Utility of multislice computed tomography in the diagnosis of a right coronary artery fistula to the right atrium

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A 32-yr-old woman presented with exertional dyspnoea and orthopnoea of three months and palpitations of two months duration. Physical examination revealed a continuous murmur, loudest at the left 4th intercostal space. A chest radiograph showed pulmonary plethora and cardiomegaly with right ventricular configuration and a dilated right atrium (RA). An echocardiogram revealed an aneurysmal vascular channel in the interatrial septum. It was thought to originate from the right coronary artery (RCA), but the site of drainage was not clear. All cardiac chambers were dilated. The cardiac valves were normal. Cardiac catheterization showed significant step-up of oxygen saturation at the level of mid RA. Pulmonary to systemic blood flow ratio was 3.37. Coronary angiography revealed a normal left coronary artery and its branches. Injection into the right coronary sinus revealed a dilated sac with fistulous communication into the RA. Whether the dilated sac was the right coronary sinus or the proximal RCA was not clear from the angiogram [Figure 1]. The distal RCA was faintly visualized. An ECG-gated MSCT angiography was performed on a 16-slice machine (Sensation 16, Siemens, Germany). Eighty ml of non-ionic (Iohexol) contrast was injected intravenously @ 4 ml/sec, with bolus tracking over the ascending aorta. Scanning parameters included: breath-hold time - 17 seconds, collimation - 12×0.75 mm, table feed - 2.8 mm/rotation, rotation time - 0.42 sec, tube voltage - 120 kV and tube current - 400 mAS. Axial images were reconstructed at various points along the R-R interval in order to obtain the best quality images (least motion artifacts). Post-processing was done with maximum intensity, multiplanar and volume-rendered projections. Both the axial and reconstructed three-dimensional images were reviewed. The proximal RCA was dilated and tortuous. This segment was seen to course downwards, posteriorly and to the left to become aneurysmal and enter the interatrial septum [Figure 2a]. This channel opened into a dilated RA. The distal RCA was normal. Curved and volume rendered [Figure 2b] reconstructions showed that there was no obstruction in the fistula.

The patient was advised to undergo surgery but refused and has been on medical follow-up.

Coronary artery fistula (CAF) is a direct connection of a coronary artery with a cardiac chamber or great vessel, bypassing the myocardial capillary bed. The incidence in the adult population is 0.1%. Majority of the fistulas are congenital, originate from the RCA and more than 50% drain into a right-sided cardiac chamber. These develop during cardiac embryogenesis, owing to enlargement of the capillary network or when the coronary arteries remain attached to the pulmonary trunk. Majority of the CAFs are asymptomatic. Symptoms include congestive heart failure (due to the left-to-right shunt) and angina (due to coronary steal). Both echocardiography and cardiac catheterization are complementary in their assessment of CAFs. Echocardiography is operator-dependent and evaluation may be incomplete due to a suboptimal acoustic window. Angiography is invasive and selective catheterization of the CAF may be difficult. The distal coronary artery may not be well evaluated due to steal occurring at the proximally located fistula. Overlap of the tortuous and aneurysmal fistulous tract with normal cardiovascular structures may hamper complete evaluation (including any obstruction) of the lesion. This information is necessary for planning the interventional therapy.
MSCT angiography is a new and non-invasive technique that can offer reliable morphological imaging of the coronary arteries. Till date, there has been one report on the utility of 4-slice MSCT in the evaluation of a CAF. Development of 16-slice MSCT offers superior temporal and spatial resolution compared to older MSCT scanners and additionally allows use of a lower contrast dose. This technology may be applied for the thorough evaluation of CAF, including the origin, course and drainage of the fistula. Detection of any aneurysm or stenosis along the tract, evaluation of the distal coronary artery and imaging of the uninvolved coronary arteries may be performed simultaneously. This modality is likely to become the investigation of choice whenever a CAF is suspected.

References

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