



## CASE REPORT

# Snake in right coronary artery—Extensive spontaneous coronary artery dissection in a young male

Shweta Vohra<sup>1</sup> | Akshyaya Pradhan<sup>1</sup> | Prachi Sharma<sup>1</sup> | Vikash Jaiswal<sup>2</sup>  | Nishan Babu Pokhrel<sup>3</sup> 

<sup>1</sup>Department of Cardiology, King George's Medical University, Lucknow, India

<sup>2</sup>Larkin Community Hospital, South Miami, Florida, USA

<sup>3</sup>Department of Internal Medicine, Tribhuvan University Institute of Medicine, Kathmandu, Nepal

## Correspondence

Nishan Babu Pokhrel, Department of Internal Medicine, Tribhuvan University Institute of Medicine, Kathmandu, Nepal.  
Email: [nishanpokhrel1@iom.edu.np](mailto:nishanpokhrel1@iom.edu.np)

## Abstract

We report an interesting case of a young man who revealed extensive spontaneous dissection of the RCA in diagnostic angiography. It was surprising that despite an extensive dissection, the patient remained hemodynamically stable on medical management throughout the procedure and during the post-procedure hospital stay.

## KEYWORDS

coronary angiography, healing, right coronary artery, spontaneous coronary dissection, young age

## 1 | INTRODUCTION

Spontaneous coronary artery dissection (SCAD) is a rare phenomenon carrying grave consequences, including myocardial infarction and sudden cardiac death. Various causes have been postulated for its occurrence, although none have shown a consistent association. Pregnancy, fibromuscular dysplasia, connective-tissue diseases, systemic inflammatory illness, hormone treatment, and medications are the most often related conditions.<sup>1,2</sup> Predilection for occurring in women is in the ratio of 9:1 as compared to men.<sup>2</sup> The left anterior descending (LAD) is the most commonly involved coronary artery, followed by the RCA.<sup>3</sup> We report an interesting case of an acute coronary syndrome (ACS)/non-ST-elevation myocardial infarction (NSTEMI) in a young man who revealed extensive spontaneous dissection of the RCA on diagnostic coronary angiography.

## 2 | CASE REPORT

A 37-year-old man presented to the emergency department with complaints of retrosternal chest pain with radiation to the left arm and sweating for the past 1 day. He did not have a history of any prior chronic illness, and a screen for conventional cardiovascular risk factors was also negative. Vitals and general physical examination were within normal limits. Cardiovascular examination revealed a normal S1 and S2, regular heart rate and rhythm, and no murmurs. Twelve lead electrocardiography (ECG) did not reveal any abnormality either (Figure 1). The two-dimensional echocardiography (2D Echo) study was also normal. However, his cardiac enzymes (Troponin T) were elevated. He was taken for diagnostic coronary angiography with an intention to revascularize. On diagnostic coronary angiography with a 5 French Tiger catheter, an extensive dissection was found in the RCA extending from

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ostium to distal RCA and posterior left ventricular (PLV) artery (Figure 2). Because of TIMI 3 flow and the absence of obstructive CAD, a decision to defer the stent implantation was made after a discussion with the patient and family members. Apart from the spontaneous dissection, the rest of the coronary arteries were normal. The patient was shifted to cardiac ICU and was kept under observation. Fortunately, the patient remained asymptomatic and hemodynamically stable. He was discharged in stable condition and prescribed guideline-directed medical therapy for secondary prevention. The patient was free of angina at the 1-month follow-up visit and adherent to all prescribed drugs. A check angiogram was advised to assess the fate of dissection but was refused by the patient as he was clinically asymptomatic.

### 3 | DISCUSSION

When there is no trauma, previous surgery or catheterization, extension of an aortic dissection, pregnancy, or other instigating factors/diseases, coronary artery dissection is referred to as spontaneous. This unusual pathology, first described in 1931, is now becoming more widely recognized because to the advent of imaging techniques including as optical coherence tomography (OCT) and intravascular ultrasonography (IVUS) that can see through the coronary wall.<sup>4,5</sup> Prevalence of SCAD is found to occur in 0.2–1.1% of coronary angiograms. SCAD has been identified as a rare cause of ACS, but it is significantly more common in young women with SCS.<sup>6,7</sup> As reported by Saw et al., SCAD accounted for 25% of  $\leq 50$ -year-old women presenting with ACS.<sup>7</sup> Spontaneous dissection leads to separation of coronary artery wall by intramural hematoma, which further compresses coronary artery lumen hence compromising blood flow. The inciting event of separation of coronary artery wall may be intimal tear or rupture of vasa vasorum.<sup>1,5</sup> Although various associations have been found, no single factor is causative, and this uncommon

phenomenon's pathogenesis is not well understood.<sup>2</sup> Various associations and hypothesized causative factors are mentioned in Figure 3. The skewed sex distribution favors females because of underlying predisposing factors such as pregnancy-related state, hormonal therapy, and fibromuscular dysplasia. The average age of presentation is 45 years.<sup>3</sup> SCAD is more commonly reported in the coronary tree in LAD, followed by RCA then LMCA.<sup>3</sup>

Spontaneous coronary artery dissection can be classified angiographically into three types; type 1, when there is multiple radiolucent lumens or arterial wall contrast staining, Type 2 gives the appearance of diffuse smooth stenosis, and Type 3 resembles atherosclerotic lesion. Type 2 is the most common type of SCAD, and Type 3 is the least common. Our patient had Type 1 SCAD according to the angiographic classification of SCAD.<sup>5</sup>

There are no clear guidelines to treat SCAD because of the rarity of this condition, and most clinicians treat it based on their clinical experience. It is essential to suspect SCAD in an atherosclerosis unlikely scenario because treatment of ACS because of SCAD differs from atherosclerotic ACS, and some treatment modalities usually used in STEMI (like fibrinolysis) are contraindicated in SCAD.<sup>6</sup> Conservative management has been reported to yield acceptable results in asymptomatic patients.<sup>6,8,9</sup> Hassan et al. conducted a study enrolling 156 patients with 182 non-contiguous SCAD lesions. On follow-up angiography, it was found that 95% of those who underwent repeat catheterization over 30 days later showed spontaneous angiographic healing.<sup>9</sup> A study by Alfonso et al. studying 45 SCAD patients over 6 years yielded an excellent long-term prognosis with a conservative strategy.<sup>9</sup>

We previously reported SCAD in the non-infract artery in a young male.<sup>10</sup> PCI was done to the infarct-related artery (LAD), and SCAD in RCA was considered an incidental finding. Similar to the current patient, he responded well to medical therapy.

PCI for SCAD is associated with lower technical success as compared to PCI for atherosclerotic disease. They

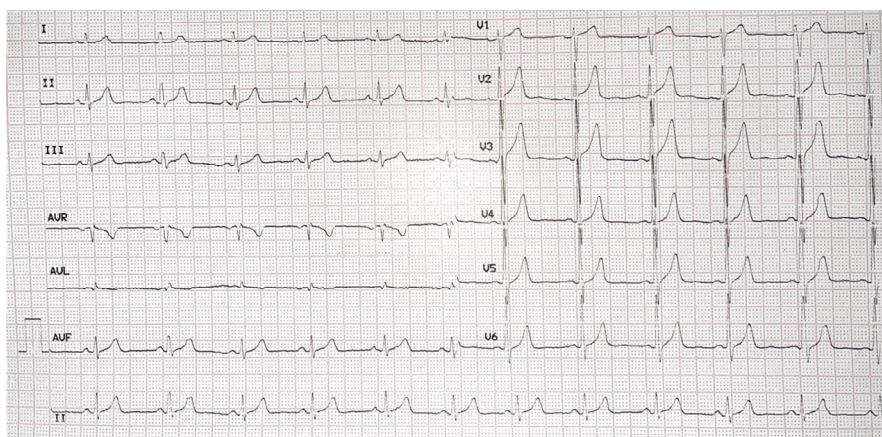
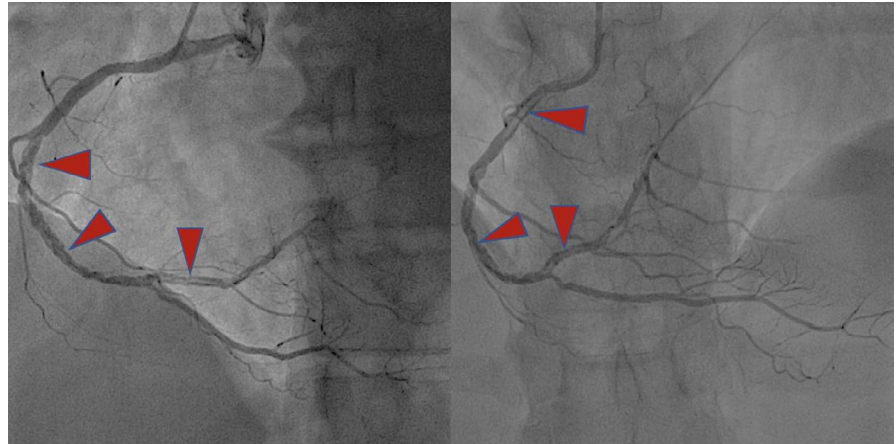


FIGURE 1 Twelve lead electrocardiography showing no significant anomaly

**FIGURE 2** Diagnostic coronary angiography showing extensive dissection in the right coronary artery (RCA) extending from ostia to distal RCA and posterior left ventricular (PLV) artery



**FIGURE 3** Causes of Spontaneous coronary artery dissection

<b>Fibromuscular Dysplasia</b>
<b>Pregnancy-Related</b>
•Antepartum
•Post-Partum
<b>Connective-Tissue Disorders</b>
•Marfan Syndrome
•Ehler-Danlos Syndrome
•Loeys-Dietz Syndrome
•Cystic Medial Necrosis
•Alpha-1 Antitrypsin Deficiency
•Polycystic Kidney Disease
<b>Systemic Inflammatory Disease</b>
•Systemic Lupus Erythematosus
•Crohn's Disease
•Ulcerative Colitis
•Polyarteritis Nodosa
•Sarcoidosis
•Churg-Strauss Syndrome
•Wegener's Granulomatosis
•Rheumatoid Arthritis
•Kawasaki's Disease
•Giant Cell Arteritis
•Celiac Disease
<b>Hormonal Therapy</b>
•Oral Contraceptive(Estrogen, Progesteron)
•Beta-HCG
•Testosterone
•Corticosteroids
<b>Drugs</b>
•Cocaine
•Amphetamines
<b>Intense Emotional Stress</b>

are met with several challenges like an extension of dissection, entering false lumen, or future stent thrombosis because of incomplete stent apposition following intramural hematoma (IMH) absorption.<sup>6</sup> In case of hemodynamically unstable patients or those with ongoing ischemia or LMCA dissection, invasive strategies of PCI should be taken. Important points should be kept in mind while performing PCI in patients with SCAD. The stent to be deployed should be long in excess of 5–10 mm on both ends to accommodate the progression of IMH when the stent is inflated. Direct stenting is the preferred option as pre-dilation prior to stent deployment lead to progression of IMH, so it should be avoided. Isolated balloon angioplasty to restore coronary flow can be done. IMH can be decompressed by cutting balloon angioplasty followed

by stent deployment if required. IMH progression can be minimized by multiple stent approach where proximal and distal ends of dissection are stented first, followed by stenting the middle part. Bioresorbable stents can be used to avoid future stent thrombosis secondary to malposition following IMH resorption, which provides a temporary scaffold.<sup>11</sup>

Our patient was a 37-year-old man with no apparent cardiovascular risk factor. Because of stable hemodynamic and TIMI 3 flow, we chose not to stent the patient and follow him closely for any deterioration. It came out to be a surprise for us that despite such an extensive dissection patient remained asymptomatic throughout the procedure and post-procedure, which prompted us to report this rare case of SCAD.

## 4 | CONCLUSION

Spontaneous coronary artery dissection is an unusual occurrence in young men. However, high clinical suspicion should be taken when a young man with no significant risk factor for atherosclerotic coronary artery disease presents with clinical presentation of ACS. Imaging modalities like OCT and IVUS that can “see-through” the coronary wall have become game-changers in diagnosing and managing SCAD. SCAD can be managed conservatively with close observation unless the patient is hemodynamically unstable, and there is ongoing ischemia or LMCA dissection.

Modified PCI strategies are employed while treating patients with SCAD.

## ACKNOWLEDGMENTS

None.

## CONFLICT OF INTEREST

None declared by the authors.

## AUTHOR CONTRIBUTIONS

SV, AP, PS, and VJ wrote the abstract, introduction, case, discussion, and conclusion. VJ, NBP and SV performed critical edits of the draft and prepared the final version of this manuscript which was approved by all authors.

## CONSENT

Written informed consent has been taken from the patient which would be available upon request.

## ORCID

Vikash Jaiswal  <https://orcid.org/0000-0002-2021-1660>

Nishan Babu Pokhrel  <https://orcid.org/0000-0002-4278-5753>

## REFERENCES

1. Maehara A, Mintz GS, Castagna MT, et al. Intravascular ultrasound assessment of spontaneous coronary artery dissection. *Am J Cardiol.* 2002;89:466-468.
2. Saw J, Mancini GB, Humphries KH. Contemporary review on spontaneous coronary artery dissection. *J Am Coll Cardiol.* 2016;68:297-312.
3. Verma PK, Sandhu MS, Mittal BR, et al. Large spontaneous coronary artery dissections: a study of three cases, literature review, and possible therapeutic strategies. *Angiology.* 2004;55:309-318.
4. Pretty HC. Dissecting aneurysm of coronary artery in a woman aged 42: rupture. *Br Med J.* 1931;1:667.
5. Saw J. Coronary angiogram classification of spontaneous coronary artery dissection. *Catheter Cardiovasc Interv.* 2014;84:1115-1122.
6. Saw J. Spontaneous coronary artery dissection. *Can J Cardiol.* 2013;29:1027-1033.
7. Saw J, Starovoytov A, Mancini J, Buller CE. Non-atherosclerotic coronary artery disease in young women. *J Am Coll Cardiol.* 2011;58:B113.
8. Hassan S, Prakash R, Starovoytov A, Saw J. Natural history of spontaneous coronary artery dissection with spontaneous angiographic healing. *JACC Cardiovasc Interv.* 2019;12(6):518-527.
9. Alfonso F, Paulo M, Lennie V, et al. Spontaneous coronary artery dissection: long-term follow-up of a large series of patients prospectively managed with a “conservative” therapeutic strategy. *JACC Cardiovasc Interv.* 2012;5:1062-1070.
10. Pradhan A, Safal S, Narain V, Sethi R. Incidental spontaneous coronary dissection: an interventionist's dilemma. *Heart Views.* 2015;16(4):158-160.
11. Hayes SN, Kim ESH, Saw J, et al. Spontaneous coronary artery dissection: current state of the science: a scientific statement from the American Heart Association. *Circulation.* 2018;137(19):e523-e557.

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