

IMAGING VIGNETTE

BEGINNER

CLINICAL VIGNETTE

# Acute Myocardial Infarction Caused by Spontaneous Coronary Artery Dissection of the First Septal Perforator



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## ABSTRACT

Spontaneous coronary artery dissection of the septal arteries is rare and may be overlooked on coronary angiogram. Additionally, dedicated intracoronary imaging may not be feasible due to artery size. Cardiac magnetic resonance imaging has an emerging role in diagnosis, which is critical because management changes significantly if spontaneous coronary artery dissection is diagnosed. (**Level of Difficulty: Beginner.**) (J Am Coll Cardiol Case Rep 2023;14:101833) © 2023 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

A 68-year-old woman presents with acute substernal chest pressure. Past medical history is significant for smoking and significant emotional stress because her husband recently had a myocardial infarction (MI). Her vitals on presentation were blood pressure of 141/67 mm Hg, heart rate of 76 beats/min, respiratory rate of 20 breaths/min, and oxygen saturation of 100%. On examination she was distressed and diaphoretic. There was no jugular venous distention, lower-extremity edema, or pulmonary findings. There were no murmurs, rubs, or extra heart sounds with auscultation. The electrocardiogram showed sinus rhythm without ST-T wave changes. Transthoracic echocardiogram showed dyskinesis of the basal-anteroseptal wall with preserved left ventricular ejection fraction, and high-sensitivity troponin was elevated at 285 ng/L with interval increase to 1,308 ng/L (normal  $\leq 10$  ng/L) consistent with a diagnosis of non-ST-segment elevation myocardial infarction. Atherothrombosis was suspected given her age and risk factors. Other etiologies on the differential included coronary dissection, vasospasm, coronary embolism, myocarditis, or stress cardiomyopathy.

Coronary angiogram revealed nonobstructive coronary disease with Type 2 spontaneous coronary artery dissection (SCAD) of the first septal-perforator artery with preserved coronary flow (**Figures 1A and 1B**). There was uncertainty about whether this was the culprit for her presentation because SCAD of the septal-perforator artery is rare.<sup>1</sup> Intracoronary imaging is instrumental in aiding the diagnosis in angiographically subtle cases but was prohibited here due to vessel size and acute takeoff.<sup>2</sup>

Due to diagnostic uncertainty, additional testing was considered since accurate diagnosis is paramount and affects acute and long-term management. Options include cardiac magnetic resonance imaging (CMR), cardiac computed tomography angiography (CCTA), or repeat coronary angiogram in 6-8 weeks to assess for healing.<sup>2</sup> Although CCTA can be used for low-/intermediate-risk MI patients with suspected SCAD, there is low spatial

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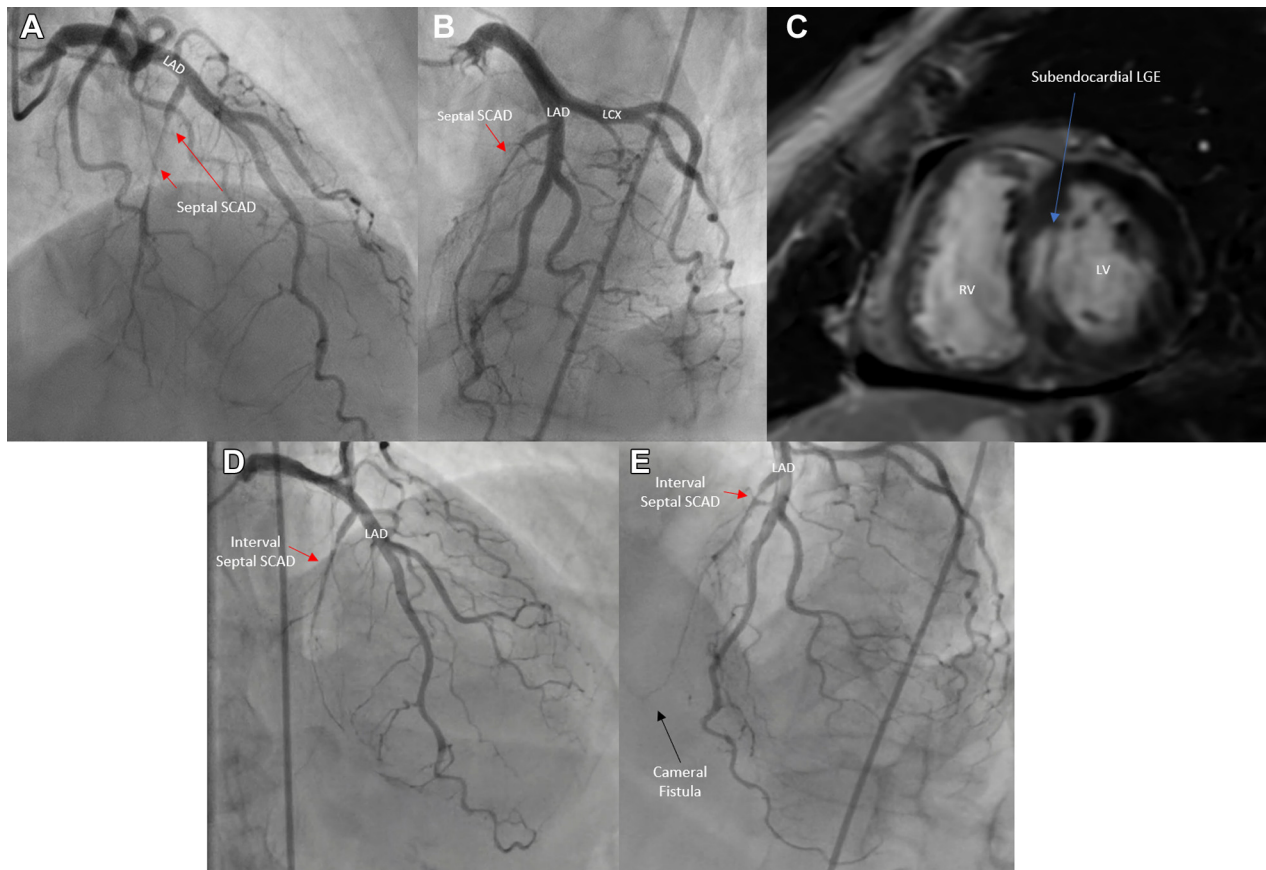
**ABBREVIATIONS  
AND ACRONYMS****CCTA** = cardiac computed tomography angiography**CMR** = cardiac magnetic resonance imaging**MI** = myocardial infarction**SCAD** = spontaneous coronary artery dissection

resolution for small vessels and dissection planes can be missed in the acute setting.<sup>2,3</sup> In this case, CMR was performed and revealed subendocardial late gadolinium enhancement of the interventricular septum consistent with isolated septal-perforator infarct (**Figure 1C**). Although helpful here, a normal CCTA or CMR does not exclude SCAD and further evaluation with repeat coronary angiography at 6-8 weeks to assess for healing also can be considered (**Supplemental Figure 1**).<sup>2</sup>

Conservative management of SCAD is recommended if patients are stable and do not have proximal or multivessel dissection.<sup>2,3</sup> Medical therapy varies according to patient-specific comorbidities and recommended length of stay is 4-5 days after presentation because approximately 1 in 6 patients may have early SCAD extension within 6 days of presentation possibly requiring urgent revascularization.<sup>2</sup>

She promptly improved and per her request was discharged on day 2, but she returned 4 days later with recurrent MI and underwent repeat angiogram (**Figures 1D and 1E**) that showed persistent SCAD.

At 5-month follow-up she denied recurrent chest discomfort, she had completed cardiac rehabilitation, and she had stopped smoking. Comprehensive imaging of the head, neck, and abdomen/pelvis was negative for

**FIGURE 1** Isolated SCAD of First Septal-Perforator Artery

**(A)** Angiographic RAO view showing Type 2 SCAD of septal-perforator artery (**red arrows**). **(B)** LAO view of first septal perforator SCAD (**red arrow**) without evidence of involvement of the LAD, LCX, or other branch arteries. **(C)** CMR showing subendocardial LGE of the interventricular septum (**blue arrow**), which corresponds with isolated septal perforator infarct and is consistent with findings seen on echocardiography and angiography. **(D)** RAO view from repeat angiogram performed 4 days after initial angiogram due to recurrent NSTEMI. The first septal perforator artery is smaller and narrower (**red arrow**). This persistent appearance on multiple angiograms is consistent with SCAD. **(E)** LAO view from second angiogram highlighting the affected septal artery as well as a tiny coronary cameral fistula between the distal septal perforator branch and the RV (**black arrow**). CMR = cardiac magnetic resonance imaging; LAD = left anterior descending; LAO = left anterior oblique; LCX = left circumflex; LGE = late gadolinium enhancement; LV = left ventricle; NSTEMI = non-ST-segment elevation myocardial infarction; RAO = right anterior oblique; RV = right ventricle; SCAD = spontaneous coronary artery dissection.

arteriopathy such as fibromuscular dysplasia. Because she has been doing well, no further coronary evaluation was performed. Although her coronary angiogram images were mostly consistent with isolated septal perforator SCAD hematoma, invasive coronary imaging could be reconsidered to assess for interval healing especially if she has recurrent symptoms.

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**KEY WORDS** cardiac magnetic resonance, intravascular diagnostics

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**APPENDIX** For a supplemental figure, please see the online version of this paper.