Case Reports

Coronary–Cameral Fistula Caused by Guidewire Trauma

and Resolved by Coil Embolization

Suvro Banerjee, MD, MRCP
Soumya Patra, MD, DM

A 57-year-old woman presented with effort angina. A coronary angiogram revealed critical 2-vessel disease, for which she subsequently underwent percutaneous coronary intervention. During angioplasty, a coronary guidewire—inadvertently passed into the right ventricle through the septal branches of the posterior descending coronary artery—caused a coronary artery-to-right ventricular fistula. This fistula was successfully closed percutaneously by coil embolization. To our knowledge, this is the first report of a case in which a coronary artery-to-right ventricular fistula caused by a guidewire was managed successfully by coil embolization. ***(Tex Heart Inst J 2016;43(4):338-40)***

Coronary artery fistula (CAF), an uncommon occurrence, is more often than not congenital in origin.[1] Iatrogenic CAF is seen in approximately 0.25% of cases, usually after myocardial infarction, endomyocardial biopsy, thoracic trauma, or cardiac surgery, or during complex percutaneous coronary intervention (PCI) with the use of rotablation.[2,3]

Guidewire-induced CAF is rarely reported,[4] so its line of management is not fully understood. However, several approaches, such as coil embolization, covered-stent deployment, balloon occlusion, surgery, and even conservative management, have been reported.[5,6] There are very few reports of iatrogenic coronary artery-to-right ventricle (RV) fistula developed during PCI[7]; we are reporting what is, to our knowledge, the first case of guidewire-induced trauma that was managed successfully through coil embolization.

Key words: *Coronary angiography; embolization, therapeutic; fistula/complications/etiology; iatrogenic disease; percutaneous coronary intervention; vascular fistula/etiology; ventricle, right; wounds, penetrating/complications*

From: *Department of Cardiology, Apollo Gleneagles Hospital, 700054 Kolkata, India*

Address for reprints: *Soumya Patra, MD, Department of Cardiology, Apollo Gleneagles Hospitals, 58 Canal Rd., Kadapara, Kankurgachi, 700054 Kolkata, India*

E-mail: *dr_soumyapatra@rediffmail.com*

Case Report

In March 2015, a 57-year-old hypertensive and diabetic woman presented with recent-onset angina. Coronary angiography performed through the right femoral artery revealed critical stenosis of the right coronary artery (RCA) ostium (Fig. 1) and the proximal left anterior descending coronary artery (LAD). Before the patient was taken for ad hoc PCI, all necessary medications, such as unfractionated heparin and a loading dose of dual antiplatelet therapy, were administered. At the beginning, we intended to perform PCI of the RCA by passing a 0.014-in RUNTHROUGH® Coronary Guidewire (Terumo Medical Corporation; Somerset, NJ) across the ostial lesion in that artery. During stent deployment, the guidewire inadvertently went deep into the RV through the septal branch of the posterior descending coronary artery (PDCA) (Fig. 2). After deployment, an angiogram revealed a PDCA-to-RV fistula (Fig. 3). The patient developed acute-onset breathlessness, although her vital signs were stable. An echocardiogram showed no evidence of pericardial effusion. The leakage was about 1.5 L/min, and there was no evidence of a decrease in shunt fraction during the observational period, so we decided to close the CAF by coil embolization of the PDCA. We occluded the distal PDCA with two 3/3 Hilal embolization microcoils (Cook Medical Inc.; Bloomington, Ind) positioned through a PROGREAT® Microcatheter (Terumo) with the help of a 0.018-in microcoil pusher (Cook Medical). The flow through the CAF into the RV was completely halted (Fig. 4). Postprocedurally, the patient's troponin T value was 0.02 ng/mL (normal value, <0.01 ng/mL), and her postprocedural electrocardiogram (Fig. 5) was similar to her preprocedural. Finally,

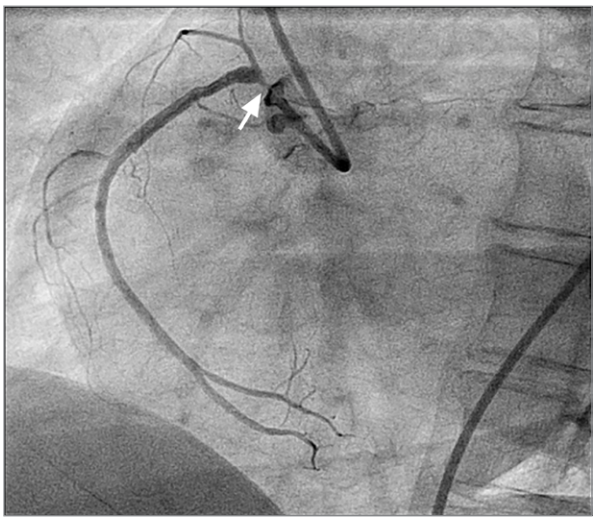

Fig. 1 *Coronary angiogram (left anterior oblique view) shows critical stenosis of the right coronary ostium (arrow).*

Supplemental motion image is available for Figure 1.

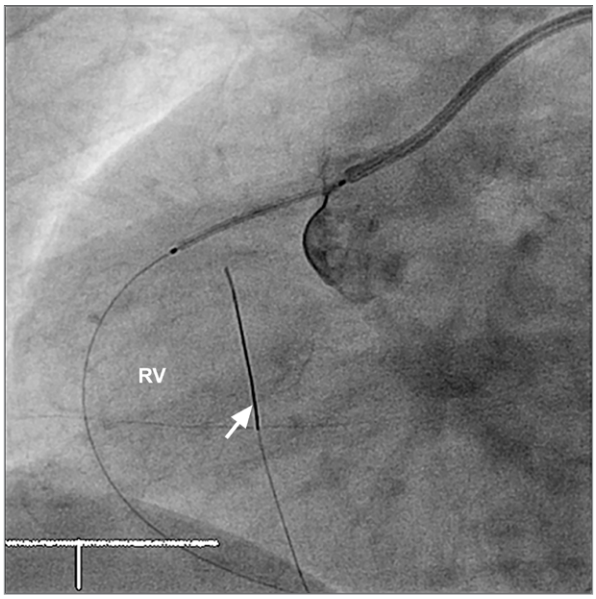

Fig. 2 *Angiogram shows inadvertent wire placement (arrow) into the right ventricle (RV) through the posterior descending coronary artery.*

Supplemental motion image is available for Figure 2.

we performed angioplasty of the LAD. The patient was asymptomatic at the end of the intervention and during follow-up.

Discussion

Probable mechanisms of iatrogenic CAF are subintimal balloon inflation, guidewire-induced perforation, overexpansion of a coronary segment, and inappropriate wire-tracking.[4] Most iatrogenic CAFs during PCI involve communications between the coronary arteries and coronary veins[8] or the cardiac chambers. To our knowledge, in only one other case[7] has CAF drainage into the RV developed during PCI of the RCA, and it was managed conservatively. In another case,[9] CAF drainage into the RV developed after stent deployment

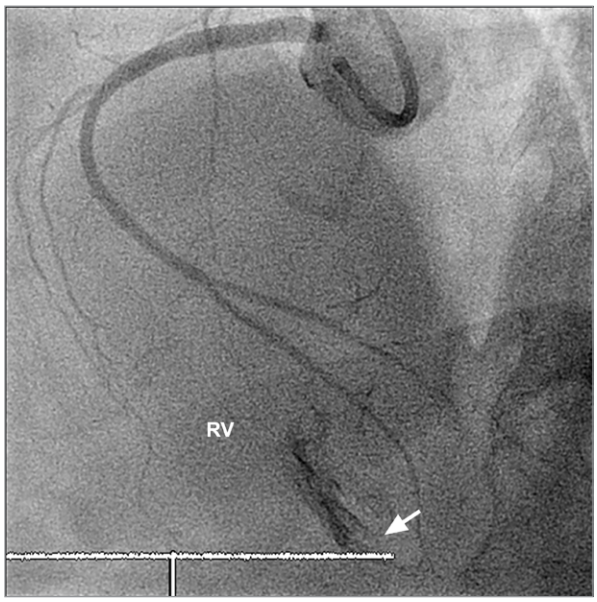

Fig. 3 *Postintervention angiogram shows the development of the fistula (arrow) from the posterior descending coronary artery to the right ventricle.*

Supplemental motion image is available for Figure 3.

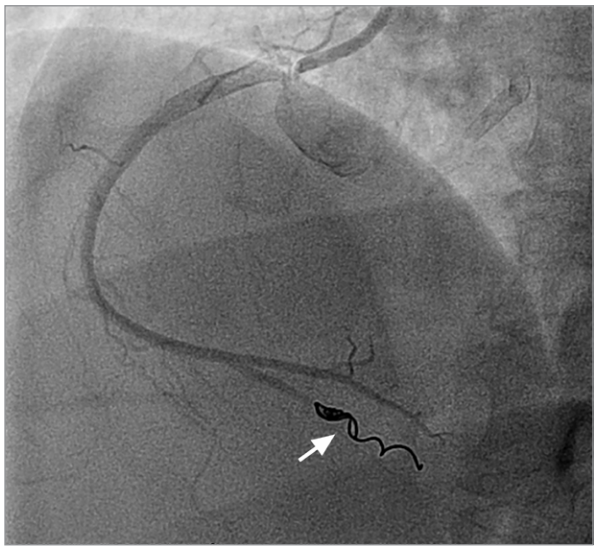

Fig. 4 *Angiogram shows coil embolization (arrow) in the posterior descending coronary artery and occlusion of flow through the fistulous connection between that artery and the right ventricle.*

Supplemental motion image is available for Figure 4.

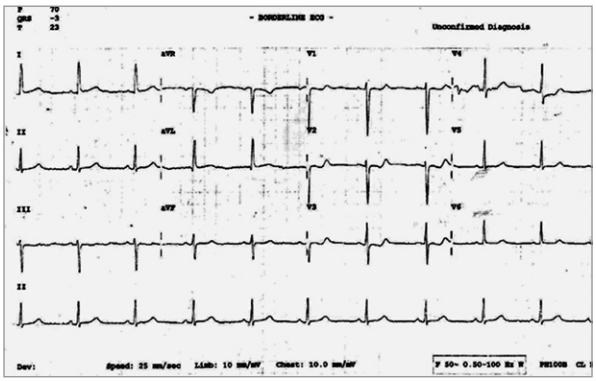

Fig. 5 *Postprocedural electrocardiogram shows no significant changes.*

in the LAD. In only a few cases have coronary arteriovenous fistulae developed (as in our case) consequent to guidewire trauma,[4] and rarely has coil embolization[6] been performed to close the fistulous connection.

In our patient, an iatrogenic CAF from the PDCA to the RV developed as a sequela of guidewire passage deep into the RV through the septal branch of the PDCA, during stent positioning. Although coronary perforation is usually seen in association with the use of stiff guidewires, in the present instance a floppy wire was used. After crossing the lesion, the operator must monitor the distal position of the tip, even in the event of floppy wire use.

The immediate intraprocedural management of a CAF resulting from PCI is not fully established. A variety of approaches can be considered. Attempted closure of the fistula by prolonged balloon inflation at the site of perforation is reasonable, but some of these lesions close spontaneously, whereas others remain patent yet asymptomatic. If a wait-and-see course of action fails, and particularly if the patient's condition deteriorates, closure of the fistula should be considered. More recently, several percutaneous treatments have become the preferred treatment options[10]: these are performed with detachable balloons, polytetrafluoroethylene-covered stents, and embolized coils, as in the case reported here. In our patient, covered stenting was not possible because the fistulous connection to the RV was at the distal end of the PDCA.

Clearly, cautious guidewire passage to the distal coronary artery is of utmost importance during PCI, even when the coronary guidewire in use is "floppy."

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