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CASE REPORT

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Case report of spontaneous coronary artery dissection in a 50-year-old man

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Abstract

Background Spontaneous Coronary Artery Dissection (SCAD) is an acute coronary event of uncertain origin. SCAD occurs when the coronary artery wall dissects non-traumatically and non-atherosclerotically, leading to the formation of an intramural hematoma or intimal tear, ultimately compressing and restricting the true lumen, or even occluding it. The management of SCAD remains controversial despite modern imaging techniques. In addition to supportive drug therapy, percutaneous coronary intervention (PCI) is another option that can be used as an effective treatment modality.

Case presentation We describe A 50-year-old male with SCAD presented to the hospital emergency department complaining of chest pain. Coronary angiography incidentally showed spiral dissection from the proximal to distal right coronary artery (RCA). Three overlapping coroflex stents were deployed from the distal to the proximal RCA.

Conclusions To stabilize the coronary artery in Acute Coronary Syndrome (ACS) patients due to SCAD, prompt interventions such as stenting and angioplasty are needed. However, it is necessary to pay attention to the clinical condition of patients and quick diagnosis for the recovery of patients and reduction of complications.

Keywords Spontaneous, Coronary artery, Dissection, Case report

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Introduction

SCAD is a significant and less understood cause of non-atherosclerotic coronary artery dissection in ACS, often resulting in subintimal hematomas that can jeopardize coronary blood flow [1]. SCAD, reported as a rare cause of myocardial ischemia [2], predominantly affects young women, often associated with pregnancy [3]. Similar to ACS, patients with SCAD present with various symptoms including chest pain, myocardial infarction with ST-segment elevation, ventricular arrhythmias, and sudden cardiac death [4]. The true prevalence of SCAD remains unknown and may account for 2–4% of all ASC cases [1] and up to 45% of ACS cases in women under 50 years old [2].

Currently, the widespread use of coronary angiography in ACS patients, along with the increasing application

Fig. 1 Coronary angiography of the left coronary artery showing a 50% stenosis in the proximal segment of LCX

Fig. 2 RCA injection revealing spiral dissection flap from the proximal to distal of RCA

of advanced intracoronary imaging techniques such as Optical Coherence Tomography (OCT) and Intravascular Ultrasound (IVUS), has led to improved awareness [5]. However, despite scientific advancements, disseminating new knowledge regarding the diagnosis of this disease has been challenging, and SCAD is still misdiagnosed or underdiagnosed and treated as atherosclerotic ACS, potentially harming SCAD patients [6]. Since PCI in SCAD is associated with a high rate of complications and relatively low technical success (~70–60%), and coronary stenting often requires multiple and prolonged stents [7]. We report a successful case of stenting and share the experiences gained in SCAD management.

Case report

A 50-year-old male (height: 171 cm, weight: 87 kg, BMI: 29.8) with a history of hypertension and hyperlipidemia presented to the hospital emergency department complaining of chest pain. At admission, he was pain-free at rest. The patient experienced an episode of chest pain with diaphoresis the day before admission, lasting approximately 10 min, which subsided at rest. However, he experienced retrosternal chest pain during activity, classified as typical chest pain FC III. The patient denied any shortness of breath or fever upon admission. His vital signs were as follows: pulse rate 80 bpm, blood pressure (BP) 135/80 mmHg, body temperature (BT) 36.5 °C, respiratory rate (RR) 18 breaths per minute, O2 saturation=98%, and Glasgow Coma Scale (GCS)=15. Electrocardiogram (ECG) showed no ischemic changes, and troponin was negative. Exercise stress testing was strongly positive (HIGH RISK), showing deep down-sloping ST depression at V4-V6 leads, accompanied by chest pain. Given that the patient experienced severe chest pain (typical chest pain) the day before and had a positive and high-risk test result indicating severe ischemia in the region of the RCA prior to the angiography. The patient was indicated for coronary angiography.

Angiography

During angiography, the patient was pain-free. Left coronary injection revealed brief ectatic and slow flow in the left anterior descending (LAD) artery. In the angiography, the patient exhibited a lesion approximately 50% in the proximal segment of the left circumflex artery (LCX), with no evidence suggesting dissection, indicating an atherosclerotic plaque. Additionally, nonsignificant atherosclerotic lesions of less than 50% were observed in the LAD, with no signs of dissection or SCAD (Fig. 1). Right coronary injection revealed spiral dissection from the proximal to distal RCA (Fig. 2). The decision was made to perform PCI on the RCA.

Angioplasty

For RCA angioplasty, a 6 French Judkins Right JR3.5×6 F catheter was introduced. Initial contrast flow in the RCA was established from the ostium to the distal segment, but spiral dissection flap was observed from the ostium to distal. A diagnosis of SCAD was made (Fig. 2). PCI was performed on the RCA. A 0/014-inch shunmeie guidewire was placed in the true lumen. Three overlapping coroflex stents (drug eluting stent; diameter: 3.5 mm, length: 28 mm) were deployed from the distal to the proximal RCA (Fig. 3). Post-dilation with a 4.5 mm ×

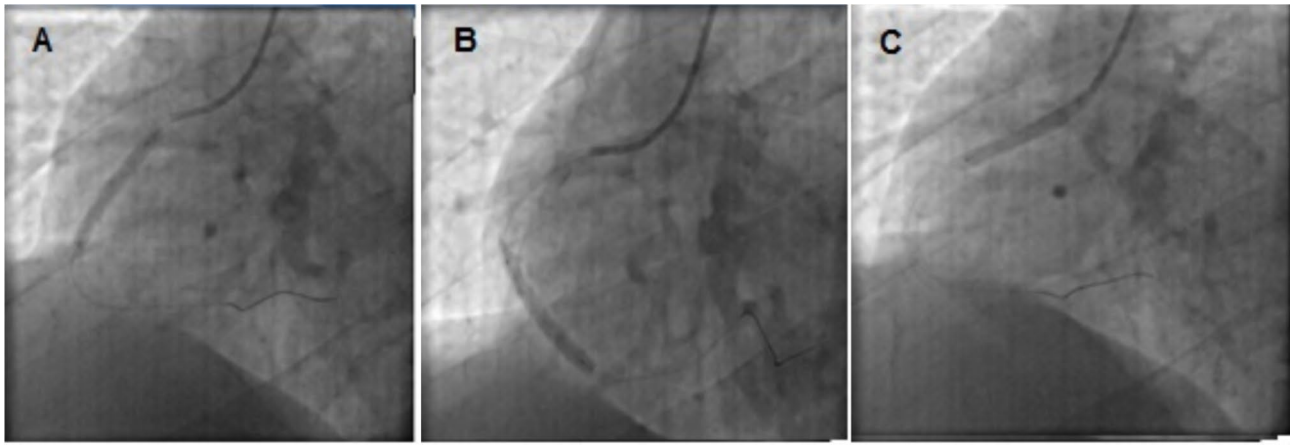

Fig. 3 Deployment of 3 stents with a diameter of 3.5 mm and a length of 28 mm from the distal to the ostio-proximal segment of the RCA

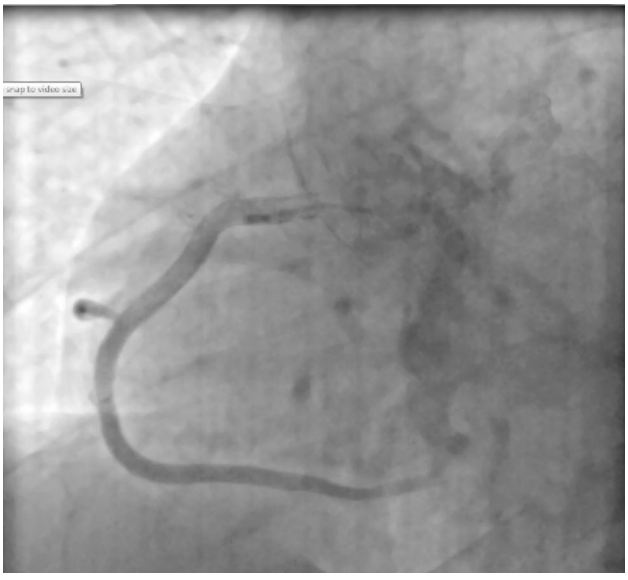

Fig. 4 RCA after PCI showing TIMI flow 3

15 mm NC Blue Medical balloon was performed. Dissection was completely resolved, and thrombolysis in myocardial infarction (TIMI) flow 3 was achieved (Fig. 4). The patient was discharged the next day with stable general condition and no pain, on the following medications: tab Aspirin 80 mg daily, tab Bisoprolol 5 mg daily, tab Valsartan 80 mg daily, tab Atorvastatin 40 mg daily, and tab Clopidogrel 75 mg daily. He remained asymptomatic with good general condition during the three-month follow-up.

Discussion

Numerous reports have documented cases of SCAD in the LAD artery [3, 7, 8], while limited studies have been conducted on SCAD in the RCA, possibly due to underreporting or the rarity of this condition in the right coronary arteries. In the case described, SCAD occurred in the RCA [9]. Additionally, SCAD is more prevalent in women [3, 10] than in men, but the patient in question is male.

Symptoms of SCAD typically include unstable angina with chest pain, shortness of breath, sudden cardiac arrest, ST-segment changes in ECG, and increased heart rate. The principal clinical presentation of SCAD was reported non–ST-segment elevation ACS (56%), followed by ST-segment elevation myocardial infarction (42%) [10]. The etiology of SCAD involves a combination of fibromuscular dysplasia, pregnancy, severe stress, anxiety, and heavy exercise [11].

The first-line treatment for SCAD patients is conservative management [12], which is considered appropriate unless there is continuous ischemia, hemodynamic instability, or Left Main Coronary Artery dissection [13]. Our study involved a patient with chest pain and ECG changes during exercise stress testing, undergoing coronary artery intervention. Although SCAD is an uncommon but important cause of ACS, there are currently no guidelines for its diagnosis and treatment [2].

SCAD is still today an underdiagnosed disease due to the absence of angiographic hallmarks in more than 70% of cases [14]. However, the widespread use of coronary angiography in ACS patients, along with the increasing application of advanced intracoronary imaging techniques such as OCT [14] and IVUS, has led to improved awareness. Both PCI and Coronary Artery Bypass Grafting (CABG) are used for treatment based on the diagnosis [15, 16]. SCAD occurs due to separation of the intimal layer from the medial layer in the coronary artery wall, resulting in tearing of the intima, intramural hematoma, or subintimal hematoma formation. This hematoma creates a false lumen in the arterial wall, compressing or completely obstructing the true lumen, leading to severely reduced or completely interrupted blood flow [16].

SCAD is classified into four types based on angiography findings: Type (1) visible flap on the artery wall with the presence of a double lumen, Type (2) diffuse smooth stenosis with varying degrees, typically 20–30 mm, Type (3) focal stenosis similar to atherosclerosis, typically 11–20 mm, and Type (4) sudden complete occlusion, usually occurring in the distal coronary arteries [3, 17]. Our study involved a Type 1 SCAD with spiral dissection from the proximal to distal segment of the RCA, demonstrating a visible double lumen (true and false lumen).

Recent studies have reported that the LAD artery is the most common coronary artery affected by SCAD, with the majority of lesions occurring in its mid and distal segments [8, 18]. However, in patients with Type 4 SCAD who underwent PCI, involvement of the proximal LAD was more frequent [19]. The present study focused on SCAD in the RCA, classified as Type 1, involving the proximal to distal segment, which merits attention. Knowledge about SCAD remains limited, and it may still be underdiagnosed [3].

PCI in patients with SCAD typically does not have a favorable prognosis compared to atherosclerotic patients, due to the risk of hematoma rupture and bleeding. Preemptive stenting before reaching the dissection site may be useful for relieving arterial stenosis. The use of a Cutting Balloon (CB) for SCAD treatment is a novel technique that has gained attention. With CB, a hole or dissection is created in the distal part of the true lumen, establishing a connection between the false and true lumens [20]. The hematoma in the false lumen is drained into the true lumen, relieving intramural hematoma pressure, thus obviating the need for stenting. However, experience with angioplasty using CB in SCAD is limited, and there have been few studies in this regard [7]. Reported cases have described the use of small CBs (typically with a diameter between 2 and 2.5 mm) in the left coronary artery system, avoiding larger balloons due to the risk of dissection or even coronary artery rupture. In the present study, stenting with three stents (coroflex) of 3.5 mm diameter and 28 mm length was initially performed, followed by balloon dilation to adhere the stents to the vessel wall. However, CB was not used due to the limited intramural hematoma. Additionally, the study demonstrated that medical treatment may not be sufficient, and delay in management due to the high risk of SCAD should be avoided.

Sharma et al. [1] also conducted a similar study where a patient with Type 3 SCAD in the mid-segment of the RCA underwent angiography and subsequent CB use, resulting in TIMI 3 flow restoration. There is no consensus on SCAD treatment; options include conservative medical management, PCI, and CABG. However, PCI in SCAD patients is associated with a high procedural failure rate, dissection propagation, and lesion passage issues. Long-term results with coronary stenting are poor, successful in only 30% of cases [21]. ACC guidelines state that CABG is usually performed when PCI fails or the patient is at high risk, such as with left main coronary artery dissection due to ischemia or MI [22]. Nevertheless, studies have shown a high rate of technical failure with CABG in SCAD treatment. Follow-up angiography revealed that out of 15 bypass grafts, 11 had occluded grafts [23]. This suggests that CABG may not provide long-term protection against recurrent SCAD effects, indicating the need for further research into SCAD management.

Another point in the management of these patients, there is a concurrent possibility of dissection occurring in other arteries, including supra-aortic trunks, the aorta, and mesenteric, renal, and iliac branches vessels, alongside SCAD [24]. Multivessel SCAD is a challenging clinical presentation that might be associated to a worse prognosis compared with patients with single-vessel [25]. However, in our patient, this evaluation was not performed. It is recommended that future studies include screening for extracoronary lesions (using CT angiography) to address this concern.

Conclusion

PCI in ACS due to SCAD yields favorable results, indicating that both stenting and balloon angioplasty may be necessary to stabilize the coronary artery. The timing of stenting before or after CB poses a challenge that requires further studies.

Abbreviations

ACS	Acute coronary syndrome
BP	Blood pressure
BT	Body temperature
CABG	Coronary artery bypass grafting
CB	Cutting Balloon
ECG	Electrocardiogram
GCS	Glasgow Coma Scale
IVUS	Intravascular Ultrasound
LAD	Left anterior descending
LCX	Left circumflex
MI	Myocardial ischemia
OCT	Optical Coherence Tomography
PCI	Percutaneous coronary intervention
RCA	Right coronary artry
RR	Respiratory rate
SACD	Spontaneous coronary artery dissection
TIMI	Thrombolysis in myocardial infarction

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Author contributions

MS and MZ write the initial report about patient, MZ, SP and AA were involved in investigation and data collection. AA, MZ and VM complete research and discussion, MZ, XX, AH, and MA drafted and corrected the manuscript. All authors read and approved the final manuscript for publication.

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
This research has a code of ethics No. IR.RUMS.REC.1403.003 from Rafsanjan University of Medical Sciences.

Consent for publication
Our patient gave written informed consent for his personal and clinical details along with identifying images to be published in this study.

Competing interests
The authors declare no competing interests.

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