

## Case Report

# Large Coronary-pulmonary Artery Fistulae. Percutaneous Embolization with Microcoils and Disposable Balloons

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*A 43-year-old symptomatic woman (dyspnea and palpitation) had multiple coronary-pulmonary artery fistulae with high output; percutaneous embolization was successfully performed using controlled-release microcoils and disposable balloons.*

Coronary fistulae are communications between these arteries and the cardiac cavities or other mediastinal vessels; frequently, they are alterations in embryo development<sup>1</sup>. Several fistulae arising from both coronaries and ending in the pulmonary artery, such as in our patient's case, are rare clinical entities<sup>2</sup>. Fistulae with marked hemodynamic repercussions leading to symptoms of heart failure and thoracic pain are, classically, treated with surgery<sup>3</sup>; however, catheter occlusion is currently increasing in frequency<sup>4-8</sup>.

## Case Report

A 43-year-old woman was referred to the hospital because of frequent episodes of palpitations and exercise-related dyspnea, with symptoms progressing in recent years. Specific clinical examination revealed a continuous cardiac murmur, heard at the left sternal border at the third and fourth intercostal spaces. Twelve-lead electrocardiography revealed complete left bundle-branch block. Echocardiographic Doppler performed at another hospital showed large patent ductus arteriosus and pulmonary artery hypertension. The patient was referred for hemodynamic study because of this diagnosis. Manometry revealed a mild increase in pressure in the right chamber and pulmonary artery. A pulse oximetric recording peaked at the level of the pulmonary artery trunk. Patent ductus arteriosus was not found. Cardiac scintigraphy demonstrated large right coronary (fig.1) and left coronary fistulae (fig. 2) in the pulmonary artery.

Percutaneous embolization was performed, using the right femoral artery for Access with a JR 4 6F guidewire catheter (Cordis, brite tip) for the right coronary and a JL 4 6F for the left coronary.

After venous administration of 5000 U unfractionated heparin, a large fistula of the right coronary ostium was catheterized selectively (Excelsior microcatheter, Boston Scientific). Controlled-release coils were used to completely occlude fistula (MicroPlex, Microvention). Microcatheters were used to perform catheterization of the 2 large fistulae in the proximal and medium third of the anterior descending artery, the fistula being successively occluded with the same type of microcoils. These coils are produced by Microvention. New platinum microcoils were introduced into the market in 2002 for the embolization of brain aneurysms. We used 11 devices for the embolization of the fistulae: 2 microplex 4mm/8cm, 2 microplex 6mm/15cm, 2 microplex 8mm/20cm, 1 microplex 4mm/10cm, 1 microplex 5mm/12cm, 1 microplex 7mm/18cm, 1 microplex 7mm/30cm, and 1 microplex 9/30cm (fig. 3).

A residual flow was left in the right coronary fistula by a lateral branch emerging before the site where the coils were released. The patient under local anesthesia tolerated the procedure well. Distal embolization was not observed for the coronary branches.

After the procedure, the patient reported a sizeable improvement in symptoms and was discharged 2 days after the procedure, receiving atenolol 25mg/day.

Doppler echocardiography performed 8 months after the procedure revealed normal cavities without anomalous flows. An electrocardiogram demonstrated complete reversion of the left bundle-branch block. Late coronary angiography revealed complete occlusion of the 2 fistulae of the left coronary artery (fig 4). The lateral branch of the fistula in the right coronary artery did not have the expected embolization, persisting and evolving. Although the patient was asymptomatic, we opted for a new embolization procedure with disposable balloons. After selective catheterization of the fistulous branch by using JR 4 8F, the fistula was occluded with 2 balloons (GVB 16, Cathnet-Science) (fig. 5).

## Discussion

Coronary fistulae may occur between these arteries and the cardiac chamber or other vessels; they may be congenital, traumatic, or iatrogenic<sup>1</sup>. Hemodynamic repercussion depends on the site of origin, ending, and size of the fistula<sup>2</sup>. Fistulae from both coronaries represent only 5% of the total.

Most coronary fistulae are small, without hemodynamic repercussions. In larger fistulae, myocardial ischemia may be due to a

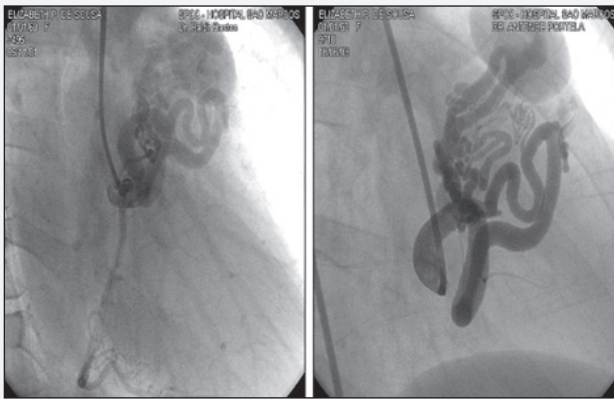


Fig. 1 - A: Right coronary (RC) in right anterior oblique (RAO). Fistulae volume in RC ostium. B: Selective catheterization of RC fistula in right anterior oblique (RAO).

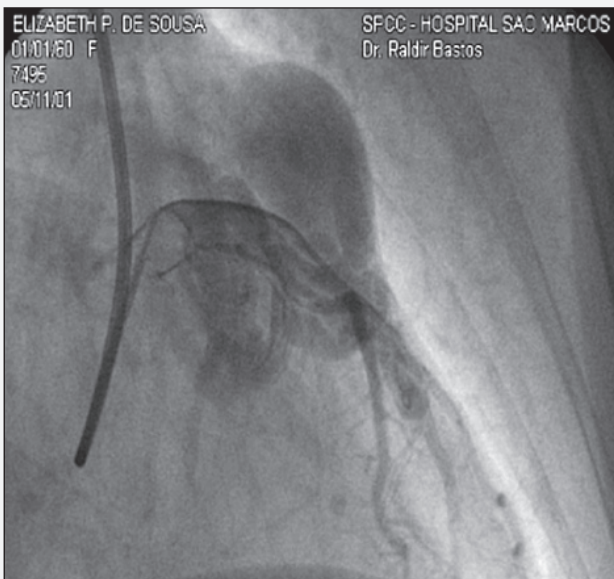


Fig. 2 - Left coronary (LC) in RAO. Coronary steal phenomenon.

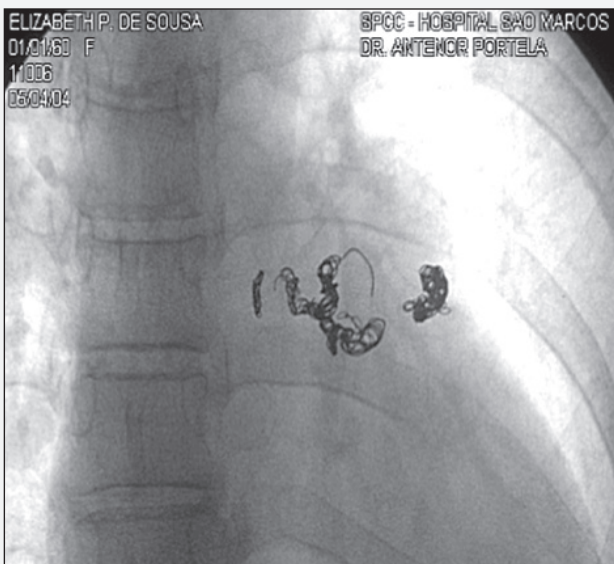


Fig. 3 - Chest X-ray in ? am PA. Implanted microcoils.

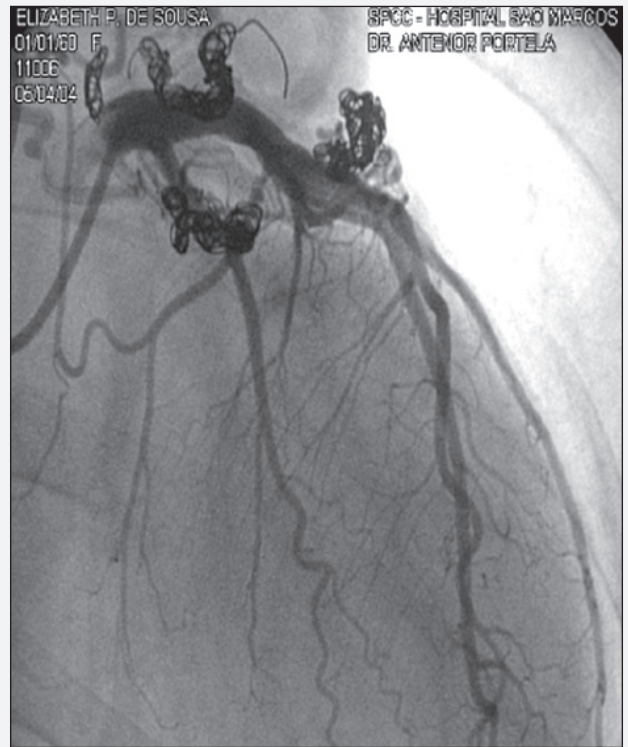


Fig. 4 - RC in RAO. Late control with fistulae occlusion.

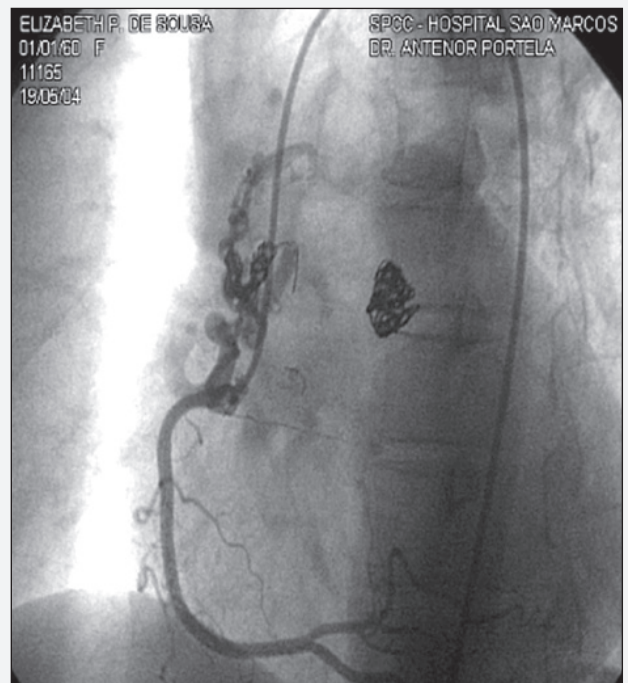


Fig. 5 - RC in LAO. Total fistula occlusion after balloon embolization.

the alterations that may be found are chronic myocardial ischemia and angina, heart failure and cardiomyopathy, myocardial infarction, pulmonary hypertension, endocarditis, arrhythmias, fistula thrombosis, and rupture, which is rare.

Many patients are referred to the hospital due to continuous murmur in the left sternal border. In larger fistulae, electrocardiography alterations may occur. Transthoracic echocardiography, in most adult cases, cannot determine the beginning and the end of the shunt, and transesophageal echocardiography is more suitable for an accurate diagnosis.

“coronary steal phenomenon”, resulting in ischemia of the myocardial segment caused by the coronary distal to the fistula. Compensatory dilation occurs in the proximal segment.

High-debt fistulae may result in symptoms or sequelae<sup>3</sup>. Among



The size and anatomical characteristics of the fistulae may be accurately established by coronary angiography.

Fistulae without complications and clinically silent should not be treated. Prophylaxis for endocarditis is controversial. Large fistulae should be linked<sup>3</sup>, and surgical methods have good results<sup>9,10</sup>.

In recent years, despite the satisfactory results of surgery, less invasive percutaneous methods have become the treatment of choice. Several devices have been used, including Gianturco's coils, disposable coils, disposable balloons, alcohol polyvinyl, double

umbrellas, and the Amplatzer occluder<sup>4-8</sup>. The risks of percutaneous treatment include myocardial infarction and embolization of the devices used for other extracardiac vascular structures.

In the present case, coronary angiography for late control demonstrated complete occlusion of the left coronary fistulae, and the residual fistula of the right coronary may be successfully treated with disposable balloons. The use of several percutaneous devices for occlusion of several fistulae from both coronaries, occurring with symptoms of heart failure makes this a peculiar case.

## References

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