Isolated Three Coronary Arteries and Malformation of Left Anterior Descending

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A 43-year-old man with congenital double-outlet right ventricle and pulmonary atresia was referred to our institution for his respiratory discomfort. He had undergone ventricular septal defect closure, ligation of patent ductus arteriosus (PDA), and a Rastelli procedure at the age of 7. Transthoracic echocardiography revealed pulmonary artery stenosis caused by calcification of the prosthetic valve with a peak transvalvular pressure gradient of 116 mm Hg and residual atrial septal defect. Heartbeat-synchronized multi-detector computed tomography (MDCT) revealed recanalized PDA, collateral arteries from the descending thoracic aorta to bilateral pulmonary arteries, and coronary artery aberrancy. His coronary system consisted of three isolated coronary arteries, the origin of which arose from each sinus of Valsalva (Fig 1A): main right coronary artery (RCA) from anatomic noncoronary sinus (Fig 1B), independent right ventricular (RV) coronary branch from the original right coronary sinus (Fig 1B), and left coronary artery (LCA) from the left coronary sinus (Fig 1C). Furthermore, whereas the left circumflex artery (LCX) appeared normal, the left anterior descending artery (LAD) was dilated and directly drained into the posterior left ventricle (LV), forming a coronary-to-ventricular fistula. For these conditions, we performed transcatheter coil embolization of the aorta-to-pulmonary collaterals, surgical ligation of the PDA, patch closure of the atrial septal defect, and reformation of a valved conduit between the RV and main pulmonary trunk. Considering the minor shunt of the LAD to the LV, the fistula was not closed, leaving the possibility of requiring transcatheter coil embolization in the future. The postoperative course was uneventful. MDCT proved useful in precise understanding of the three-dimensional structure of the heart, including the coronary system. Based on the information provided, we could successfully avoid injury to the coronary arteries and the RV on reentry of the densely adhered mediastinum (Fig 2).