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The role of coronary computed tomography angiography in pregnancy-associated myocardial infarction

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Abstract

Background: Pregnancy-associated coronary artery dissection is one of the critical causes of myocardial infarction in young females. The challenges in the diagnosis and follow-up of pregnancy-associated myocardial infarction prompted us to highlight the potential role of coronary computed angiography in managing this life-threatening medical condition. **Case Summary:** We describe a case of a 29-year-old female with sudden onset chest discomfort one-week postpartum. She presented to the hospital with an ST-elevation myocardial infarction and was urgently taken to the cath lab for PCI and stent placement. Thirteen months later, with intermittent chest discomfort, an coronary computed tomography was done, demonstrating evidence of SCAD and aneurysm formation in the left main coronary artery and left circumflex coronary artery. Repeat cardiac catheterization confirmed the same diagnosis. Given her refractory chest discomfort and the chance of aneurysm rupture decision was made to proceed with a three-vessel CABG. At 3-month and 1-year followup visits, the patient is doing well and remains pain-free. **Conclusion:** In this case presentation, we aim to highlight the potential role of Coronary Computed tomography angiography in the diagnosis and follow-up of pregnancy-associated spontaneous coronary artery dissection, given the high accuracy and non invasiveness of this diagnostic modality in the context of the high prevalence of spontaneous coronary artery dissection in symptomatic or asymptomatic pregnancy-associated myocardial infarction.

INTRODUCTION

Spontaneous coronary artery dissection (SCAD) has emerged as an important cause of myocardial infarction (MI) over the past decade, particularly among younger women [1], with a prevalence of 35% in women ≤50 years old [2] and 43% in pregnancy-associated myocardial infarction (PAMI) [3]. The ongoing challenges in accurately diagnosing SCAD prompted us to present a case of pregnancy-associated myocardial infarction due to undiagnosed SCAD culminating in life-threatening aneurysm formation.

CASE PRESENTATION

A 29-year-old female one-week postpartum, presented with substernal chest discomfort and dyspnea. Pulmonary edema on CXR, ST-depression on ECG, posterolateral wall hypokinesis on transthoracic echocardiogram (TTE), and elevated serum troponin level were consistent with NSTEMI. She was urgently taken to the Cath lab. Left heart catheterization (LHC) with 100% obtuse-marginal (OM) artery occlusion led to a single drug-eluting stent placement in the lateral branch of OM (Figs 1 and 2).

Thirteen months after stent placement, with intermittent burning left chest discomfort, patient sought a second opinion from another cardiologist. On review of initial LHC, concerns were raised about the proximal extension of the dissection into the left main coronary artery (LMCA). This prompted a recommendation

for coronary computed tomography angiography (CCTA), which revealed evidence of SCAD in LMCA extending into the distal LMCA and proximal OM branch with aneurysm formation at distal LMCA and Left circumflex artery (LCX) (Figs 3 and 4). Repeat LHC revealed aneurysms in distal LMCA and mid-left circumflex artery, with 50% narrowing of the lumen in between two aneurysms, as well as a focal dissection in the medial branch of LCX (Fig. 5). The previously placed stent was patent. With LMCA involvement, decision was made to proceed with a three-vessel CABG. At 3-month and 1-year follow-up, the patient is doing well and remains pain-free. Neck and abdomen MR-angiography reported normal carotid, cervical and renal arteries. The genetic panel for aneurysm-related disorders was negative.

DISCUSSION

The complexity of PAMI, in contrast to non-PAMI, poses management challenges owing to the high prevalence of pregnancy-related SCAD (P-SCAD). Catheter-based coronary angiography is the gold standard diagnostic test for diagnosis of SCAD [4]. Non-invasive CCTA has a potential role in diagnosing SCAD in patients with acute chest pain and low risk for coronary artery disease [5–8].

Conservative therapy is the preferred management for hemodynamically stable patients with SCAD in the absence of MI [9]. In the presence of MI, PCI with stent placement is considered [10]. In
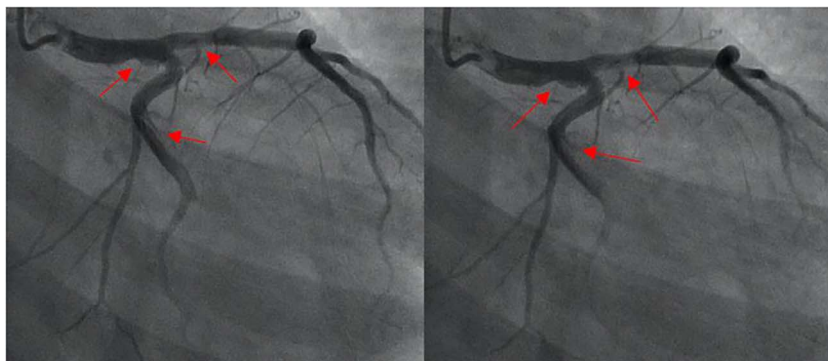
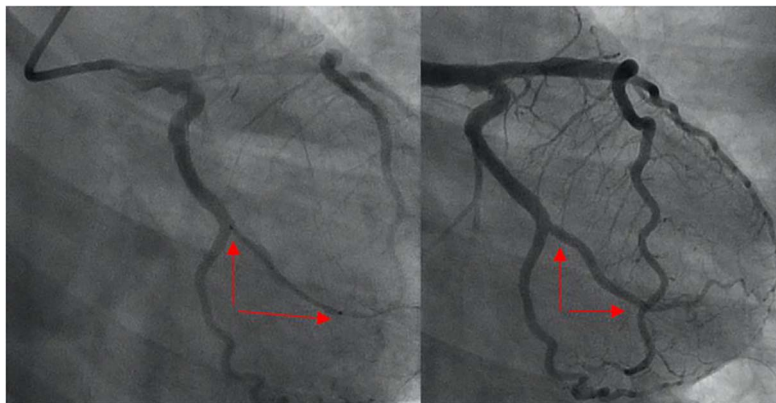**Figure 1.** Initial cardiac catheterization before stent placement.

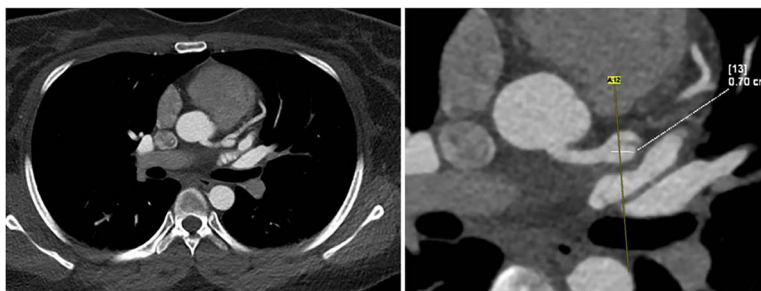**Figure 2.** Initial cardiac catheterization during and after stent placement.

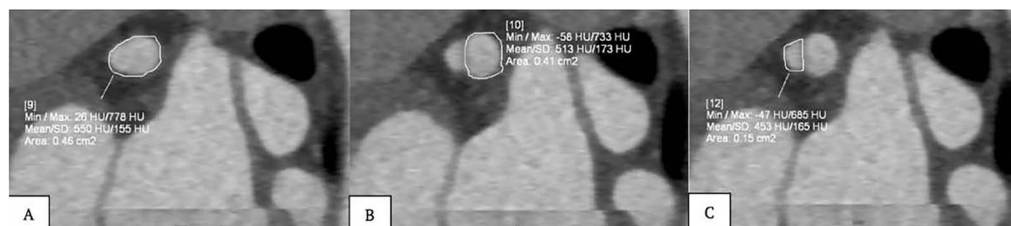**Figure 3.** Evidence of SCAD in LMCA extending to the distal LMCA in CCTA.

Figure 4. (**a**) Distal LMCA prior to the visualization of the dissection flap has a lumen area of 0.46 sq cm. (**b**) At its widest dimension, the false lumen measures 0.41 sq cm. (**c**) In the narrowest part of the true lumen, it has an area of 0.15 sq cm.

patients with LMCA, proximal, multivessel dissections, complex lesions, failure of attempted PCI and refractory ischemia, CABG is the desirable mode of treatment [11–13].

Refractory ischemia, despite conservative or invasive therapy, warrants investigation for dissection propagation, intramural hematoma displacement, and aneurysm formation [13, 14]. Both diagnostic and therapeutic invasive procedures increase the risk

of dissection extension and new iatrogenic dissection formation [15].

CCTA is a noninvasive, quick and accessible modality with high diagnostic accuracy for detecting obstructive CAD (95% sensitivity and 83% specificity) and has a 99% negative predictive value [16]. CCTA is capable of visualizing the healing process and life-threatening aneurysm formation [17]. CCTA has limitations in
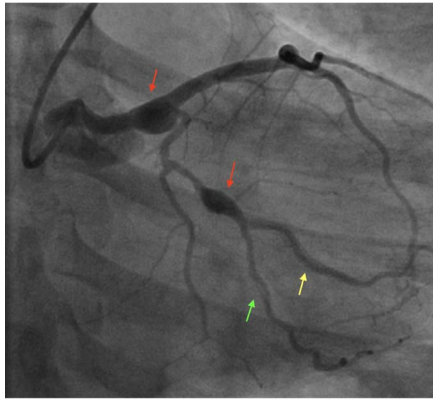
Figure 5. The LCX has a prominent aneurysmally, focally dilated segment coming off the LMCA. The proximal LCX distal to the LMCA aneurysm (red arrow) is moderately narrow (50%). Prior to the takeoff of a dominant bifurcating marginal system, there is a second, somewhat smaller aneurysm (red arrow). This does not involve bifurcation. The more lateral branch has a stent with mild to moderate intimal hyperplasia (yellow arrow). The more medial branch has a focal area of dissection (green arrow). The terminal LCX is free of the disease.

detecting mid to distal coronary artery dissection. Normal CCTA in a symptomatic patientcannot rule out SCAD.

CONCLUSION

In this case presentation, we aim to highlight the potential role of CCTA in the diagnosis and follow-up of P-SCAD, given the high accuracy and noninvasiveness of this diagnostic modality in the context of the high prevalence of SCAD in symptomatic or asymptomatic PAMI.

CONFLICT OF INTEREST STATEMENT

No Conflict of interest declared by authors.

ETHICAL APPROVAL

None required.

DATA AVAILABILITY STATEMENT

The data underlying this article cannot be shared publicly due to HIPAA.

CONSENT

Written consent was obtained from the patient.

GUARANTOR

Craig K. Reiss.

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