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FISTULA BETWEEN THE LEFT ANTERIOR DESCENDING ARTERY AND THE PULMONARY TRUNK

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ABSTRACT

Background: Coronary artery fistulas are usually asymptomatic anomalies diagnosed most often incidentally during conventional coronary angiography or computed tomography angiography (CTA) of the coronary arteries.

Case report: We present the case of a 74-year-old woman with exertional dyspnoea, preserved left ventricular systolic function, no hemodynamically significant coronary artery stenosis, and a fistula between the anterior interventricular branch of the left anterior descending artery and the pulmonary trunk, identified by classic coronary angiography and CTA.

Conclusion: The growing prevalence of CTA examination of the coronary arteries in recent years has increased the recognition of coronary fistulas. Early diagnosis and appropriate management are essential in symptomatic patients.

KEYWORDS

Fistula, pulmonary trunk, LAD, left anterior descending artery

LEARNING POINTS

- Coronary artery fistulas, though rare, should be considered in the differential diagnosis of unexplained exertional dyspnoea, especially in elderly patients with comorbidities.
- Angio-computed tomography scan is the most effective imaging modality for identifying coronary artery fistulas and assessing their hemodynamic significance.
- Early diagnosis and appropriate intervention can prevent complications such as coronary steal syndrome, heart failure, and pulmonary hypertension, highlighting the importance of multidisciplinary management. Early recognition of coronary steal syndrome is crucial in symptomatic patients with exertional dyspnoea and no significant coronary artery stenosis.

INTRODUCTION

Coronary artery fistulas are rare anomalies consisting of abnormal connections between a coronary artery and the heart chambers or another blood vessel. We report the case of a 74-year-old woman with a symptomatic fistula between the anterior interventricular branch of the left anterior descending artery (LAD) and the pulmonary trunk.

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CASE DESCRIPTION

A 74-year-old obese woman with a history of hypertension, persistent atrial fibrillation, and type 2 diabetes presented with exertional dyspnoea, easy fatigability, and decreased exercise tolerance (New York Heart Association, NYHA class II). Coronary angiography performed on a scheduled basis showed no hemodynamically significant coronary artery stenosis but revealed a fistula between the LAD and the pulmonary trunk *(Fig. 1)*.

Further diagnostic evaluation included coronary computed tomography angiography (CTA) performed using a 64-slice scanner and bolus tracking technique with an intravenous injection of 60 ml of contrast agent. The images revealed optimal contrast of the left heart, thoracic aorta, and coronary arteries, but no contrast within the pulmonary arterial system. The examination was technically challenging due to the patient's irregular and excessively fast heart rate. Retrospective protocol and post-processing generated diagnostic tomograms that confirmed a fistula between the mid-LAD segment and the pulmonary trunk.

The tortuous duct of the fistula, originating from the mid-LAD approximately 30 mm from its outlet from the left coronary artery trunk, ran anteroinferiorly (diameter 1-2 mm) and subsequently widened to 4-5 mm before entering the anterolateral part of the pulmonary trunk. Leakage of contrast into the pulmonary trunk was observed *(Fig. 2)*. The pulmonary trunk diameter was borderline at 31-32 mm, and the left atrium was found to be enlarged.

On clinical examination, no pathological murmurs were reported. The electrocardiogram (ECG) revealed persistent atrial fibrillation with a ventricular rate of 75 bpm and an undetermined axis. Transthoracic echocardiography showed normal left ventricular systolic function with an ejection fraction (EF) of 60% and no valvular abnormality. B-type natriuretic peptide was not measured. The patient was treated conservatively with β-blockers, diuretics, α-blockers, and anticoagulants. After stabilization, she was discharged in good condition and referred for further imaging, including contrast-enhanced coronary CTA. No interventional closure of the fistula was attempted.

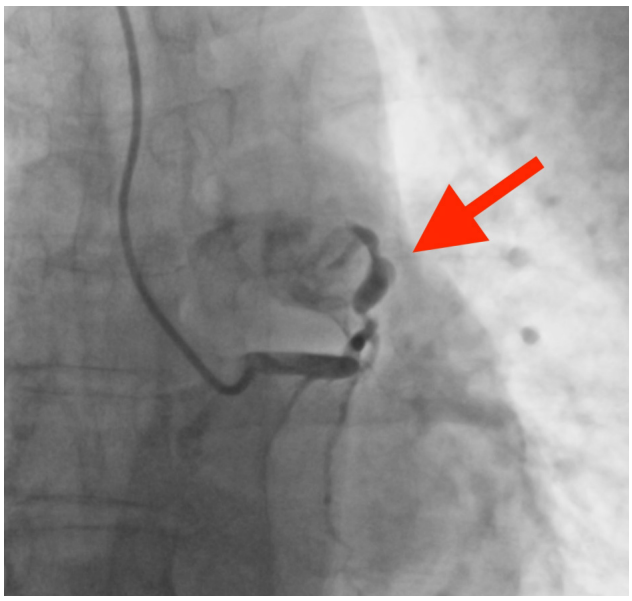


Figure 1. Cardiac catheterization image. The fistula between the left anterior descending artery and pulmonary artery.

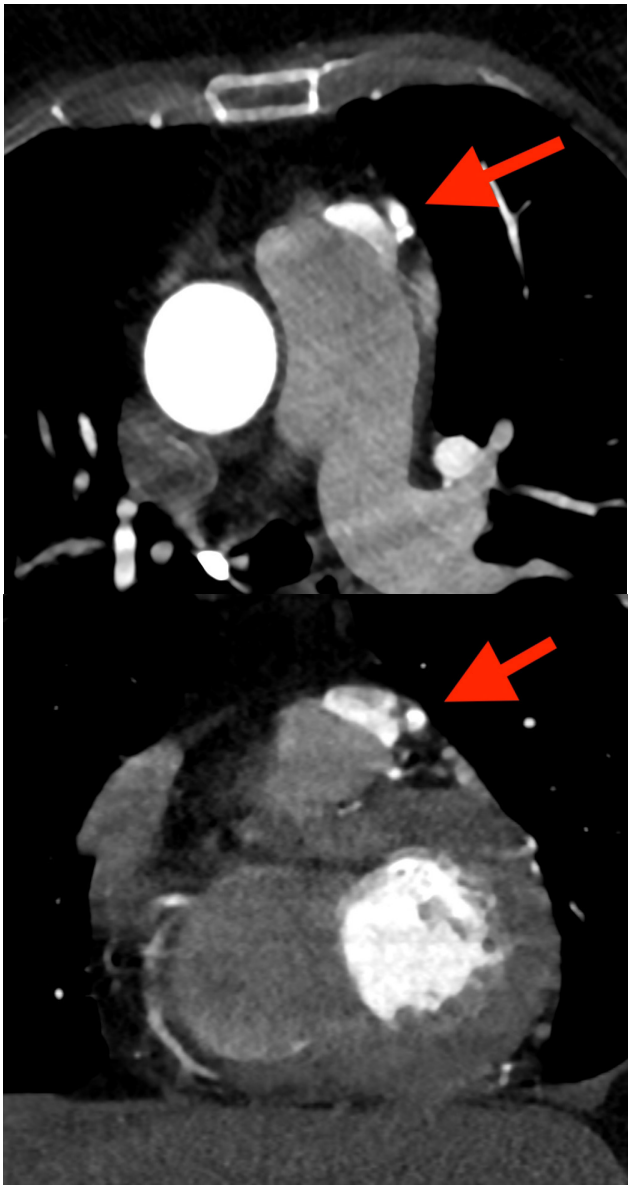


Figure 2. Axial and coronal computed tomography angiography images show contrast leakage into the pulmonary trunk.

DISCUSSION

Coronary artery fistulas are abnormal connections between the lumen of the coronary artery and the heart cavity or another blood vessel. They are estimated to occur in about 0.002% of the general population, accounting for about 0.4% of all cardiac malformations[1]. However, the growing availability of CTA examinations of the coronary arteries in recent years has resulted in an increased recognition of this anomaly. A study of 6,249 patients who underwent coronary-artery CTA revealed a coronary fistula in 0.9% of them. In patients undergoing classical coronary angiography, the incidence of coronary fistula diagnoses is estimated to be 0.05-0.25%[2]. A review of the literature does not allow a clear determination of the incidence of the coronary fistula site. A group study of 363 patients showed the right

coronary artery to be the most common site of origin of the fistula (50%), followed by the LAD (42%) and both arteries (5%). The most common site of the outlet of coronary fistulas was the right ventricle (41%), followed by the right atrium (26%) and the pulmonary trunk (17%)[3]. Cases of multiple fistulas have also been described[4].

The majority of coronary fistulas are congenital, with far fewer being acquired as a result of trauma, vasculitis, myocardial infarction or iatrogenic arising as complications of cardiac surgery and radiotherapy[4,5]. Coronary artery fistulas tend to remain asymptomatic and are diagnosed incidentally. The occurrence of symptoms depends on the size of the fistula, pressure gradient and volume of blood flowing through the fistula. Large or multiple fistulas can cause congestion of the pulmonary circulation, pulmonary hypertension, congestive heart failure[4]. In the case described here, in a patient with a preserved LV systolic function and no haemodynamically significant coronary artery stenosis, "coronary steal syndrome" was suspected, leading to myocardial ischaemia distal to the fistula site as a result of impaired coronary circulation caused by the flow of oxygenated blood from the LAD to the pulmonary trunk (according to the blood pressure gradient). Consequently, in this case it was manifested as exertional dyspnoea, easy fatigability and reduced exercise tolerance, the so-called "masks" of angina pectoris, occurring more frequently in the elderly and patients with diabetes. Other complications of coronary fistulas include arrhythmia, coronary artery aneurysm, fistula rupture, infective endocarditis and sudden death[4,5].

CTA of the coronary arteries is the optimal method of diagnosing coronary artery fistulas, as well as defining and visualising their anatomy. Other diagnostic methods include classic coronarography, magnetic resonance imaging and transoesophageal ultrasound examination.

In symptomatic patients, percutaneous transcatheter closure or surgical ligation of the fistula is performed. The choice of method depends on the anatomical features of the fistula, i.e. tortuosity, length and diameter[1,4]. There is no consensus on the treatment of asymptomatic patients, although some authors recommend intervention, especially in children and young adults[1,4].

In the case presented here, the fistula was suspected to cause symptoms via the mechanism of coronary steal syndrome, particularly as no hemodynamically significant coronary artery stenosis was found and systolic function was preserved. Although closure of the fistula was considered, the patient responded well to conservative treatment and reported complete resolution of symptoms during follow-up, which supported the decision to withhold invasive intervention. Regarding the plausibility of closure, the anatomical characteristics of the fistula — its tortuous course and connection to the pulmonary trunk — would technically allow for percutaneous or surgical correction. However, due to the patient's comorbidities and clinical improvement, invasive treatment was not pursued.

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