Spontaneous Coronary Artery Dissection with Sudden Cardiac Arrest in a Female Patient During Her Postpartum Period: A Case Report and Review

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Conflict of interest: None declared

Patient: Female, 29-year-old
Final Diagnosis: Spontaneous coronary artery dissection
Symptoms: Cardiac arrest
Medication: —
Clinical Procedure: —
Specialty: Critical Care Medicine

Objective: Unknown etiology

Background: Spontaneous coronary artery dissection (SCAD) is a rare cause of acute myocardial infarction, and the literature is undecided on the etiology, predisposing factors, and susceptible populations involved. SCAD is a disease that is under-recognized, underdiagnosed, and mainly affects young women of reproductive age. It has the highest incidence in the third trimester and postpartum period.

Case Report: We present a case of a 29-year-old woman who was brought by family members to our Emergency Department (ED) in Riyadh, Saudi Arabia with sudden cardiac arrest due to SCAD in the right coronary artery 13 days after normal spontaneous vaginal delivery. The patient was brought in with no cardiopulmonary resuscitation for 20 min. She was resuscitated successfully in the ED. Her initial rhythm was ventricular fibrillation (VF). Point-of-care ultrasound (PoCUS) was performed during pulse checks, which revealed no signs of right ventricular strain nor signs of deep vein thrombosis (DVT). After that, she underwent primary percutaneous coronary intervention, which confirmed the diagnosis of right coronary artery dissection. The patient was successfully managed and discharged from the hospital after 18 days. She was independent and in good health after 4 months of follow-up.

Conclusions: A high index of suspicion, familiarity with predisposing factors for SCAD, and PoCUS may play a critical role in detecting and managing SCAD patients.

Keywords: Chest Pain • Dissection • Heart Arrest • Postpartum Period

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Background

Spontaneous coronary artery dissection (SCAD) is a rare cause of acute myocardial infarction [1]. SCAD occurs more frequently among females [1]. In a series of 62 autopsies, the left anterior descending (LAD) artery was predominantly the culprit [1]. In a case series of 21 antepartum patients diagnosed with SCAD, in which more than half were females, the LAD was the culprit artery, more among females, while the right coronary artery (RCA) was the most common culprit among male patients [1]. SCAD is more prevalent in pregnant women and in the postpartum period and they usually have more acute presentations [1,2]. This paper presents a case of a SCAD of the RCA in a female patient during her postpartum period. A review of the literature is also provided.

Case Report

We present a case of a 29-year-old woman who was brought by family members to our Emergency Department (ED) in Riyadh, Saudi Arabia due to loss of consciousness (LOC), where she was found to be in cardiac arrest. According to family members, they witnessed that the patient had a brief episode of chest pain (for seconds) followed immediately with LOC 20 min prior to her arrival to our ED. The patient had an uncomplicated spontaneous vaginal delivery 10 days prior to her presentation and did not have any known medical illness. She did not suffer from any emotional or physical stresses at that time.

Upon presentation there was no pulse and CPR was immediately started according to the advanced cardiac life support (ACLS) protocol. The initial rhythm was ventricular fibrillation (VF). The foremost differential diagnosis at that time was pulmonary embolism (PE). Thus, point-of-care ultrasound (PoCUS) was performed during pulse checks, which revealed no signs of right ventricular strain nor any signs of deep vein thrombosis (DVT). However, signs of retained products of conception was discovered during PoCUS. PE was ruled out as a cause of the arrest based on the initial rhythm and the PoCUS findings. Return of spontaneous circulation (ROSC) was achieved after 11 min of CPR. She was intubated with minimal sedation requirements.

After ROSC, she was hypotensive and required intravenous nor-epinephrine to maintain good perfusion (4 doses, each dose 16 mg i.v., 0.05 mcg/kg/min). The first electrocardiogram (ECG) did not meet the ST-elevation myocardial infarction (STEMI) diagnostic criteria (Figure 1), so the cardiology on-call was involved due to the possibility of SCAD. The patient underwent official echocardiography at the bed side, read by a cardiology imaging consultant, which revealed reduced ejection fraction of 30-35% with septal akinesia. The patient then underwent a CT angiography to rule out PE and a CT of the brain to rule out intracranial pathology, which was negative for PE and intracranial insult. She was then taken to the cardiac catheterization lab.

A primary percutaneous coronary intervention (PPCI) of our patient showed clear RCA dissection, successfully treated with 2
drug-eluting stents (DES) with good results, and an intravascular ultrasound (IVUS) showed diffuse mild-to-moderate LAD atherosclerosis. She was shifted to the Medical Cardiac Intensive Care Unit (MCICU) on mechanical ventilation and inotropic support. She tested negative for Coronavirus Disease 2019 (COVID-19) and Middle East Respiratory Syndrome (MERS-CoV).

She was successfully extubated on day 3 after admission. On hospital day 5, she developed sudden loss of consciousness secondary to seizure and respiratory arrest, after which she was re-intubated. Brain and chest CT revealed no acute insult. She was started on Levitiracetam 500 mg twice a day for seizure control, which occurred twice during her hospital stay. She was extubated after 3 days of mechanical ventilation. After that, she was downgraded to the medical cardiac ward for continuity of care and discharged home with a good neurological outcome on hospital day 18.

She was discharged on aspirin, clopidogrel, a statin, metoprolol, perindopril, quetiapine, spironolactone, and levitiracetam, and was given instructions for lifestyle modifications. She sustained mild memory loss and behavioral changes along with the aforementioned seizures. She was followed up at 4 months after hospital discharge and found to be independent and in good health.

Discussion

The first case of SCAD was reported in 1931 in a woman aged 42 years and it was called a “dissecting aneurysm of coronary artery” [3]. SCAD is a rare condition, and often requires a high index of suspicion to be detected. Multiple studies in the literature showed that SCAD was the cause of 0.1% to 4% of patients diagnosed with acute coronary syndrome [4-10]. Furthermore, this range was higher in a specific population – women under age 50 years [6,8,11-13]. However, the true incidence of SCAD is still unclear [6]. According to the European Society of Cardiology [14], SCAD has 3 different angiographic types: (1) type 1 has contrast dye staining of the arterial wall with multiple radiolucent lumen; (2) type 2 has non-obstructive coronary arteries (less than 50%), which is long diffuse and smooth narrowing, with obstructive coronary arteries (more than 50%); and (3) type 3 which is focal or tubular stenosis that mimics atherosclerosis. The literature is unclear on the etiology, predisposing factors, and susceptible populations involved. For example, Saw et al reported that almost 20% of SCAD cases were idiopathic [15]. In contrast, another paper from the same author showed that almost all patients had a predisposing arterial disease [16]. Pregnancy and the postpartum period were associated with many SCAD cases [2,6,12,17]. An analysis of 120 pregnancy-associated SCAD cases over 15 years showed that pregnancy-associated SCAD is associated with a high incidence of reduced ejection fraction and life-threatening maternal and fetal complications [18]. Recent papers found that most SCAD patients were not pregnant or in the postpartum period [15,19]. Young women generally have a low risk of coronary artery diseases, but pregnancy is associated with a 3 times higher risk of acute myocardial infarction compared to non-pregnant women [20,21]. In addition, fibromuscular dysplasia (FMD) was also linked to SCAD in multiple reports [19,22,23]. This was not the case according to a recently published local registry in our area, the Arab Gulf countries SCAD registry (G-SCAD registry), which showed that not a single patient reported a history of FMD or inflammatory diseases [12]. There is limited literature on the etiology of SCAD and its natural history, especially in our area, the Middle East. The American Heart Association published a scientific statement on SCAD and concluded it with “Despite increased recognition of the condition by the medical community and patients, large gaps in knowledge must be addressed to provide the best outcomes” [6]. Survivors from SCAD are prohibited from getting pregnant due to the high risk of recurrence [24]. However, a recent update about pregnancy after SCAD concluded that “there is insufficient data to challenge the traditional assumption that subsequent pregnancy should be avoided” [24]. Due to the rarity of the disease, many controversies exist about SCAD management. Conservative management was reported in the literature with an average period of 35 days from the event to full angiographic healing [25]. However, PPCI was required in many reports [25]. Coronary artery bypass grafting was the initial treatment in some cases [26]. A patient-specific treatment for SCAD seems to be an acceptable management strategy.

The patient in this case had no risk factors for SCAD other than being in the postpartum period. She had only a very short period of chest pain and went into cardiac arrest with a downtime of about 20 min before arriving to the hospital. ROSC was achieved after 11 min of CPR according to ACLS protocol. Cath lab was activated after ROSC based on clinical suspicion of SCAD, and PPCI was required, which showed a clear RCA dissection. Our patient was treated with a drug-eluting stent (DES) placed in the RCA by interventional cardiology. The patient had 2 episodes of seizure in the hospital, with mild psychological impact. Other than that, she returned back to her normal life and lives independently.

In our case, the location of the SCAD was in an unseal location (the RCA). A high index of suspicion along with knowledge about the predisposing factors of SCAD will help emergency physicians recognize and detect SCAD in a timely manner to ensure adequate and early treatment for those patients, which would positively affect outcomes. Any patient presenting in cardiac arrest with a history of chest pain and an unclear cause of arrest should have SCAD ruled out, even when...
no clear ischemic changes are present in the ECG. Bedside echocardiography during pulse check or after ROSC can help in ruling out other potential causes of arrest, including massive PE, aortic dissection, and dilated cardiomyopathy. Early defibrillation and high-quality CPR are key for survival with good neurological outcome.

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Conclusions

High index of suspicion, familiarity with predisposing factors for SCAD, and PoCUS may play a critical role in detecting and managing SCAD patients who present in cardiac arrest. SCAD is more frequent among pregnant women in their third trimester and in the postpartum period, as was the patient presented in this paper.