

Successful Stent Implantation Guided by Intravascular Ultrasound and a Doppler Guidewire Without Contrast Injection in a Patient with Allergy to Iodinated Contrast Media

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ABSTRACT: Presence of allergy to iodinated contrast may prevent percutaneous coronary intervention (PCI) to be performed. We present a 76-year-old male with a history of allergic reaction to iodinated contrast who successfully underwent intravascular ultrasound (IVUS) and a Doppler guidewire-guided PCI. Stent size was determined based on IVUS. After PCI, stent expansion and a lack of edge dissection or incomplete apposition were confirmed by IVUS and a good antegrade coronary flow was confirmed

by a Doppler guidewire. Thus, PCI without contrast injection under IVUS and a Doppler guidewire-guidance may be feasible in selected patients with allergy to iodinated contrast.

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Key words: contrast allergy, percutaneous coronary intervention

Presence of allergic reaction to iodinated contrast is one of the risks for coronary angiography and intervention. Although percutaneous coronary intervention (PCI) can be safely performed with ultra low dose contrast media in patients with renal insufficiency,^{1–3} it is unknown if PCI can be completed without use of contrast in patients with allergy to iodinated contrast media. We report a case of unstable angina pectoris with known history of allergic reaction to iodinated contrast media that was successfully treated by intravascular ultrasound (IVUS) and a Doppler guidewire-guided PCI.

[3]Case description. A 76-year-old man with previous history of stent implantation to his proximal right coronary artery was admitted to our hospital because of unstable angina pectoris. Although previous angiography as well as coronary intervention could be performed without any complications, anaphylactoid reaction with hypotension was reported 1 month prior to admission when he underwent contrast-enhanced computed tomography. Coronary angiography was carefully performed under prophylactic steroid administration and revealed proximal edge stenosis of the initially stented right coronary artery (Figure 1). During angiography, he became hypotensive (systolic blood pressure < 50 mmHg) with skin rash requiring noradrenalin administration, despite the use of prophylactic corticosteroid. He was medically treated with intravenous nitrate and heparin in addition to oral antiplatelet therapy. Despite the intensive medical treatment, his angina could not be managed. Therefore, PCI without using iodinated contrast media was planned and performed.

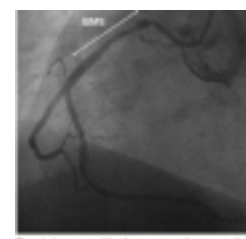


Figure 1. Angiogram of the right coronary artery showing proximal edge stenosis.

[4]Prophylactic corticosteroid was administered just in case he emergently required contrast injection. A 6 Fr sheath was inserted to his right radial artery. A 6 Fr guiding catheter (JR3.5, Heartrail, Terumo, Japan) was engaged under fluoroscopic guidance. Using the previous angiogram as a road map, a floppy guidewire (Runthrough NS, Terumo, Japan) was carefully advanced to cross the lesion. A Doppler guidewire (FloWire, Volcano Corp., San Diego, California) was also advanced distal to the lesion and baseline coronary flow signal was recorded [5]as a reference (Figure 2A). Then IVUS (Atlantis Pro, Boston Scientific, Natick, Massachusetts) was advanced to the RCA and pullback imaging was performed using an automated pullback device at a rate of 0.5 mm/sec (Figure 3). Size (3.0 mm) and length (18 mm) of the stent were determined based on the IVUS images. Also, during IVUS imaging, IVUS was used as a marker of the distal as well as proximal

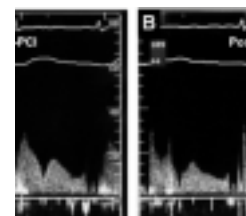


Figure 2. Baseline coronary flow signal recorded before and after PCI.

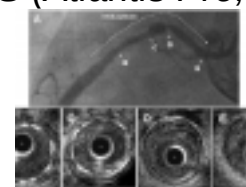
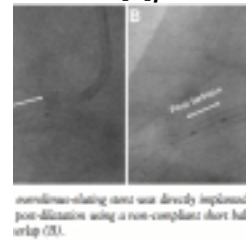


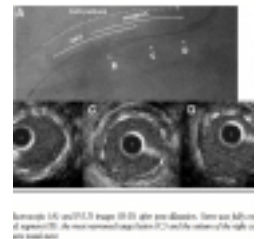
Figure 3. IVUS images of the right coronary artery showing the stent.

ends of the target lesion. Furthermore, to precisely determine the [6]proximal end of the stent and to prevent the guiding catheter from being [6] deeply engaged into the RCA during the procedure, another floppy guidewire was carefully inserted into the conus branch, which was separately branched from the right sinus of Valsalva. A 3.0 x 18 mm, everolimus-eluting stent (PROMUS stent, Boston Scientific) was directly implanted under fluoroscopic guidance using an inflator filled with saline only (16 atm) (Figure 4A). After stent implantation, IVUS was repeated to confirm stent expansion, absence of edge dissection or incomplete stent apposition. Because the stent was not fully expanded yet at the site of stent overlap, high-pressure, post-dilatation was performed using a 3.0 x 8 mm, non-compliant balloon (Quantum Maverick, Boston Scientific) at inflation pressure of 18 atm (Figure 4B). IVUS was repeated and improved stent expansion was confirmed without causing edge dissection (Figure 5). Coronary flow measurement was repeated using a Doppler guidewire to confirm good antegrade flow (Figure 2B) and the procedure was completed without use of iodinated contrast media.



Discussion

[7]It is reported that PCI can be safely performed with use of ultra-low dose of contrast injection under IVUS-guidance even in patients with renal insufficiency. In our present case, because allergic reaction to iodinated contrast media was documented during both contrast-enhanced computed tomography and diagnostic angiography, PCI without iodinated contrast media was planned and successfully completed. Although IVUS is useful in determining vessel size and lesion length prior to intervention and to confirm stent expansion, a lack of edge dissection or incomplete stent apposition, coronary flow dynamics cannot be evaluated by IVUS alone. Therefore, final angiographic confirmation of the good antegrade coronary flow using minimal contrast injection may sometimes be required even in patients with renal insufficiency. In our present case, a Doppler guidewire was useful in confirming good antegrade coronary flow.⁴



Several tips and tricks of this procedure should be kept in mind. First, emergent contrast injection may be required during PCI because of unpredictable complication. Therefore, we pre-administered corticosteroid just in case. Also, gadolinium regularly used for magnetic resonance imaging was prepared as an alternative contrast media. Gadolinium has been reported to be alternatively used in such cases with allergy to iodinated contrast.^{5,6} Because allergic reaction to gadolinium has been also reported, we tried not to use any contrast material during the procedure. Second, coronary perforation may not be detected by either IVUS or a Doppler guidewire. Therefore, careful manipulation of the guidewire was required to avoid this complication. Finally, a small amount of contrast media may be inadvertently injected into the coronary artery if a balloon ruptures during stent deployment. Therefore, we also avoided use of contrast media even in the inflator.

In conclusion, IVUS and a Doppler guidewire-guided PCI without contrast injection may

be feasible in selected patients with a known history of allergic reaction to iodinated contrast media.

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