Pregnancy-Related Acute Myocardial Infarction in Japan

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Acute myocardial infarction (AMI) rarely occurs among women of childbearing age. However, dynamic changes in cardiovascular physiology and coagulation in peripartum can increase the risk of AMI among pregnant women, compared with non-pregnant women of the same age. Moreover, current trends in lifestyle factors, increasing maternal age (**Figure 1**),¹ and fertility are likely to be contributing to this increase in incidence. The United Kingdom (UK) has developed a nationwide system to precisely investigate maternal death (Centre for Maternal and Child Enquiries: CMACE). CMACE reported that cardiovascular disease had been the most frequent cause of indirect maternal death, and ischemic heart disease had now become a common cardiac cause of death in pregnancy.²

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During pregnancy, plasma volume increases to approximately 50% higher than before pregnancy.³ Heart rate and cardiac output also increase. During labor, uterine contraction and pain causes more increases in circulatory volume and cardiac output. It takes approximately 4–6 weeks to return to a normal hemodynamic status. The physiologic increase in both blood volume and cardiac output may magnify shear forces of the blood column in large vessels, resulting in a greater propensity for dissection. Moreover, female hormone levels during pregnancy are known as a major cause of spontaneous coronary artery dissection, as well as for pregnancy-related aortic dissection in Marfan syndrome patients.⁴ Both coagulation and fibrinolysis are augmented but remain balanced to maintain homeostasis during pregnancy. Whenever homeostasis is imbalanced, such as in congenital thrombophilia, major bleeding, and cesarean section, peripartum women can develop thrombosis. The concentrations of lipids, lipoproteins, and apolipoproteins in plasma increase appreciably during pregnancy to maintain the pregnancy and fetal growth. Maternal hypercholesterolemia may increase the risk of cardiovascular disease. These changes begin from the early stage of pregnancy, and even in cases of aborted pregnancy there is a risk of developing AMI.

In Japan, AMI incidence during pregnancy is still anecdotal, and the clinical picture is unknown. In this issue of the Journal, Satoh et al retrospectively review case reports from medical institutions in Japan, over the past 30 years, and describe its epidemiology, etiology and treatment.⁵

Age, multipara, smoking, and other complications such as hypertension, thrombophilia, diabetes mellitus, and hyperlip-

idemia, are known risk factors for pregnancy-related AMI in Western countries.^{6,7} In the CMACE report, all the women who died from AMI between 2006 and 2008 in the UK had identifiable risk factors, including obesity, age >35 years, parity >3, smoking, diabetes, pre-existing hypertension, and family history. Therefore, it is recommended that the threshold for further investigation (such as serial ECGs and troponin level) of angina-like symptoms should be low, especially in women with known risk factors.

However, the prevalence of conventional risk factors in Japanese women is lower. Instead, many Japanese patients with pregnancy-related AMI received medications such as methylergometrine maleate, ritodrine hydrochloride, and prostaglandin for obstetrical reasons. We need to take care in the use of these medications.

In consideration of the risk factors, the etiology of pregnancy-related AMI is also different between Western countries and Japan. Atherosclerotic changes remain the primary cause of pregnancy-related AMI in the West, whereas spontaneous coronary dissection, spasm, and thrombus are the most often

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postulated etiologies of pregnancy-related AMI in Japan. The present study revealed that the use of methylethylgometriline and prostaglandin was related to coronary spasm, and the use of ritodrin was related to coronary dissection. Takotsubo cardiomyopathy had been reported as the cause of pregnancy-related AMI. Pregnant women with the coronary aneurysms of Kawasaki disease may also experience a progression of ischemic disease, when they have coronary stenosis, history of MI and coronary intervention.⁸ The different etiology may lead to different maternal outcomes. In Japan, there seems to be less maternal death from AMI, compared with Western countries.

Criteria for the diagnosis of AMI in pregnant women are, in general, the same as in non-pregnant patients and consist primarily of symptoms, ECG changes, and cardiac markers. At the same time, however, the diagnostic approach is also influenced by fetal safety and normal changes during pregnancy. The use of radiation during pregnancy should be kept to a minimum. Careful attention to fetal radiation exposure is

needed during cardiac catheterization and interventional procedures.

The Japanese guideline recommends that β -blockers are the first-line therapy to prevent myocardial infarction.⁹ Low-dose aspirin is effective in preventing myocardial ischemic attacks during pregnancy. Many reports have described that thrombolytic therapy for the treatment of AMI is not teratogenic, and the prognosis of the mother and fetus is favorable. Percutaneous coronary intervention and coronary artery bypass grafting during pregnancy are also effective. However, because of the possible increased risk of coronary dissection during pregnancy or the early postpartum period, noninvasive risk stratification may be preferred in stable and low-risk patients. **Figure 2** shows the approach for pregnancy-related ischemic heart disease. When women with a MI deliver, appropriate anesthesia, administration of oxygen, and monitoring are recommended.

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