

CASE REPORT

Management of Iatrogenic Coronary Artery Dissection: A Case Report

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Abstract

Background:

Catheter-induced coronary artery dissection (CICAD) is an infrequent but potentially catastrophic complication of coronary angiography and percutaneous coronary intervention (PCI).

Case report:

We report a 70 -year-old man who underwent bail-out stenting.

Conclusion:

Iatrogenic coronary artery dissection represents a life-threatening complication of coronary angiography. Careful attention to preventative techniques and knowledge of effective treatment strategies will prepare operators well and facilitate successful outcomes in this potentially life-threatening complication.

Introduction

Catheter-induced coronary artery dissection (CICAD) is an infrequent but potentially catastrophic complication of coronary angiography and percutaneous coronary intervention (PCI). Distinct and clinically separate from spontaneous coronary artery dissection, iatrogenic coronary artery dissection is characterized by mechanical disruption of the endothelial cell layer of a coronary artery followed by extravasation of blood into subendothelial tissue planes.¹

Although it can generally be prevented, it cannot always be avoided and has been reported to have an incidence rate of 0.02%.²

We present a case of iatrogenic left main dissection that was successfully treated with multiple stents.

Case Presentation

A 70-year-old man presented with complaints of typical angina for one month. His medical history was positive for hyperlipidemia and hypertension. On admission, Physical examination was unremarkable while laboratory data showed no abnormal finding. Transthoracic echo cardiography demonstrated normal left ventricular function without wall motion abnormalities and no valvular disorder.

A right femoral approach was chosen to perform the angiography. During angiography Judkins 4.0 catheter (Medtronic, Inc.) was used to engage the left coronary artery and a diagnostic 5 Fr right Judkins 4,0 catheter (Medtronic, Inc.) for engaging right coronary artery. Angiography of the left coronary artery showed severe lesion in mid left anterior descending artery (LAD). Right coronary artery was dominant without significant lesion.

The decision was made to proceed with a LAD intervention. We successfully crossed the mid-LAD lesion with an Asahi Sion Blue guide wire. Pre dilatation was done using a compliant balloon 2,5 x 12 mm. An injection revealed a contrast stain of the LM artery showing spiral dissection as well as retrograde dissection into the adjacent aortic wall.

The patient complained of chest pain and his electrocardiogram showed ST segment elevation. A stent 3.0 x 20 mm was deployed immediately in the left main. The flow in the LAD was normalized. The lesion of the LAD was then successfully stented using 2.5 X 20 mm. A non-compliant balloon 3,5 x 8 mm was used to post dilate the stent of the left main.

After LM stenting, the patient's chest pain and ST segment elevation were resolved. His ejection fraction remained

normal, and the patient was discharged one week later in stable condition.

Discussion

Iatrogenic left main dissection as a life-threatening condition is a rare complication during coronary angiography or angioplasty.

The clinical incidence of CICAD has been estimated to be <0.1%, although the true incidence is likely underreported.^{3,4} In 1 retrospective 10-year cohort study of 56,968 patients undergoing coronary angiography, catheter dissections occurred more frequently in the right coronary artery (50%) than the left main artery (45%), with the majority of these caused by guiding catheters. Most were managed with stenting (82%) or conservative therapy (12%), with only 6% requiring surgery.⁵ The long-term prognosis was favorable, with 94% surviving to discharge.

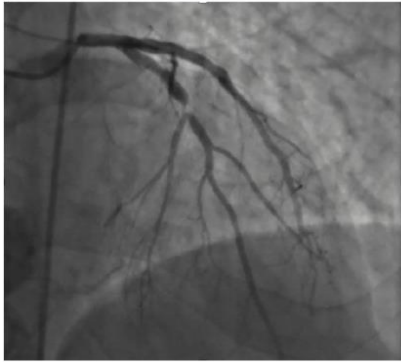
CICAD occurs more frequently during PCI because of the use of larger-caliber catheters and manipulation of coronary guidewires and other interventional equipment within the coronary artery. Additional risk factors for CICAD include female sex, left main atherosclerosis, use of Amplatz-shaped catheters, complex lesions, and deep seating of the catheter within the artery.³

A meticulous catheterization technique should be used. This includes utilizing appropriately sized and shaped catheters without deep intubation of the vessel, avoidance of noncoaxial alignment of the catheter, and not injecting if the pressure waveform is dampened or at an atherosclerotic plaque.¹

One of the most important aspects of management of significant dissection is to avoid any further antegrade injections. Antegrade injections of any form will pressurize the artery causing hydraulic dissection into the distal vessel and may also extend the dissection retrogradely into the aorta.

A non-hydrophilic workhorse guidewire with a low tip load should be chosen to attempt wiring of the true lumen as this will provide more tactile feedback reducing the chance of extending the dissection with the guidewire.

The presence of resistance to guidewire progress, particularly if the dissected artery does not have atheromatous disease, or formation of a sigmoid or knuckle shape by the guidewire suggests the guidewire is in the false lumen or subintimal space. Conversely, if the wire passes distally without resistance and can enter

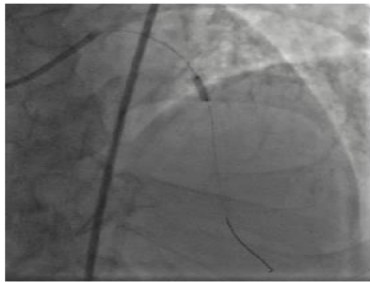


A

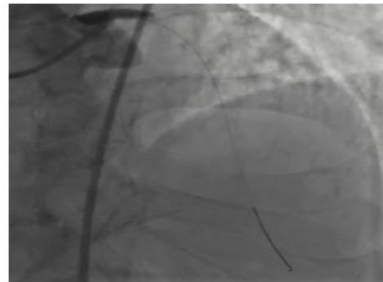


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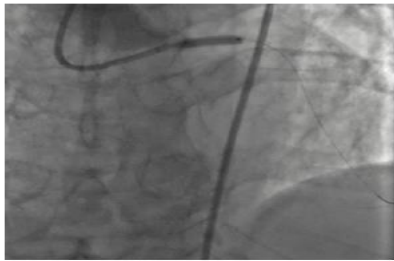
Figure 1: A) Severe lesion in the mid left anterior descending artery, cranial projection; B) Dominant right coronary artery without significant lesion.



A



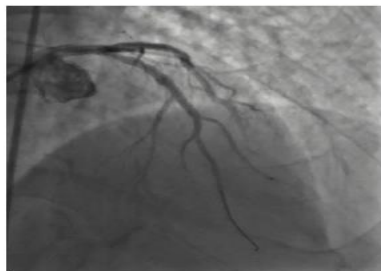
B



C



D



E

Figure 2: A) Balloon pre dilatation B) Left main dissection followed with LAD occlusion C) Left main Stent position; C) Deploying the stent of the LAD; E) Final result

multiple side branches, this suggests the wire is in the true lumen.⁶

As highlighted by Hashmani⁷, IVUS is extremely valuable in managing coronary dissections. IVUS can confirm the dissection entry point and confirm whether the guidewire is in the true or false lumen. If the guidewire is in the false lumen, then the IVUS can be left in place on the original wire and parallel wiring performed. This has the benefit of providing greater stability if the guide is disengaged to allow wiring of ostial dissection and allows real-time IVUS guidance to confirm the second wire is in the true lumen. Once the true lumen wiring has been achieved, IVUS can be used to assess the length of dissection, stent sizing, and optimization following stent placement.

Sumiyoshi,⁸ highlight another important strategy for the management of an occlusive dissection and present a novel application of microcatheters to reduce an obstructive hematoma. The authors describe the successful use of a 2.3-F microcatheter (Transit-II, Johnson and Johnson, Bridgewater, New Jersey) to aspirate blood from the subintimal space to allow for visualization of the distal vessel. In this case, a stent was deployed at low pressure (8 atm) to seal the proximal dissection entry site, and the microcatheter was used to aspirate the residual intimal hematoma and establish Thrombolysis in Myocardial Infarction flow grade 3. The stent was then post-dilated successfully to high pressure. Sumiyoshi et al. thus illustrates a technique to effectively reestablish distal flow in dissections complicated by severe compressive hematomas.

Conclusion

CICAD is a rare but important complication of coronary angiography and PCI. Careful attention to preventative techniques and knowledge of effective treatment strategies will prepare operators well and facilitate successful outcomes in this potentially life-threatening complication.

Acknowledgement

None.

Conflicts of Interest

None.

Funding

None.

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