

Closure of an Iatrogenic Coronary Artery Fistula With a PTFE-Coated Stent

José L. Mestre Barceló, Luisa Salido Tahoces, Alejandro del Río del Busto, Asunción Camino López, José L. Moya Mur, and Jaime Pey Illera

Unidad de Hemodinámica y Cardiología Intervencionista, Instituto de Cardiología, Hospital Ramón y Cajal, Madrid, Spain.

Acquired coronary-cameral fistula is an uncommon disorder. We describe a 50-year-old man with rheumatic valvular disease who required emergency mitral and aortic valve replacement due to *Staphylococcus aureus* acute infective endocarditis. He underwent further surgical interventions due to bleeding and prosthetic dehiscence. During follow-up, a continuous parasternal murmur was noted. Echocardiography showed continuous coronary fistula flow from the left anterior descending artery to the right ventricle. Elective closure of the ostium was achieved with direct implantation of a 3.5 × 16 mm PTFE-coated stent (Jostent Coronary System Graft[®], Jomed, Germany).

Key words: Coronary-cameral fistula. Stent. Coated stents.

Full English text available at: www.revespcardiol.org

INTRODUCTION

Posttraumatic coronary-cameral fistula is an uncommon finding. We present the first reported case of a postsurgical iatrogenic coronary fistula flowing from the anterior descending artery to the right ventricle, treated successfully by percutaneous insertion of an expandable polytetrafluoroethylene (PTFE)-coated stent.

CASE REPORT

A 50-year-old male diagnosed with rheumatic mitral and aortic valve disease presented to the emergency room with a clinical picture that included pro-

Cierre percutáneo de fístula coronaria iatrogénica con *stent* recubierto de politetrafluoroetileno expandido

Las fístulas coronario-cavitarias adquiridas son una enfermedad poco común. Describimos el caso de un paciente de 50 años de edad sometido a una intervención urgente de remplazo valvular aórtico y mitral por endocarditis por *Staphylococcus aureus*. Preciso reintervenciones por sangrado y dehiscencia protésica e implantación de un tubo de tórax por neumotórax izquierdo. En el seguimiento postoperatorio se documentó un soplo continuo y el estudio ecocardiográfico estableció el diagnóstico de fístula coronaria de descendente anterior a ventrículo derecho. Se procedió al cierre del *ostium* de la fístula mediante la implantación de un *stent* recubierto de politetrafluoroetileno expandido de 3,5 mm de sección por 16 mm de longitud (Jostent Coronary System Graft[®], Jomed, Alemania), con lo que se logró la oclusión completa de la fístula.

Palabras clave: Fístula coronario-cavitaria. Stent. Stent recubiertos.

gressive dyspnea, poor general health, and fever. The clinical examination was consistent with moderate double mitral valve lesions and moderate aortic insufficiency. Notable findings from standard laboratory workup were neutrophilic leukocytosis and an elevated level of liver enzymes. The electrocardiogram revealed atrial fibrillation with rapid ventricular response. Echocardiographic images from the echocardiography suggested vegetations in on the mitral valves and the aortic semilunar valves. Blood cultures were positive for *Staphylococcus aureus*. Given his rapid clinical deterioration, the patient required emergency aortic (Carbomedics, 23) and mitral (Carbomedics, 27) valve replacement surgery. Inotropic support and 2 more further interventions because of bleeding in the postoperative period were also necessary. One week after discharge, he was readmitted to the hospital because of heart failure. The echocardiogram revealed a dehiscence of the aortic prosthesis with a perivalvular, aneurysmal appearance and severe aortic insufficiency. An intervention

Correspondence: Dr. J.L. Mestre Barceló.
César Pastor Llopis, 1, portal 3, 3.º 1. 28031 Madrid, España.
E-mail: jlrestreb@yahoo.es

Manuscript received December 4, 2003.
Accepted for publication February 5, 2004.

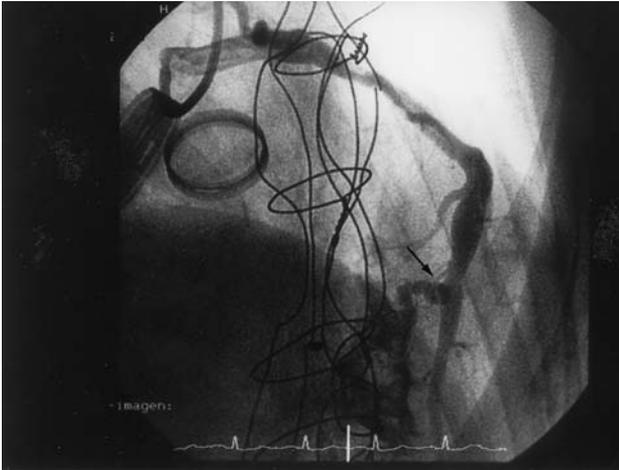


Fig. 1. Angiographic image of the left coronary artery through a 30° right oblique anterior projection with 25° cranial angulation. A fistula can be observed in the middle segment of the anterior descending artery, draining into the right ventricle (RV). The arrow indicates the proximal ostium of the fistula.



Fig. 2. Angiographic image with the same projection showing complete occlusion of the coronary-cameral fistula after implantation of an expanded 3.5 mm 16 mm PTFE-coated stent (Jostent Coronary System Graft®, Jomed, Germany) in the middle segment of the anterior descending artery (arrow).

was performed to suture the dehiscence. In the postoperative period after this second intervention, the patient developed a left pneumothorax requiring insertion of a chest tube. A continuous parasternal murmur was noted on follow-up examination. Doppler color echocardiogram revealed a continuous flow from the anterior descending artery to the right ventricle. The hemodynamic study and coronary angiography confirmed the presence of a fistula (Figure 1) with a left-to-right shunt (pulmonary to systemic flow ratio [Qp/Qs] of 1.2). Elective closure of the fistula's ostium was achieved by inserting a 3.5 mm 16 mm PTFE-coated stent (Jostent Coronary System

Graft®, Jomed, Germany). Complete closure of the fistula was achieved (Figure 2).

DISCUSSION

Acquired coronary fistula is an uncommon disorder. It has been described after surgical procedures, endomyocardial biopsy, coronary angioplasty, acute myocardial infarction, and thoracic trauma.¹⁻⁵ In our case, the most likely cause was an inadvertent direct puncture of the epicardium during insertion of a chest tube for postsurgical left pneumothorax. This puncture created fistulous flow between the anterior descending coronary artery and the right ventricle. The flow increased progressively to the point where it was detectable on physical examination.

For large fistulas and those with greater hemodynamic consequences, early surgical closure has been recommended to prevent later complications that may lead to left-to-right shunting, pulmonary hypertension, heart failure, or the emergence of myocardial ischemia due to coronary steal. Iatrogenic fistulas are usually benign, thus allowing for conservative management, although serious complications secondary to volume overload and impairment of distal myocardial flow have also been described.⁶ Surgical resolution involves external ligation and often requires extracorporeal circulation.⁵

The development of percutaneous closure procedures (coil embolization, umbrella device, etc), which have mainly been used for congenital coronary fistulas, may increase the number of surgical indications because these procedures provide good results with low morbidity and mortality.^{7,8}

The Jostent coronary stent graft consists of a concentric, double metallic mesh enclosing a layer of PTFE. This polymer, which is impermeable and expandable, permits the closure of coronary aneurysms and iatrogenic punctures of the coronary wall.⁹ It has proven useful in the treatment of vein graft lesions because it decreases the risk of distal embolization. The use of this type of stent in the closure of an iatrogenic coronary arteriovenous fistula between the right coronary artery and the posterior interventricular vein has also been described.²

In our case, closure of the fistula was indicated to prevent the fistula from progressing to a significant shunt or causing myocardial ischemia because of distal flow deterioration. We chose direct insertion of this type of stent for the occlusion of the ostium proximal to the fistula due to its relative accessibility and the adequate caliber of the anterior descending artery in this area.

To date, no case of acquired coronary-cameral fistula occluded with this method has been reported in the medical literature.

The direct implantation of this type of coated intracoronary stent to close the fistula's proximal os-

tium provides complete occlusion through a simple percutaneous procedure with low morbidity and mortality.

REFERENCES

1. Ramsheyi SA, Nataf P, Jaula F, Pavie A, Gandjbakhch I. Iatrogenic left coronary atrial fistula after mitral valve replacement: a propos of a case. *Arch Mal Coeur Vaiss* 1995;88:1897-9.
2. Morocutti G, Gelsomino S, Bernardi G. Covered stent for iatrogenic coronary arteriovenous fistula in heart transplant recipient. *Heart* 2002;87:339.
3. Iannone LA, Iannone DP. Iatrogenic left coronary fistula to left ventricle following PTCA: a previously unreported complication with nonsurgical management. *Am Heart J* 1991;120:1215-7.
4. Schanzembacher P, Bauersachs J. Acquired right coronary artery fistula draining to the right ventricle: angiographic documentation of first appearance following reperfusion after acute myocardial infarction, with subsequent spontaneous closure. *Heart* 2003;89:e22.
5. Friesen CH, Howlett JG, Ross DB. Traumatic coronary artery fistula management. *Ann Thorac Surg* 2000;69:1973-82.
6. Wexberg P, Gottsauner-Wolf M, Kiss K, Steurer G, Glogar D. An iatrogenic coronary arteriovenous fistula causing a steal phenomenon: an intracoronary Doppler study. *Clin Cardiol* 2001;24:630-2.
7. Descalzo Señorans A, Santos de Soto J, González García A, Mayol Deya A. Fístula coronaria congénita a ventrículo derecho. Tratamiento mediante embolización transcatheter con coils. *Rev Esp Cardiol* 1999;52:526-8.
8. Armsby LR, Keane JF, Sherwood M, Forbess JM, Perry SB, Lock JE. Management of coronary artery fistulae. Patient selection and results of transcatheter closure. *J Am Coll Cardiol* 2002;39:1026-32.
9. Reifart N, Rossler C. The Jostent coronary stent range. In: Serruys PW, Kutryk MJB, editors. *Handbook of coronary stents*. 3rd ed. London: Martin Dunitz, 2000; p. 119.