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Case Report

ANOMALOUS DRAINAGE OF THE RIGHT CORONARY TO THE RIGHT ATRIUM: CASE REPORT

Almir A. Lacalle., Evaldo G. F. Filho., Isabela C. Altomari., Rebecca C.V. Baldo., Jenner L. Lopes., José G. R. Paula and Elizabeth E.S. Cestário*

Centro Universitário de Votuporanga University Center of Votuporanga (UNIFEV), São Paulo, Brazil

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A B S T R A C T

Introduction: The approach to chest pain in the emergency department, which is often crowded, is a great challenge that can lead to crucial differential diagnoses and some rare conditions being missed.
Objective: To report the case of a patient who was admitted to our clinic with a typical complaint of chest pain and after a thorough investigation was diagnosed with an arteriovenous fistula as the main cause of the symptoms and comorbidities.
Methods: This case data were obtained through medical records and bibliographic review.
Final Considerations: We described this case to highlight the importance of searching for the etiology, whenever possible, of chest pain in emergency departments and in cardiology wards for an accurate diagnosis and early rehabilitation.

INTRODUCTION

Fistulas are defined as vascular abnormalities that can create shunts between the high resistance arterial systems and the low resistance venous bed. Its origin may be congenital, as most artery-chamber fistulas, or acquired, for example, after an invasive procedure or due to coronary dissection.[1]

The pathological mechanism of an arterial fistula is sustained by a communication between coronary arteries and other compartments, such as atria or veins. The consequence of this phenomenon is increased resistance, pressure and volume at the fistula drainage site leading to a rise of the heart rate and cardiac output in order to compensate for the lack of perfusion caused by the fistula. An untreated fistula can progress to myocardial hypertrophy and hyperdynamic heart failure.[1,2]

Epidemiological data show that coronary fistulas are rare. They usually involve the right coronary artery (ACD) and drain into the right ventricle in approximately 41% of cases; they can also drain into the right atrium (26%), pulmonary arteries (17%), left ventricle (3%) and more rarely to the superior vena cava in approximately 1% of cases.[3,4]

Objective

To report the case of a patient with a coronary fistula to the right atrium who was admitted to the emergency room with the complaint of chest pain and dyspnea and was submitted to a surgical procedure.

Corresponding author:* **Elizabeth E.S. Cestário
Centro Universitário de Votuporanga University Center of Votuporanga (UNIFEV), São Paulo, Brazil

METHODS

The data of this case report were obtained by reviewing medical files, imaging records of the diagnostic methods to which the patient was submitted.

Case report

Patient workup

A 49-year-old male, mixed ancestry patient originally from Itapetininga, Sao Paulo but currently resident in Votuporanga, Sao Paulo, was admitted to the emergency room (ER) of our service reporting an insidious dyspnea exacerbated by minimal effort and alleviated by rest. The patient´s complaint was associated with fatigue.

When asked about the chest pain, he reported a feeling of tightness of the chest coinciding with a worsening of the dyspnea, associated with shortness of breath that improved with rest. He reported that similar episodes had occurred other times, although he was not unduly concerned until the most recent episode, in which the pain was more intense. He denied irradiation of the pain.

Background

The patient is an ex-smoker with arterial hypertension diagnosed ten years previously. He had suffered pulmonary thromboembolism ten years ago and he had been admitted to

the intensive care unit 15 years ago due to pulmonary hypertension. His father had died of sudden death at 45 years old.

Physical exam

The patient's general state of health was ruddy, hydrated and acyanotic. He had a pulse of 72 bpm, respiratory rate of 16 breaths per minute and a blood pressure of 130/85 mmHg. Bilateral lung auscultation was normal. However, he had an abnormal heart rhythm with normal sounds and normal S1 and S2 without murmurs. His pulses were symmetrical and he had no leg edema.

Diagnostic hypothesis

The diagnostic hypothesis was acute myocardial infarction (AMI) without ST-segment elevation or pulmonary embolism.

Medical conduct

The chest pain was assessed and aspirin, clopidogrel and morphine were prescribed. Complementary exams were performed, including laboratory exams (Table 1), electrocardiography and chest x-ray.

Table 1 Laboratory exams on admission

Variable	
Sodium	137 mEq/L
Potassium	4.0 mEq/L
Troponin I	1.78 ng/mL
Creatinophosphokinase (CPK)	799 U/L
Creatinophosphokinase- mb fraction (CKmb)	27.81 U/L
Urea	28.98 mg/dL
Creatinine	0.83 mg/dL
AST	23.1 u/L
ALT	25 u/L
Ht	38.3 %
Hb	13.8 g/dL
Leukocytes	4322 cels/ mm^3
Rod cells	0
Segmented cells	41.2 %
Platelet count	163000 cels/mm^3
aPTT	52.30 s
INR	1.16
Arterial Blood Gases	
Ph	7.34
PO^2	106.1mmHg
PCO^2	44.7 mmHg
HCO^3	21.7 mEq/L
BE	1.8
O^2 saturation	97.7%

The electrocardiogram called the attention of the ER physician because of the patient's atrial fibrillation rhythm. The chest x-ray showed a small increase in the cardiac area. The patient was hospitalized based on the diagnosis of a possible AMI without ST-segment elevation and pulmonary embolism.

Follow-up

The cardiac enzymes (Troponin and CKmb) were investigated during hospitalization and found to be elevated. However, given the diagnostic doubts, these laboratory tests alone did not elucidate the case.

An echocardiogram was then requested which showed an ejection fraction of 51.3% and an additional unspecified finding near the right coronary artery (RCA) and so the investigation continued with a transesophageal echocardiogram.

This exam identified dilation of both the right and left atria (right atrium volume: 54 mL/m^2 - significant increase; left atrium volume: 48 mL/m^2 - moderate increase), mild tricuspid insufficiency, minimal mitral insufficiency, slight dilation of the aortic root (39 mm), mild left ventricular contractile dysfunction with a slight increase in its diameter (60 mm) and ejection fraction 48%. Moreover, the left coronary artery was dilated (0.4 cm) suggesting a local aneurysm. The local systolic flow was turbulent with a fistula originating at the right coronary ostium and communicating with the right atrium near the juncture of the superior vena cava (Figure 1). Cardiac catheterization was performed in order to clarify diagnostic doubts.

Figure 1

Cardiac catheterization demonstrated a small increase in ventricular volumes, diffuse and mostly inferior hypokinesia, dominant RCA with no obstruction and no obstruction of the right posterior descending branch and the right posterior ventricular branch. As an additional finding, there was a dilation at the ostium of the RCA suggesting a right coronary fistula with drainage to the right atrium (Figure 2).

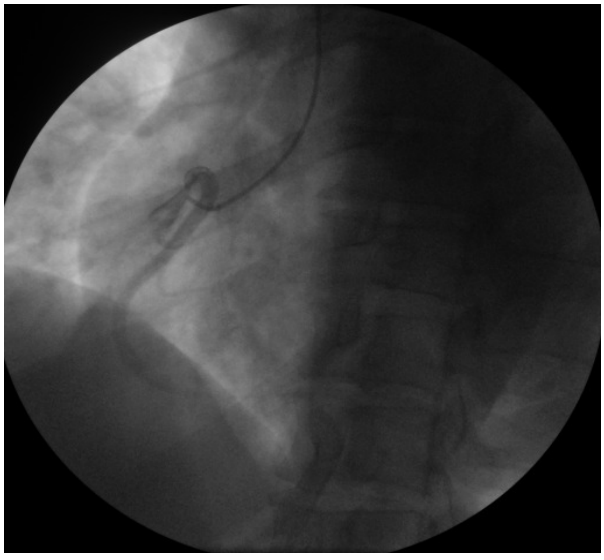

Figure 2

After the diagnosis was elucidated, an evaluation of a cardiovascular surgeon was requested who recommended surgical treatment of the fistula due to the patient's age and symptoms (Figure 3).

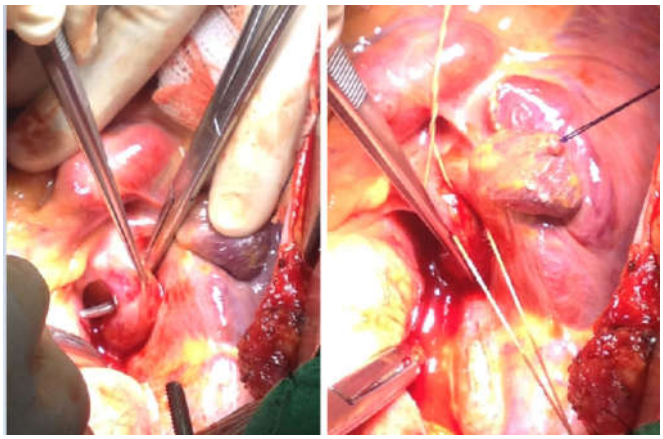

Figure 3

The patient was discharged from hospital with complete resolution of the symptoms, and sinus rhythm. Months after the surgery, the patient reported that he was asymptomatic without any complaints of chest pain, fatigue or dyspnea.

DISCUSSION

The natural history of coronary arteriovenous fistulas shows a benign character; they are often a chance finding during the investigation of other cardiac pathologies, such as angina.[5]

These anomalies, however, are sometimes associated with intermittent, acute, sustained or chronic interruption of myocardial perfusion, which may result in angina, congestive heart failure, myocardial infarction, cardiomyopathy, ventricular aneurysms and even sudden death.[5,6]

The clinical manifestations begin around the second decade of life and range from continuous murmurs with diastolic accentuation[7] to congestive heart failure, precordial pain, arrhythmias such as atrial fibrillation and endocarditis. [3-8]

The diagnosis of arteriovenous fistulas depends on imaging exams. The echocardiogram has a limited role in the diagnosis with transesophageal echocardiography being better than transthoracic echocardiography. Computed tomography has a sensitivity of 87%, while coronary angiography may have low sensitivity (maximum of 58%) especially if the fistula drainage is to a heart chamber [1]. The combination of echocardiogram and angiography leads to a more accurate diagnosis than the use of a single exam.[9]

Considering treatment methods, studies suggest that both symptomatic and asymptomatic patients should receive surgical correction. Asymptomatic patients should be submitted to surgery in order to prevent later complications such as congestive heart failure, angina, acute myocardial infarction, endocarditis and pulmonary hypertension[4-10]. Hence, an advantage of treatment might be obtained by the closure of fistulas in asymptomatic patients during childhood. Symptomatic carriers should be treated surgically despite their age. [11]

It is also important to stress that the flow of the vessel should not be impaired during the repair of coronary fistulas. [12] Despite controversy and the different therapeutic options available, percutaneous closure seems to be the treatment of choice. This method occludes the fistula using devices to cause embolization or using balloons. Open surgery can also be used, in particular, in symptomatic patients with several surgical techniques having been employed, including simple fistula ligation. [10]

Final considerations

It is known that the management of dyspnea and chest pain in the emergency room is always a challenge due to the many differential diagnoses, the stress of the team and the need of emergency care.

However, some rare conditions must be remembered and sometimes investigated. In this case, the detailed patient workup revealed sudden paternal death and a personal history of hospitalizations with cardiopulmonary complaints, which led us to seek structural abnormalities to explain all these events.

This case report draws the attention of ER physicians and cardiologists to the importance of careful differential diagnoses of chest pain in the ER.

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Conflict of interest

The authors have no conflict of interest.

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