Recognizing Myocardial Infarction in Women: A Case Study

Being aware of the symptoms women experience may prevent a life-threatening event.

ABSTRACT: The author presents the case of a 52-year-old woman who experienced symptoms of myocardial infarction (MI) over many months; neither her clinicians nor the patient—herself a nurse—recognized them. The author discusses the signs and symptoms of MI in women and highlights how failure to recognize them may lead to misdiagnosis and even death. This case illustrates how important it is that health care providers consider the possibility of heart disease in any woman whose symptoms could be cardiac in origin, even when the cause appears to be something else.

Keywords: acute myocardial infarction, cardiovascular disease, coronary heart disease, myocardial infarction, prodromal symptoms, risk factors, women

LB is a 52-year-old white woman who presents to the ED with esophageal burning, nausea, and vomiting. (This is a real case, but some identifying details have been changed.) A few weeks ago, she had an injection of cortisone in her left knee for pain and was prescribed naproxen (Naprosyn) twice a day for three weeks until the swelling subsided; she took the medication as prescribed, with food. Since then, she describes feeling a burning sensation in her esophagus. At first she attributed the discomfort to her history of gastroesophageal reflux disease (GERD). But then the feeling worsened a few days ago—she said it felt like the naproxen was "sitting in my throat"—and she felt no relief with omeprazole (Prilosec). The following morning, about 48 hours ago now, when she felt continued worsening of the burning sensation, she called her gastroenterologist, who said the symptom was likely an adverse effect of naproxen but that she should come in that day for an endoscopy.

LB was seen by two intake nurses and her gastroenterologist for the endoscopy. At that time, her blood pressure was 130/60 mmHg, which was slightly higher than usual. No one questioned her symptoms or recommended an electrocardiogram (ECG). The endoscopy indicated significant esophageal erosion (as well as candidiasis). LB was sent home with three medications: sucralfate (Carafate), fluconazole (Diflucan), and nystatin. Her symptoms initially improved.

Since then, LB says she has had worsening esophageal pain, especially during the night, as well as nausea and vomiting. At 4:30 AM, after vomiting three times, she drove herself to the ED, bringing with her the endoscopy report.

At the ED, she showed the report to the triage nurse and said she thought the vomiting was related to the esophageal erosion, especially since the endoscopy had already confirmed this. She repeated this when giving her history to the physician.

Patient history. In addition to a history of knee pain and GERD, LB has mild hypertension, which is well controlled with amlodipine (Norvasc) 5 mg daily. She also has asthma, for which she is taking fluticasone/salmeterol (Advair Diskus inhaler) 250 mcg/50 mcg daily, montelukast (Singulair) 10 mg daily, and albuterol as needed (rarely); she has also had several courses of prednisone in the last year but not in the last six months.

LB had a hysterectomy seven years ago, which was complicated by a bowel-perforation abscess requiring a partial colectomy. She has previously had gestational diabetes, although her fasting blood sugar is now

within normal limits. She reports that nine months ago she had an elevated glycated hemoglobin (HbA_{1c}) level of 7.2%, for which her physician prescribed metformin (Glucophage). Her HbA_{1c} subsequently improved to 6.2% about six months ago; it is now 6.6%.

Her current total cholesterol level is within normal limits at 179 mg/dL; her high-density lipoprotein cholesterol level is high and her low-density lipoprotein cholesterol level is low. She says she walks three miles twice a week, but reports gaining 50 lbs. over the last six years. She attributes the weight gain to working longer hours and to eating more prepared and processed foods.

She has not reached menopause. She has never smoked. She states that she adheres to her medication regimen and does not take vitamins or herbal remedies. She receives the flu vaccine every year. She has no known allergies to medications or foods. She does have allergies to ragweed, dust, mold, and pollen.

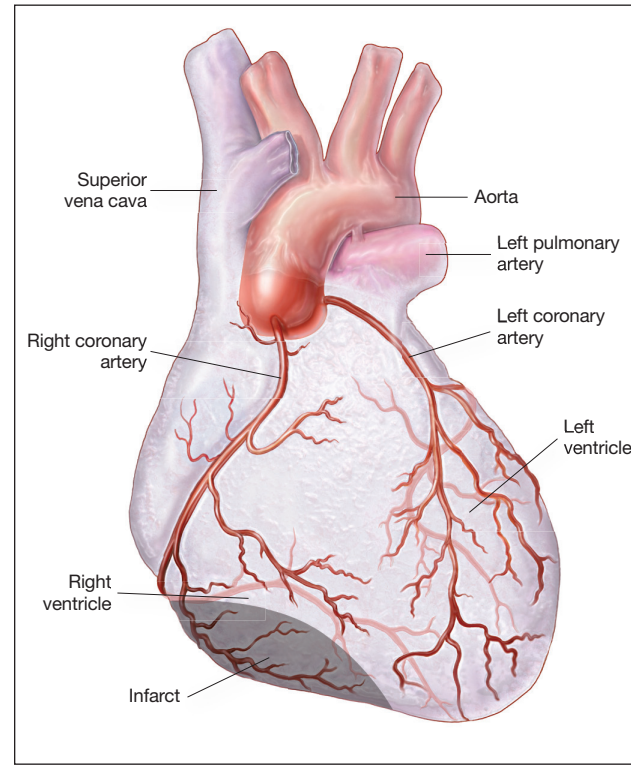
Family and social history. LB is a middle-income nurse with a graduate-level education. She lives with her husband in an affluent rural community in the Northeast; she has two grown children who live outside the home. She is the oldest of five siblings; her two sisters and two brothers are in good health. LB's father had a myocardial infarction (MI) at age 64 and a second MI at 71. LB's mother died at 64 from multiple myeloma. She knows that one of her grandmothers died at 59 of MI. That grandmother's three sisters also died of MIs, although the ages at which they died are unknown.

LB has experienced a lot of stress in the last year, including anxiety over her access to health care. She reports that her health insurance is "in flux" and that she delayed coming to the ED for financial reasons.

More than one in three adult women has some form of CVD.

She doesn't have insomnia or experience weakness or unusual sweating, although she says she hasn't felt "right" for many months, describing a general feeling of "malaise." She reports becoming unusually short of breath once or twice while running to catch a flight on her way to a nursing conference and that her albuterol rescue inhaler did not improve her symptoms, although she felt better after resting.

Figure 1. Inferior Wall Myocardial Infarction



An inferior wall myocardial infarction (MI)—the event that occurred in this case study—is usually caused by occlusion of the right coronary artery, resulting in damage to part of the inferior wall of the heart (the shaded area). It is sometimes referred to as a diaphragmatic MI because this wall lies over the diaphragm. Image courtesy of Wolters Kluwer Health.

The nurse decides to obtain an ECG to rule out an MI.

WHAT THE ECG SHOWED

The ECG revealed an acute inferior wall MI. LB was rushed to the intervention room for an emergency cardiac catheterization, which showed that her left anterior descending artery was 95% blocked. She had a left ventricular ejection fraction of 39%.

A stent was placed. New medications were prescribed. She was given aspirin 325 mg daily, bisoprolol (Zebeta) 5 mg daily, clopidogrel (Plavix) 75 mg daily, losartan (Coozar) 25 mg daily, nitroglycerin 0.6 mg sublingually as needed, and simvastatin (Zocor) 10 mg daily. She also continued her asthma medications, metformin, and omeprazole. After nine weeks convalescing, LB successfully completed the hospital's 12-week cardiac rehabilitation program.

COULD THIS MI HAVE BEEN PREVENTED?

Except for the ED triage nurse, none of LB's health care providers had considered the possibility of MI. Even LB's gastroenterologist had said she would normally assume LB's symptoms were heart related—but not in this case. Here she was confident LB's symptoms were the adverse effects of naproxen. She never suggested that LB was even at risk for MI. But how could she have been so certain?

Neither of the two nurses at intake assessed LB further for signs and symptoms of MI. And although a nurse herself, LB didn't think she was at risk for MI—even given her family history and the presence of several risk factors (such as treated hypertension and a history of gestational diabetes,[1] as well as shortness of breath and nausea/vomiting[2]). She had never smoked, her cholesterol levels were within normal limits, and she exercised and had always eaten fruits and vegetables. Moreover, she felt protected because she hadn't yet reached menopause. She denied that her primary care provider had ever talked with her about her MI risk.

It's true that the adverse effects of naproxen and the presence of candidiasis made LB's symptoms difficult to recognize. And the fact that the medications she was given after the endoscopy initially improved her symptoms further confirmed for LB and her gastroenterologist that they were gastrointestinal (GI) in origin. In fact, an ECG at the time of the endoscopy may or may not have indicated cardiac changes. It's also possible that her MI did not occur until she presented with nausea and vomiting to the ED. But it's equally possible that her episodes of breathlessness, symptoms of esophageal discomfort, and complaints of fatigue were heart related and may have even been prodromal symptoms of MI.

Although this is certainly a challenging case, had the clinicians been more wary of LB's vague complaints, with earlier recognition and medical intervention, it is possible that this patient could have averted an MI or at least minimized the damages sustained.

Women with MI are more likely than men to present with fatigue, neck pain, syncope, nausea, right arm pain, dizziness, and jaw pain.

HEART DISEASE IN WOMEN

According to the American Heart Association (AHA), cardiovascular disease (CVD) is the leading cause of death in women—as well as men.[3] More than one in three adult women has some form of CVD. And CVD was responsible for the deaths of almost 400,000 American women in 2011—approximately the number of women who died in the same period from cancer, chronic lower respiratory disease, and diabetes combined.[3] And while many women believe breast cancer is the greatest risk to their health, many fewer women (40,931) died of breast cancer that year.[3] Despite these alarming statistics, a 2012 AHA survey indicated that only about half of women know that CVD is the number-one killer of women.[4]

Recognizing symptoms of MI. It is crucial that patients and health care professionals recognize the signs and symptoms of MI that are common to women (see *Symptoms of Myocardial Infarction*[2, 5, 6]). We now know that MI can be harder to recognize in women because women do not always have the same symptoms as men; moreover, men's symptoms have been studied more extensively and are therefore considered typical.[6] But recent studies are challenging the familiar presentation of MI as a dramatic and acute onset of chest pain followed by collapse. Crushing chest pain and shortness of breath are the most common symptoms in men but not necessarily in women. According to one meta-analysis, women with acute MI (AMI) are less likely than men to experience chest pain, and much more likely to present with fatigue, neck pain, syncope, nausea, right arm pain, dizziness, and jaw pain.[5]

Women also experience prodromal symptoms of MI and may experience them days, weeks, and months prior to an event.[5] In one study of 515 women, patients

Symptoms of Myocardial Infarction[2, 5, 6]

Symptoms experienced by both men and women:

- chest pressure or pain
- pain or discomfort in one or both arms
- sweating
- lightheadedness

Symptoms more likely to be experienced by women:

- shortness of breath
- fatigue
- back pain, neck pain, or jaw pain
- nausea and vomiting

experienced fatigue, sleep problems, and shortness of breath four weeks or more before they had an AMI.[6] Less than 30% reported prodromal chest pain and nearly half didn't experience chest pain at all.

Coventry and colleagues suggest that national public health campaigns include the full variety of AMI symptoms and draw attention to how AMI might appear in women as well as men.[5] The AHA has indeed been emphasizing these points, particularly in its Go Red for Women campaign. The educational curricula of nurses and other health care providers should also include this information, and health care providers should teach their female patients what to look for, especially if these patients are in an at-risk group. Women frequently delay treatment for MI and often because they do not recognize the symptoms. ED clinicians in particular should learn that a patient may have an MI without experiencing chest pain.[5]

The time to treatment is crucial for the survival of a patient who is having an MI. The most important factor affecting time to treatment in women is the patient's ability to recognize her symptoms as heart related. Factors associated with increased time to treatment in patients with acute coronary syndrome—an umbrella term for the signs and symptoms of myocardial ischemia, including MI—include "female sex," "lack of recognition and discounting of symptoms," "self-treatment," and "mismatch between expected and actual symptoms"[7]: four factors that are pertinent to LB's case. Reperfusion within three hours can preserve myocardial function; delay may cause irreversible damage to the heart.[7]

Awareness of CVD risk is an important factor in a patient's ability to prevent a heart attack. Even with her family history of heart disease and her knowledge as a nurse, LB did not think she was at risk for an MI. Her perception of her risk and how she framed her symptoms may have influenced the decision making of the nurses and physicians who treated her. LB attributed her initial complaint of esophageal erosion to GERD, and when she received no relief from self-medicating with omeprazole, she called her gastroenterologist thinking she had a more serious GI problem. Even after she began experiencing nausea and vomiting, she continued to believe it was a GI problem and that was why she brought the endoscopy report with her to the ED.

This case illustrates how important it is that all practitioners consider the possibility of heart disease when faced with a woman whose symptoms could be cardiac related even when they seem to be something else. All nurses and physicians must continue to educate their patients on the seriousness of heart disease, on identifying and reducing any risk factors they may have, and on the importance of seeking early intervention for an MI by promoting early detection and response. Nurses are in a unique position to make a difference in the lives of women with CVD and can educate them on their MI risk, as well as on how to recognize an MI and even prevent one from happening. ▼

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REFERENCES

1. Mosca L, et al. Effectiveness-based guidelines for the prevention of cardiovascular disease in women—2011 update: a guideline from the American Heart Association. *Circulation* 2011;123(11):1243-62.
2. American Heart Association, Go Red for Women. Hard-to-recognize heart attack symptoms. n.d. https://www.goredforwomen.org/about-heart-disease/symptoms_of_heart_disease_in_women/hard-to-recognize-heart-attack-symptoms.
3. Mozaffarian D, et al. Heart disease and stroke statistics—2015 update: a report from the American Heart Association. *Circulation* 2015;131(4):e29-e322.
4. Mosca L, et al. Fifteen-year trends in awareness of heart disease in women: results of a 2012 American Heart Association national survey. *Circulation* 2013;127(11):1254-63.
5. Coventry LL, et al. Sex differences in symptom presentation in acute myocardial infarction: a systematic review and meta-analysis. *Heart Lung* 2011;40(6):477-91.
6. McSweeney JC, et al. Women's early warning symptoms of acute myocardial infarction. *Circulation* 2003;108(21):2619-23.
7. DeVon HA, et al. Time to treatment for acute coronary syndromes: the cost of indecision. *J Cardiovasc Nurs* 2010;25(2):106-14.