

## Unusual Case of Surgically Failed Coronary-Cameral Fistula: Successful Outcome with Transradial Coil Embolization

Abdul Basit, MD<sup>1</sup>, Raja Nazir, MD<sup>2</sup>, Ajay Agarwal, MD<sup>3</sup>

**ABSTRACT:** Coronary-cameral fistula is a rare clinical entity. Symptoms depend upon the size and location of the fistula. Closure of fistula is indicated in the presence of symptoms. Newer, less invasive techniques are being employed and are in constant evolution. We report the first case of a coronary-cameral fistula that failed open surgical treatment and responded to percutaneous transradial intervention. This case illustrates the feasibility of transradial intervention for symptomatic coronary-cameral fistula.

J INVASIVE CARDIOL 2013;25(1):56-57

**Key words:** coronary-cameral fistula, transradial access

Coronary-cameral fistula (CCF) is an anomalous communication between any epicardial coronary artery and cardiac chamber. The most common type of CCF is congenital rather than the acquired variety. CCF can originate from any coronary blood vessel and can terminate in any cardiac chamber. We report a case of surgically ligated coronary-cameral fistula originating from the right posterior descending artery (RPDA) with termination in the left ventricle (LV). Surgical ligation of CCF failed 6 years later. The patient underwent successful coil embolization through transradial approach because of progressive chest pain and dyspnea on exertion.

### Case Description

A 68-year-old Caucasian male presented with progressive exertional chest pain and shortness of breath over the past several months. His symptoms progressed to New York Heart Association (NYHA) functional class III. He had a significant history of coronary artery disease (CAD) status post 2-vessel coronary artery bypass graft (CABG), hypertension, hyperlipidemia, remote tobacco smoking, and presence of premature CAD in the family. In 2004, he required 2-vessel CABG after acute myocardial infarction (AMI). Left internal mammary artery (LIMA) to left anterior descending artery (LAD) and saphenous venous (SVG) to major diagonal branch of LAD was grafted. Fistulous tract between RPDA to LV cavity was also ligated at the time of surgery. The patient underwent myocardial perfusion imaging due to progression of symptoms. It showed fixed apical lateral wall perfusion abnormality representing myocardial

scar and minimal reversible ischemia. Coronary angiogram revealed 80% segmental stenosis in the mid LAD, 90% stenosis in the second diagonal branch and persistence of fistulous track between RPDA to LV cavity (Figure 1). LIMA to mid-LAD and SVG to diagonal branch were widely patent. Right heart catheterization data for the pressures and oxygen saturations were within normal limits. Medical management was prescribed. However, the patient continued to have symptoms despite optimal medical management. Percutaneous coronary intervention (PCI) to second diagonal was performed with a 2.25 x 12 mm Taxus Liberté RX stent in an attempt to control the symptoms. On follow-up, the patient reported no improvement in his symptoms. In view of appropriate medical management and recent revascularization, the patient's symptoms were attributed to coronary steal phenomenon. At this point, the decision was made for coil embolization of the fistula. Transradial coil embolization with 4 x 8 IntraCoil system was successfully deployed through Renegade microcatheter to the distal end of the RPDA. Flow in the fistula ceased within 5 minutes (Figure 2). The patient noticed significant improvement in the symptoms when seen on follow-up.

### Discussion

CCF is a rare disorder. CCF originates from the right coronary artery (55%), left coronary artery (35%), or both coronary arteries (5%). CCF terminates in the right ventricle (40%), right atrium (26%), and pulmonary arteries (17%), less frequently in the superior vena cava or coronary sinus, and least often in the left atrium or left ventricle.<sup>1</sup> Coronary angiography is the gold standard in the diagnosis of CCF. Contrast-enhanced computer tomography with three-dimensional reconstruction or magnetic resonance imaging is used to locate the exact anatomy of CCF.<sup>2</sup> Most patients with CCF are asymptomatic due to small fistula size. Coronary steal phenomenon can occur in large-size fistulas by myocardial stealing or reduction in myocardial blood flow distal to the site of the coronary artery fistula connection. Spontaneous closure is more frequent in children than adults.<sup>3</sup> Hemodynamically significant fistula can lead to congestive heart failure, pulmonary hypertension, coronary steal phenomenon, and cardiac arrhythmias. The mechanism of coronary steal phenomenon is due to presence of diastolic pressure gradient and runoff from the coronary vasculature to a low-pressure receiving cavity.<sup>4</sup> Uncommon consequences include endocarditis, thromboembolism from fistula, and rupture of fistula aneurysm.

Treatment options for CCF vary depending on presence of symptoms and hemodynamic significance of the fistula.<sup>5</sup> Clinical follow-up is necessary in asymptomatic and hemodynamically insignificant fistula. Symptomatic patients with CCF require closure through percutaneous transcatheter techniques<sup>6</sup> or surgical

From the <sup>1</sup>Department of Cardiology and <sup>2</sup>Department of Preventive Cardiology, Kettering Medical Center, Kettering, Ohio, and <sup>3</sup>Department of Clinical Medicine at Wright State University/Boonshoft School of Medicine, Dayton, Ohio.

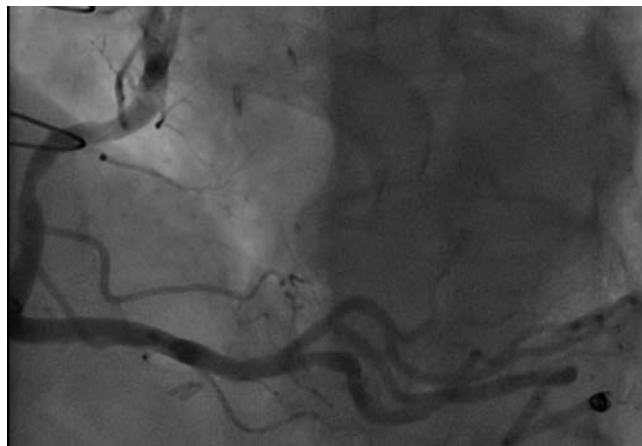
Disclosure: The authors have completed and returned the ICMJE Form for Disclosure of Potential Conflicts of Interest. The authors report no conflicts of interest regarding the content herein.

Manuscript submitted May 21, 2012 and accepted July 9, 2012.

Address for correspondence: Abdul Basit, MD, 3535 Southern Blvd, Kettering Medical Center, Kettering, OH 45429. Email: basetmd@yahoo.com



**Figure 1.** Right coronary angiogram showing origin of coronary-cameral fistula from right posterior descending artery with opening to the left ventricle.



**Figure 2.** Post-deployment right coronary angiogram revealing complete closure of coronary cameral fistula with IntraCoil system.

ligation.<sup>7</sup> With the advent of transcatheter techniques and newer occlusion devices, percutaneous technique has become a better option for fistula closure. Coil embolization and Amplatzer devices have been reported for fistula closure.<sup>8</sup>

Our case is unique in many aspects, demonstrating the potential challenges in CCF management. Surgical ligation failed 6 years after the procedure. Our patient remained symptomatic despite medical management and later following the PCI. Our patient noticed significant improvement in the symptoms after coil embolization. To the best of our knowledge, this is the first case report of CCF describing surgical failure and successful transradial intervention. This case underscores the need to consider the presence of CCF in patients with CAD who do not respond to standard therapy for the ischemia.

In conclusion, CCF can persist or recur after surgical ligation, and transradial approach is feasible for the closure of symptomatic CCF.

## References

1. Hauser M. Congenital anomalies of the coronary arteries. *Heart*. 2005;91(9):1240-1245.
2. Rath V, Mikolich B, Patel M, Doyle M, Yamrozik J, Biederman RW. Coronary artery fistula; non-invasive diagnosis by cardiovascular magnetic resonance imaging. *J Cardiovasc Magn Reson*. 2005;7(4):723-725.
3. Sunder KR, Balakrishnan KG, Tharakan JA, et al. Coronary artery fistula in children and adults: a review of 25 cases with long-term observations. *Int J Cardiol*. 1997;58(1):47-53.
4. Schamroth C. Coronary artery fistula. *J Am Coll Cardiol*. 2009;53(6):523.
5. Sherwood MC, Rockenmocher S, Colan SD, Geva T. Prognostic significance of clinically silent coronary artery fistulas. *Am J Cardiol*. 1999;83(3):407-411.
6. Okubo M, Nykanen DG, Benson LN. Outcomes of transcatheter embolization in the treatment of coronary artery fistulas. *Catheter Cardiovasc Interv*. 2001;52(4):510-517.
7. Kamiya H, Yasuda T, Nagamine H, et al. Surgical treatment of congenital coronary artery fistulas: 27 years' experience and a review of the literature. *J Card Surg*. 2002;17(2):173-177.
8. Bruckheimer E, Harris M, Kornowski R, Dagan T, Birk E. Transcatheter closure of large congenital coronary-cameral fistulae with Amplatzer devices. *Catheter Cardiovasc Interv*. 2010;75(6):850-854.