fine crackles over the perihilar regions of each lung and the bases. You also hear mild bronchial wheezing. ECG reveals sinus tachycardia with a right bundle branch block. The patient appears to be in moderate distress, and you believe she's experiencing an acute exacerbation of her CHF.

You begin to treat the patient with oxygen at 15 l/min via nonrebreather mask, sublingual nitroglycerin, morphine sulfate and furosemide. Several minutes later, the patient appears to have decreased respiratory distress, and her crackles become fainter. She is delivered to the local emergency department (ED) without additional issues.

Hours later, you return to the same ED with another patient only to find that your patient didn't have CHF and has since been intubated and admitted to the ICU. Her prognosis looks poor. You're informed that she had severe pneumonia affecting both lungs.

### **Cardiac Misdiagnoses & Their Causes**

Between 2–27% of cardiac patients are misdiagnosed in EDs in the developed world. These misdiagnoses lead to severe complications, one in four of which are lethal.<sup>1</sup> In fact, diagnosing a myocardial infarction (MI) in the elderly can be so difficult that in one study, only half of the elderly who had died of an MI had been correctly diagnosed before their deaths.<sup>2</sup>

The main factors behind these misdiagnoses are lack of the typical presentation of chest pain as a symptom and lack of ST elevation. The risk of death in cardiac patients who don't experience chest pain is three times higher than in patients experiencing it. The one-year mortality of patients with a "silent MI" is double.<sup>1</sup> Studies reveal that 43% of women, 43.7% of patients older than 65 and the majority of those older than 85 didn't experience chest pain during an MI.<sup>2-4</sup>

Factors contributing to an atypical cardiac presentation involve advanced age, female gender, underlying disease and even the patient's race. One study found that Asians are 64–69% more likely than Caucasians to present atypically. These patients are 70% less likely to seek emergency care in a timely manner (within three hours of onset) and are less likely to have a favorable outcome.<sup>5</sup>

Similarly, women and those older than 85 tend to delay seeking emergency care.<sup>6</sup> Women in general, as well as our older patients, often have atypical symptoms that lead them to delay seeking care or lead health-care personnel down the wrong clinical pathway, resulting in greater delays in diagnosis and treatment.

These delays in treatment are significant; the 30-day mortality of acute myocardial infarction (AMI) in patients who arrived at the hospital within one hour of onset is 5.6%, while those patients who delayed treatment for more than four hours have an 8.6% jump in mortality rate.<sup>6</sup> Delays cost many lives and significantly contribute to poor outcomes.

### **AMI**

Acute myocardial infarction (AMI) is often overlooked or misdiagnosed. Those who present atypically often have “anginal equivalent complaints” that providers should be aware of. These include epigastric discomfort, general weakness and other nonspecific complaints. In fact, only 25% of the elderly present with the classic triad of chest pain, ECG abnormalities and serum markers corresponding to their MIs. Nondiagnostic ECG findings are present for 50–75% of elderly patients experiencing MI.<sup>2,7</sup> Further, certain medications (like digoxin) can alter the ST segment such that a patient won’t have ST elevation.<sup>2</sup>

Patients who have an AMI often delay going to the hospital, with 40% waiting longer than six hours past symptom onset.<sup>6</sup> This means that the patient has potentially experienced an expanded myocardial injury during this period. EMS providers must attempt to compensate for delay by quickly recognizing the AMI, treating it appropriately and transporting the patient to the appropriate facility.

Neuropathies of the autonomic nervous system, cortical failure, damage to cardiac sensory nerves caused by heart disease, increased pain threshold and any comorbidities, including dementia, all contribute to atypical presentations. The most common atypical presentation of the silent AMI is dyspnea. Other likely presentations include general weakness, fatigue, cold sweats or dizziness. Providers also shouldn’t dismiss a syncopal episode as the primary symptom of an MI, as this occurs in 3% of elderly patients and is correlated with high mortality.<sup>4</sup>

A common site for the referred pain in patients with cardiac ischemia who aren’t experiencing chest pain is the craniofacial area (38–60%). For 6% of patients, this was the only complaint. The most common location is the upper throat (82%). This is followed by the mandible (45%) or the left temporomandibular joint/ear (18%). After craniofacial pain, cardiac patients tend to have referred pain in the left arm or shoulder (20%), followed by the stomach or back (12%).<sup>1</sup>

High-flow oxygen, 12-lead ECG monitoring, pulse oximetry and capnography should be promptly initiated. Aspirin, a nitrate and morphine should be given as indicated. Fentanyl or heparin are also commonly indicated. Hypotension potentially indicates worsening of the hypoperfusion of cardiac tissues, and a hypotensive MI patient should be transported immediately. Beta blockers and ACE inhibitors are important components in treating an MI and should be utilized when in the provider’s scope of practice.

Fibrinolytic treatment is beneficial in the prehospital setting, and patients who are given prehospital fibrinolytics are much more likely to receive them in the two-hour period following symptom onset.<sup>8</sup> Fibrinolytics increase the risk of hemorrhage, especially in the elderly, but are shown to be more beneficial than withholding their use in appropriate patients.<sup>2</sup> Prehospital providers should keep in mind the goals of door-to-needle fibrinolytic therapy within 30 minutes and door-to-balloon inflation (percutaneous coronary intervention) of 90 minutes.<sup>9</sup>

In one study of women with AMI, 95% reported prodromal symptoms at least one month before their AMI. The most common symptom was unusual fatigue, which occurred in 70.7% of women. This was followed by sleep disturbances (47.8%), increased dyspnea (42.1%), the feeling of indigestion (39%), anxiety (36%), chest discomfort (30%) and increased confusion or nausea (each as the only symptom in 3% of the elderly).<sup>3</sup> These vague symptoms are often benign taken alone but should be taken into consideration when making a field diagnosis.

### **Congestive Heart Failure**

CHF is one of the most commonly encountered cardiac emergencies in the prehospital setting. It affects 3 million people in the U.S. every year and is the most common cause of hospitalization in the elderly.<sup>10</sup> Typically, pulmonary edema is associated with hypertension or left ventricular damage of such a nature that fluid backs up into the pulmonary system, causing an increased hydrostatic pressure that overwhelms the ability of the lymphatic system to remove the fluid. The fluid then accumulates in the alveoli, causing pulmonary edema and leading to dyspnea, orthopnea, cough, tachypnea and crackles or rales.

Other symptoms associated with left-sided heart failure are diaphoresis and altered mental status as the brain becomes increasingly deprived of oxygen. Left-sided heart failure is the most common cause of right-sided (right ventricular) heart failure, which causes fluid to back up into systemic circulation. This backup leads to signs, such as peripheral edema, jugular venous distention, weight gain and tachycardia (in response to decreased cardiac output).

Most CHF patients have a combination of left- and right-sided heart failure. CHF is a condition that requires careful monitoring because further deterioration of the heart's pumping ability has the potential to lead to cardiogenic shock, a condition in which the heart can no longer meet the body's metabolic needs. CHF is such a sensitive condition that half of all CHF patients die within five years of diagnosis.<sup>10</sup>

Prehospital treatment of CHF works toward improving oxygenation and increasing cardiac output.<sup>10</sup> Capnography, pulse oximetry, oxygen and 12-lead ECG monitoring are indicated early on in treating these patients. However, the former gold standards of EMS treatment of CHF has changed dramatically.

It had been thought that BiPAP increases the risk of AMI when used in patients with severe CHF. However, recent studies demonstrate that neither BiPAP nor CPAP contribute to a greater risk of AMI when compared to the oxygen mask.<sup>11,12</sup> Patients with severe CHF who are placed on BiPAP and CPAP have a lower intubation rate than those on an oxygen mask.

CPAP patients have greater improvement in respiratory rate, arterial pH and increased stroke volume, as well as decreased intubation rates 30 minutes into treatment. Patients who don't require intubation have lower morbidity and shorter hospital stays than patients who require intubation.<sup>11</sup> CPAP is becoming a standard in prehospital respiratory care and providers who have access to CPAP or BiPAP should strongly consider taking advantage of them when indicated.

Another factor believed to contribute to poor outcomes in patients with CHF is morphine. CHF patients given morphine are more likely to require mechanical ventilation and have longer hospitalizations and a much greater mortality rate (13% versus 2.4% in acute decompensated heart failure).<sup>10,13</sup> Morphine was recommended for these patients because of its effects in reducing preload and afterload as well as decreasing heart rate and anxiety.<sup>13</sup>

Many clinicians are now arguing that morphine hasn't been proven to have a clinically beneficial effect on CHF patients, and its continued use in these situations is uncertain.<sup>13</sup> Providers should always follow their local protocols.

Diuretics, such as furosemide, are also associated with poor short-term outcomes in patients with acute CHF, which some experts believe is the result of toxicity. This leads to hypokalemia, decreased renal function and hypotension.<sup>10,12,14</sup> Almost half of all illnesses believed to be CHF in the prehospital setting are misdiagnosed, and most are eventually discovered to be pneumonia. This creates another problem, because furosemide may be detrimental to the pneumonia patient.<sup>15</sup>

Several studies have suggested that when furosemide is given as a lower dose along with a hypertonic saline solution, the detrimental effects associated with the furosemide may be lessened.<sup>16-18</sup> A loading dose of furosemide followed by an infusion might be less detrimental than a high-dose bolus.<sup>23</sup> Research in this area is ongoing, and providers should follow local protocols when determining treatment.

Normotensive patients without contraindications should receive 0.4 mg nitroglycerin early into treatment; hypertensive patients (systolic BP 140–180 mmHg) should receive a “stacked” dose of 0.8 mg nitroglycerin; and very hypertensive patients (systolic BP higher than 180 mmHg) should receive a stacked dose of 1.2 mg nitroglycerin.<sup>10,12</sup> A dose of a nitrate should be repeated every three to five minutes as long as the patient is symptomatic and maintains an adequate blood pressure.

Sublingual nitroglycerin is among the best options in CHF because of its speed and efficacy. However, if the patient can't tolerate the nitrate by mouth (as in a severely dyspneic patient on CPAP) and IV is not available, topical nitrates should be considered.<sup>10</sup>

Angiotensin-converting enzyme, or ACE, inhibitors are beneficial in the treatment of CHF because they reduce afterload and cause vasodilation. Following the administration of a nitrate, an ACE inhibitor should be administered to the patient when protocols allow.<sup>9, 10</sup>

### **Cardiogenic Shock**

Cardiogenic shock is a condition in which the heart is no longer able to maintain the metabolic needs of the body. It typically occurs when greater than 40% of the left ventricle is damaged, and it has a very high mortality rate even with treatment. The prehospital provider can assume that a patient is in cardiogenic shock if they have signs or symptoms of an MI along with a BP of less than 90 mmHg systolic. Altered mental status is common, as are tachydysrhythmias, especially those that are atrial in nature. A lack of peripheral pulses; cool, clammy skin; peripheral edema; and recent history of an MI are also common.<sup>9,10</sup>

Cardiogenic shock requires prompt recognition and rapid transport to a hospital with advanced cardiac capabilities in order to offer the patient the best chance of recovery. Correct any major dysrhythmias in order to eliminate the dysrhythmia as the cause of the hypotension.<sup>10</sup>

Pressor support (dopamine) should be administered, along with high-flow oxygen by mask or BVM if ventilatory support is necessary (CPAP should not be used, as it can worsen hypotension), and aspirin if indicated.<sup>10,19</sup>

### **Conclusion**

Cardiac calls are common in EMS and are often considered routine. However, the treatment of cardiac complaints is rapidly changing. As our population ages and becomes more diverse, the typical presentations are no longer typical. EMS providers should be aware of the latest trends in assessment and treatment. **JEMS**

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