

## IMAGING VIGNETTE

### CLINICAL VIGNETTE

# Spontaneous Coronary Artery Dissection in Hyperdominant Left Anterior Coronary Descending Artery



Princess Neila Litkouhi, BMED, MD,<sup>a</sup> Aditya Bhat, MBBS, BMEDSc, MPH,<sup>a,b</sup>  
Christopher Choong, MBBC<sub>HIR</sub> (CANTAB), PhD,<sup>a</sup> Ravinay Bhindi, MBBS, MSc, PhD<sup>a,b</sup>

### ABSTRACT

A hyperdominant left anterior descending coronary artery variation is a rare but important diagnosis because of the risk for large-territory ischemia. We describe a very rare presentation of spontaneous coronary artery dissection in the distal portion of a hyperdominant left anterior descending coronary artery. No similar cases have been described. (J Am Coll Cardiol Case Rep 2024;29:102365) © 2024 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 61-year-old man presented to his primary physician with 2 days of recurrent episodic chest discomfort occurring at rest. He had a medical background of hypertension and had no regular medications. He had no other cardiovascular history. The initial high-sensitivity troponin I level was 3,600 ng/L. The patient was referred to the emergency department, at which time he was asymptomatic. His vital signs and physical examination were unremarkable. Repeat troponin I measurements peaked at 16,849 ng/L. Electrocardiography revealed mild inferolateral ST-segment depression and 1-mm ST-segment elevation in lead aVR. Transthoracic echocardiography revealed normal left ventricular cavity size and systolic function (ejection fraction 65%), with evidence of inferobasal akinesis and normal contraction of other myocardial segments.

Coronary angiography was promptly performed and demonstrated a hyperdominant left anterior descending coronary artery (LAD) with continuation beyond the cardiac apex as the posterior descending artery (PDA). The angiographic appearance within the PDA segment was suggestive of type 2a

### LEARNING OBJECTIVES

- To describe the clinical and angiographic findings for SCAD in a hyperdominant LAD artery to educate other clinicians regarding a rare but important clinical presentation.
- To discuss the challenges of diagnosing SCAD, which is additionally complicated in the present case by a distal vessel lesion and unusual coronary artery anatomy.
- To discuss the role and limitations of specialised imaging modalities.

From the <sup>a</sup>Department of Cardiology, Royal North Shore Hospital, St. Leonards, Australia; and the <sup>b</sup>School of Medicine, University of Sydney, Camperdown, Australia.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

Manuscript received January 24, 2024; revised manuscript received April 4, 2024, accepted April 11, 2024.

**ABBREVIATIONS  
AND ACRONYMS****CTCA** = computed tomographic coronary angiography**LAD** = left anterior descending coronary artery**PDA** = posterior descending artery**SCAD** = spontaneous coronary artery dissection

spontaneous coronary artery dissection (SCAD), which persisted despite the use of intracoronary glyceryl trinitrate (Videos 1 and 2). No percutaneous coronary intervention was performed.

A hyperdominant LAD is an anatomical variant in which the PDA arises from the LAD. Although rare, with <20 cases reported in the literature, occlusion to a hyperdominant LAD poses significant risk given the potential for large-territory ischemia (anterior, septal, and inferior myocardium) following myocardial infarction.<sup>1</sup>

SCAD is a nontraumatic separation of the coronary arterial wall, which can cause myocardial infarction via intimal disruption or an intramural hematoma. To our knowledge, the present case is the first report of SCAD in a hyperdominant LAD. The pathophysiology of SCAD remains largely unknown, and as a result the condition is commonly underdiagnosed.<sup>2</sup> Intravascular ultrasound is frequently used to differentiate SCAD from atherosclerotic plaque. However, in very distal and small vessel lesions such as the present case, intravascular ultrasound is difficult to use without risk for further endothelial injury, making diagnosis more challenging. Progress imaging such as computed tomographic coronary angiography (CTCA) is also used for serial assessment of the resolution of SCAD and can support a retrospective diagnosis of the condition. However, CTCA has limited resolution and visualization of distal vessels.<sup>3</sup> Medical management was initiated, involving dual antiplatelet therapy for 6 months, followed by lifelong aspirin and commencement of a beta-blocker and a statin.

SCAD has been associated with fibromuscular dysplasia and, in a smaller subset of patients, connective disorders such as Marfan and vascular Ehlers-Danlos syndromes.<sup>2</sup> Aortic and cerebral CTCA was performed in our patient and demonstrated no concomitant aneurysms, dissections, tortuosity, or suggestion of associated disease phenomena. The patient recovered uneventfully and was discharged from the hospital.

In summary, our case involved the combination of 2 rare phenomena: a patient presenting with distal vessel SCAD in a hyperdominant LAD. The case describes our angiographic and clinical findings to aid other clinicians in the diagnosis of this rare presentation and to encourage discussion regarding best practices and the utility of specialized imaging.

**ACKNOWLEDGMENT** The authors thank the patient for consenting to the publication of this clinical case.

**FUNDING SUPPORT AND AUTHOR DISCLOSURES**

The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

**ADDRESS FOR CORRESPONDENCE:** Prof Ravinay Bhindi, Department of Cardiology, Royal North Shore Hospital, Reserve Road, St. Leonards, Sydney NSW 2065, Australia. E-mail: [@Ravinay.](mailto:ravinay.bhindi@sydney.edu.au)

**REFERENCES**

1. Sen G, Veitch A, Sinha M. Hyper-dominance of the left anterior descending artery—a large territory. *BJR Case Rep.* 2021;7(1):20200069.
2. Saw J, Humphries K, Aymong E, et al. Spontaneous coronary artery dissection: clinical outcomes and risk of recurrence. *J Am Coll Cardiol.* 2017;70(9):1148-1158.
3. Logghe Y, Van Hoe L, Vanhoenacker P, et al. Clinical impact of CT coronary angiography without exclusion of small coronary artery segments: a real-world and long-term study. *Open Heart.* 2020;7(1):e001222.

**KEY WORDS** coronary angiography, coronary vessel anomaly, dissection

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