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(CASE REPORT)

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Case report: coronary artery dissection complicating stent implantation and percutaneous coronary intervention with hematoma in the distal right coronary artery

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Abstract

Coronary artery angiography (CAG)/ percutaneous coronary intervention (PCI) and stent placement for restenosis is an important means of diagnosis and treatment of coronary heart disease. The case presents a 61-year-old woman with coronary artery disease who presented with recurrent wheezing, chest tightness, palpitations, and a sensation of pharyngeal blockage. A recent coronary artery computed tomography angiography (CTA) indicated CAD-RADS grade 4 coronary atherosclerosis, characterized by calcified plaques and varying degrees of stenosis in the left main trunk, left anterior descending artery (LAD), left circumflex artery (LCX), and right coronary artery (RCA). The patient exhibited intermittent T-wave changes on a dynamic electrocardiogram, leading to her admission for treatment and complete coronary angiography. The angiography revealed significant stenosis in the LAD, diffuse plaque lesions in the LCX, and dissection from the middle to distal RCA, confirming spontaneous coronary artery dissection (SCAD). The patient underwent a two-stent procedure, which resulted in favorable outcomes with TIMI flow grade 3 observed in the RCA. Additionally, balloon angioplasty, stenting, multi-catheter angiography, and percutaneous coronary intervention (PCI) were performed to address proximal-mid RCA dissection with intramural hematoma. The case study concludes by highlighting the successful management of severe RCA stenosis, dissection, and hematoma using a PCI strategy for SCAD.

Keywords: Percutaneous coronary intervention; Drug-eluting stents; Balloon angioplasty; Bioabsorbable stent; Spontaneous coronary artery dissection; Strategy

1. Introduction

Spontaneous coronary artery dissection (SCAD) is a condition characterized by a tear in one of the epicardial coronary arteries. This range of manifestations includes intimal rupture, intramural hematoma, and false lumen formation, occurring without triggers such as atherosclerotic plaque rupture, trauma, or prior coronary artery procedures. Notably, SCAD is the primary cause of acute coronary syndrome (ACS) in young middle-aged women, including those who are peripartum, even in the absence of traditional cardiovascular risk factors [1].

The majority of patients [70-97%] showed spontaneous angiography healing, according to observational data [2,3]. In the meanwhile, high rates of technical failure (36-53%) have been linked to percutaneous coronary intervention (PCI) for SCAD [2,4]. Research has indicated that PCI for SCAD May results in less-than-ideal results and a higher chance of complications [5]. The guide wire might inadvertently enter the incorrect pathway, and the use of balloon dilatation or

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stent placement could potentially trigger a new dissection or lead to the expansion of an existing one in the direction of blood flow. Furthermore, the fact that most SCAD lesions are situated distally makes them less suitable for PCI. This procedure is typically considered for individuals experiencing persistent ischemia or unstable hemodynamics.

Balloon angioplasty marked the beginning of percutaneous coronary intervention (PCI) in the 1970s [6]. In the mid-1980s, bare metal stents were quickly created to treat dissections, acute recoil, and later arterial restenosis. However, these devices were linked to new difficulties such as thrombosis and stent restenosis [7].

`Nevertheless, the PCI technique for SCAD has not been established in full detail. In this study, we describe the case of a 61-year-old woman, who presented with pharyngeal obstruction, wheezing, palpitation, and T-wave changes (MaVF), caused by SCAD in the proximal RCA after revealing by angiogram, treated with PCI. Likewise, we discuss SCAD, including proximal to distal RCA, focusing on the PCI technique.

2. Case demonstration

A 61- year-old woman, was admitted to our hospital due to repeated wheezing and throat blockage for 1 month. present situation: The patient experienced dyspnea, and pharyngeal obstruction, chest tightness, which was obvious in the morning and worsened during emotional tension and fatigue, accompanied by palpitations. The symptoms recurred without therapy and the patient visited our outpatient clinic one week ago for further examination. After completing the relevant investigation of CTA considering unstable angina, the patient was hospitalized for treatment and to undergo CAG.

The past medical history: General health in the past, denies circulatory system diseases such as hypertension and coronary artery disease, endocrine diseases such as hyperthyroidism and diabetes, infectious disease history such as hepatitis or tuberculosis, history of foot burn surgery many yes ago, no major trauma or surgeries, no history of drug or food allergies, no history of blood transfusion. The physical examination was routine, there were no unusual findings, such as murmur, rub, gallop, or indications of heart hypertrophy. Dynamic electrocardiogram: Ventricular premature beats (16 times, intermittent), Atrial premature beats (8 times), Intermittent T-wave changes (**Fig1**)," laboratory tests blood testing revealed troponin I<0.001 4g/L, triglyceride 2.30mol/L, 6.27mmol/L total cholesterol, 0.93mmol/L HDL, and 3.47mmol/L LDL. After the patient was admitted comprehensive treatment was given, aspirin enteric-coated tablets combined with clopidogrel tablets for anti-platelet therapy, ezetimibe tablets to stabilize plaques, and lansoprazole 30mg IV drip once a day for gastric protection.

One day later, coronary angiography revealed a long lesion in the mid-segment of the LAD with a maximum stenosis of 70-80%, diffuse plaque lesions in the entire course of the LCX, a long lesion in the proximal segment with a maximum stenosis of 80%, and a 40% stenosis at the obtuse marginal branch (Fig 2). 5F multifunctional angiography revealed 40% stenosis in the proximal segment of the RCA, long calcified lesions in the mid-segment with a maximum stenosis of 90%, and a 50% stenosis in the distal segment. After further discussion, we decided to perform RCA PCI (preferably with a bioabsorbable stent). An APT guide-wire was advanced to the distal RCA, followed by a Run-through guide-wire for protection. A 2.5*15mm ePTFE balloon was advanced along the guide wire to pre-dilate the mid-segment lesion of the RCA, and then withdrawn. A 3.5*28mm XINSORB bioabsorbable coronary stent was advanced to the RCA lesion, but it was difficult to position, due to severe stenosis, so the stent was withdrawn. An Eptfe extension catheter was introduced for reinforcement, and repeat angiography revealed an intimal dissection shadow in the mid-segment of RCA with contrast retention, suggesting a dissection flap, leading to Intramural hematoma (IMH) formation (Fig 3) . Considering the dissection a 3.5*30mm Resolute stent also called drug eluting stent (DES) was advanced to release at the mid-segment lesion of the RCA, followed by a 3.5*18mm Resolute stent (DES) at the mid-distal segment of the RCA. Repeat angiography showed closure at the intimal flap in the proximal segment and compression of vessels in the distal segment, preventing local contrast filling (Fig 4). APT and run-through guidewires were advanced to the true lumen of the distal RCA, followed by cutting balloons and balloons of various sizes to dilate the mid-distal segment of the RCA, which were then withdrawn. A stent balloon was advanced into the true lumen of the distal RCA coronary artery and expanded from proximal to distal. Repeat angiography revealed good wall apposition of the RCA stent, closure at the intimal flap (dissection) in the proximal segment, and visible blood flow in the distal segment at grade 3 TIMI flow (Fig 5).

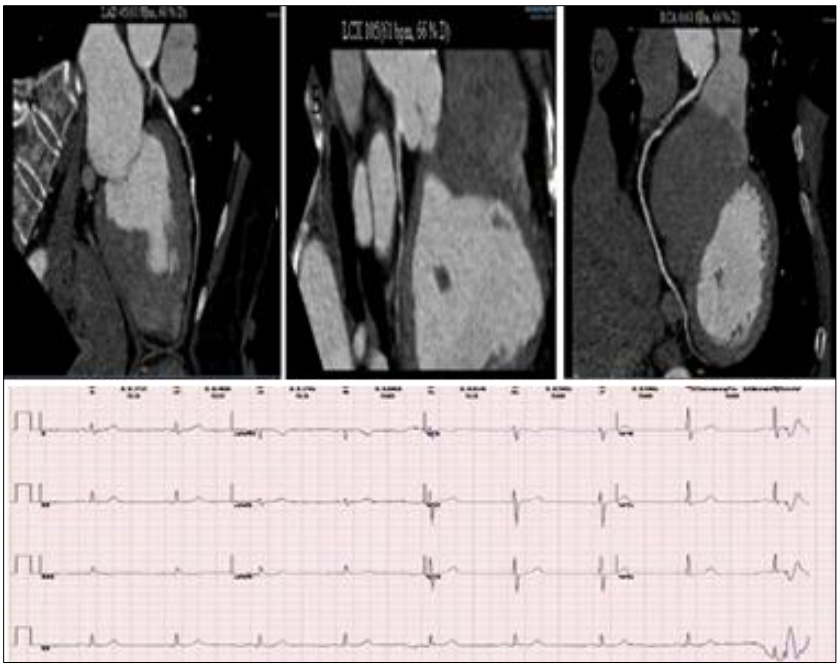

Figure 1 CTA & ECG

Computed tomography angiography (CTA). (a) calcified plaques in the proximal and middle segments in the left anterior descending artery LAD. (b) calcified plaque in the proximal left circumflex artery (LCX) and mild stenosis of the lumen. (c) Calcified and noncalcified plaque in the proximal segment right coronary artery (RCA), With severe lumen stenosis.

Dynamic ECG: Revealed L. Sinus rhythm, Ventricular premature beats (16 single beats, inter-temporal), Atrial premature beats (8 single beats), Intermittent T wave changes (MaVF).

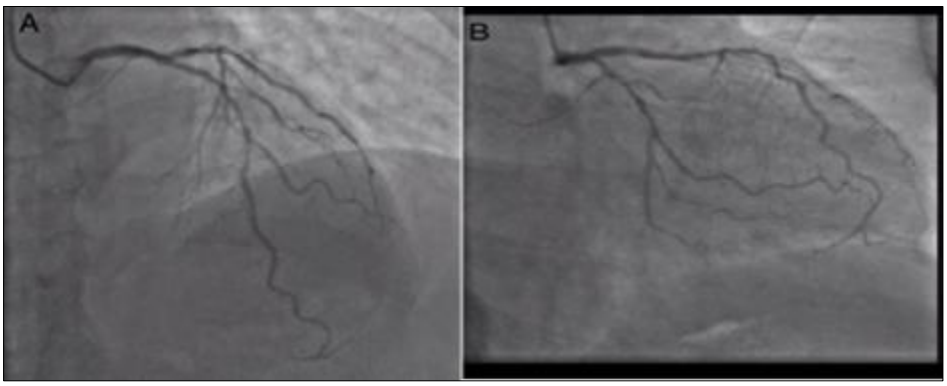

Figure 2 Coronary Angiography

Coronary angiography. (a) A long lesion in the mid-segment of the left anterior descending artery (LAD) RAO cranial projection (b) diffuse plaque lesions in the entire course of the left circumflex artery (LCX) RAO caudal projection

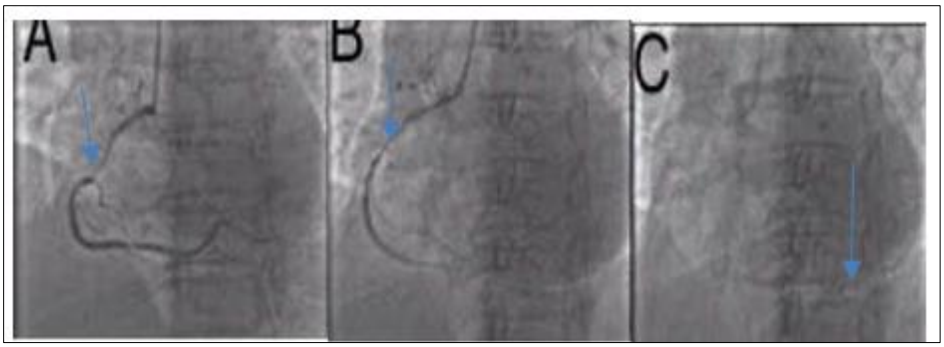

Figure 3 Coronary Angiography

Coronary angiography showed the following findings: (a) In the LAO cranial projection, long calcified lesions were observed in the mid-segment of the right coronary artery (blue arrow). (b) right coronary artery LAO caudal Projection revealing pre-dilatation mid segment lesion (blue arrow). (c) In the LAO caudal projection, contrast agent retention in the distal part of the right coronary artery was noted, attributed to the formation of an intramural hematoma (IMH) (blue arrow).

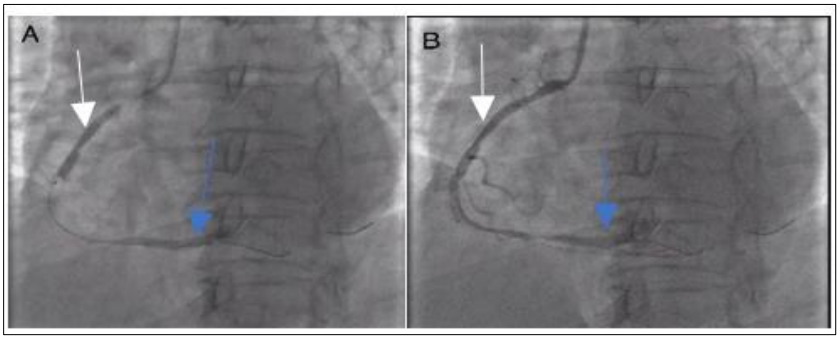

Figure 4 Angiogram

(a) The angiogram displays stent placement in the mid-segment lesion of the RCA, indicated by the white arrow, and in the mid-distal segment, indicated by the blue arrow.

(b) Subsequent angiography revealed closure at the intimal flap or dissection in the proximal segment, marked by the white arrow, and constriction of vessels in the distal segment, indicated by the blue arrow.

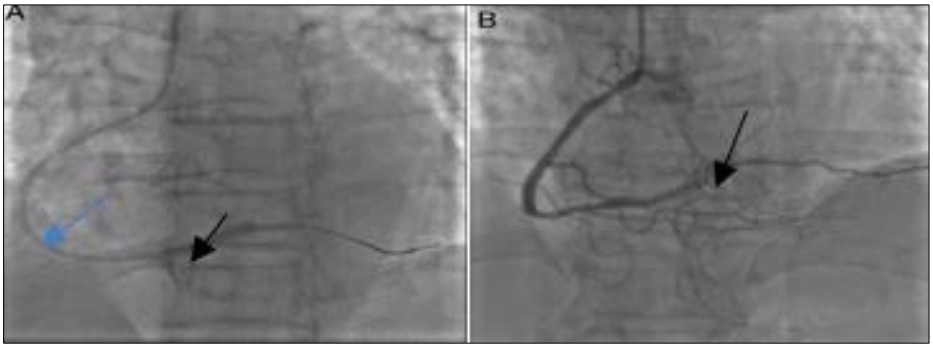

Figure 5 Stent implantation & Visible blood flow

(a)A stent balloon was advanced into the true lumen of the distal RCA coronary artery and expanded from proximal to distal. Stent implantation proximal-mid RCA blue arrow, and distal end indicated by black arrow. (b) visible blood flow in the distal segment of RCA at grade 3 TIMI flow (black arrow)**.**

The patient was observed for 15 minutes, and vital signs remained stable. Repeat angiography showed complete expansion of the RCA stent, good wall apposition, and grade 3 TIMI flow.

There were no significant adverse cardiovascular events and the post-procedural course was unremarkable. Before discharge, the ECG showed remission of T-wave changes (aVF). Follow-up at the outpatient clinic revealed no significant changes in the patient clinical course.

3. Discussion

Coronary artery dissection (Cad) is a rare but serious complication that can occur during percutaneous (PCI), particularly during stent implantation. This case illustrates the challenges faced when managing a patient with SCAD following attempted stent placement in the RCA. The patient presented with symptoms suggestive of unstable angina, and diagnostic imaging revealed significant stenosis in multiple coronary arteries, necessitating intervention. The decision to proceed with PCI was warranted given the patient's clinical presentation and angiographic findings. However, the complications arising from the procedure highlight the inherent risks associated with coronary interventions. In this case, the initial attempt to deploy a bioabsorbable stent was complicated by severe stenosis, leading to intimal dissection and subsequent intramural hematoma formation. This phenomenon is not uncommon; studies have shown that mechanical trauma to the vessel wall during stent deployment can lead to dissection, which may further complicate the procedural outcome [8]. Several studies have highlighted instances of SCAD occurring in the LAD artery [9, 10, 11]. However, there is a scarcity of research focused on SCAD in the right coronary artery (RCA), which may be due to either underreporting or the infrequency of this condition in the RCA. In the case presented, SCAD was identified in the RCA [12].

The management of Coronary artery dissection during PCI is critical. In this instance, the use of drug-eluting stents (DES) was appropriate, as they are designed to reduce the risk of restenosis and promote healing of the arterial wall [13]. The deployment of multiple stents in this case was necessary to address the dissection and restore blood flow. The decision to utilize cutting balloons and various sizes of balloons for dilation also reflects an adaptive approach to managing complications during PCI, which can help facilitate revascularization in cases of dissection [14,15]. This case also underscores the importance of careful patient selection and pre-procedural planning in PCI. Identifying patients at higher risk for complications, such as those with complex coronary anatomy or significant calcification, can help guide the choice of intervention and stent type. Moreover, maintaining a high index of suspicion for complications like coronary artery dissection during and after PCI is essential for timely recognition and management.

4. Conclusion

Coronary artery dissection complicating stent implantation is a rare but significant concern in PCI procedures. This case demonstrates the complexities involved in managing such complications, including the need for adaptive strategies and advanced techniques to ensure successful revascularization. Continuous advancements in stent technology and procedural techniques are crucial for improving outcomes in patients undergoing PCI. Future studies should focus on identifying predictive factors for coronary artery dissection (CAD) during PCI and developing standardized protocols for managing these complications effectively.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

The case study involving a single patient was approved by the First Affiliated Hospital of Zhejiang Chinese Medical University. The study was conducted in accordance with local legislation and institutional requirements.

Statement of informed consent

Informed consent was obtained from the patient for this case report

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