

Acute anterior myocardial infarction in the 36th week of pregnancy: A successful stepwise treatment approach

Otuz altı haftalık gebede akut ön duvar miyokart enfarktüsü: Başarılı basamaklı tedavi yaklaşımı

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Summary– Acute myocardial infarction (AMI) is associated with a high incidence of maternal and fetal complications when it develops during pregnancy or the early postpartum period. The pathophysiology involves various factors, including alterations in the vascular wall and hypercoagulability as a result of the hormonal and hemodynamic effects of pregnancy. It frequently occurs due to the development of a thrombus following a ruptured plaque. In addition, coronary artery dissection constitutes a significant cause of AMI in pregnancy. In the literature, the therapeutic approach covers a wide spectrum, ranging from conservative follow-up to percutaneous coronary intervention, urgent bypass surgery, and occasionally, thrombolytic therapy. The success rate is often low; however, maternal and fetal complications are seen more frequently during invasive interventions and bypass surgeries because of the structural changes in the coronary intima and media wall. Presently described is the case of a woman in the 36th week of pregnancy who presented with AMI. The occlusion could not be detected during the primary percutaneous intervention, and thrombolytic treatment and a stepwise percutaneous intervention were performed with a successful result.

In pregnancy, the incidence of acute myocardial infarction (AMI) ranges from 3 to 100 of every 100,000 deliveries.^[1-3] The maternal mortality rate ranges between 5.1% and 11%, and the fetal mortality rate has been reported to be 9%.^[1,2] In cases of AMI during pregnancy, coronary artery dissection has an occurrence rate of 16%, thrombus without atherosclerotic disease occurs at a rate of 21%, normal coronary arteries have been reported at a rate of 29%,

Özet– Gebelikte veya erken postpartum dönemde gelişen akut miyokart infarktüsü (AMI) sık maternal ve fetal komplikasyonlar ile ilişkilidir. Gebelikteki hormonal ve hemodinamik etkilerle koroner arter intima ve medyasında yapısal değişiklikler, hiperkoagulabilite gibi farklı faktörler patofizyolojide rol almaktadır. Miyokart enfarktüsü sıklıkla yırtılmış plak üzerine trombus gelişimiyle oluşurken, gebelikte spontan koroner arter diseksiyonu da önemli bir nedeni oluşturmaktadır. Literatürde, tedavi yaklaşımı olarak konservatif yaklaşımdan, perkütan koroner girişim ve ivedi baypas ameliyatına ve nadiren trombolitik tedaviye kadar giden olgular bildirilmiştir. Arter intima ve medyasındaki yapısal değişiklikler nedeniyle invaziv girişimler ve baypas ameliyatında anne ve fetus açısından komplikasyon riski daha yüksek, tedavi başarısı daha düşüktür. Biz bu yazıda, hamileliğinin 36. haftasında olup akut ön duvar miyokart enfarktüsüyle başvuran bir kadın hastayı sunuyoruz. Primer perkütan girişimde oklüzyon saptanamamış, trombolitik tedavi ve aşamalı perkütan girişim uygulanmış ve başarılı sonuç vermiştir.

and atherosclerosis with or without an intracoronary thrombus has been observed at a rate of 43%.^[1,2,4] The risk of AMI increases during pregnancy due to hormone-mediated and hemodynamic changes, including hypercoagulability and the increase in the level of progesterone, which can lead to degeneration of the connective tissue in the intima and media layers of the coronary arteries. Coronary arterial wall abnormalities, such as periadventitial inflammation,

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eosinophilic infiltration-associated medial degeneration, cystic medial necrosis, fibromuscular dysplasia, Marfan syndrome and Ehler-Danlos syndrome type IV, are predisposing factors for coronary dissection. [5-8] The physiological increase in blood volume and cardiac output during pregnancy may present additional stress on the blood vessels and increase the risk of coronary dissection and thrombotic rupture. [1,2,5,6]

CASE REPORT

A 34-year-old female patient presented at the emergency department with typical chest pain, cold sweat, and nausea. The patient was in the 36th week of pregnancy with no known risk factor for coronary artery disease and no history of substance abuse. It was her second pregnancy and she had not experienced any problems related to the pregnancy. Electrocardiography revealed ST-segment elevation in the D1, aVL

and V1-V6 leads (Fig. 1a). The physical examination revealed a systolic blood pressure of 130 mm Hg, a diastolic blood pressure of 85 mm Hg, and a heart rate of 100 beats per minute; cardiac auscultation indicated no abnormality. Acetylsalicylic acid, clopidogrel, and enoxaparin were administered, and primary percutaneous coronary intervention (PCI) was performed via the femoral arterial approach in the second hour of chest pain. The patient's abdomen was covered with lead shielding to protect the fetus from radiation. The left anterior descending artery (LAD) could not be

Abbreviations:	
AMI	Acute myocardial infarction
CABG	Coronary artery bypass graft
LAD	Left anterior descending artery
PCI	Percutaneous coronary intervention
P-SCAD	Pregnancy-associated spontaneous coronary artery dissection
STEMI	ST-segment elevated myocardial infarction
TIMI	Thrombolysis in Myocardial Infarction

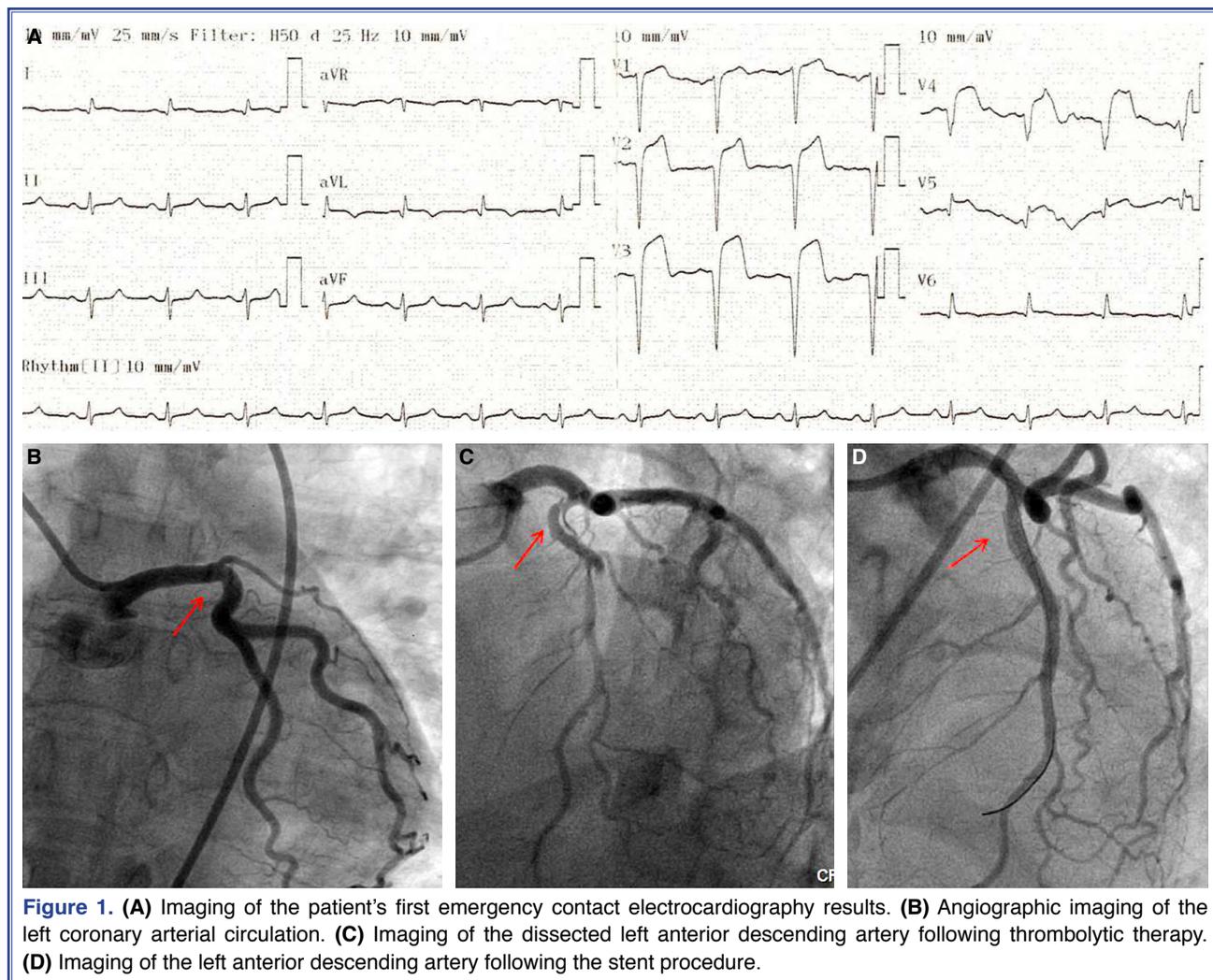


Figure 1. (A) Imaging of the patient's first emergency contact electrocardiography results. (B) Angiographic imaging of the left coronary arterial circulation. (C) Imaging of the dissected left anterior descending artery following thrombolytic therapy. (D) Imaging of the left anterior descending artery following the stent procedure.

visualized on coronary angiography (Fig. 1b/Video 1). It was considered that the LAD might be so completely occluded that the stump couldn't be visualized from the ostium. Echocardiography revealed that the septum, anterior, and apical walls were hypokinetic. During the third hour of chest pain, and due to a continued ST-segment elevation, 100 mg alteplase was administered intravenously within 90 minutes. The patient's chest pain was relieved and the ST-segment elevation improved. Laboratory analysis revealed cardiac troponin I level of >50 ng/mL (normal range: 0.0–0.1 ng/mL) and a creatine kinase myocardial band CK-MB level of 72 U/L (normal range: 0–25 U/L). A follow-up angiography was performed 24 hours later. A circular dissection starting from the ostium was observed in the LAD with a Thrombolysis in Myocardial Infarction (TIMI) flow score of 3 (Fig. 1c/Video 2). The results of a control echocardiography showed an ejection fraction of 35% with hypokinesis of the septum, and the anterior and apical walls. Further PCI was considered high-risk for complications, including progression of the dissection. Therefore, a conservative approach was pursued until delivery, to be followed by PCI. Dual antiplatelet therapy was continued. A healthy baby was delivered 3 days later by cesarean section under general anesthesia. Neither the mother nor the child showed any signs of complication. The mother was taken to the angiography laboratory 1 week after the delivery and a 3.0x38-mm Resolute Integrity (Medtronic, Inc., Minneapolis, MN, USA) drug-eluting stent was implanted in the ostium of the LAD. Post-dilatation was performed with a 3.5x15-mm Simpass NC non-compliant balloon (Simeks Medical Products, Tuzla, Turkey) (Fig. 1d, Video 3). The patient was discharged without any complications and with acetylsalicylic acid, clopidogrel, metoprolol, atorvastatin, furosemide therapy. She was asymptomatic in follow-up of 6 months. A control echocardiography revealed an ejection fraction of 40% with ongoing hypokinesis of the septum and the anterior and apical walls. Because of an increased risk of subsequent pregnancies, family planning measures were taken.

DISCUSSION

Pregnancy-associated spontaneous coronary artery dissection (P-SCAD) is one of the major causes of myocardial infarction in young women.^[1,6] Multiple

predisposing risk factors for P-SCAD have been described, including infertility therapies, greater maternal age, multiparity, hyperlipidemia, smoking, hypertension, and eclampsia or preeclampsia.^[9,10] No randomized clinical trials or retrospective studies are currently available to guide a best treatment option in patients with P-SCAD, as a result of the wide variety of clinical presentations and the rarity of the pathology.^[1,5,6]

Therapeutic options in AMI during pregnancy include a conservative strategy, PCI, coronary artery bypass grafting (CABG), and occasionally, thrombolytic therapy.^[3,4,5,6,11] The conservative approach can be successful in stable patients with normal coronary artery flow. PCI is recommended in cases with continuing ischemia and infarction when a large myocardial area is at risk and the angiographic lesion is eligible. However, the risk of complications is high, due to the potential progression of the dissection as a result of the passage of a wire into a false lumen and the displacement of an intramural hematoma via stent placement, leading to stent malapposition and thrombosis. Intravascular ultrasound or optical coherence tomography can provide additional information about periprocedural complications.^[1,6] CABG surgery is recommended in cases of coronary dissection extending to the left main coronary artery, multiple proximal coronary lesions, and in cases where PCI is unsuccessful or not appropriate.^[12] In our case, the LAD was not visualized on the first angiography, and a CABG procedure was considered high-risk for both the mother and the fetus in terms of emergency revascularization by the surgery team. During CABG, it can be difficult to clearly identify the true lumen, which may result in grafting of a false lumen. Also, the long-term durability of surgical grafts in cases of SCAD has been reported to be poor. The spontaneous healing of a dissected coronary segment can lead to graft failure due to competitive flow. Nonetheless, CABG is recommended the first-choice method in many life-threatening instances.^[1,5,6,13]

The complications of thrombolytic therapy include maternal hemorrhage, placental abruption, fetal loss, and uterine bleeding.^[1,6,14] It increases the risk of bleeding and the progression of the intramural hematoma and coronary dissection.^[1,6,14] However, after evaluating the benefit-risk ratio, when PCI is inadvisable, and in cases of ST segment-elevated myocar-

dial infarction (STEMI) where the lesion cannot be evaluated clearly, as in our case, thrombolytic therapy can be performed successfully.^[1,5,13] The present case is noteworthy in that the difficult initially non-visible LAD lesion dissected from the ostium following reperfusion with the thrombolytic treatment. Medical follow-up was administered until a stepwise PCI could be performed, which had successful results. In cases of symptomatic patients presenting with STEMI during pregnancy and for whom PCI or CABG is not appropriate, unsuccessful, or the angiography results do not demonstrate any lesion, the applicability of thrombolytic treatment should also be considered.^[1,5,6]

Conclusion

AMI has a high risk of maternal and fetal complications in pregnancy. The therapeutic approach presented in the literature covers a wide spectrum, ranging from conservative follow-up to PCI and urgent bypass surgery. Thrombolytic therapy should be considered as an alternative treatment approach in difficult cases.

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Keywords: Acute myocardial infarction; pregnancy; spontaneous coronary artery dissection; stepwise treatment approach; thrombolytic therapy.

Anahtar sözcükler: Akut miyokart enfarktüsü; gebelik; spontan koroner arter diseksiyonu; basamaklı tedavi yaklaşımı; trombolitik tedavi.