

# Cardiovascular Emergencies in Pregnancy



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## KEYWORDS

• Pregnancy • Heart failure • Hypertensive emergency • Chest pain • Mitral stenosis

## KEY POINTS

- Acute coronary syndromes in pregnancy may result from typical atherosclerotic processes, as well as altered endothelial function of the coronary arteries, resulting from physiologic changes in pregnancy.
- Hypertensive disease in pregnancy may result from underlying hypertensive disease or as part of a preeclampsia syndrome.
- Physiologic features of the pregnant state can lead to decompensation of preexisting valvular heart disease and cardiomyopathy.
- Prompt recognition of conditions particularly devastating in pregnancy, such as spontaneous coronary artery dissection, mitral stenosis, and peripartum cardiomyopathy, is vital in the acute care of pregnant patients.
- Many typically used cardiovascular medicines, such as angiotensin converting enzyme (ACE)-inhibitors and statins, are contraindicated in pregnant women.

## INTRODUCTION

Cardiac emergencies during pregnancy are uncommon but have significant morbidity and mortality when they arise. Management of these high-risk patients involves close coordination of care between emergency medicine providers, obstetricians, and cardiovascular medicine. This article discusses management of chest pain syndromes in pregnancy, including acute myocardial infarction (AMI) and spontaneous coronary artery dissection (SCAD). An overview of the medical management of hypertensive crisis, mitral stenosis (MS), and acute heart failure (HF) are discussed.

## CHEST PAIN SYNDROMES IN PREGNANCY

Chest pain syndromes in a pregnant woman may be the result of conditions that can range from benign to life-threatening, including AMI, SCAD,

aortic dissection, pulmonary embolism, and hypertensive crisis. AMI and SCAD are highlighted.

### ***Acute Myocardial Infarction in Pregnancy***

AMI in pregnancy is an uncommon event with significant maternal, fetal, and neonatal morbidity and mortality. The risk of AMI is 2 to 3 times higher in pregnant women relative to nonpregnant women of reproductive age.<sup>1</sup> As pregnancy rates in women older than 40 years have increased in recent years, the incidence of AMI in pregnancy has also increased. Epidemiologic data gathered from a report of births from a 10-year period between 1991 and 2000 in California revealed an incidence rate of 1 in 35,700 deliveries, and the incidence rate increased over the study period.<sup>2</sup> In that study, compared with women who did not have an AMI in pregnancy, those women with an AMI were more likely to be older (30% were older than age 35 years

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compared with 10% in the non-AMI group), multiparous (78% compared with 61%), non-Hispanic white (40% compared with 35%), or African Americans (15% compared with 7%).<sup>2</sup> In another study of 125 documented cases of AMI in pregnancy, the highest incidence was seen to occur in the third trimester and in multigravidas older than 33 years of age.<sup>3</sup> AMI was most commonly located in the anterior wall.<sup>4</sup> The maternal death rate was 21% and death tended to occur most often at the time of AMI or within 2 weeks of the infarction, and was usually related to labor and delivery.<sup>3</sup> Coronary atherosclerosis with or without intracoronary thrombus was found in 43% of patients, whereas coronary thrombus without atherosclerotic disease was found in 21% of patients. Coronary dissection was seen in 16%, and 29% of patients had normal coronary arteries.<sup>3</sup> Another review of 103 cases from 1995 to 2005 showed that coronary atherosclerosis was present in only 40% of cases,<sup>5</sup> with the remaining cases consisting of coronary artery dissection (27%), thrombus in a normal coronary artery (8%), coronary artery spasm (2%), emboli (2%), and normal coronary arteries (13%). These studies suggest that atherosclerosis is less often the direct cause of AMI than in the general population, although some risk factors seem to overlap. Additionally, there seems to be a relatively high incidence of coronary artery dissection in this population.

### Risk factors

Risk factors for AMI in pregnant women are similar to those in the population in general, which includes age older than 35 years, hypertension, diabetes mellitus, obesity, smoking, and lipid disorders (Box 1).<sup>4</sup> The Nationwide Inpatient Sample for the years 2000 to 2002 evaluated all pregnancy-related discharges and a total of 859

discharges included a diagnosis of AMI with a rate of 6.2 per 100,000 deliveries. The odds of AMI in pregnant women were 30-fold higher for women older than 40 years of age than for women younger than 20 years of age.<sup>1</sup> Demographic features associated with myocardial infarction (MI) included hypertension, with an odds ratio (OR) of 21.7, thrombophilia with an OR of 25.6, diabetes mellitus with an OR of 3.6, smoking with an OR of 8.4, transfusion with an OR of 5.1, and postpartum infection with an OR of 3.2. In that study, there were 44 deaths due to AMI (case fatality rate of 5.1%) and a mortality rate of 0.35 per 100,000 deliveries.<sup>1</sup>

### Clinical presentation

Pregnant women with AMI present with signs and symptoms similar to the general population, with complaints of anterior chest pain or epigastric discomfort. Shortness of breath and nausea may also be present. There is some evidence that women more often present with atypical features such as dyspnea or nausea without chest discomfort, syncope, palpitations, or cardiac arrest, and it is unclear whether pregnancy affects the clinical presentation of MI. In a 2014 study of 150 subjects with pregnancy-associated MI, 75% of women presented with an ST-segment-elevation MI and 25% with a non-ST-segment elevation MI.<sup>4</sup> The MI involved the anterior wall in 69% of cases.<sup>4</sup> For both types of MI, 50% of cases occurred after delivery and, for the remainder, the frequency increased with each trimester.<sup>4</sup>

### Diagnosis and management

As with cases in the nonpregnant general population, diagnosis is made by ischemic symptoms, such as angina, electrocardiographic abnormalities, and elevation in cardiac biomarkers. Management of AMI in pregnant women is similar to that in the general population with the notable exception to avoid teratogenic agents, such as angiotensin inhibitors and statins. Standard recommended drug therapy in AMI for nonpregnant patients includes morphine, beta-blockers, nitroglycerin, heparin; and antiplatelet therapy with aspirin, clopidogrel, ticagrelor, or prasugrel, among others. These guideline-recommended drug therapies are beneficial for the gravid mother with AMI. However, only limited information is available on fetal safety for some of these drugs.<sup>4,6</sup> A review of 150 patients with pregnancy-associated MI evaluated the use of medical therapy and coronary intervention.<sup>4</sup> Coronary angiography was performed in 129 patients, and 5 patients developed acute coronary dissection during the procedure as a result of intracoronary

#### Box 1

#### Risk factors for acute myocardial infarction in pregnancy

- Older age (>35 years)
- Multiparity
- African American race
- Third trimester
- Hypertension
- Diabetes mellitus
- Obesity
- History of tobacco use
- History of lipid disorder

Data from Refs. 1–5

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