Coil embolization of coronary arteriovenous fistulas: lessons from long-term follow-up

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A 52-year-old woman was admitted to the hospital due to dyspnea on exertion and abnormalities seen on electrocardiography, namely, the T-wave inversion in leads V2–V6. Cardiac computed tomography angiography showed multiple coronary arteriovenous (AV) fistulas communicating the left main coronary artery, mid-left anterior descending artery (LAD), and right coronary artery (RCA) ostium with the main pulmonary artery (PA) (Figure 1A and 1B). The patient was further examined by coronary angiography (Supplementary material, Figure S1A and S1B, Videos S1 and S2).

During cardiac catheterization, the left-to-right shunt was moderate (Qp/Qs, 1.72), and pulmonary vascular resistance and PA pressure increased to 402.2 (dyn·s)/cm5 and 49/17/28 mm Hg, respectively. As the patient refused surgery, we performed transcatheter coil embolization in the AV fistulas from the RCA ostium and the mid-LAD to the PA (Supplementary material, Figure S1C and S1D, Videos S3 and S4), except for the left main AV fistula (Supplementary material, Figure S1D) due to its small size and technical difficulty in managing it. Multiple different coils were embolized with the Finercross microcatheter (Terumo Co., Tokyo, Japan): 2 Tornado fibered coils of 6 mm × 2 mm (Cook Medical, Bloomington, Indiana, United States), 1 Tornado coil of 7 mm × 2 mm, and 2 VortX fibered coils of 5 mm × 2 mm (Boston Scientific, Marlborough, Massachusetts, United States) from the RCA to the PA; 1 Tornado coil of 4 mm × 2 mm and 3 VortX coils of 4 mm × 2 mm from the mid-LAD to the PA. After embolization, the hemodynamics improved (Qp/Qs, 1.1; PA pressure, 31/13/19 mm Hg). In the long-term follow-up, 9 years after the procedure, the patient remained asymptomatic, while follow-up cardiac computed tomography angiography and coronary angiography revealed a near-complete obstruction of the RCA ostium and the mid-LAD fistulas to the main PA, with a remaining small AV fistula from the left main coronary artery to the main PA. However, shunt flow was decreased (reduced contrast density in the PA as depicted in Figure 1C and 1D and in the Supplementary material, Figure S1E and S1F, Videos S5 and S6) compared with that observed in the previous evaluation.

In most patients, transcatheter coil embolization of coronary AV fistulas is an acceptable alternative to surgery.1-4 Our case demonstrated that it is feasible, reduces shunt flow, and improves symptoms in multiple coronary AV fistulas that significantly affect hemodynamics. To our knowledge, this is the first report of long-term follow-up in a patient with coronary AV fistulas. Although small AV fistulas remained,1 reducing shunt flow could prevent their sequelae during long-term follow-up without complications.

SUPPLEMENTARY MATERIAL
Supplementary material is available at www.mp.pl/kardiologiapolska.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.
FIGURE 1 Cardiac computed tomography angiography showing: A – coronary arteriovenous (AV) fistulas from the right coronary artery ostium; B – multiple coronary AV fistulas communicating the left main coronary artery and the mid-left anterior descending artery with the main pulmonary artery (PA). After 9-year follow-up: C – no significant shunt flow from the right coronary artery to the PA; D – no significant shunt flow from the mid-left anterior descending artery to the PA and reduced shunt flow in the remaining small AV fistula from the left main coronary artery to the main PA.

REFERENCES

1. Reidy JF, Anjos RT, Qureshi SA, et al. Transcatheter embolization in the treatment of coronary artery fistulas. J Am Coll Cardiol. 1991; 18: 187-192.
2. Jama A, Barsoum M, Bjarnason H, et al. Percutaneous closure of congenital coronary artery fistula: results and angiographic follow up. JACC Cardiovasc Interv. 2011; 4: 814-821.
3. Samitowski Z, Mędrzycki M, Hołda MK, Kędziora A. Successful closure of a symptomatic left circumflex coronary artery to coronary sinus fistula. Kardiol Pol. 2019; 77: 1204-1205.
4. Romano S, Petroni R. Coronary artery fistula: an innocent bystander or harmful company? Kardiol Pol. 2019; 77: 1051-1054.
5. Cheung DL, Au WK, Cheung HH, et al. Coronary artery fistulas: long-term results of surgical correction. Ann Thorac Surg. 2001; 71: 190-195.