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Case Report

Usefulness of Cardiac Computed Tomography in Spontaneous Coronary Artery Dissection

Frédéric Turcotte-Gosselin, MD,[a,b] Tomas Cieza, MD,[a] and Jonathan Beaudoin, MD[a]

[a] *Quebec Heart And Lung Institute, Laval University, Québec, Québec, Canada*

[b] *Centre Hospitalier Affilié Universitaire Régional de Trois-Rivières, Trois-Rivières, Québec, Canada*

ABSTRACT

Spontaneous coronary artery dissection (SCAD) is a cause of myocardial infarction with nonobstructive coronary arteries. We describe a case of SCAD in a 39-year-old postpartum woman who presented with acute anterior myocardial infarction, no coronary occlusion but a suspicious coronary angiography. A coronary computed tomography angiogram demonstrated a left anterior descending intramural hematoma confirming the diagnosis. Teaching points emerging from this case are that SCAD and other causes of myocardial infarction with nonobstructive coronary arteries should be investigated, especially because the outcome is not benign. Also, coronary computed tomography angiogram should be considered as a part of the workup and follow-up for SCAD.

RÉSUMÉ

La dissection spontanée de l'artère coronaire (DSAC) est une cause d'infarctus du myocarde en l'absence d'artère coronaire obstruée. Nous présentons un cas de DSAC survenu après un accouchement chez une femme de 39 ans; la patiente présentait un infarctus aigu du myocarde antérieur sans occlusion coronarienne, mais les résultats de la coronarographie ont tout de même éveillé des soupçons. De fait, l'angiogramme coronaire obtenu par tomodensitométrie a révélé un hématome intramural dans l'artère interventriculaire antérieure, ce qui a confirmé le diagnostic de DSAC. Ce cas fait ressortir des points d'enseignement importants, notamment qu'il faut rechercher les signes de DSAC et investiguer les autres étiologies d'infarctus associées à des artères coronaires non obstruées, en particulier parce que les conséquences de telles affections ne sont pas bénignes. La réalisation d'une coronarographie par tomodensitométrie devrait aussi être considérée dans le bilan et le suivi après une DSAC.

Case Presentation

A 39-year-old woman presented herself to a regional hospital with a 2-day history of paroxysmal chest pain, progressive dyspnea, orthopnea, and paroxysmal nocturnal dyspnea. She had an emergency C-section 1 week before her presentation. Her past medical history and risk factors were otherwise unremarkable. On physical examination, she appeared pale and unwell during episodes of pain. Her vitals were normal apart from sinus bradycardia. Heart and lung examination were normal. Electrocardiogram showed transient ST elevation in the anterolateral territory (Supplemental Fig. S1), and she was therefore referred to our centre for an urgent coronary angiography.

Coronary angiography was performed, demonstrating no coronary occlusion, although proximal left anterior descending (LAD) calibre seemed oddly reduced (Fig. 1). The ventriculography revealed akinetic anterolateral and apical segments with an ejection fraction of 43%. Troponins were elevated, and acute myocarditis or spontaneous coronary artery dissection (SCAD) was suspected at that time. No intravascular imaging was performed.

Echocardiography confirmed the segmental wall motion abnormalities, and cardiac magnetic resonance showed myocardial edema with subtle subendocardial late gadolinium enhancement, more likely associated with an ischemic event than myocarditis (Supplemental Fig. S2). A cardiac computed tomography (CT) was then performed and confirmed the proximal LAD stenosis, with thickening of the vessel wall extending from the left main coronary artery up to the first diagonal artery (Fig. 2). The images were consistent with SCAD.

The patient had a very favorable evolution and left the hospital 6 days later. Medical management on discharge included low-dose aspirin, clopidogrel, low-dose metoprolol, and an angiotensin-converting enzyme inhibitor. The patient was referred to cardiac rehab, and usual recommendations

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Corresponding author: Dr Jonathan Beaudoin, MD, Institut Universitaire de Cardiologie et de Pneumologie de Quebec, 2725 Ch. Ste-Foy, Québec, Québec G1V 4G5, Canada. Tel.: +1-418-656-8711.

E-mail: jonathan.beaudoin@criucpq.ulaval.ca

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Novel Teaching Points

- SCAD should be a part of the differential diagnosis in MINOCA cases and searched meticulously when suspected.
- A specific cause for MINOCA must be investigated as it can influence treatment and prognosis.
- CCTA is a powerful and noninvasive tool for diagnosing SCAD. It can be combined with an extracardiac CT to screen for FMD.
- CCTA should be considered for follow-up in patients with SCAD.

were given to avoid strain, Valsalva, and isometric exercises. Subsequent head to pelvic CT showed no evidence of fibromuscular dysplasia (FMD). Wall motion abnormalities were normalized on follow-up echocardiography 4 months and 1 year later, whereas LAD calibre was restored on a follow-up coronary computed tomography angiogram (CCTA) at 10 months (Fig. 2). After over 2 years of clinical follow-up, the patient is still doing well and symptom free.

Discussion

SCAD is involved in approximately 1%-4% of all acute coronary syndromes.[1] This entity has mostly been described in young women ($\leq$50 years of age) and is particularly associated with pregnancy where it represents for up to 43% of all myocardial infarctions. The initial presentation can vary widely, but in our case, it was an anterior ST-elevation myocardial infarction associated with heart failure symptoms. As mentioned in a 2019 American Heart Association statement, it is considered as a part of the differential diagnosis in the increasingly recognized myocardial infarction with nonobstructive coronary arteries (MINOCA) group of pathologies.[2] These patients can have adverse outcomes with significant short- and long-term events.[3] Such findings should prompt clinicians to carefully search for these entities. In this reported case, coronary angiography revealed a subtle, unexpected tapering of the LAD that was suspicious for SCAD. Although endovascular imaging was not performed, intravascular ultrasound and optical coherence tomography have been described as high yield investigations in this condition.[4]

Given the results of our investigations and the apparent anterior ST-elevation myocardial infarction, confirmatory imaging was required. CCTA has been repeatedly described as being a useful imaging modality in SCAD.[5] Its anatomical accuracy allows us to evaluate coronary stenoses and adjacent vessel walls. Spatial and temporal resolution should be optimized using modern scanners combining fast gantry rotation and submillimetre resolution. Interestingly, a study suggested that healing of SCAD at a control CCTA at 3-6 months after the initial event seems to be associated with a better prognosis, whereas complications such as aneurysms and persistent dissections are other possible outcomes.[6] Although there is no specific recommendation at this time, these characteristics support follow-up imaging; CCTA is noninvasive and represents an excellent tool for that purpose.

Importantly, there is an association between FMD and SCAD. The use of a low-dose/high-pitch head to pelvic CT can efficiently rule out FMD in most vascular beds. With the last-generation scanners, protocols combining cardiac and extra-cardiac evaluation have been described and should be considered to minimize radiation and contrast dose.[7]

Conclusion

SCAD is a well-known cause of acute coronary syndrome and MINOCA, particularly in young and postpartum women, that could be easily overlooked by conventional imaging modalities. Because of its well-known association with FMD and potentially morbid outcome, it needs to be diagnosed early, treated accordingly, and monitored closely. Finally, considering all the above-mentioned reasons, CCTA should be considered as a part of the initial workup for this condition. CCTA can provide noninvasive follow-up images to confirm healing and rule out complication.

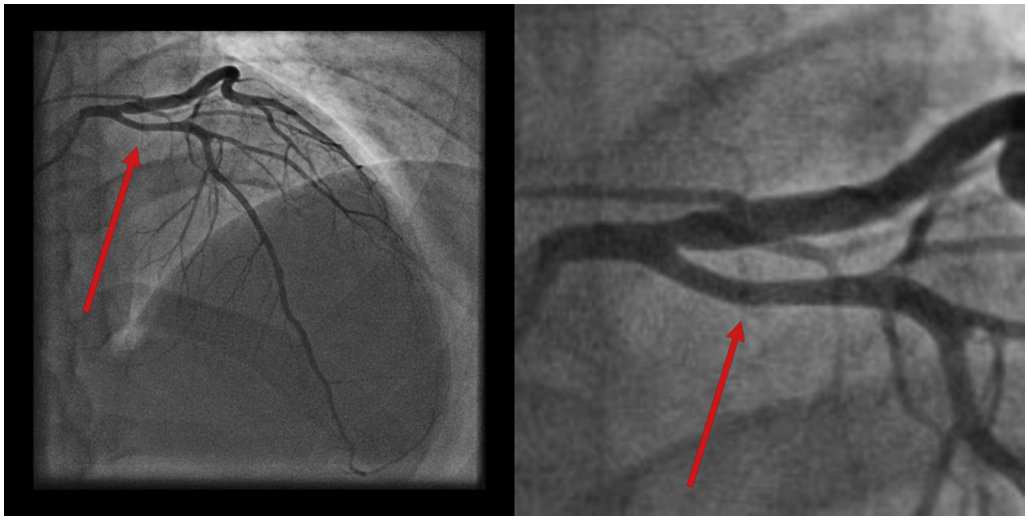

Figure 1. Coronary angiogram with a 10° right/40° cranial left coronary artery demonstrating a suspicious narrowing of the proximal left anterior descending (LAD) when compared with the distal LAD and proximal circumflex arteries.

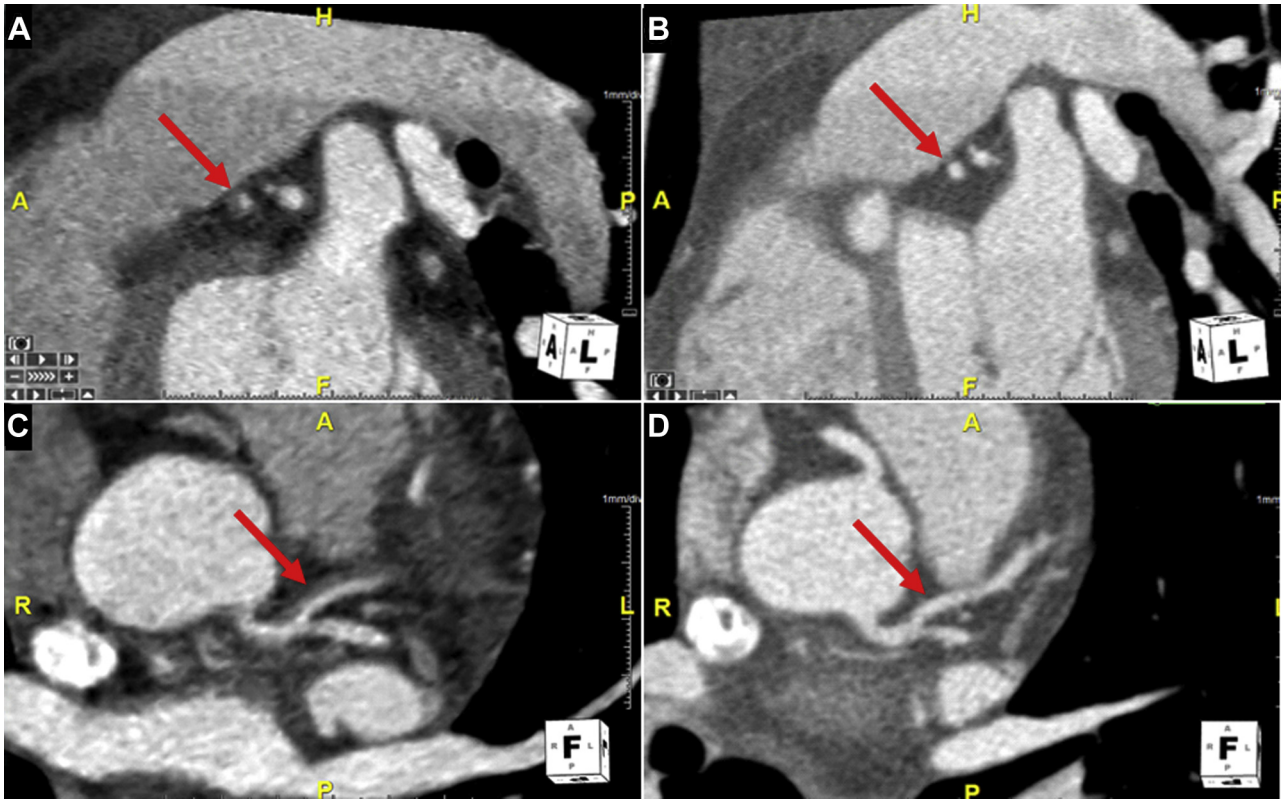

Figure 2. Left: Initial coronary computed tomography (CCT) scan with proximal left anterior descending (LAD) stenosis associated with vessel wall thickening. (**A**) LAD short axis reconstruction; (**B**) LAD long axis reconstruction. **Right:** Follow-up CCT scan at 10 months showing complete normalization of the findings. (**C**) LAD short axis reconstruction; (**D**) LAD long axis reconstruction.

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Disclosures

The authors have no conflicts of interest to disclose.

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Supplementary Material

To access the supplementary material accompanying this article, visit *CJC Open* at https://www.cjcopen.ca/ and at https://doi.org/10.1016/j.cjco.2020.04.010.