

# Acute Myocardial Infarction Due to Spontaneous Coronary Dissection in Pregnancy: A Case Report and Management Considerations

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**Abstract:** Acute myocardial infarction (AMI) during pregnancy is a rare but life-threatening condition with unique pathophysiological mechanisms and management challenges. We present the case of a 28-year-old woman at 37 weeks of gestation who developed AMI due to spontaneous coronary artery dissection (SCAD). Initially admitted with retrosternal pain and transient electrocardiographic changes, she exhibited a significant rise in troponin levels, prompting a multidisciplinary reassessment. Conservative management was initially pursued, but recurrent chest pain and worsening electrocardiographic findings necessitated urgent coronary angiography. The procedure confirmed a long dissection of the left circumflex artery, successfully treated with percutaneous coronary intervention using a “stent-in-stent” technique. Given the high-risk nature of her pregnancy, anticoagulation therapy was carefully adjusted to minimize peripartum hemorrhagic complications. At 39 weeks, she underwent cesarean delivery of a healthy neonate. Follow-up evaluation one year post-intervention showed overall improvement, with only minor residual sequelae, including mildly reduced left ventricular function and subtle electrocardiographic changes. This case underscores the complexities of diagnosing and managing SCAD-related AMI in pregnancy, emphasizing the need for individualized treatment strategies that balance maternal cardiovascular risks with fetal safety. Given the rarity of SCAD in this population and the limitations of standardized guidelines, accumulating clinical experience is essential to refine management approaches in future cases.

**Keywords:** acute myocardial infarction, spontaneous coronary artery dissection, pregnancy, management

## Introduction

Over 33.3% of pregnancy-related deaths are due to cardiovascular diseases, with acute myocardial infarction (AMI) being a significant contributor to maternal mortality.<sup>1</sup> While the risk of AMI during pregnancy and the early postpartum period is relatively low (6 to 10 cases per 100,000 pregnancies), it is three times higher compared to non-pregnant women of reproductive age.<sup>2,3</sup> Pregnant women who experience AMI have a 22-fold higher in-hospital mortality risk, with a 37% mortality rate and the potential loss of both mother and child.<sup>1,4</sup> In the past 20 years, the incidence of AMI in pregnancy has increased, likely due to the rising average maternal age and greater prevalence of risk factors.<sup>5,6</sup> The etiology of AMI also differs significantly. In the general population, most cases result from atherosclerotic coronary artery disease. However, among pregnant women, approximately 40% of AMI cases are associated with spontaneous coronary artery dissection (SCAD). Atherosclerosis accounts for around 27% of cases, while myocardial infarction with non-obstructive coronary arteries (MINOCA) represents up to 29%.<sup>2,7,8</sup>

The pathophysiology of SCAD remains unclear and likely multifactorial. It involves spontaneous coronary artery dissection due to an intramural hematoma, with or without intimal rupture.<sup>7,8</sup> SCAD is often linked to arteriopathies,

connective tissue disorders, and autoimmune diseases.<sup>8</sup> Pregnant women, especially in the third trimester and postpartum, are at higher risk, particularly those who have undergone infertility treatment, including in vitro fertilisation.<sup>9–11</sup>

## Case Report

A 28-year-old female, gravida 3, at 37 weeks of gestation, was admitted to the district central hospital via emergency medical services with complaints of a single episode of vomiting, nausea, constrictive retrosternal pain, and a sensation of rapid heartbeat. She attributed the onset of symptoms to the consumption of a low-alcohol beverage the previous evening (300 mL of light beer) along with potato chips.

Her medical history revealed a prior smoking habit, with a four-year history of tobacco use, smoking up to 15 cigarettes per day (pack-year index: 3). She discontinued smoking upon conception of the current pregnancy. Her family history was unremarkable for cardiovascular disease, connective tissue disorders, or sudden cardiac death. The patient's obstetric history included a spontaneous miscarriage at 11 weeks of gestation in 2015. In 2018, she had an uncomplicated full-term pregnancy, resulting in a vaginal delivery of a healthy female neonate weighing 3300 g.

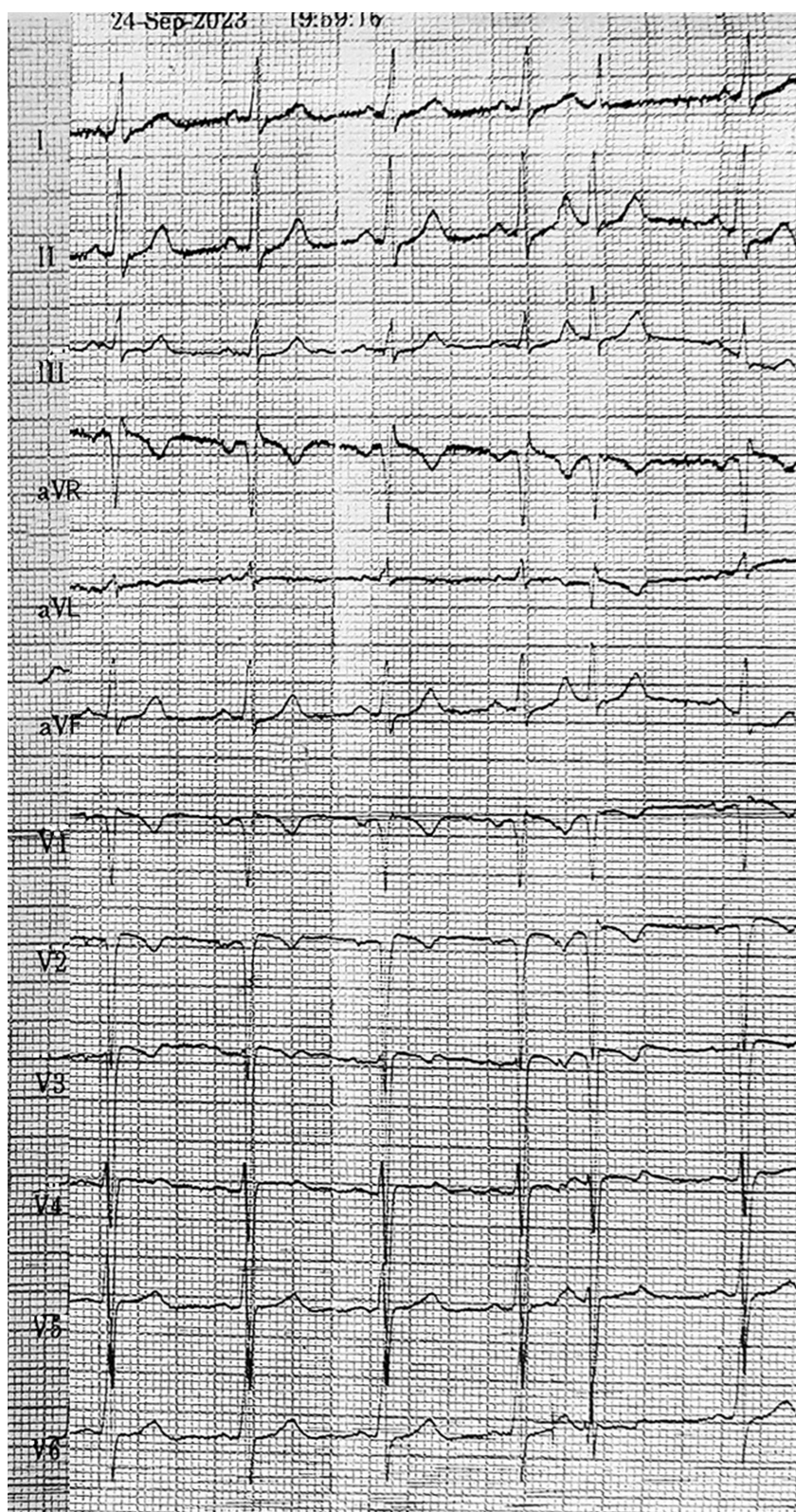
The emergency medical team administered antispasmodics with minimal effect. The time from the onset of symptoms to hospitalization was 7 hours. An electrocardiogram (ECG) was performed immediately upon arrival (Figure 1, ECG from 24.09.23), showing no signs of acute ischemia. Troponin I was measured at 0.10 ng/mL (normal value: up to 0.16 ng/mL). Routine laboratory tests showed elevated total cholesterol (TC) at 7.03 mmol/L, low-density lipoprotein cholesterol (LDL-C) at 4.70 mmol/L, high-density lipoprotein cholesterol (HDL-C) at 1.48 mmol/L, and triglycerides (TG) at 2.74 mmol/L. These findings were considered physiological for late pregnancy and not indicative of a primary lipid disorder.

Upon admission, the patient continued to experience recurrent episodes of constricting retrosternal pain. A repeat investigation was performed, revealing a significant rise in troponin I levels, which was 14.31 ng/mL, 4 hours after hospitalization. The repeat ECG (Figure 2, ECG from 24.09.23) showed ST-segment elevation in leads I, aVL, and V<sub>4</sub>-V<sub>6</sub>, with reciprocal ST depression in leads II, III, aVF, and negative T-waves in leads I and aVL. Echocardiography demonstrated septal and anterior left ventricular wall hypokinesis with left ventricular ejection fraction of 50%. Given the patient's clinical symptoms, ECG findings, and the increase in myocardial necrosis markers, along with input from relevant specialists, the decision was made to transfer the patient to a center capable of providing specialized care.

Thus, the patient was admitted to the intensive care unit of the maternity hospital for further observation and continuous cardio-respiratory monitoring. An ultrasound was immediately performed in the obstetrics department to assess the fetal condition. At the time of admission, the patient did not report any complaints, and the ECG showed no abnormalities. Considering the transient, rapidly evolving changes on the ECG, which were clearly associated with retrosternal pain, and the significant rise in myocardial necrosis markers over time, a presumed diagnosis of acute type 2 myocardial infarction was made.

A decision was reached to proceed with conservative management, and the patient was started on enoxaparin 0.4 mL twice daily subcutaneously and acetylsalicylic acid (ASA) 100 mg once daily. The following day, the patient again complained of severe retrosternal pain, which did not alleviate despite the administration of nitrates and required opioid analgesics. In response, an echocardiogram was immediately performed, revealing hypokinesis of the anterior segment of the left ventricular wall. The repeat ECG (Figure 3, ECG from 26.09.23) was registered. The aforementioned changes were interpreted as an expansion of AMI, prompting the decision to proceed with urgent coronary angiography to determine the subsequent treatment strategy. During the coronary angiography, a femoral access was used. A long dissection in the mid-distal segment of the left anterior descending artery (LAD) was noted (Figure 4A). Two Resolute Integrity (DES) stent systems were then implanted using the "stent-in-stent" technique. Follow-up angiography showed complete stent deployment in the LAD, with adequate positioning and restoration of the main blood flow through the LAD (TIMI – 3; TIMI myocardial perfusion grade – 3) (Figure 4B). No significant narrowings were identified in the left circumflex artery or the right coronary artery.

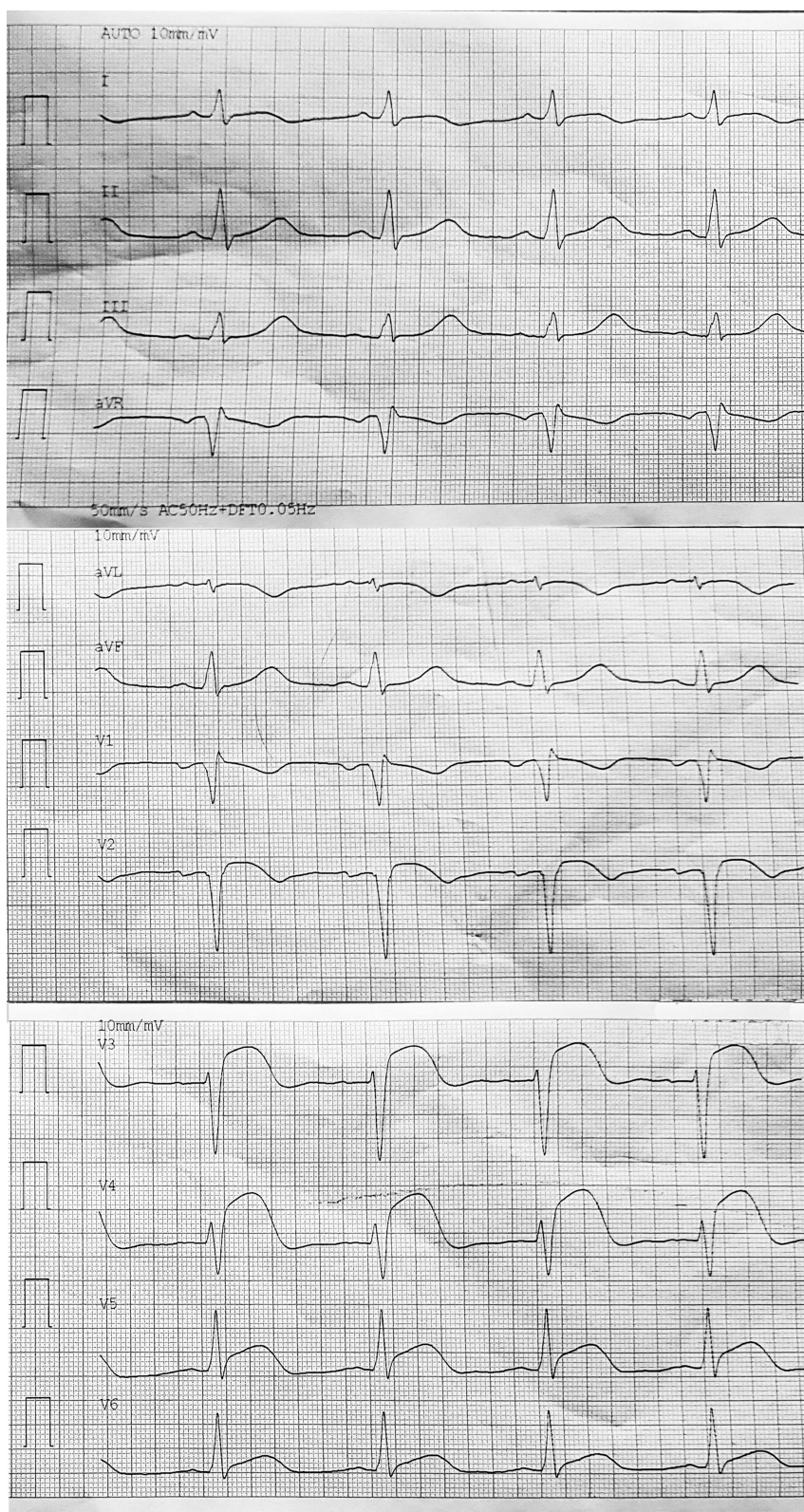
Following PCI, clopidogrel (75 mg once daily) and bisoprolol (1.25 mg once daily) were added to the patient's treatment regimen. Regarding pregnancy management, multiple consultations were held with a multidisciplinary team comprising specialists in obstetrics and cardiology. The patient remained under continuous surveillance in the high-risk



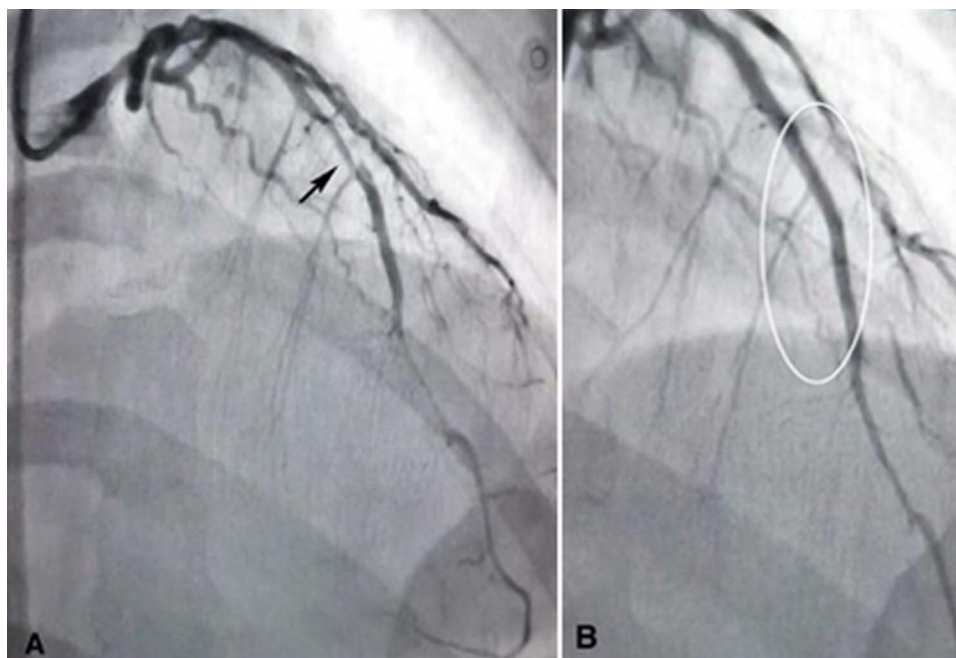
**Figure 1** Initial ECG recording taken on admission. No signs of acute ischemia are seen.



**Figure 2** Follow-up ECG displaying ST-segment elevation and reciprocal changes, indicating acute ischemic injury.



**Figure 3** ECG taken during symptom recurrence, revealing expansion of ischemic changes.



**Figure 4 (A)** Coronary angiography identifying a long dissection in the left anterior descending artery (arrow). **(B)** Post-stenting angiography confirming restored blood flow in the affected artery (ellipse).

obstetric intensive care unit. Given the gestational age of 37–38 weeks and the elevated risk associated with surgical delivery, adjustments were made to the antiplatelet and anticoagulant therapy. Specifically, clopidogrel was discontinued, and enoxaparin was replaced with heparin. Heparin was administered at a dose of 7,000 IU every six hours, with activated partial thromboplastin time monitoring. It was recommended that the final dose be administered no later than four hours before the planned delivery.

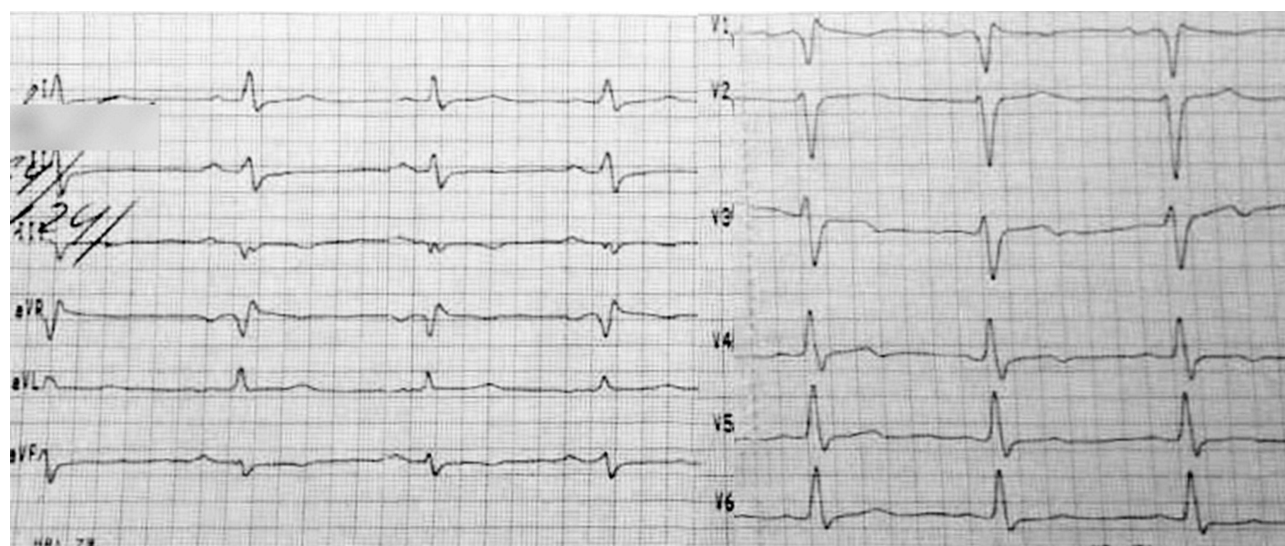
At 39 weeks of gestation, due to the onset of spontaneous labor and rupture of membranes in the presence of a pure breech presentation, a decision was made to proceed with delivery via cesarean section. A female neonate was delivered, weighing 3,300 g and measuring 54 cm in length, with Apgar scores of 8/8. On postoperative day 4, the patient and her newborn were discharged home. Recommendations were provided regarding ongoing pharmacological therapy, specifically the continuation of DAPT (ASA and clopidogrel) for the next 12 months.

The subsequent follow-up period was uneventful. At 4 months postpartum, her lipid profile had normalized: total cholesterol 4.71 mmol/L, LDL-C 2.9 mmol/L, HDL-C 1.54 mmol/L, and triglycerides 0.93 mmol/L, supporting the interpretation that the earlier elevation was related to physiological gestational changes. One year after myocardial infarction, ECG revealed persistent scarring at the apex extending to the interventricular septum, mild ST-segment elevation, and biphasic T waves in leads V<sub>3</sub>–V<sub>4</sub> (Figure 5, ECG from 11.11.2024). Echocardiography showed a preserved left ventricular ejection fraction. No clinical evidence of a vascular or systemic connective tissue disorder has been observed during the one-year follow-up to date.

## Discussion

Cardiovascular risk factors in pregnancy are consistent with those in the general population, including a family history of cardiovascular disease, dyslipidemia, diabetes, and smoking.<sup>12</sup> Pregnancy-specific factors include polycystic ovary syndrome, early menarche, maternal age over 35, gestational diabetes, pre-eclampsia, and hormonal therapy use.<sup>13</sup>

Although the patient had ceased smoking during pregnancy, her prior tobacco use may have contributed to vascular vulnerability. Several studies have identified smoking as a potential risk factor for SCAD, both in pregnancy-associated and non-pregnancy cases, likely due to its role in vascular inflammation and endothelial dysfunction. In particular, a meta-analysis of women with SCAD, smoking was among the most frequently reported cardiovascular risk factors,



**Figure 5** Follow-up ECG one year later, showing residual non-specific ST-T abnormalities.

present in nearly a quarter of cases.<sup>14</sup> Another study found a significant association between smoking and increased mortality in SCAD patients.<sup>15</sup>

Similarly, while gestational hyperlipidemia has been proposed to influence vascular function through mechanisms such as endothelial dysfunction or oxidative stress, its direct role in SCAD remains unproven. SCAD is typically not associated with lipid deposition or coronary atherosclerotic plaque.<sup>16</sup> During pregnancy, physiological hyperlipidemia is well recognized: total cholesterol and LDL-C typically rise by 30–50%, triglycerides by 50–100%, and HDL-C by 20–40% as gestation progresses.<sup>17</sup> The patient's third-trimester lipid profile was consistent with these expected changes, and normalization at follow-up supported the interpretation of a transient physiological response. These findings underscore the importance of interpreting lipid values in pregnancy within trimester-specific reference ranges, rather than assuming pathological significance in isolation.

Pregnancy-related SCAD likely results from increased shear stress, elevated progesterone reducing arterial elasticity, and estrogen-induced hypercoagulation and collagen inhibition. Increased cardiac output and blood volume further contribute. It often affects major coronary arteries, leading to reduced ejection fraction and severe maternal-fetal complications.<sup>18–23</sup>

Managing patients with pregnancy-related SCAD is challenging, particularly in diagnosing the condition. In 70% of cases, SCAD presents with typical ST-segment elevation on ECG.<sup>24</sup> However, nearly one-third of patients show no ECG signs of coronary circulation impairment.<sup>10,25</sup> In the presented clinical case, early ECG showed a transient ST elevation in the anterior-lateral wall, which resolved after pain relief, initially suggesting vasospastic angina. The key indicator of myocardial injury was the sustained rise in troponin I levels. Notably, troponin is preferred over CK-MB in pregnant women, as CK-MB can rise due to uterine contractions or cell breakdown during delivery, with lower specificity in pregnancy and postpartum.<sup>26</sup>

Given the absence of pronounced clinical symptoms at the time of our patient's transfer, a conservative treatment approach was initially chosen. However, this was later reassessed due to the recurrence of symptoms (angina, vomiting), accompanied by deteriorating ECG changes and severe arrhythmias. There is no consensus on the preferred management strategy for pregnant women with AMI, and each case requires an individual approach. Conservative management of SCAD not related to pregnancy has shown better outcomes than in pregnant women and the early postpartum period.<sup>9,23,24</sup> In pregnant women with SCAD, coronary interventions were associated with a higher risk of dissection progression and the occurrence of new iatrogenic dissections during the procedure.<sup>23–25</sup> Additionally, concern arises over the potential impact of X-ray exposure on the fetus during coronary angiography (CAG). During CAG, the patient's radiation dose is less than 20 mGy, while the fetal radiation dose is estimated at 0.074 mGy.<sup>27</sup> The teratogenic risk to the

fetus is minimal for doses below 50 mGy and potentially fatal for doses above 150 mGy, depending on gestational age.<sup>28</sup> Therefore, it can be concluded that the radiation dose during coronary angiography is generally safe for most pregnant patients.<sup>29</sup> An alternative option is the use of computed tomography coronary angiography, particularly in non-ST elevation myocardial infarction patients, but it may cause delays and is not always effective in detecting small areas of dissection.<sup>30</sup> The access route for percutaneous intervention is also crucial. Radial access, as opposed to femoral access, reduces radiation exposure to the fetus, as it avoids direct X-ray exposure, making it more often recommended for pregnant women. Moreover, radial access is associated with a lower risk of complications, such as bleeding.<sup>31</sup> However, some studies suggest that femoral access may be more effective for pregnant women with SCAD, as it has been linked to nearly three times fewer iatrogenic dissections compared to radial access.<sup>32,33</sup> In our patient, femoral access was used, and no expansion of the dissection zone was observed during the procedure.

Pharmacological management, particularly dual antiplatelet therapy (DAPT) after percutaneous coronary intervention (PCI), has specific considerations. According to the latest European Society of Cardiology guidelines, clopidogrel is recommended as part of DAPT in pregnant women post-PCI, as it is considered safer than glycoprotein IIb/IIIa inhibitors, due to a lack of data on their use in pregnancy.<sup>10</sup> However, there are no clear guidelines on the duration of DAPT during labour for patients at high risk of thrombosis or those with recent intervention. Some studies show positive outcomes, while others report serious side effects from prolonged DAPT use.<sup>25</sup> A decision was made to continue long-term DAPT, with a short-term discontinuation of clopidogrel before the planned cesarean section. After discharge, the patient continued DAPT for 12 months with no complications.

While the case highlights key aspects of diagnosis and management, it also has certain limitations. These are inherent to a single-patient observation. Intravascular ultrasound or optical coherence tomography was not performed, which might have provided more precise characterization of the arterial dissection. Additionally, no further investigations were undertaken to evaluate possible underlying vascular or connective tissue disorders. However, the case reflects real-world clinical complexity, where decisions must often be made based on evolving symptoms and limited diagnostic data.

## Conclusion

The issue of myocardial infarction during pregnancy involves several aspects, including challenges in emergency diagnosis due to a low index of suspicion among young women without traditional risk factors, as well as the absence of clear, definitive algorithms for selecting a management strategy (conservative/invasive). Additionally, there is uncertainty regarding the volume and duration of anticoagulant and antiplatelet therapy. Since the likelihood of conducting randomized clinical trials among pregnant women is quite limited and problematic, the accumulation of sufficient clinical case reports from real-world practice will, in the future, allow for the formulation of a well-founded expert opinion and evidence-based recommendations for managing this patient cohort.

## Date and Materials Statement

This is a case report without statistical analysis of the raw medical record data. All medical data involving the patient were documented in the patient's medical records. If necessary, more detailed imaging data or laboratory data can be provided by the corresponding author upon reasonable request.

## Ethics Statement

Ethical review and approval were not required for the study involving human participants in accordance with the local legislation and institutional requirements. Written informed consent was obtained from the patient for the publication of any potentially identifiable images or data included in this report.

## Informed Consent for Publication

The patient agreed to publish her medical data including imaging data and laboratory data, and signed the informed consent.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

All the authors declare that they have no conflicts of interest in this medical case report and have not received any financial support.

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