Inadvertent Percutaneous Coronary Endarterectomy: An Unreported Complication of Percutaneous Coronary Intervention

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**ABSTRACT:** Iatrogenic coronary artery dissection during percutaneous coronary intervention (PCI) is rare (incidence of less than 0.1%), but it is a potentially lethal complication. Iatrogenic ostial coronary avulsion with total closure has been reported. Herein, we describe a case of complete neoendothelial avulsion and distal embolization of right coronary artery in-stent restenosis (ISR) during PCI, which was successfully managed with thrombosuction. Importance of guide catheter and guidewire handling is also discussed.

**Key words:** endovascular therapy, percutaneous coronary intervention, thrombectomy

Iatrogenic coronary artery dissection is rare, with incidence <0.1%, but it can be a devastating complication of percutaneous coronary intervention (PCI). The reported mechanism is mechanical injury to the arterial wall during guide catheter or guidewire manipulation, inadvertent balloon dilatation or stent deployment in false lumen, and forceful injection of contrast in patients with ostial coronary artery lesions. Various congenital anomalies such as unicuspid/bicuspid aortic valves and Marfan syndrome (cystic medial degeneration) have also been reported to be associated with increased risk of coronary artery dissection. We describe a unique case where total coronary neoendothelium avulsion and distal embolization during right coronary artery in-stent restenosis PCI was noted. To our knowledge, this has never been described in the medical literature.

**CASE REPORT**
A 66-year-old male with hypertension, past history of tobacco use and inferior wall myocardial infarction (IWMI), and status post primary percutaneous coronary intervention (PCI) to the ostioproximal and distal right coronary artery (RCA) presented with recent-onset typical chest pain 2 years post procedure. His resting echocardiogram (ECG) showed nonsignificant T-wave inversions in inferior leads, and 2-dimensional ECG showed mild left ventricular dysfunction (as before) with hypokinesia in the RCA territory. Cardiac biomarkers were within normal limits.
He was admitted and was managed for acute coronary syndrome – unstable angina. He was managed as per guideline-directed medical treatment and was later taken for coronary angiogram after written informed consent. A precatheterization profile was performed and a radial approach with a 5 Fr Tiger catheter (Terumo) was chosen. The left coronary system showed no significant lesions, but Mehran type III in-stent restenosis (ISR) was noted in the ostioproximal RCA stent (Figure 1). Accordingly, the decision was made to proceed with repeat PCI, and when the 6 Fr Judkins right 3.5 guide catheter (Medtronic) was exchanged and manipulated, the patient reported severe chest pain. Echocardiogram showed ST elevation in inferior leads. The check angiogram showed ostial right coronary total occlusion (Figure 2A), so the RCA was quickly wired with a 0.014” balance middle weight floppy wire (Abbott Vascular) and the ostioproximal lesion was predilated with a 2 mm x 10 mm Sprinter Legend semi-compliant balloon (Medtronic) (Figure 2B). Postdilatation cine showed a longitudinal homogenous opacity moving from the proximal RCA and embedded into the distal RCA, causing TIMI 0 flow (Figures 2C and 2D). Because the first differential for TIMI 0 flow was thrombotic occlusion, our strategy was to disintegrate the thrombus via balloon manipulation. After failure on multiple attempts, thrombosuction with a 6 Fr, 140 cm Thrombuster II (Kaneka Medix Corp.) was performed and a pale soft tissue was retrieved (Figure 3A). Imaging post thrombosuction showed clearing of the ISR and TIMI III flow across the RCA (Figure 4). Histopathology of the retrieved tissue reported

Figure 1. Right coronary artery angiogram (left anterior oblique cranial) shows Mehran type III in-stent restenosis of ostioproximal stent.

Figure 2. Right coronary artery guiding shot with 014” wire (A). Balloon predilatation (B). Longitudinal homogenous opacity in ostioproximal right coronary artery (C). TIMI 0 flow in distal right coronary artery (D).
endothelial cells with intermittent muscle cells (Figure 3B). The ostioproximal RCA was stented with a 3 mm x 18 mm Xience Pro everolimus-eluting coronary stent (Abbott Vascular) and TIMI III flow was noted with resolution of chest pain and ECG changes (Figure 5). The patient was closely monitored for 48 hours and was discharged.

DISCUSSION

Iatrogenic coronary dissection caused by coronary angiography or angioplasty is a rare but potentially devastating event. The incidence of catheter–induced aortocoronary dissection is 0.008% to 0.02% for diagnostic coronary angiography and 0.06% to 0.15% for PCI.\textsuperscript{4,5} In the setting of acute coronary syndrome, the incidence further worsens and is reported to be
approximately 0.19%. Jose et al studied the susceptibility and reasons for aortocoronary dissection and concluded the following reasons for increased susceptibility of RCA dissections:

1) The left coronary system subtends an acute angle (20° to 25°) with the ascending aorta, whereas relatively the RCA is straighter (60° to 88°). Hence, catheterization of the left coronary artery (LCA) is more coaxial, compared to the RCA.

2) The ostium of the LCA is greater than that of the RCA in >76% of cases.

3) Histologically, the LCA ostium has more Type I than Type III collagen, which provides greater tensile strength, while the situation is reverse in the RCA.

Predisposing factors defined for catheter-induced aortocoronary dissection include hypertension, aging, calcification of the aortic root or coronary lesion site, recent acute coronary syndrome (ACS), and intra-aortic balloon pump support. In our patient, aging and ACS might have been the predisposing factors for coronary dissection, because aging attributes to medial cystic degeneration and ACS contributes to vascular inflammation.

The selection and manipulation of the guiding catheter is of utmost importance in reducing the possibility of risk of coronary artery dissection. In the case presented here, aggressive manipulation of the 6 Fr Judkins right catheter must have triggered the ostial RCA dissection, leading to its total occlusion. To the best of our knowledge, the literature on coronary dissection does not describe coronary dissection in the presence of an ostial stent. From the technical viewpoint, an appropriate guiding catheter, careful manipulation of the catheter, optimal coaxial alignment of the catheter, and gentle contrast injection are recommended to prevent iatrogenic dissection.

Other factors that contribute to ostial coronary dissections are guidewire manipulation, inadvertent balloon dilatation, or stent placement in false lumen. In our case, careful assessment of cine images post procedure revealed that the guidewire probably created a false track, which was later dilated with the balloon. Hence, the longitudinal homogenous opacity which was seen in post dilatation cine was actually the neoendothelium stripped off inadvertently.

CONCLUSION

Considering this case, several points need to be made. First, the presence of an ostial stent does not preclude the risk of dissection and total coronary occlusion. Second, haziness during coronary angiogram is not always the thrombus. Third, manual thrombus aspiration, though downgraded in recent guidelines (class IIb), can prove to be an effective bailout strategy during complex PCI.

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REFERENCES


