



Case Report

Pregnancy-Related Spontaneous Coronary Artery Dissection in a 25-Year-Old Woman: A Case Report

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Abstract

Pregnancy-related spontaneous coronary artery dissection (P-SCAD) is a life-threatening condition that occurs during or after pregnancy, is rare and can be overlooked. It is one of the most important causes of pregnancy-related acute myocardial infarction. A 25-year-old female patient was admitted with a complaint of chest pain in her 37th week of pregnancy. There was nothing specific in her medical history except for a cesarean section, performed 2 years ago. There was diffuse ST-segment depression, and ST-segment elevation in leads V1, V2, and AVR. The patient was evaluated multidisciplinary and it was decided to perform a cesarean section and then urgently perform coronary angiography (CAG). Dissection within the lumen of the left anterior descending artery (LAD) was observed. The LAD was filling retrogradely from the right coronary artery, but no antegrade filling was observed (Type 2 SCAD). The patient, whose hemodynamics were stable and whose electrocardiography (ECG) showed no change, was monitored intubated, and stabilized in the intensive care unit (ICU) to minimize cardiac demand and reduce the risk of further myocardial ischemia. After that, an on-pump beating heart coronary artery bypass grafting (CABG) was performed 2 days later due to the high risk of bleeding related to the recent cesarean section operation. The LAD and diagonal artery were anastomosed with the left internal thoracic artery and saphenous vein grafts. She was discharged from the intensive care unit on postoperative day 2 and discharged from the hospital on day 8. P-SCAD is an important condition that can occur especially at a young age, its diagnosis may be overlooked, but it can cause serious clinical consequences. The treatment strategy should be decided in a multidisciplinary manner and should be individualized for each patient. This diagnosis should be kept in mind, especially when a young pregnant patient without cardiovascular risk factors presents with myocardial infarction findings.

Keywords: Dissection, myocardial infarction, pregnancy

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Pregnancy-related spontaneous coronary artery dissection is a rare and life-threatening condition during pregnancy, characterized by non-traumatic and non-iatrogenic separation of coronary artery walls and false-lumen formation.^[1] P-SCAD accounts for 14.5% to 43% of pregnancy-associated acute myocardial infarction (MI).^[2] Since it can develop especially in young women and in patients

who are not at high risk for cardiovascular disease, it can often be misdiagnosed. Therefore, to reduce maternal and infant mortality, rapid diagnosis, appropriate treatment, and awareness of this issue are important. In this case report, we present a 25-year-old woman who developed P-SCAD at the end of pregnancy and underwent CABG after an emergency cesarean section.

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Case Report

A 25-year-old female patient (63 kg) was admitted to the emergency department with a complaint of chest pain in her 37th week (gravidity 3, parity 2) of pregnancy. There was no feature in her medical history except for a cesarean section, performed 2 years ago and she did not have any family history. In her examinations, there was ST-segment elevation in leads V1, V2, and AVR and diffuse ST-segment depression in remaining leads with sinus tachycardia. The initial troponin T level was 719 ng/L (max 14 ng/L) (Fig. 1). Transthoracic echocardiography (TTE) revealed a normal

ejection fraction with no valvular pathology. The patient was evaluated by the cardiology, and gynecology obstetrics clinics, and it was decided to perform a cesarean section and then urgently perform CAG. Under emergency conditions, a cesarean section was performed which was followed by CAG. Dissection within the lumen of the LAD was observed on CAG. The LAD was filling retrogradely from the right coronary artery (RCA), but no antegrade filling was observed (Fig. 2). Despite repeated attempts, adequate images could not be obtained from the left main coronary artery (LMCA). The patient, whose ST-segment

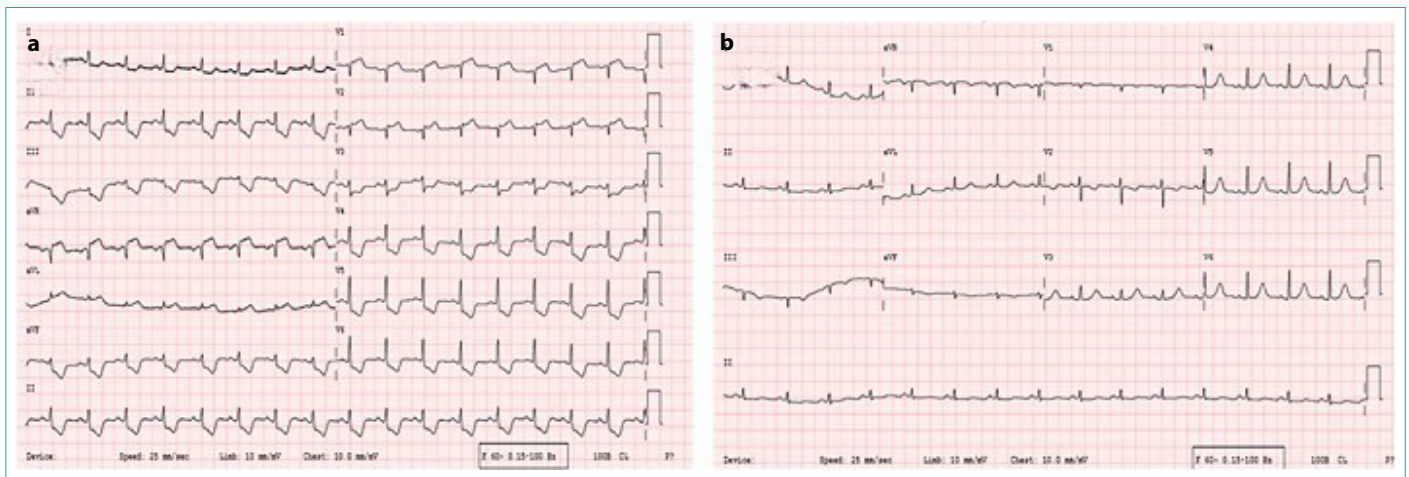


Figure 1. (a) The electrocardiogram shows ST-segment elevation in leads V1, V2, and AVR and diffuse ST-segment depression in remaining leads with sinus tachycardia. (b) The electrocardiogram shows that the ST-segments have resolved.

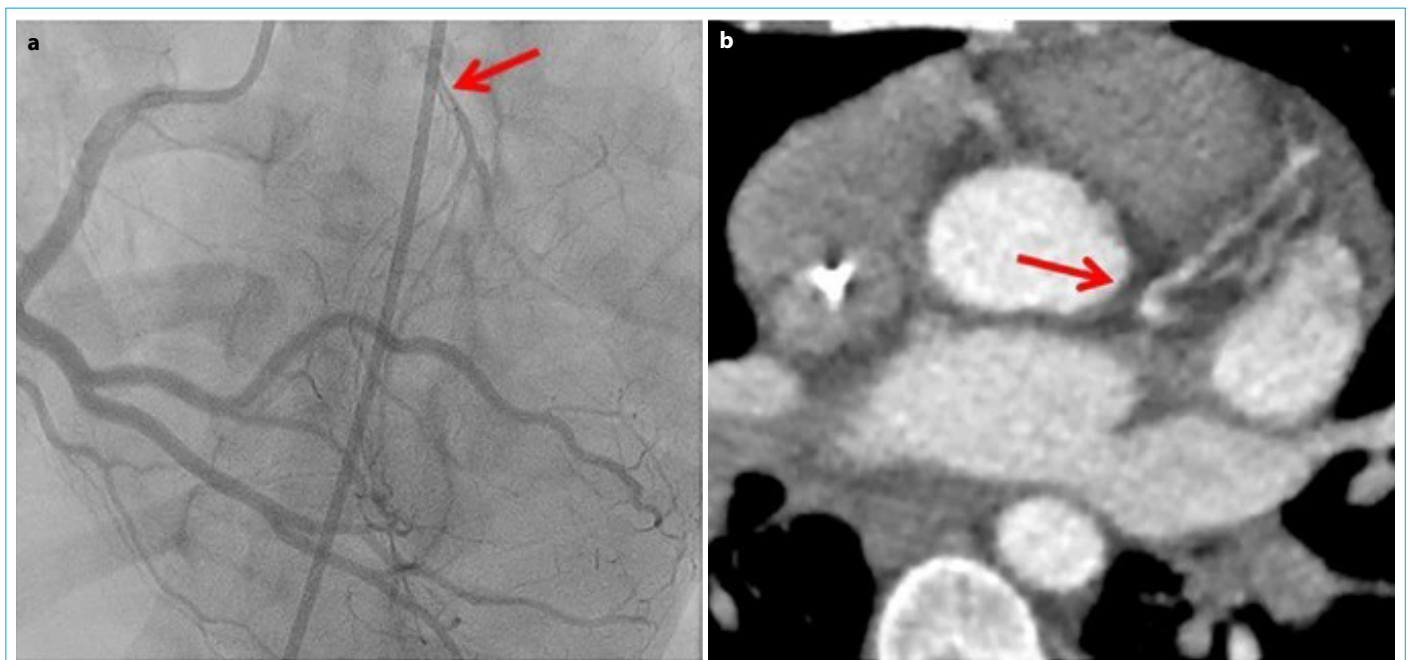


Figure 2. (a) A coronary angiogram shows the dissection within the lumen of the left anterior descending artery (LAD) was observed. The LAD was filling retrogradely from the right coronary artery, but no antegrade filling was observed. (b) The computed tomographic angiogram shows that no flow in the proximal left main coronary artery and the ostium of LAD, and findings consistent with dissection were detected in the LAD.

depression had regressed (Fig. 1) and remained hemodynamically stable, underwent cardiac computed tomographic angiography (CTA) for coronary artery imaging. CTA revealed no flow in the proximal LMCA and the ostium of LAD, and findings consistent with dissection were detected in the LAD (Fig. 2).

It was decided to perform a CABG for the patient, who was evaluated by the multidisciplinary team of cardiology and cardiovascular surgery clinics. The patient was hemodynamically stable and had no ECG changes, therefore she was followed in the ICU to be operated on 2 days later, due to the high risk of bleeding related to the recent cesarean section operation. She remained intubated and stable during ICU follow-up and was then taken into operation. On-pump beating heart CABG was performed after median sternotomy. The LAD and diagonal artery were anastomosed with the left internal thoracic artery and saphenous vein grafts, respectively. The circumflex artery was not suitable for anastomosis because its size was thin. Two U of erythrocyte suspension was given during the operation. There was 1100 ml of drainage after the operation. She was discharged from the ICU on postoperative day 2 and discharged from the hospital on acetylsalicylic acid + clopidogrel on day 8. At the outpatient clinic check-up 1 week after discharge, a postero-anterior chest radiograph revealed a pleural effusion in the left thorax. No pericardial effusion was detected in TTE. Pleurocan was placed on the left thorax and 1300 ml of serous fluid was obtained. Control chest radiography showed that the pleural effusion had almost completely disappeared and the patient was discharged again 2 days later. No complications were encountered during the subsequent follow-up period.

Discussion

P-SCAD is a rare condition that occurs during pregnancy or the first 3 months thereafter, with an incidence of approximately 1.81 per 100,000 pregnancies.^[3] It has been reported that the most commonly affected artery is the LAD.^[4] It is among the most important causes of MI seen in the postpartum period. Complications such as cardiogenic shock, ventricular arrhythmia, need for CABG, and mortality are significantly higher in patients with P-SCAD than in non-pregnancy SCAD.^[5] This situation is important because it can occur especially at a young age and in patients who are not in the cardiovascular high-risk group, can cause significant complications, and is often misdiagnosed. In this case report, we present a 25-year-old patient who was not in the high-risk group for MI but developed P-SCAD at the end of her pregnancy and therefore underwent CABG.

The pathophysiology of P-SCAD is not fully understood,

but potential causes are thought to be hormonal and hemodynamic changes during pregnancy. Increased progesterone causes loss of normal corrugation of elastic fibers. Estrogen increases the release of matrix metalloproteinase. With the decrease in the structural support of the vasa vasorum, rupture and resulting intramural hematoma (IMH) may occur with increasing hemodynamic stress during pregnancy.^[6] Moreover, during pregnancy, high plasma volume and cardiac output, and intense physical stress such as childbirth can lead to an increase in shear forces on the intima and lead to the development of dissection.^[7] As in our case, women with multiple births may have a higher risk of developing SCAD due to the accumulation of these hormones.^[8] Additionally, cumulative arterial wall changes over several pregnancies may also increase this risk.^[9]

There are 3 angiographic types for SCAD according to the Saw classification.^[10] Type 1 is the pathognomonic angiographic appearance of SCAD with contrast dye staining of the arterial wall with multiple radiolucent lumens. Type 2 is the most common angiographic type and has a long area of diffuse (>20 mm) stenosis. Type 3 is characterized by a focal area of stenosis that can mimic atherosclerosis. While it may be easier to diagnose Type 1 lesions with CAG, it may be difficult to diagnose Type 2 and Type 3 lesions, especially since they do not have the typical dissection appearance. Therefore, intracoronary imaging with optical coherence tomography (OCT) or intravascular ultrasound (IVUS) is required to identify such lesions. In our case, there were findings consistent with Type 2 dissection on CAG. Since the wire could not be advanced during CAG, adequate images could not be taken. Since OCT and IVUS could not be performed, CTA was performed. However, CTA is not always sufficient for diagnosis because SCAD also affects small side branches or distal coronary arteries. Additionally, IMH that causes mild luminal compression may not be detected. IMH can be better visualized with IVUS.

In our case, no antegrade filling was detected in the LAD and LMCA in CAG and CTA, and the retrograde filling was observed through the RCA. Considering that multiparity is an important risk factor for P-SCAD, we think that the patient developed P-SCAD during her previous pregnancies, and in her last pregnancy, myocardial ischemia was developed due to acute flow limitation on a chronically stenosed coronary artery and increased demand due to hormonal, and hemodynamic changes and physical stress in the last period of pregnancy. However, the typical Type 1 flap appearance was not seen clearly in the CAG and CTA images and was found to be compatible with Type 2 SCAD. Although intracoronary imaging is required to support this, OCT cannot be performed in our center, and IVUS could not be planned because antegrade images could not be obtained during CAG.

However, since our patient was a 25 years old female with no cardiovascular risk factors other than multiparity, and the symptoms appeared during pregnancy and were aggravated during the period when physical stress was most intense, we think that the findings are compatible with P-SCAD rather than atherosclerotic disease.

A conservative approach is generally recommended for treatment, as most of these lesions heal spontaneously.^[7] In cases such as ischemia and cardiogenic shock, percutaneous coronary intervention (PCI) or CABG may be considered. Since the weakened coronary arteries and false lumen are inherent in SCAD, there is a risk of dissection spreading in percutaneous interventions.^[1] Therefore, conservative treatment is the recommended treatment strategy in stable patients. In our case, CABG was planned because the patient had a critical lesion in the LMCA and LAD, had severe chest pain at the time of admission, had ST-segment changes, and had failed percutaneous intervention. The timing of CABG is also crucial for these patients due to the increased risk of bleeding related to childbirth or the cesarian section. It is important to balance the risks of uterine bleeding due to heparinization with myocardial compromise if ischemia is not treated in time. In our patient, after the cesarian section, ST segment changes subsided and the patient became hemodynamically stable. Also, there was no increase in repeat cardiac troponin levels. The operation was not planned urgently due to retrograde filling in CAG, no new-onset ECG changes, and a high-risk period of increased uterine bleeding after the cesarian section. The patient was kept intubated to minimize cardiac demand and to decrease the risk of further myocardial ischemia. If the patient is not stable, an intraaortic balloon pump may also be inserted for hemodynamic support but it was not necessary for our case. Another issue is that spontaneous dissection may recanalize or progress over time. Especially in patients undergoing CABG, this may cause graft failure due to competition or impaired graft flow. Therefore, these patients should be followed closely.

Due to the lack of evidence regarding P-SCAD, uncertain effects on lactation, and the nature of the dissection, single antiplatelet therapy (SAPT) is recommended instead of dual antiplatelet therapy (DAPT) unless percutaneous intervention is performed. The benefit of adding clopidogrel in patients without PCI is uncertain.^[11] In our case, we talked to the patient, informed her about the medications and their risks, and learned that she would not breastfeed. Due to emergency CABG, we started acetylsalicylic acid + clopidogrel. Additionally, we started indomethacin (25 mg/day po) and colchicine (0.5 mg/day po) for pleural effusion. Associations with SCAD and fibromuscular dysplasia (FMD),

connective tissue diseases such as Marfan syndrome, and Ehlers-Danlos syndrome have been reported.^[11] There was no known disease in our case. In our patient, the only known risk factor for P-SCAD was multiparity. However, it is still recommended that patients with SCAD be screened for arteriopathies such as FMD.^[1] Therefore, we performed postoperative carotid, renal artery, and peripheral arterial Doppler ultrasonography on our patient, but we could not find any pathology.

One of the most important and controversial issues in P-SCAD patients is the termination of pregnancy. The condition of the fetus, how many weeks old it is, and the patient's cardiac and hemodynamic status should be evaluated in detail. Most importantly, the possible risks should be discussed in detail with the patient and their relatives, and the decision to evacuate the fetus should be made with a multidisciplinary approach. In our case, because the mother was in the 37th week of pregnancy with severe ischemic findings and main coronary artery occlusion, a multidisciplinary team discussion by cardiology, gynecology obstetrics, and cardiovascular surgery clinics with the patient and their relatives resulted in a decision to perform a cesarean section followed by CABG. Despite critical coronary lesions, we managed to successfully perform a redo cesarean section under emergency conditions and then discharge the patient after performing CABG in a short time. The diagnosis of P-SCAD must be kept in mind in a pregnant patient presenting with MI findings, especially in the young age group. It is also important to be aware of treatment options and the decision should be made by a multidisciplinary team as well as patient and relatives.

Conclusion

P-SCAD is an important condition that can occur especially at a young age. Its diagnosis may be overlooked and this may cause serious clinical consequences. The treatment strategy should be decided in a multidisciplinary manner according to the patient's clinical condition and the characteristics of the lesion and should be individualized for each patient. This diagnosis should be kept in mind, especially when a young pregnant patient without cardiovascular risk factors presents with MI findings.

Disclosures

Informed consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

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