Aortocoronary Dissection Resolved by Coronary Stenting Guided by Intracoronary Ultrasound

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Percutaneous coronary intervention (PCI) was performed for chronic total occlusion of the proximal right coronary artery in a 70-year-old male with unstable angina. The forceful manipulation of the guide catheter led to an aortocoronary dissection involving the right Valsalva sinus and the ascending aorta. Intracoronary ultrasound (ICUS) showed the important characteristics of the dissection, enabling successful coronary stenting under ICUS guidance. (Circ J 2004; 68: 389 – 391)

Key Words: Ascending aorta; Complication; Coronary sinus of Valsalva; Percutaneous coronary intervention

Aortocoronary dissection is a rare complication of percutaneous coronary intervention (PCI). The trigger for aortocoronary dissections is a coronary dissection, which extends progressively into the coronary sinus of Valsalva and the ascending aorta.1–4 We report a case of iatrogenic coronary dissection extending into the ascending aorta that was successfully resolved by ICUS-guided coronary stenting.

Case Report

A 70-year-old male was admitted for unstable angina. He had a past history of cerebral infarction and pulmonary silicosis for which he needed home oxygen therapy. Coronary angiography (CAG) revealed 2 chronic total occlusions (CTO): a proximal site in the dominant right coronary artery (RCA), and a distal site in the circumflex artery. There were other significant stenoses without occlusions in the mid-portion of the left anterior descending artery (LAD) and the diagonal branches. The diseased LAD supplied good collateral flow to the occluded RCA. Thallium-201 myocardial scintigraphy showed ischemia in the anteroseptal and inferior walls. He agreed to undergo PCI, because he was a high-risk patient for coronary bypass surgery with his reduced pulmonary function capacity.

PCI to the CTO of the RCA was planned. The Amplatz L-1 7Fr catheter was engaged in the ostium of the RCA, but manipulation of the guide wire in the catheter was difficult and it was exchanged for a Judkins-right 4. A 0.014-inch guide wire was able to cross the occlusion, but it was difficult with a balloon catheter because the lesion was very hard. Using more back-up force, the tip of the guide catheter was advanced closer to the CTO while rotating it clockwise, and as the balloon catheter was advanced to the CTO, the guide catheter was rotated a little counter clockwise. The balloon catheter was pushed strongly while keeping the tip of the guide catheter in the RCA, and it successfully passed the hard lesion. After dilating the CTO, contrast injections to the RCA revealed a large dissection from where the tip of the guide catheter contacted RCA to the right coronary cusp (RCC). Balloon angioplasty with a 3.0-mm balloon was performed for the CTO and the dissection, while the guiding catheter was dislodged from the ostium and contrast injections were gently done. The area in the RCC dyed by contrast medium widened (Fig 1B), and the patient suddenly complained of anterior chest pain and back pain without ST change on the electrocardiogram.

ICUS was immediately performed to get more information than was shown by CAG. ICUS (Fig 2) showed an entry point of a large dissection in the proximal RCA, which...
spread anterograde for 2 mm from the entry and retrograde for more than 7 mm, and was located in the myocardial side with dissected arcs of 180 degrees: 300 degrees in the ostium, and never closed the origin of the sinus nodal artery. The ICUS finding (Fig 2E) gave rise to the suspicion that the dissection had already advanced beyond the aortic annulus and the cause of the chest pain was the extension of the dissection to the ascending aorta. Stent implantation to the CTO lesion was done close to the distal edge of the aortocoronary dissection, and a 4.0×15 mm NIR stent was implanted over the entry point of the dissection (Fig 1C). Post-dilation of the ostium was performed with a 5.0 mm balloon without problems. After that, CAG showed no flow into the false lumen and patency of the sinus nodal artery, and the patient had no complaints. ICUS (Fig 3) revealed that the stent in the dissected lesion was fully dilated and had secured the dissected layer. Computed tomography (CT) immediately after the PCI showed a dissection from the RCC to the ascending aorta with contrast medium pooling in the mediastinum near the RCC (Fig 4). Six h
after the PCI, CT did not show contrast pooling in the aorta wall or near the RCC. Three months later, a follow-up CAG revealed no significant stenosis in the RCA.

**Discussion**

In the present case, the trigger for the aortocoronary dissection was a coronary dissection that was caused by forceful manipulation of the guide catheter. The tip of the guide catheter damaged the wall on the myocardial side of the RCA. Extension of the coronary dissection to the Valsalva sinus and the ascending aorta was possibly the result of raised coronary flow pressure from the contrast injections. In addition, the shearing force of blood flow may have assisted the progressive extension of the dissection because no vigorous contrast injections or forceful manipulation of the guide catheter occurred after we became aware of the coronary dissection and the manipulation of the wires was gentle during the PCI. If a dissection is limited to the aortic sinus of Valsalva, it will resolve with conservative treatment only. However, when it extends over the aortic sinus of Valsalva, advanced percutaneous or surgical intervention is often necessary. Dunning et al. reported that patients with limited aortic involvement were successfully managed with stenting of the entry point of the coronary dissection, whereas aortic dissection extending more than 40 mm up the aorta from the coronary ostium required surgical intervention.

A metallic stent was used to close the entry point of the aortocoronary dissection. If the entry orifice is wide, a covered stent will be more useful than a conventional metallic stent, but if large branch arteries arise from the site where the covered stent is implanted, complete occlusion of the branches must be avoided. ICUS revealed the characteristics of the aortocoronary dissection in the present case, including the position of the entry point and the size of the dissected vessel, and we were thus able to choose an appropriate stent to both secure the dissected layer and stop blood flow into the false lumen.

To the best of our knowledge, this is the first report of ICUS used to evaluate an aortocoronary dissection as a complication of PCI and then guide the reparative stenting procedure to successful resolution of this complication. ICUS shows the characteristics of coronary lesions more clearly than coronary angiography.

**References**