

CASE REPORT

COVID Infection and Spontaneous Coronary Dissection in a Pregnant Woman — a Therapeutic Challenge

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ABSTRACT

The link between COVID-19 and cardiovascular diseases, specifically myocardial infarction, has been well documented, but the interactions between these comorbidities in the context of pregnancy has not been elucidated so far. We report an intriguing case of a 35-year-old woman in her 35th week of pregnancy, with SARS-CoV-2 infection, who developed an acute coronary syndrome caused by a spontaneous coronary dissection. To our knowledge, this paper presents one of the first cases reported in the literature of acute coronary syndrome and COVID-19 infection in a pregnant patient.

Keywords: pregnancy, COVID-19, myocardial infarction

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INTRODUCTION

With the global escalation of COVID-19 to pandemic dimensions, there has been a pronounced shift in focus toward discerning the intricacies of its impact on cardiovascular health. Despite many studies investigating the effect of COVID-19 on the heart, little is known regarding its impact on pregnant women. This engrossing domain encompasses an array of both microvascular and macrovascular thrombotic complications, on top of inflammatory processes that can culminate in myocardial infarction (MI). Moreover, the spectrum extends to include heart failure and arrhythmias, all of which have come under heightened scrutiny as a result of this viral outbreak.¹

Pregnant women have a significantly higher risk of adverse outcomes compared with nonpregnant women of reproductive age. These repercussions span a spectrum necessitating intensive care unit (ICU) admission, mechanical ventilation, and extracorporeal membrane oxygenation (ECMO) for hemodynamic support. Noteworthy case series detailing COVID-19 infections intertwined with pregnancy have unveiled an array of cardiovascular concerns including myocardial infarction, ventricular dysfunction, arrhythmias, thrombotic complications, and an elevated susceptibility to preeclampsia. Furthermore, pregnant individuals also report persisting symptoms, commonly referred to as “long haul” symptoms.^{2,3}

Pregnancy induces a complex interplay of physiological, immunological, and mechanical transformations, thereby augmenting vulnerability to infectious respiratory agents and fostering a predisposition toward increased disease severity. An intriguing facet to consider is the role of angiotensin-converting enzyme 2 (ACE-2) receptors, postulated as the gateway for the intrusion of SARS-CoV-2 into host cells. Remarkably, pregnancy is marked by an upsurge in the expression of ACE-2 receptors. It is noteworthy that SARS-CoV-2 has the capacity to downregulate ACE-2 receptors, thereby negating their cardioprotective function and engendering a surge in concentrations of tumor necrosis factor- α and inflammation. This intricate cascade of events may conceivably underlie myocardial dysfunction in individuals—both pregnant and nonpregnant—confronted with COVID-19. These multifaceted pathways, the evolving understanding of the interplay between pregnancy, ACE-2 receptors, and viral infection deepens, amplifying the need for comprehensive investigation and tailored management approaches.^{4,5}

The diagnostic strategies for suspected myocardial injury align notably with those applied to nonpregnant patients. The initial evaluation hinges on an amalgamation of historical context, insights gleaned from physical examination, chest radiography, electrocardiography (ECG), cardiac biomarker analysis, and often, the indispensable insights offered by echocardiography. Although coronary atherosclerosis is infrequently encountered within the reproductive age demographic, the prevailing cause of acute myocardial infarction during pregnancy remains spontaneous coronary dissections. In instances where the ECG indicates ST-segment elevation myocardial infarction (STEMI), prompt angiography is a prudent course of action. This approach aligns with the contemporary directives for assessment when active COVID-19 infection is present.^{6,7}

In the presence of myocardial injury, the formation of a multidisciplinary heart team, tasked with orchestrat-

ing maternal cardiac stabilization and determining the opportune moment for delivery within a controlled environment, becomes crucial. The composition of this collaborative ensemble may encompass experts from various domains, including general and interventional cardiology, obstetrics, maternal fetal medicine, critical care, anesthesia, and cardiac surgery. The selection of team members is contingent upon a comprehensive assessment, accounting for factors such as the patient's hemodynamic condition, gestational phase, etiology of the injury, and institutional resources.^{8–10}

CASE PRESENTATION

A 35-year-old woman, active smoker, with a history of hypertension and hypothyroidism, at 35 weeks of pregnancy, has been admitted to a territorial hospital for a pelvic inflammatory syndrome. Ultrasound parameters were in accordance with gestational age. Due to respiratory infection symptoms, the suspicion of SARS-CoV-2 infection was raised, and the patient tested positive on the RT-PCR test. During hospitalization, the patient presented retrosternal chest pain described as pressure, lasting more than 30 minutes and accompanied by shortness of breath, raising the suspicion of acute coronary syndrome, and the patient was transferred to our department.

At admission, the ECG showed pathognomonic ST-segment elevation in leads V1–V3 and ST-segment depression with inverted T-wave in DII, DIII, and aVF (Figure 1). The echocardiography revealed mild systolic dysfunction of the left ventricle, with akinesia of the apical septal and apical inferior segments of the left ventricle, characterized by a left ventricular ejection fraction of 45%. Additionally, a moderate mitral regurgitation was found.

The laboratory findings showed leukocytosis with neutrophilia (leukocytes 18,390 cells/ μ L; neutrophils 15,880 cells/ μ L), mild anemia (hemoglobin 10.6 g/dL; hematocrit 25.1%), elevated myocardial enzymes (hs-cTnI 12,077 ng/L;

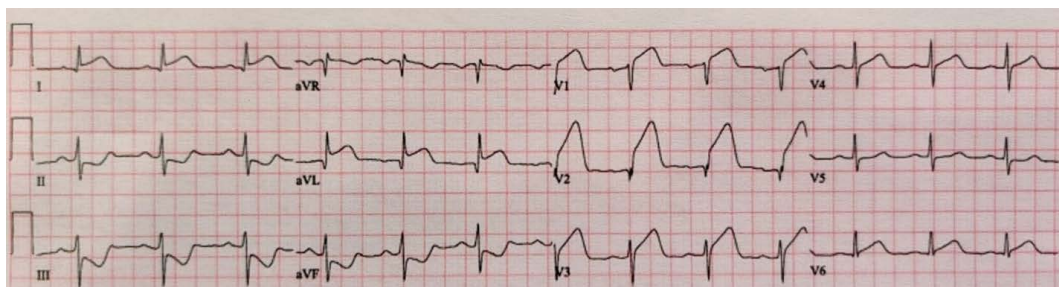


FIGURE 1. The electrocardiogram trace at admission revealing pathognomonic ST-segment elevation in leads V1–V3 and ST-segment depression with inverted T-wave in DII, DIII, and aVF

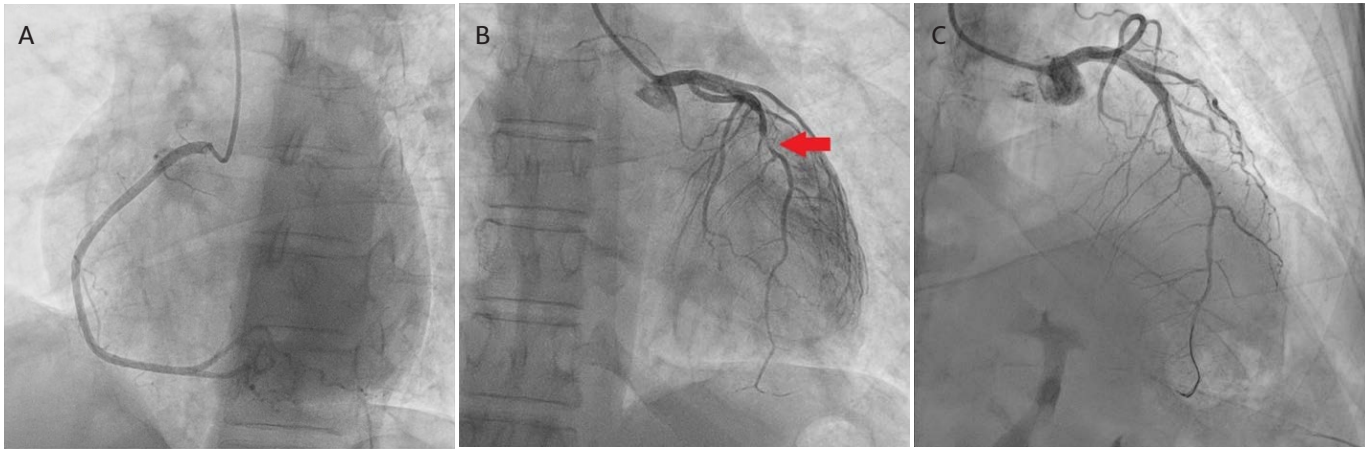


FIGURE 2. **A** – Right coronary artery at coronary angiography; **B** – Left anterior descending artery revealing subocclusive stenosis; **C** – Left anterior descending artery after revascularization

CK-MB 108 ng/mL), and an inflammatory syndrome characterized by elevated erythrocyte sedimentation rate (36 mm/h, reference range <20 mm/h), procalcitonin (0.08 ng/mL, reference range <0.05 ng/mL), and a urinary tract infection discovered at urinalysis (both nitrites and leukocytes were positive).

Based on the clinical symptoms, ECG findings, echocardiographic changes, and positive myocardial enzymes, the diagnosis of anterior myocardial infarction with ST segment elevation was established. The patient was transferred to the cardiac catheterization laboratory, and an emergency coronary angiography was performed, showing a spontaneous dissection in the left anterior descending artery associated with subocclusive stenosis spanning 25 mm in the second and third segments, with distal TIMI II flow. Direct stenting was performed using a 3 × 33 mm drug-eluting stent at the level of the anterior descending artery with restoration of the vascular lumen and coverage of the dissected entry point. The angiographic result was favorable, showing TIMI III flow in the distal region (Figure 2).

Given the epidemiological context, the patient was transferred to the COVID unit and monitored continuously in a noninvasive way. Unfortunately, shortly after the transfer to the COVID unit, the patient presented cardiorespiratory arrest and underwent an emergency cesarean section under resuscitation maneuvers. During the intervention, a live fetus was delivered and received advanced medical support. Throughout the procedure, resuscitation efforts were sustained by the operating team. However, despite these extensive efforts, a positive response was not achieved, leading to the patient's death.

The autopsy report revealed transmural infarction affecting the anterolateral and middle-anterior septal walls. The stent graft at the level of the anterior descending ar-

tery was patent. The myocardium exhibited severe myopathic changes, with scattered diffuse deposits suggestive of myocarditis. Additionally, diffuse interstitial infiltrates were observed bilaterally within the pulmonary tissue.

ETHICS STATEMENT

The publication of the case was approved by the ethics committee of the medical institution, and all the procedures required for the retrospective publication of the case were done in accordance with the Declaration of Helsinki.

DISCUSSION

The presented case underscores the intricate and complex nature of medical challenges that can arise during pregnancy, particularly in the context of cardiovascular complications and COVID-19 infection. This challenging scenario involved a multidisciplinary approach for both diagnostic and therapeutic interventions.

Pregnancy, with its physiological and immunological changes, can exacerbate the susceptibility to various medical conditions.¹¹ In this particular case, the patient's underlying pathologies might have contributed to the clinical outcome. The emergence of an acute coronary syndrome in the presence of SARS-CoV-2 infection is particularly noteworthy,¹² requiring a careful balance between the management of cardiovascular issues and the unique considerations of pregnancy.

A critical point of consideration was the timely initiation of interventions. The rapid transfer of the patient to the cardiac catheterization laboratory facilitated the diagnostic coronary angiography. The subsequent coronary

intervention, involving direct stenting and restoration of the vascular lumen, showcases the seamless collaboration between the cardiology and obstetric staff.

The patient's decline post-cardiovascular intervention, leading to cardiac arrest, accentuates the unpredictability of clinical trajectories. The urgency of the multidisciplinary consensus in determining the need for an emergency cesarean section while sustaining resuscitation efforts highlights the intricate decision-making process in these high-stakes situations.

When it comes to the cause of death, potential causes could include the following: cardiac complications – acute myocardial infarction itself can induce serious rhythm disturbances such as ventricular arrhythmias that can lead to cardiac death¹³; obstetric conditions – pregnancy-related complications like HELLP syndrome, eclampsia, or amniotic embolism can be associated with severe cardiovascular events and cardiac arrest¹⁴; SARS-CoV-2 infection, by triggering inflammatory and thrombotic reactions,¹⁵ can lead to acute cardiac events or worsen preexisting cardiovascular conditions. It is important to note that these are just a few potential causes. In the presented case, it is possible that multiple factors contributed to the patient's fatal outcome, including the interaction between cardiac conditions, pregnancy, SARS-CoV-2 infection, and their associated complications.

CONCLUSION

In conclusion, this case emphasizes the vital role of a collaborative and multidisciplinary approach in managing emergency complex medical scenarios during pregnancy. The challenges posed by the interplay of cardiovascular complications, COVID-19 infection, and pregnancy underscore the need for dynamic and adaptive strategies to optimize maternal and fetal outcomes. This case serves as a poignant reminder of the importance of constant vigilance and interdisciplinary collaboration in the pursuit of emergency patient care.

CONFLICT OF INTEREST

Nothing to declare.

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