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Catheter Induced Dissection of Right Coronary Artery during Percutaneous Coronary Intervention: A Case Report

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Authors' contributions

This work was carried out in collaboration among all authors. Authors AK and SP designed the manuscript and wrote the initial draft. Authors JBS and RC reviewed the literature and edited the manuscript. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Iatrogenic coronary artery dissections are rare but life-threatening complications which may have different etiologies. These complications should be recognized promptly and must be managed to avoid mortality. We are reporting a case of a 57-year old man who presented to us with acute inferior wall myocardial infarction and developed proximal right coronary dissection while undergoing percutaneous angioplasty through trans radial approach and was managed successfully with immediate rewiring and stenting of the right coronary artery. The patient remained asymptomatic at regular follow up. Coronary angiogram and angioplasty are both invasive procedures which may at times result in iatrogenic complications like catheter induced coronary dissection. Coronary artery dissection may prove fatal at times and should be dealt with immediately with appropriate intervention.

Keywords: Catheter induced dissection; angiography; percutaneous coronary intervention; transradial angiography; case report.

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1. INTRODUCTION

Iatrogenic catheter induced coronary artery dissection is a rare but life-threatening complication. The incidence has been reported to be less than 0.2 % [1]. This complication is usually associated with hemodynamic compromise and may prove fatal at times. We report one such case of a 57-year-old gentleman, who had proximal right coronary artery (RCA) dissection immediately after percutaneous angioplasty for mid-segment of RCA and was successfully managed.

2. PRESENTATION OF CASE

A 57-year-old hypertensive man, presented to us for recent ST-elevation inferior wall myocardial infarction, for which he received fibrinolytic therapy with streptokinase at a peripheral centre, after which he had episodes of intermittent chest pain radiating to his left arm. On presentation, his heart rate was 96/minute, normal sinus rhythm and blood pressure was 140/86 mm of Hg, and was afebrile. On Cardiovascular examination first and second heart sounds were normal and no murmur was heard, and there were no added sounds. The chest was clear on auscultation. The patient's resting electrocardiogram (ECG) showed normal sinus rhythm with ST elevation and T wave inversion in Lead II, III, aVF. The serum troponin I level (cTnI) at the time of admission was 11.6 ng/ml. Transthoracic echocardiography showed regional wall motion abnormality in the inferoseptal wall with mild LV systolic dysfunction, (ejection fraction 45%), with no mitral regurgitation, ventricular septal defect or pericardial effusion. Coronary angiography (CAG) was performed via the right trans radial approach. Following local anaesthesia, the radial artery was punctured with a 20-gauge needle and cannulated with a soft, 0.025″ straight guidewire. A 6 French (Fr), 23 cm radial sheath (Terumo) was placed. Intra-arterial nitroglycerin (200 micrograms) and 5000 units of unfractionated heparin were administered. Angiography of the RCA with a diagnostic 5 Fr Tiger catheter (Terumo) showed ostial plaque with mild (30%) stenosis followed by mid-long segment severe (90%) stenosis [Fig. 1a]. The left coronary system was engaged with the same diagnostic 5 Fr Tiger catheter and was normal. After consent, the patient was taken for percutaneous angioplasty to RCA through right radial route. The RCA was hooked with JR 3.5 guiding catheter (Launcher, Medtronic), and the lesion was crossed with floppy wire (0.014 “,Runthrough ,Terumo) followed by pre-dilatation with 2x12 mm semi-compliant balloon (Boston scientific) at 10 atmosphere (atm) pressure and percutaneous stenting of proximal to mid-RCA was done with 3.0 X 38mm drug-eluting stent [Ultimaster (Terumo)] [Fig. 1b], followed by post-dilatation with Non-compliant balloon 3.0 x 12 mm at 16 atm (Boston Scientific).

Just when the wire was removed after post dilatation, the patient complained of chest heaviness with no significant ECG changes but, the blood pressure dropped to 100/70 mm of Hg. The immediate angiogram was done in left anterior oblique (LAO) view, which showed spiral dissection in proximal RCA [Fig. 1c and 2a]. The RCA was wired promptly with floppy soft tip 0.014" wire and proximal RCA was stented with 3.5 X 15 mm DES [Ultimaster (Terumo)], overlapping with previous stent [Fig. 2b]. Post stenting angiogram revealed TIMI 3 flow in the distal RCA with no other complications [Fig. 2c].

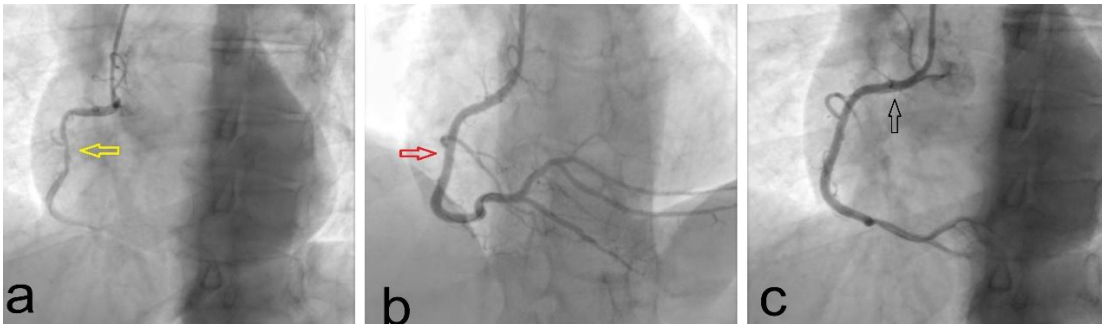

Fig. 1. (a) Diagnostic angiogram of RCA showing severe disease in mid-RCA (yellow arrow), (b) Percutaneous coronary intervention done to mid RCA with 3.0 x 38 mm DES (red arrow), and (c) Final angiographic result after stenting to mid-RCA revealed a luminal filling defect in proximal RCA (black arrow)

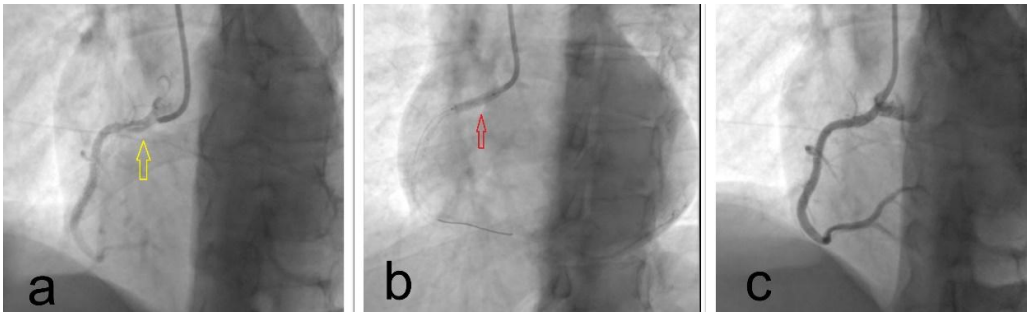

Fig. 2. (a) Further contrast injection showed dissection flap with double lumen in ostio-proximal RCA (yellow arrow), (b) Another DES 3.5 x 15 mm deployed overlapping proximally with the stent in mid-RCA (red arrow), (c) Contrast injection showing Stent deployed, dissection sealed with TIMI 3 flow in distal RCA

The patient's symptoms improved after stenting and the patient was transferred to the coronary care unit. The left ventricular ejection fraction on Day 3 improved to 52% with no mechanical complications. The patient was discharged after five days in stable condition. The patient remained asymptomatic at 3 months follow up.

3. DISCUSSION

Iatrogenic catheter induced coronary artery dissection is a rare complication but can be life-threatening at times [1,2]. The procedural risks for iatrogenic coronary artery dissection make intuitive sense, especially in vessels with abnormal structural integrity. These dissections are reported more commonly in the right coronary artery than left coronary artery [3], as was seen in our case. It is also important to classify coronary artery dissections. The National Heart, Lung, and Blood Institute classifies coronary dissections into 6 types (A–F) based upon their angiographic appearance.

A. Minor radiolucent areas with little or no persistence of contrast.
B. Parallel tracts or a double lumen with little or no persistence of contrast.
C. Contrast outside the coronary lumen with persistence of contrast.
D. Spiral dissection with filling defects.
E. Persistent filling defects in lumen.
F. Total occlusion without distal flow.

In our case, the dissection in RCA was revealed in left anterior oblique view which showed a double lumen separated by a radiolucent area without any persistence of contrast (National Heart, Lung and Blood Institute type B) [4,5]. Theses dissections may progress antegrade or retrogradely into the aorta. The incidence of retrograde progression has been reported to be around 0.008%, however, the mortality rate can be as high 50% [6,7]. Diagnosis and quick intervention are pivotal to decrease this high rate of mortality Exact mechanisms behind this complication are unclear [8]. Guide catheters are stiffer and may cause more mechanical trauma to the vessel wall. Deep catheter intubation can traumatize the deep segment of the arterial wall, especially if the catheter tip abuts the arterial wall. In these situations, a forceful contrast injection can further elicit a tear due to high hydraulic pressure. We believe that in our case it was a forceful injection of contrast into the abnormal vessel segment that may have led to the dissection of proximal RCA. Hemodynamic status and the dissection extent with distal flow define the algorithm for management of such cases. Various lines of management include immediate wiring and stenting of the coronary artery which at times may need the assistance of imaging technique like intravascular sonography (IVUS) or optical coherence tomography (OCT), and sometimes emergent coronary artery bypass grafting (CABG) may be required [9,10]. In our case, immediate wiring and stenting was done at proximal RCA with stent overlapping with the distal stent, which gave satisfactory result and salvaged the case.

4. CONCLUSION

Our case highlights the occurrence of a guiding catheter induced dissection which may prove fatal at times but a keen observation and prompt intervention may avoid serious outcomes. Coronary angiogram and angioplasty are both invasive procedures which may at times result in iatrogenic complications like catheter induced

coronary dissection. While doing these invasive procedures, one should be gentle and careful while manipulating catheters and forceful injections should be avoided. This case report emphasizes the importance of early diagnosis of coronary artery dissection and ruling out any anterograde and retrograde progression, and prompt intervention by an interventional Cardiologist.

CONSENT

All authors declare that 'written informed consent was obtained from the patient for publication of this case report and accompanying images'.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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