

Iatrogenic Aortic Dissection during Right Coronary Artery Stenting

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ABSTRACT

Aortic dissection limited to one sinus of Valsalva has been observed as an iatrogenic complication during coronary intervention. We report on a 65-year-old female patient who had a diagnosis of acute inferior myocardial infarction and experienced type A aortic dissection during stenting of the right coronary artery (RCA). Dissection was seen during aortic injection. There were no associated diseases in the sinuses of Valsalva or the aortic valve. An opening was seen intraoperatively in the right sinus of Valsalva. The opening was immediately and successfully sutured. The RCA was bypassed.

INTRODUCTION

Iatrogenic acute dissection of the ascending aorta following coronary angiography and percutaneous intervention is rare [Sohrabi 2007]. Localized aortic dissections have been treated by sealing the opening with a coronary stent [Chai 2005]. Extensive dissections may require surgical intervention. We describe 2 local dissections, the first located proximally in the right coronary artery (RCA) and the second located in the right sinus of Valsalva, that occurred during angioplasty of the RCA in a 65-year-old female patient with an acute inferior myocardial infarction. The treatment modalities are discussed in light of the relevant literature.

CASE REPORT

A 65-year-old woman was admitted to our hospital with sudden chest pain. She was assisted for 4 hours after the onset of the pain. The patient had hyperlipidemia as a cardiovascular risk factor. An electrocardiogram obtained on admission revealed an acute myocardial infarction with ST-segment elevation in leads II, III, and aVF. We administered acetylsalicylic acid, clopidogrel, nitroglycerin, and heparin to the

patient and transported her to the cardiac catheterization room. A coronary angiography evaluation showed total occlusion in the proximal part of the RCA (Figure 1A). The other coronary arteries had no significant stenosis but did show arteriosclerotic changes. After placing the guidewire in the RCA, we treated the high-grade stenosis through angioplasty. It was not possible to pass a stent through the stenosis. We then observed a local dissection in the proximal part of the RCA before the stenosed area (Figure 1B). We successfully placed a stent in this localized area (Figure 1C) and extended it to the right coronary ostium; we could not place the second stent through the stenosis. This stent was placed distal to the first stent because of the extension of the local coronary dissection up to the stenosed area (Figure 1D). Stabilization of the catheter on the right coronary ostium was difficult during this manipulation, however, and during an attempt to stabilize this catheter, a second dissection occurred in the right sinus of Valsalva. This dissection extended into the ascending aorta (Figure 2). We subsequently observed cardiocirculatory instability with symptomatic hypotension and severe bradycardia that required cardiac inotropic treatment for the patient. Electrical cardioversion was also performed for ventricular tachycardia. The patient was transferred immediately to the operating room.

The patient underwent operation via a median sternotomy, and the surgical procedure was performed with cardiopulmonary bypass, normothermia, and blood cardioplegia. The external aorta and adjacent structures seemed to be normal. After opening the aorta ventrally, we observed a small area of aortic dissection limited to the right sinuses of Valsalva, with an opening between the aortic annulus and the right coronary ostia. While we initiated selective cardioplegia in the RCA ostia, we observed a portion of the cardioplegia solution flowing through the dissected aortic wall in the area of the aortotomy. There were no other openings in the ascending aorta. We therefore closed this opening with 3 pledged sutures. An autologous vein was then used to perform a bypass to the RCA. The proximal anastomosis of this bypass was completed on the ventral ascending aorta distal to the aortotomy in the cross-clamped ascending aorta. The aortotomy was subsequently closed.

The postoperative period was uneventful. The patient was discharged after a 2-day stay in the intensive care unit and

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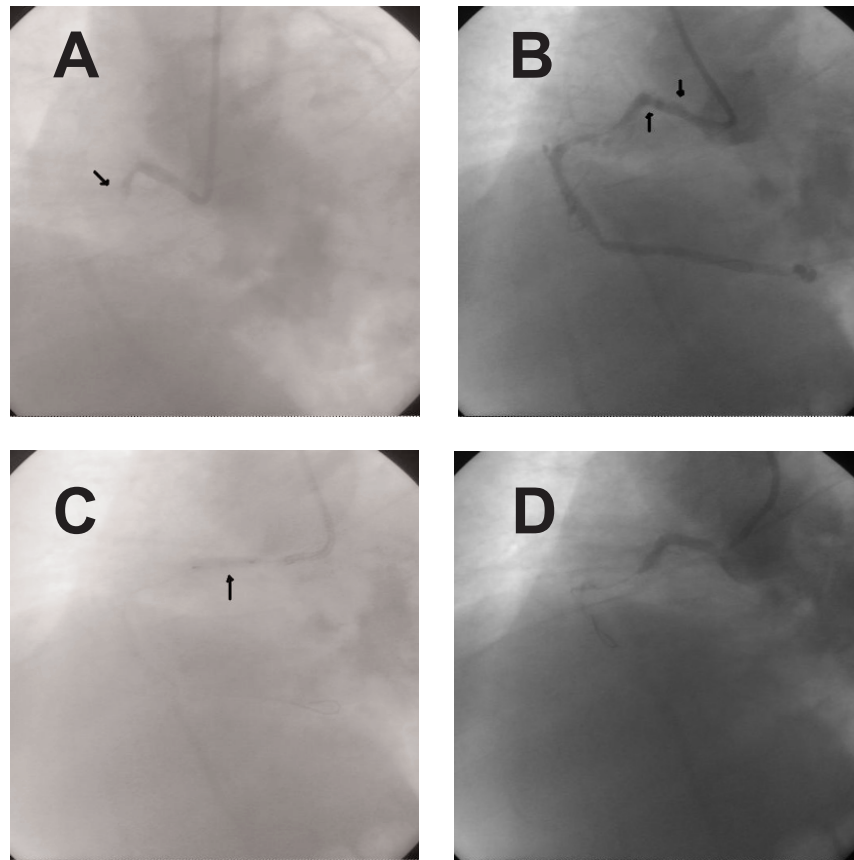


Figure 1. A, Total occlusion of the right coronary artery (RCA) became apparent during injection with a guiding catheter (arrow). B, Arrows show a dissection in the proximal part of the RCA that extended up to the stenosis after stenting; we could not pass through the RCA stenosis. C, Arrow shows stenting of the dissected part of the RCA. D, We could not pass the stenosis with the second stent, which was placed up to the stenosed RCA area distal to the first stent. Thereafter, the RCA showed no sign of dissection.

7 days in the hospital. A multidetector computed tomography scan performed 6 months after the operation showed no dissection layer in the ascending aorta and demonstrated a patent graft to the RCA (Figure 3).

DISCUSSION

Type A aortic dissection is a life-threatening cardiovascular event because of its proximity to the heart. Acute aortic dissection during coronary angiography is rare but is a catastrophic and life-threatening complication when it occurs. Patients in this clinical setting may have a risk of acute myocardial infarction requiring emergency life-saving surgery. Awareness of the problem and its prompt recognition are essential. Dissection of the RCA can occur during diagnostic coronary angiography and can extend beyond the coronary ostium into the ascending aorta. This extension to the ascending aorta can be observed during injections carried out for positioning of stents in the proximal RCA. Sealing of the aortic dissection, rescue of the RCA, and patient stabilization are possible with rapid stenting of the RCA ostium [Sohrabi 2007]. This complication was observed in 0.14% of the cases in a large coronary angiography series [Chai 2005].

RCA dissection caused by a guiding catheter takes various forms, such as extensive antegrade and retrograde dissection. This pathology can be successfully treated by closing the opening and obliterating the false lumen in the RCA via stent

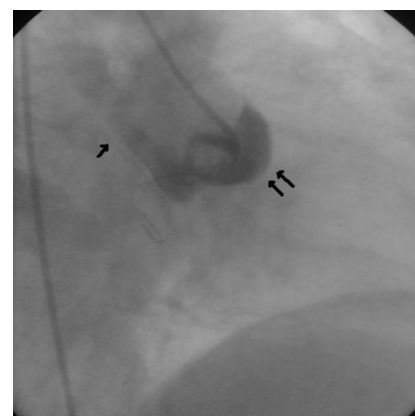


Figure 2. The pair of arrows shows the new dissection in the right sinus of Valsalva. The single arrow shows the extension of the dissection in the ascending aorta.

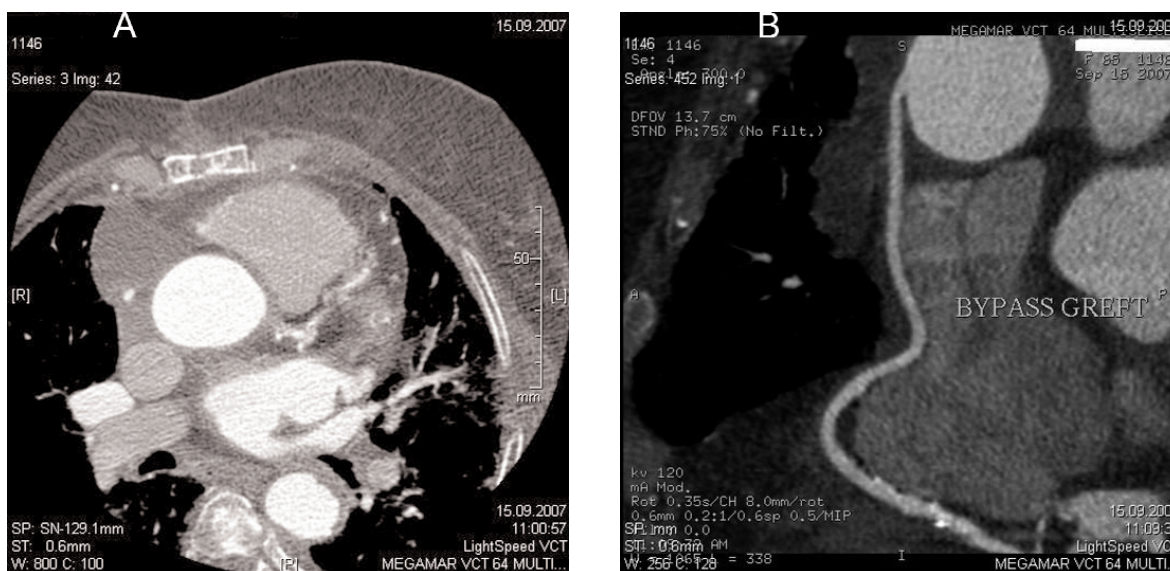


Figure 3. A, Axial cross-sectional view of a contrast-enhanced multidetector computed tomography scan after the operation. The dissection in the ascending aorta is no longer apparent. B, Postoperative axial cross-sectional view of a contrast-enhanced multidetector computed tomography scan showing a patent right coronary artery bypass graft.

implantation [Abu-Ful 2003]. In our case, however, we observed 2 local dissections. One occurred in the RCA, which was stabilized by placement of a stent. The second dissection occurred in the ascending aorta between the aortic annulus and the right coronary ostium and was caused by the guiding catheter. This dissection was closed with pledged sutures during the operation. It is well known that aneurysms of the sinus of Valsalva are predisposed to aortic dissection [Vaideeswar 2001]. In the present case, cardiac images and observations made during surgery definitely ruled out an aneurysm as the cause.

A rare variation of type A dissection in which spontaneous dissection is limited to the left sinus of Valsalva and causes critical obstruction of the left main coronary artery has been described [Vianna 2007]. In this case, a bovine pericardium patch was sutured from the aortic annulus to surround the dissection area and include the ostium of the left main coronary artery. The left anterior descending artery was revascularized with a left internal thoracic artery graft, and the obtuse marginal branch of the circumflex artery was revascularized with a saphenous vein graft. A common surgical therapy technique for type A aortic dissection is to replace the ascending aorta with a vascular prosthesis. The aim of this operation is to prevent possible aortic valve insufficiency, myocardial ischemia, and pericardial rupture by closing the dissection through replacing the ascending aorta with a vascular prosthesis. This approach is necessary in an extended dissection

with a large opening and false lumen. In our case, the ascending aorta was macroscopically normal, and the aortic wall was stable. Therefore, we were able to close the opening, and replacing the ascending aorta was not required. The multidetector computed tomography scan showed no sign of dissection.

We conclude that the iatrogenic local dissection of the sinus of Valsalva can be treated by direct surgical closing of the opening, if it is in the sinus of Valsalva.

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