Assessment of a Coronary Artery Fistula Using Coronary Pressure Wire

Olivier Muller, MD, PhD; Sofie Verstreken, MD; Marc Vanderheyden, MD

Figure. (A) Coronary angiogram showing a fistula originating from a severely dilated and ectatic left anterior descending coronary artery (LAD; red star). (B) Coronary pressure wire pullback from the right ventricle to the LAD (black star), illustrating the course of the fistula. (C,D) Computed tomography confirming the exact course of the fistula from the LAD to the right ventricle (RV; red star). LV, left ventricle.
A 53-year-old woman was admitted for symptoms of dyspnea. She had a previous history of congenital heart disease with aortic and pulmonary valve plasty and closure of a small high ventricular septum defect (VSD) in 1966, which remained uneventful until 2008. At that time a DDD pacemaker was implanted for symptomatic high-degree AV block. Echocardiography showed a dilated left ventricle with a poor systolic function (ejection fraction of 23%) with an eccentric continuous color jet near the apex of the right ventricle (RV) mimicking a VSD on color flow Doppler (Movie 1). A coronary angiogram showed a fistula originating from a severely dilated and ectatic left anterior descending coronary artery (LAD; Figure A, Movie 2). The shunt ratio was calculated using saturation method and the result was 1.24 (which excluded the shunt as the unique cause of the left ventricle systolic dysfunction). In order to assess the course of this fistula, the LAD was wired with a microtip coronary pressure wire (RADI) and advanced through the ectatic vessel into the RV, as evidenced from the pressure tracings in Figure B (green tracing showing the pull back from the RV to LAD). Indeed, microtip coronary pressure wire in this context could not give information on the effect of the fistula on coronary circulation. Contrast-enhanced electron-beam tomography confirmed the exact course of this fistula from the LAD to RV (Figures C, D).

Congenital and acquired coronary artery fistulae are rare anomalies with an incidence of approximately 0.5%. After the right coronary artery, the LAD is the second most likely site of origin and the fistula usually ends in the RV (45%). The affected coronary artery is often ectatic, dilated, and tortuous, as it was in this case. In addition to coronary angiography (planar imaging and restricted angle of angiographic projections), several diagnostic methods can be used in order to investigate coronary fistulae. Echocardiography may detect coronary fistula as in the present case, but the predictive value of this method is uncertain. Contrast-enhanced electron-beam tomography has also been recommended. The spatial resolution is excellent and allows detection of most coronary fistulae. But it uses contrast agents in addition to radiation, and gives no information on the hemodynamic repercussion of the fistula. Although magnetic resonance imaging is the safest and most sensitive method to detect these coronary anomalies, it is not always feasible, for instance in a distal coronary situation and in the case of patients with pacemakers. As illustrated in the present patient, a coronary pressure wire might be an elegant tool to investigate cardiac fistulae. Together with a coronary angiogram, it provides accurate online spatial and hemodynamic assessment of the exact course of the fistula.

References

Supplementary files
Movie 1. Color flow Doppler showing an eccentric continuous color jet near the apex of the right ventricle mimicking a ventricular septum defect.
Movie 2. Coronary angiogram showing a fistula originating from a severely dilated and ectatic left anterior descending coronary artery.

Please find supplementary file(s); http://dx.doi.org/10.1253/circj.CJ-09-1046