Emergency Percutaneous Coronary Intervention in the Setting of a Single Left Coronary Ostium

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A 34-year-old man with no significant cardiac risk factors presented with an anterolateral ST-elevation myocardial infarction and was transferred to our institution for rescue percutaneous coronary intervention after failed thrombolysis. At the time of the procedure, he had ongoing chest pain, and there was persistent ST-segment elevation on the ECG. The right coronary artery (RCA) could not be located with a series of diagnostic catheters. Diagnostic images of the left coronary artery showed the circumflex artery and an aberrant dominant RCA arising from the left main stem but, despite multiple views, the left anterior descending artery could not initially be identified (Figure 1; Videos 1 and 2). An aortogram demonstrated only a single coronary ostium in the left coronary sinus. After re-engaging the left coronary artery for further diagnostic images, the left anterior descending artery was finally identified, which was occluded at its ostium and visible in one view only (Figure 2; video 3). After guide wire passage, flow was restored in the culprit vessel and subsequent intervention was uncomplicated with a single 3-mm bare metal stent deployed (Figure 3; Videos 4 through 6). There was TIMI 3 flow at the end of the procedure, and the patient was discharged home 2 days later.

Multislice cardiac computed tomography performed as an outpatient identified the aberrant RCA running anteriorly to the pulmonary artery and aorta (Figure 4). The left anterior descending artery stent was widely patent but there was poor run-off distal to the stented segment as a result of significant myocardial necrosis in the infarct territory. The patient was well and asymptomatic at 6-month follow-up.

Discussion

Although congenitally aberrant coronary arteries are found in ~1% to 2% of patients undergoing angiography,1 a single coronary ostium is rare, occurring with an incidence of ~0.05%.2 Usually, a single ostium is located in the right coronary sinus; a single left coronary ostium is extremely rare and, when present, the aberrant RCA usually arises as an extension of the circumflex artery in the atrioventricular groove. The variant in this case, where the left main stem trifurcates into the three main coronary arteries, is exceedingly rare and only a few cases have been described in the literature. This is the first reported case of emergency percutaneous coronary intervention on a patient with a single left coronary ostium.

Figure 1. Coronary angiography. The left anterior oblique caudal view (A) demonstrates the aberrant RCA and circumflex artery (Cx) arising from a single coronary ostium. A further image from the same left anterior oblique caudal view (B) shows the course of the aberrant dominant RCA. The right anterior oblique cranial view (C) shows the aberrant RCA and obtuse marginal branches of the circumflex artery (OMs). The left anterior descending coronary artery is not identified in either view. LMS indicates left main stem.
The interventional cardiologist needs to be aware of the full range of aberrant coronary anatomy, particularly in emergency cases where rapid identification of the culprit vessel is crucial. This is highlighted in this case where difficulties in identifying the culprit vessel, which was occluded at its ostium and not visible on the initial angiographic images, led to delays in attaining prompt reperfusion. Our practice in patients with ST-segment elevation myocardial infarction is to image the nonculprit artery first if possible; this also lengthened the procedure to some extent as we could not locate a RCA in the right coronary sinus. However, in the setting of a ST-segment elevation myocardial infarction, if a nonculprit artery is not readily identifiable then the operator should move rapidly on to the culprit artery as further imaging can always be obtained at the end of the procedure. Although aberrant coronary arteries can pose technical difficulties with regard to guide support, this was not an issue in this case as the left coronary ostium itself was situated normally in the left coronary sinus.

Although most patients with coronary artery anomalies are asymptomatic, there is a reported increased risk of sudden cardiac death when an aberrant coronary artery runs between the aorta and pulmonary trunk and these patients should be considered for surgical repositioning of the aberrant vessel. The mechanism for an increased risk of death is unclear but may be as a result of ischemia secondary to mechanical compression of the vessel between the aortic and pulmonary roots. Although identification of the proximal course of an aberrant coronary artery can often be obtained in the catheter laboratory, this can require multiple additional angiographic views and may necessitate right heart catheterization for placement of a catheter into the pulmonary artery. In emergency cases this may not be appropriate because it will prolong the procedure and increase the bleeding risk. If the course of the aberrant vessel is not clear from angiography further imaging is mandated. Although echocardiography has been

Figure 2. Posteroanterior caudal view after re-engagement of the left coronary artery showing the site of occlusion of the left anterior descending artery (arrowhead). Cx indicates circumflex artery.

Figure 3. Posteroanterior cranial view (A) after passage of a guide wire showing site of plaque rupture (arrowhead). The final result in the posteroanterior cranial (B) and caudal views (C) is shown. LAD indicates left anterior descending artery; Cx, circumflex artery.

Figure 4. Cardiac computed tomography demonstrating the course of the aberrant RCA anterior to the pulmonary artery (PA) and aorta (Ao). LAD indicates left anterior descending artery.
used previously to identify anomalous coronary arteries, multislice computed tomography and cardiac MRI provide much better anatomic information and are now the investigations of choice. It has recently been suggested that family screening of patients with an interarterial anomalous coronary artery is warranted as there may be a possible genetic element to this condition. In this case, as the aberrant RCA coursed anteriorly to the pulmonary artery, no further intervention was required.

Disclosures

None.

References

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SUPPLEMENTAL MATERIAL

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Video legend

Video 1
Coronary angiography in the LAO caudal view demonstrates the aberrant RCA arising from a single coronary ostium; the LAD is not identified

Video 2
Initial RAO cranial view

Video 3
The PA caudal view following re-engagement of the LCA shows a faint haziness at the ostium of the occluded LAD

Video 4
PA cranial view following guidewire passage

Video 5
Final result in the PA cranial view

Video 6
Final result in the PA caudal view