

5th European Conference on

Clinical and Medical Case Reports

September 07-08, 2017 Paris, France

Multimodality assessment of a right coronary artery to left ventricle fistula complicated by a large coronary aneurysm

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An asymptomatic 45-year-old woman presented with incidentally detected diastolic murmur. As the initial echocardiogram showed an abnormal blood flow in the left ventricular chamber, a computed tomography (CT) were performed, which revealed a right coronary artery (RCA) to left ventricle (LV) fistula complicated by a coronary arterial aneurysm (Panel A; Supplementary data online, Movie S1). Coronary angiograms (Panel B and Supplementary data online, Movie S2) followed by a coronary flow reserve (CFR) test (Panel C) confirmed a brisk blood flow of 91 cm/s through the fistula (yellow, red and blue line: RCA, LV pressure and RCA flow velocity). An intravascular ultrasound study (IVUS) showed a 13-mm widest (Panel D) and 4-mm narrowest (Panel E and Supplementary data online, Movie S3) diameter of the fistula. A left ventriculogram showed opacified blood flowing from LV into the fistula during systole (Panel F and Supplementary data online, Movie S4). The analysis of computational fluid dynamics, using ANSYS 15.0 software (ANSYS Inc., Canonsburg, PA, USA), showed that the fistula was exposed to high pressure during entire cardiac cycle (Panel G and Supplementary data online, Movie S5). To prevent the late symptoms and complications including rupture of fistula, surgical ligation of the fistula and coronary artery bypass grafting were performed. (Panel H and supplementary data online, Movie S6). The blood flow velocity of RCA was measured as 11cm/s (Panel I). Histopathological examination showed that the media of the fistula was characterized with prominent myxoid degeneration, which suggested the presence of long-term pressure loading (Panel J).

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