

Coronary fistula to the right atrium (RCD code: I-1C.4)

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Abstract

We present the case of a patient with a large coronary fistula. Coronarography of the patient admitted to the Cardiology Department with STE-ACS revealed a large fistula from the circumflex branch of the left coronary artery to the right atrium. The patient underwent successful percutaneous embolisation with three vascular coils. Currently he is under close ambulatory observation. JRCD 2018; 3 (7): 243–245

Key words: rare disease, echocardiography, coronary angiography, embolisation, vascular coils

Background

Coronary arteriovenous fistula (CAVF) is an abnormal connection between the coronary artery and vein or heart chamber – right ventricle, right atrium, coronary sinus or pulmonary artery. Coronary fistulas were first described in 1865. The most common connections derive from the right coronary artery (55%), followed by the left coronary artery (approximately 1/3 of cases), while fewer cases arise from both of them. These abnormalities have a congenital origin and typically occur in isolation. Usually the fistulas are small and asymptomatic. On the other hand, larger or multiple CAVFs may lead to many abnormalities such as steal phenomenon, myocardial ischaemia, infective endocarditis, aneurysm of the fistula, congestive heart failure, or pulmonary hypertension. The most common method of treatment for large, symptomatic CAVFs leading to coronary artery disease is the coil embolisation procedure during cardiac catheterisation.

Case presentation

A 57-year-old patient, current smoker, with no previous cardiovascular disease (CVD), with a history of duodenitis (2013) and thoracic spondylosis was admitted to our department with unstable angina Canadian Cardiovascular Society (CCS) class III/IV. Family history of CVD was negative.

On admission the patient remained hemodynamically stable but reported acute chest pain. Physical examination revealed no abnormal findings.

Due to abnormalities in the electrocardiogram (ECG) which suggested evolution of an anterolateral ST elevation acute coronary syndrome (STE-ACS), the patient underwent coronarography which showed 70% stenosis of the bifurcation of the left anterior descending artery (LAD) and second diagonal branch (D2). Additionally, a large fistula from the circumflex branch of the left coronary artery (LCx) to the right atrium (RA) was revealed. During the same procedure, percutaneous coronary intervention (PCI) of the LAD was performed with implantation of a single drug-eluting stent. Due to the high probability of steal phenomenon, the patient was also tentatively qualified for the fistula coil embolisation procedure.

Results of basic laboratory tests were as follows: mild anaemia, elevated highly sensitive cardiac troponin T – 1459 [ng/l] and cardiac specific isoenzymes of CK – 58.2 [U/l]. Other biochemical parameters were within normal limits – kidney function tests (eGFR >90 ml/min/1.73 m²), TSH – 0.86 [μIU/ml], K⁺ – 3.87 [mmol/l], Na⁺ – 141 [mmol/l]. ECG showed sinus rhythm 70/min, undetermined heart axis, QS complex in lead aVL, pathological Q wave in lead I and T-wave inversion in leads I, aVL, V5–V6.

Transthoracic echocardiogram demonstrated normal left ventricular (LV) systolic and diastolic function with LVEF of 55% and subtle hypokinesis of the distal segment of anterior and lateral wall. The left ventricle was slightly dilated and hypertrophic with LV end



Figure 1. Coronary angiogram. Large left circumflex artery fistula with drainage into the right atrium



Figure 2. Coil delivery system

diastolic diameter of 51mm, interventricular septum thickness of 12mm and posterior wall thickness of 12mm. Dimensions of other cardiac chambers and great vessels were normal. Additionally, dysfunction of heart valves was not observed.

Computed tomography scan with contrast suggested presence of a fistula from the circumflex branch of the left coronary artery to the right chambers of the heart, however, the scan could not definitively confirm it.

After PCI, the patient still presented with persistent CCS class II exertional symptoms. The patient reported that these symptoms had been present as long as he could remember but was accustomed to limiting physical effort. An exercise stress test was performed six weeks after PCI, which was positive (chest pain with downsloping ST segment depressions). The patient underwent repeat coronarography, which showed an excellent angiographic response to the previous PCI procedure. In addition, a large, hemodynamically significant fistula from the distal LCx to RA with apparent steal phenomenon was present, along with faint antegrade coronary flow with sluggish and delayed filling of the distal territory of circumflex and obtuse marginal branches.

The decision was made to embolise the abnormal LCx-RA connection. After intubation of the left main coronary artery with an Amplatz Left guiding catheter, the distal part of the fistula was crossed with a Whisper ES guidewire and subsequently with an Amicath microcatheter, which passed through the entire course of the fistula, from the proximal to distal parts. With support of

a Guidezilla catheter, three vascular coils were introduced and implanted in the correct position IMWCE – 5 PDA, IMWCE 6.5 PDA and IMWCE – 5 PDA with remnant flow in the fistula. The procedure was completed without any complications. (Procedural fluoroscopy time – 11 minutes, total X-ray radiation – 730mGy, contrast consumption-100 ml). Follow-up computed tomography scan with contrast was planned.

During hospitalisation, the patient was treated with angiotensin-converting-enzyme inhibitor, beta-blockers, double antiplatelet therapy (clopidogrel and acetylsalicylic acid), proton-pump inhibitor, atorvastatin and periprocedural unfractionated heparin. The next admission to our hospital was scheduled within two months.

In the follow-up coronary angiography two months after successful fistula closure, we confirmed total occlusion of the LCx-RA fistula with increased diameter of the distal portion of the LCx and marginal branches in comparison with the diameter of these vessels before fistula closure. The patient remains in good clinical status, free of exertional stenocardia.

Discussion:

Coronary fistulas are found in 0.1% of coronary angiography examinations. Their distal connections drain into a low-pressure system, mainly to one of the right heart chambers, less often to



Figure 3. Transcatheter coil embolization of the fistula

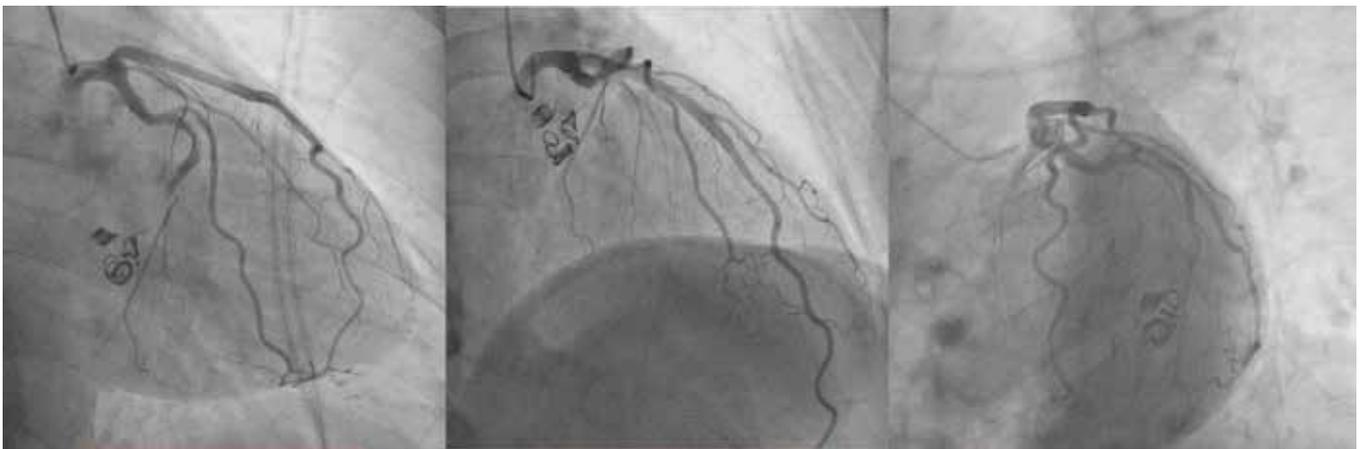


Figure 4. Postprocedural coronary angiogram. Successful obliteration of the fistula

the pulmonary artery or one of its branches, and occasionally to veins. In most cases, CAVFs are small and asymptomatic, are revealed incidentally, and do not require invasive treatment. However, large CAVFs with a diameter exceeding the coronary artery diameter can cause myocardial hypoperfusion and lead to exertional angina, ventricular arrhythmias, cardiac arrest, or congestive heart failure symptoms.

Invasive methods of treatment include cardiac surgery and endovascular procedures such as embolisation with coil delivery or covered stent implantation. Although covered stent implantations are simpler and easy to perform, they carry a high risk of restenosis. In our case, due to a significant difference between the coronary diameter before and after CAVF origin, covered stent implantation would not have been an appropriate treatment. If stent size were fitted to the proximal diameter, or in the case of incomplete fistula closure due to stent cover adjustment to the distal diameter, increased risk of complications such as coronary rupture or large dissection could have appeared.

In our case, the patient was not qualified for closure procedure until complete revascularisation was performed. Only ischaemia and evidence of symptomatic CAVF combined with lack of coronary lesion narrowing was proof for the presence of steal phenomenon and hypoperfusion in the myocardial region distal to fistula

origin. Confirmation of our correct treatment plan was seen as complete resolution of anginal symptoms after the procedure and essential improvement of contrast flow in the distal part of the LCx, which was visualized in staged coronary angiography.

In conclusion, percutaneous embolisation of the fistula was successful and led to complete resolution of stenocardial symptoms. The decision to use an endovascular method for fistula occlusion was based on anatomical conditions and was in line with the patient's preferences. The total fluoroscopy time, X-ray dose, contrast consumption, and access site were acceptable and safe.

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