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Case Report

Coronary-Pulmonary Artery Fistula Arising from the Left Anterior Descending Coronary Artery Draining into the Pulmonary Artery: A Clinical Case and the State of the Art

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Abstract

A 76-year-old woman with hypercholesterolemia and hypertension presented with dyspnea and initial heart failure. An echocardiography showed a severe aortic regurgitation but normal left ventricular volume. Coronary angiography showed no significant atherosclerotic lesions in the major epicardial coronary arteries and a coronary artery to pulmonary artery fistula (CAF) originating from the left anterior descending artery. A multi-detector row computed angio-tomography (MDCT) confirmed the CAF and it was treated using ligation and endocardial closure. The aortic valve was replaced. MDCT was useful for understanding the spatial relation of the CAF.

Keywords: *Dyspnea; Fistula from Left Anterior Descending Artery; Angio-TC; Pulmonary Artery*

Introduction

Coronary artery fistulae (CAF) represent the most frequent congenital anomalies of the coronary arteries but remain a relatively uncommon clinical problem. Coronary artery fistula is an abnormal direct connection between a coronary artery and either a cardiac chamber (coronary–cameral fistula), a vein (coronary arteriovenous fistula) or, most rarely, the pulmonary artery.

Clinical Case

A 76-year-old woman with hypercholesterolemia and hypertension presented with dyspnea upon minimal exertion (New York Heart Association class II-III). The vital signs were normal. Echocardiography showed normal left ventricular (LV) ejection fraction and volume, non-critical aortic valvular stenosis and severe regurgitation with initial LV diastolic dysfunction. Coronary arteriography showed no atherosclerotic lesions in the 3 major coronary arteries; however, in the anterior descending artery a communication with the pulmonary artery (PA) cavity through a complex fistula was detected (Figure 1 and 2), resulting in a very important pulmonary artery contrast opacification. The patient was stabilised on medical therapy and was referred for surgical correction with a ligation of the fistula and replacement of aortic valve with mini-thoracotomy approach.

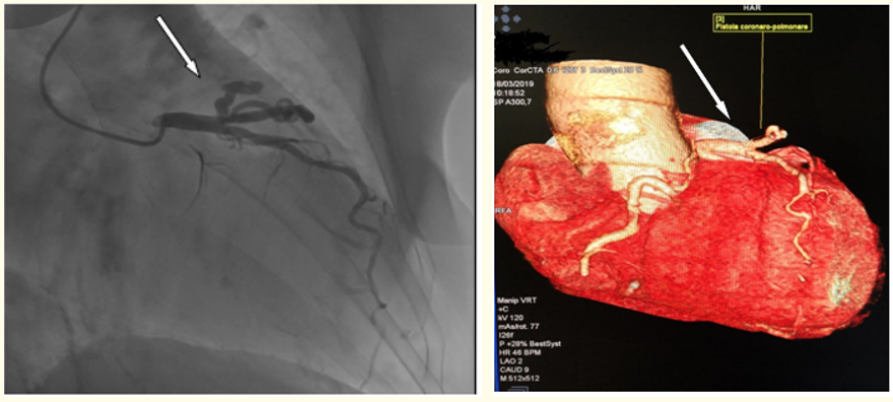

Figure 1A ***Figure 1B***

Figure 1: *Selective coronary arteriography (40° cranial 0° antero-posterior view, IA) showsthe fistula arising from the proximal left anterior descending artery with diagonal branches communicating with the pulmonary artery (arrows). The preoperative angio-TC (3D reconstruction, I B) confirms the communication between the LAD and PA (arrow).*

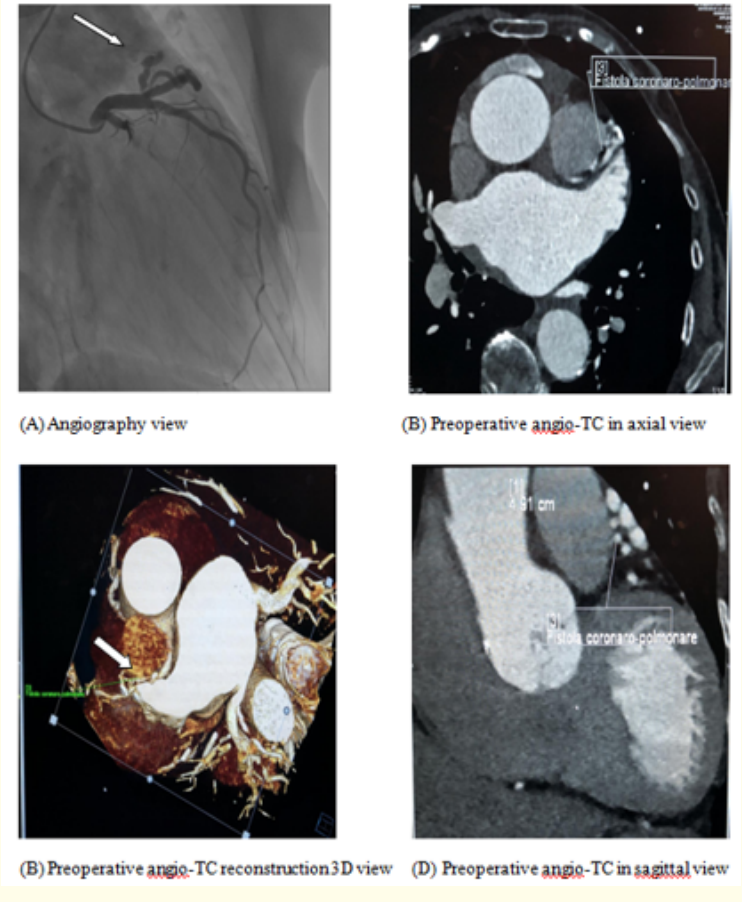

Figure 1: *Selective coronary arteriography (40° cranial 0° antero-posterior view, IA) showsthe fistula arising from the proximal left anterior descending artery with diagonal branches communicating with the pulmonary artery (arrows). The preoperative angio-TC (3D reconstruction, I B) confirms the communication between the LAD and PA (arrow).*

Discussion and Conclusion

Coronary artery fistulae (CAF) represent the most frequent congenital anomalies of the coronary arteries but remain a relatively uncommon clinical problem. Coronary artery fistula is an abnormal direct connection between a coronary artery and either a cardiac chamber (coronary-cameral fistula), a vein (coronary arteriovenous fistula) or, most rarely, the pulmonary artery. Coronary artery fistulae are observed with an incidence of less than 0.5% [1]. Most CAF are small and asymptomatic. The clinical presentation depends mainly on the extent of the left to right shunt. However, symptoms can develop with advancing age and shunting of the blood flow. Symptoms include angina pectoris, resulting in a coronary steal phenomenon or, as in this case, dyspnea on exertion, fatigue, and congestive heart failure with volume overload. It is widely accepted that all symptomatic CAF patients should be treated surgically but surgery for asymptomatic patients is still controversial [2]. A PubMed search was performed for articles between 2000 and 2010 to describe the current characteristics of congenital CAFs in adults [3]. A group of 304 adults was collected. With regard to CAF origin, the subjects were tabulated into unilateral, bilateral or multilateral fistulas and compared. Fistula-related major complications are described as: aneurysm formation, infective endocarditis, myocardial infarction, rupture, pericardial effusion and tamponade. In this group of 304 patients, dyspnea (31%), chest pain (23%) and angina pectoris (21%) were the prevalent clinical presentations. Continuous cardiac murmur was heard in 82% of the subjects.

The cornerstone in establishing the diagnosis was echocardiography (68%), and conventional contrast coronary angiography (97%). However, multi-slice detector computed angio-tomography (MDCT) was performed in 16%. Most patients (80%) had unilateral fistulas, 18% presented with bilateral fistulas and 2% with multilateral fistulas. A unilateral fistula originated from the left coronary artery in 69% of the subjects and from the right coronary artery in 31%.

Due to the low prevalence of these multilateral fistulas, the appropriate management of patients with symptomatic coronary artery fistulae is controversial. Rarely, they may cause myocardial ischemia (due to the coronary steal phenomenon), heart failure, or spontaneous intrapericardial rupture. Sixty percent of these fistulae arise from the right coronary artery, and 90% terminate in the right side of the heart [3,4]. Depending upon the size and location of the fistulae, epicardial and endocardial surgical ligation or percutaneous endoluminal procedures (embolization) may be performed in some cases. Intervention is difficult or impossible when the fistulae are diffuse. Transcatheter closure approaches have emerged as a less invasive strategy and are nowadays considered a valuable alternative to surgical correction with similar effectiveness, morbidity and mortality. The percutaneous management, however, is mainly limited by the individual anatomic features of the fistula and an appropriate patient's selection is considered as a key determining factor to achieve complete occlusion. Therapeutic approaches are designed to reduce myocardial oxygen demand and thereby ameliorate the demand–supply mismatch. Symptomatic relief has been achieved with β-blockers or with calcium-channel blockers [5]. In our case, the junction of the CAF and the drainage site was identified. The fistula vessel was resected and closed. Concomitantly, the aortic valve was replaced.

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