CASE REPORT

Spontaneous coronary artery dissection in a postpartum e-cigarette smoker

Navid Ahmed,¹ Aleksandr Kalininskiy,¹ Himali Gandhi,¹ Jooyoung Julia Shin²¹Department of Medicine, Albert Einstein College of Medicine, Bronx, New York, USA²Division of Cardiology, Albert Einstein College of Medicine, Bronx, New York, USA**Correspondence to**
Dr Navid Ahmed,
nahmed@montefiore.org

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SUMMARY

Spontaneous coronary artery dissection (SCAD) is a rare but lethal cause of acute coronary syndrome that occurs in young women during the peripartum/postpartum periods. We present a case of a 41-year-old woman with no significant medical history, but was a habitual e-cigarette smoker who presented with atypical chest pain 2 weeks after an uncomplicated delivery while breast feeding. The patient was found to have elevated cardiac enzymes and ST segment elevations in the anterior leads. An urgent cardiac catheterisation was performed, which revealed dissection and occlusion of the left anterior descending artery, and a drug-eluting stent was placed that resulted in the resolution of chest pain. Physiological changes during the postpartum period may be linked to an increased risk of developing SCAD.¹ In addition, e-cigarette smoking is associated with increased oxidative stress and sympathetic activity, which may predispose patients to an increased risk of acute coronary syndrome.

BACKGROUND

Spontaneous coronary artery dissection (SCAD) is an aetiology of chest pain that is often under-reported. It should be considered in the differential diagnosis of young women with no significant cardiac history who present with chest pain during the peripartum and postpartum period. The peripartum and postpartum period is associated with hormonal changes, which may be associated with an increased risk of dissection.¹ In addition, the patient had a history of daily e-cigarette use, which is associated with increased oxidative stress and sympathetic activity that may increase the risk for SCAD.² We report a case of a patient with no significant medical history except daily e-cigarette smoking who developed SCAD while breast feeding after an uncomplicated delivery.

CASE PRESENTATION

A 41-year-old woman with a history of daily e-cigarette smoking for several years and uncomplicated pregnancy with C-section 2 weeks prior presented with sudden onset stabbing chest pain, dyspnoea and diaphoresis, which began while breast feeding. On presentation, her blood pressure was 148/105 with a heart rate of 88 and unremarkable physical examination.

INVESTIGATIONS

Initial ECG showed ST elevations in V2–V4 with ST depressions in the inferior leads (figure 1).

Troponin T and creatine phosphokinase (CPK) levels peaked at 15.1 and 5330, respectively.

TREATMENT

An emergent cardiac catheterisation revealed dissection of the left anterior descending artery (LAD) with 99% stenosis of the vessel with compromise of the first and second diagonal arteries (figure 2). A drug-eluting stent was placed in the mid-LAD while the diagonals received balloon angioplasty (figure 2).

OUTCOME AND FOLLOW-UP

The patient had resolution of chest pain and ST segment elevations. A post-catheterisation transthoracic echocardiogram revealed an ejection fraction of 50% with akinesis of the anteroseptal, apical and distal anterior walls. The patient was discharged on aspirin, clopidogrel, atorvastatin, metoprolol and lisinopril with cardiology follow-up.

DISCUSSION

SCAD is a rare aetiology of acute coronary syndrome (ACS) seen in women. Early retrospective studies suggested approximately 30% of SCAD cases; however, more recent reviews suggest that pregnancy-related SCAD accounts for less than 5% of SCAD cases.³ SCAD is defined as a non-traumatic and non-iatrogenic formation of a false lumen due to the separation of the coronary arterial walls resulting in an intramural haematoma (IMH).⁴ There are two commonly accepted theories regarding the formation of the IMH. One theory is a tear in the intima resulting in blood entering from the endoluminal space to the intimal space, creating a false lumen.⁴ The second proposed mechanism of IMH formation is due to rupture of the vasa vasorum, which are the small arterioles within the walls of arteries supplying blood to the wall resulting in blood pooling within the intramural space creating a haematoma.⁴ The pathophysiology remains largely unknown but is likely a combination of predisposing factors that precipitate SCAD.⁵

This case of SCAD presented in a young healthy woman with no significant medical history except for the use of daily e-cigarettes for several years. The peripartum and postpartum state is associated with hormonal changes, which increase the risk of weakening the arterial walls of the heart increasing the risk for SCAD.^{1,4} The postpartum state is associated with an elevation of progesterone leading to weakening of the tunica media, increasing the risk of dissection.⁴ Oestrogen, which has a protective

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Figure 1 Admission ECG showing ST elevations in V2–V6 (left, A), with evolution of ST changes post stent (right, B).

effect against atherosclerosis and ischaemic injury of the myocardium, falls after parturition.^{1,4} Thus, it can be hypothesised that as progesterone levels rise and oestrogen levels, fall there is an increased risk of SCAD.

The patient's history of daily e-cigarette smoking during her partum and postpartum period also potentially increased her risk for SCAD. E-cigarettes are aerosolised mixtures of glycerin, propylene glycol, nicotine and flavouring additives, thus delivering nicotine by inhalation in the absence of combustion.² The long-term effects of e-cigarette are currently not well known; however, a recent review article has found that some e-cigarette emit chemical levels similar to traditional tobacco cigarettes and thus may not be as safe as reported.³ Further research on the cardiovascular safety of e-cigarettes is warranted. However, habitual e-cigarette smoking has been linked with an increase in cardiac sympathetic activity and oxidative stress, which can predispose patients to cardiac events.²

SCAD has been associated with precipitating stressors that raise catecholamines, which can increase cardiocirculatory shear stress that can predispose to SCAD.³ Emotional and mechanical stressors have also been linked to higher-than-expected proportion of cases of SCAD.^{4,5} Tobacco cigarette use is associated with increased sympathetic stimulation resulting in increased heart rate and increased blood pressure.⁶ In addition, smoking results in increased carboxyhaemoglobin leading to decreased oxygen-carrying capacity.⁶ In turn, this can lead for the need for increased oxygen demand for the heart resulting in increased risk for myocardial ischaemia. Previous case reports have associated SCAD in patients who were daily tobacco and cannabis smokers, and it is plausible that e-cigarette smoking can also increase the risk for SCAD based on similar mechanisms.^{5–9} In this patient, the postpartum state in combination with e-cigarette usage may have increased her risk for developing SCAD due to increased catecholamine release. Nicotine

Figure 2 Initial angiogram showing dissection of the left anterior ascending artery (left), followed by placement of a drug-eluting stent (right).

has been shown to promote atherosclerosis in vitro, as well as an increase in diastolic pressure,¹⁰ which may further weaken coronary artery endothelium.^{10 11} Less than 4% of cases of SCAD present with focal atherosclerotic stenosis such as this patient and are classified as type 3 lesions.⁵ Physicians should strongly discourage e-cigarette smoking in pregnant women as its long-term effects are currently unknown but may increase the risk for cardiovascular events. Buccal and transdermal nicotine should be offered as alternatives as there is slower absorption and increased first-pass metabolism resulting in less abuse potential.

SCAD should be considered as an aetiology of ACS in young women who present with chest pain. This case illustrates a young woman with an e-cigarette smoking history who presented after an uncomplicated pregnancy. The hormonal changes during the postpartum period in addition to the effects of e-cigarette smoking may have led to weakening of the patient's arterial walls predisposing the patient to an increased risk for dissection of her LAD in addition to premature atherosclerosis from increased nicotine exposure.

Learning points

- ▶ Clinicians should consider spontaneous coronary artery dissection (SCAD) as an aetiology for chest pain in women without known cardiac history.
- ▶ Physiological changes such as increased progesterone and decreased oestrogen during the peripartum and postpartum period may contribute to an increased risk for SCAD.
- ▶ Clinicians should encourage smoking and e-cigarette cessation in our patients especially during the peripartum and postpartum period as it can lead to increased oxidative stress, which can predispose patients to cardiovascular damage.

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