Images in Cardiovascular Medicine

Right Coronary Artery-to-Right Ventricle Fistula

in a Pediatric Patient Evaluated by 64-Detector-Row Computed Tomographic Coronary Angiography

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A 2-year-old girl in whom a cardiac murmur had been detected at the age of 4 months underwent physical examination. She had no cyanosis, but a continuous murmur was detected. The murmur was centered in the 4th right intercostal space and radiated vertically. The echocardiogram showed right coronary artery (RCA) dilation.

We sedated the patient and obtained computed tomographic (CT) images by use of contrast-enhanced electrocardiographic-gated multidetector computed tomographic (MDCT) angiography. A 64-slice CT scanner (Siemens Sensation 64; Erlangen, Germany) (120 kV, 35 mA) was used, with a detector configuration of 64 × 0.6 mm and a reconstruction interval of 0.6 × 0.4 mm. We administered 2 mL/kg of nonionic iodinated contrast medium at 2 mL/sec through the antecubital vein; a threshold of 100 Hounsfield units was used to trigger the diagnostic image acquisition. The scan time was 3.4 seconds, with an effective radiation dose of 1.3 mSv. The MDCT coronary angiograms showed RCA dilation with a fistula to the posterobasal region of the right ventricle (RV) (Figs. 1–3). The fistula was closed successfully with an intraluminal occlusion device (AMPLATZER® Duct Occluder, AGA Medical Corporation; Plymouth, Minn), as shown on invasive coronary angiograms (Figs. 4 and 5).

Comment

Primary coronary artery-to-camera fistula is a rare congenital anomaly in which a communication is present between a coronary artery and a cardiac chamber.[1,2] Usually, symptoms appear when patients reach adulthood. More than 50% of patients have no symptoms other than a continuous murmur. Heart failure is the most com-

Fig. 1 *Volumetric multidetector computed tomographic image shows aneurysmal dilation of the right coronary artery and its drainage into the right ventricle.*

mon complication.[1] Elective closure has been recommended.[3,4]

The quality of coronary artery images obtained by use of MDCT enables the assessment of congenital coronary anomalies, such as fistulae, even in children. Some questions regarding the usefulness of MDCT in children remain, however, because children have higher heart rates than adults do. Higher heart rates have been shown to have a negative effect on the quality of MDCT images, introducing motion artifacts and reducing the number of evaluable images.[5] In the case of our pediatric patient who had an RCA-to-RV fistula, MDCT proved effective in evaluating the RCA, measuring its diameter, determining the path of tortuosity, and, most important, locating the site of drainage into the ventricle. The fistula was totally occluded by an intraluminal occlusion device.

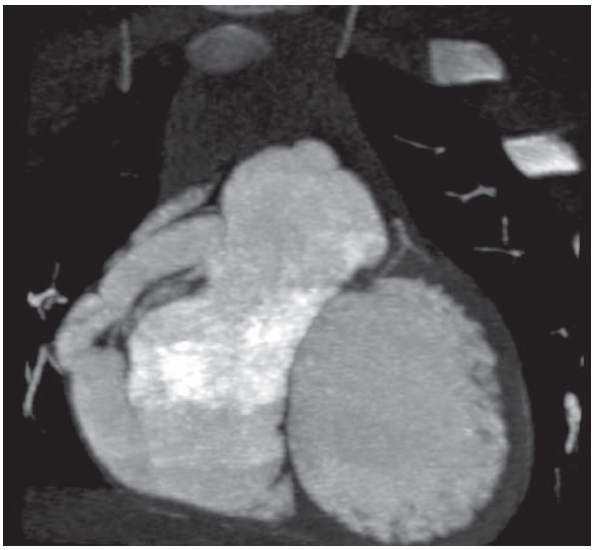

Fig. 2 *Maximum-intensity projection image from multidetector computed tomographic angiography shows the fistulous trajectory of the right coronary artery and its drainage into the basal portion of the right ventricle.*

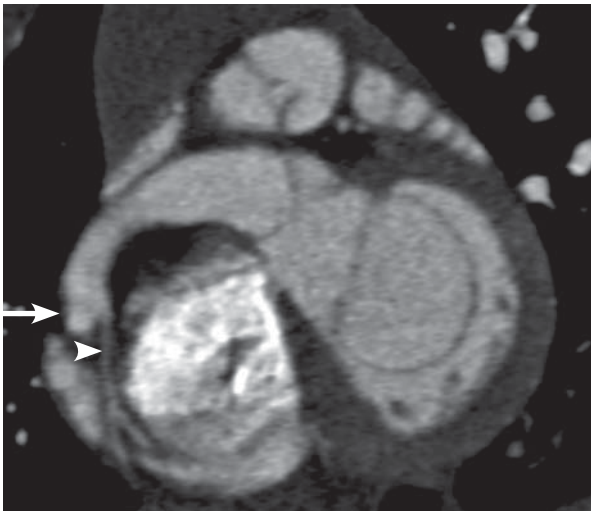

Fig. 3 *Multiplanar reconstruction from multidetector computed tomographic angiography shows the trajectory of the right coronary artery. The distal segment of the artery has a normal diameter (arrowhead), and the proximal segment is dilated (arrow) and drains into the right ventricle.*

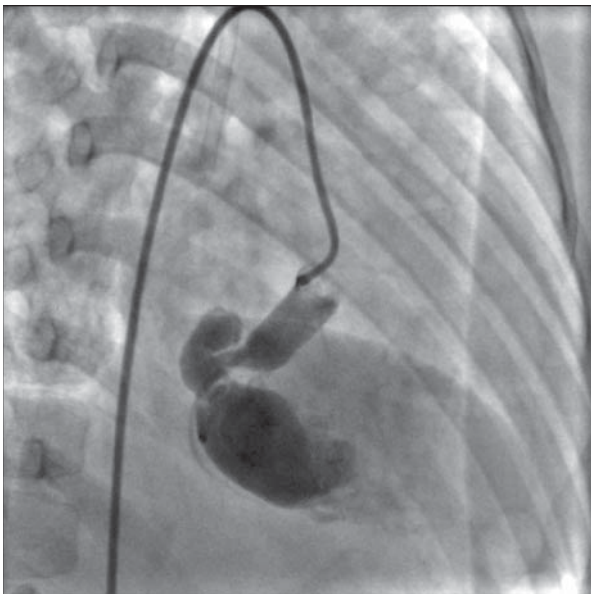

Fig. 4 *Invasive coronary angiography shows aneurysmal dilation of the right coronary artery and drainage into the right ventricle. The distal segment of the artery has a normal diameter.*

Click here for real-time motion image: Fig. 4

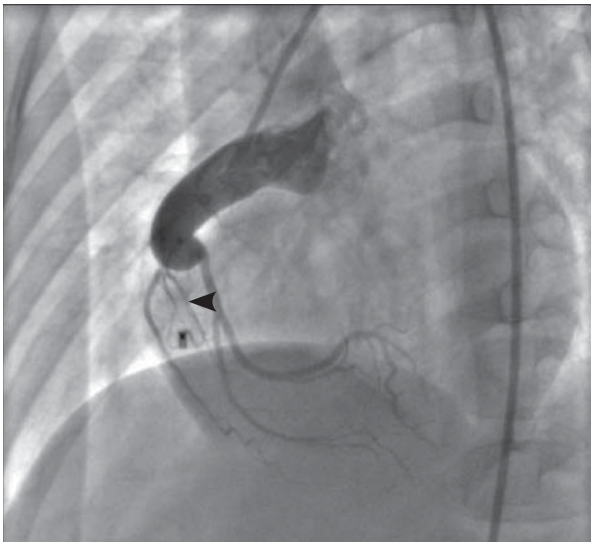

Fig. 5 *Invasive coronary angiography after transcatheter closure of the fistula with an intraluminal occlusion device. The fistulous trajectory that was seen before treatment (arrowhead) is totally occluded.*

Click here for real-time motion image: Fig. 5

Magnetic resonance imaging (MRI) has also been used to diagnose coronary artery fistulae, but it has some limitations. For example, MRI requires that patients be sedated for longer periods than CT does, which increases the risk of complications. In addition, the spatial resolution is often limited, and the distal course of arteries and the fistulous connection are not always clear. In contrast, MDCT enables excellent imaging of the distal coronary arteries and side branches; moreover, the spatial resolution is superior to that of MRI.[6] The exposure to radiation on MDCT is not entirely risk free; however, in our patient, the ability to obtain a clear and accurate diagnosis and the potential for therapeutic benefit outweighed the risks.[7]

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