Simultaneous Right and Left Coronary Occlusion Caused by an Extensive Dissection to the Coronary Sinus of Valsalva During Percutaneous Intervention in Right Coronary Artery

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Summary

We report a case of simultaneous right and left coronary occlusion during percutaneous coronary intervention in the right coronary artery. An aortocoronary dissection induced by the forceful manipulation extended from the right to left sinus of Valsalva and occluded the ostia of both coronary arteries. The patient suffered cardiogenic shock and ventricular fibrillation. However, after successful rapid stenting to right and left coronary arteries, safe discharge was possible. (Int Heart J 2009; 50: 663-667)

Key words: Aortocoronary dissection, Percutaneous coronary intervention, Coronary artery occlusion

Dissection of the sinus of Valsalva is an extremely rare but potentially life threatening complication of percutaneous coronary intervention (PCI). The incidence of aortocoronary dissection is 0.02%-0.15% for PCI procedures. Here, we report a case of simultaneous right and left coronary occlusion caused by dissection of the sinus of Valsalva complicating PCI in right coronary artery (RCA).

Case report

The patient was an 81 year-old man admitted for congestive heart failure with coronary artery disease. He had undergone coronary artery bypass grafting and thoracic aortic aneurysm replacement surgery 15 years earlier, and abdomi-
nal aortic aneurysm replacement 10 years previously. His coronary angiography demonstrated an occluded saphenous vein graft (SVG) to the distal RCA, subtotal occlusion in the mid left anterior descending artery (LAD), and severely degenerative SVG to the distal LAD with meagre flow. The dominant RCA had diffuse stenosis in its proximal portion and critical stenosis in the mid portion, which further delayed flow in the distal portion (Figure 1).

We decided to perform PCI for the RCA stenosis. After insertion of a right femoral sheath, a short Amplatz L-0.75 7Fr. catheter (Mach1, Boston Scientific, MA, USA) was positioned near the right coronary ostium without engagement. It was impossible to engage it in the right coronary ostium because the tortuosity of the aorta made manipulation of the guiding catheter very difficult. Next, a 0.014-inch hydrophilic coating guidewire (Fielder, Asahi Intecc, Aichi, Japan) was crossed through the stenosis of the RCA and two sirolimus-eluting stents (Cypher 3.0 × 18 and 3.0 × 18 mm, Cordis, NJ, USA) were implanted in the proximal RCA. However, it was difficult to advance the balloon catheter to the lesion in the mid RCA because the stenosis was very tight. In order to use more back-up force, the guiding catheter was pushed and rotated clock-wise. A 1.5 mm balloon catheter was successfully advanced to the lesion and dilated it. The lesion was also continuously dilated with a 2.5 mm balloon catheter. Angiography after removing the balloon catheter showed simultaneous occlusion of the right and left coronary ostia caused by the dissection which extended from the right to left sinus of Valsalva (Figure 2A and 2C). The patient developed cardiogenic shock suddenly. We immediately implanted a sirolimus-eluting stent (Cypher 2.5 × 18 mm) prepared for the mid RCA lesion in the right coronary

Figure 1. (A) The dominant RCA had diffuse stenosis in the proximal portion and critical stenosis in the mid portion, which delayed further flow in the distal portion. (B) Subtotal occlusion in the mid LAD.
ostium at 20 atm. However, his cardiogenic shock persisted and an electrocardiograph monitor showed ventricular fibrillation. Immediate defibrillation, mechanical ventilatory support with oxygenation, and inotropic agents were instituted. After confirmation of optimal dilation of the right coronary ostium (Figure 2B), we removed the guiding catheter and performed intra-aortic balloon pump

Figure 2. (A and C) Simultaneous occlusion of the right (white solid arrow) and left (white dotted arrow) coronary ostia caused by the dissection which extended from the right to left sinus of Valsalva. Black arrows show the prosthesis graft in the ascending aorta. (B) After stenting in the right coronary ostium. (D) After stenting in the LMCA ostium to the proximal LCX.

Figure 3. A computed tomography scan 7 days after PCI shows no progression of the dissection. (A) The level of the left coronary sinus of Valsalva. (B) The level of the right coronary sinus of Valsalva.
counterpulsation through the right femoral sheath. Although the patient was in cardiogenic shock, we attempted percutaneous intervention to the ostium of the left main coronary artery (LMCA). After insertion of a left femoral sheath, a Judkins Left-3.5 7Fr. catheter (Mach1) was positioned near the LMCA ostium. The dissection in the left sinus of Valsalva made engagement difficult. A 0.014 inch guidewire crossed through the left circumflex artery (LCX) without engagement. After dilation with a 2.5 mm balloon, a bare-metal stent (Driver 3.5 × 24 mm, Medtronic, MN, USA) was implanted from the LMCA ostium to the proximal LCX at 16 atm. An optimal flow was observed in the LMCA (Figure 2D), and the patient immediately recovered from his cardiogenic shock.

In the intensive care unit, his clinical status improved rapidly. He was weaned from vasopressors and inotropic agents, the intra-aortic balloon pump was removed, and he was extubated within 48 hours after the procedure. We chose not to reverse the anticoagulation and treated him with aspirin 100 mg and ticlopidine 200 mg daily. A computed tomography scan after 7 days showed no progression of the dissection (Figure 3). After 3 weeks, he was discharged from hospital in stable condition.

**DISCUSSION**

Aortocoronary dissection is an extremely rare complication of PCI. The etiologies have been emphasized due to the use of rigid wires, forceful manipulations of guiding catheters and balloon inflations, and vigorous contrast medium injections. The optimal treatment for this complication is not established. If a dissection is limited to the sinus of Valsalva, it will resolve with conservative treatment only. However, when it extends over the sinus of Valsalva, advanced percutaneous or surgical intervention is often necessary. Recent reviews have reported that, when possible, coronary stenting is a preferable method in this complication. Because successful coronary stenting can break down the dissection route, propagation of aortic dissection can be prevented. This subsequently leads to stabilization of the aortocoronary dissection, and, in turn to the avoidance of surgical intervention.

There are two kinds of coronary stents; drug-eluting stents and bare-metal stents. We elected to use a drug-eluting stent in the right coronary ostium, because it had been already prepared for the mid RCA lesion. A bare-metal stent was used in the LMCA ostium for its delivery ability. We administered aspirin and ticlopidine as the standard regimen of coronary stents. In the reports reviewed, it is unclear as to exactly what kind of coronary stent and antiplatelet therapy are suitable for aortocoronary dissection during PCI.

In the present case, the aortocoronary dissection at the right coronary os-
tium induced by the forceful manipulation of the guiding catheter was extended by the contrast medium injection and the shearing force of blood flow. However, the dissection could not advance into the ascending aorta, but extended into the left sinus of Valsalva and occluded the LMCA. We suspected that the cause of this unusual extension was that the past ascending aorta replacement with a prosthesis graft interrupted the extension of the dissection. Although the patient suddenly developed cardiogenic shock, rapid stenting to the right and left coronary ostia and careful observation of his course made his safe discharge possible.

It is usual that a dissection in a coronary sinus of Valsalva extends to the ascending aorta. In this case, however, the dissection in the right coronary sinus of Valsalva extended to the left coronary sinus of Valsalva and LMCA, because of the past ascending aorta replacement with a prosthesis graft. We report a very unusual complication of coronary intervention, consisting of simultaneous right and left coronary occlusion which was managed with rapid stenting to right and left coronary arteries. To the best of our knowledge this is the first time such a devastating complication of PCI has been reported in the medical literature.

REFERENCES