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Case Report

Chest Pain in a Patient With an Anomalous Coronary Artery and Multiple Valvular Diseases: What is the Culprit?

Meity Ardiana[1*], MD; Inna Maya Sufiyah[1], MD; Melita Amalia Ayuba[1], MD

ABSTRACT

Rare congenital abnormalities known as "coronary artery abnormalities (CAAs)" have various pathophysiological causes and clinical manifestations. We describe a 50-year-old man who complained of recurrent shortness of breath. The patient had a 3-day history of the condition, which worsened with exertion. A coronary angiography, followed by a coronary computed tomography angiography, showed that the ostium of the left main coronary artery (LMCA) originated from the proximal right coronary artery. Our elderly patient with an uncommon CAA also had significant aortic stenosis. Coronary angiography and coronary computed tomography angiography are crucial procedures in these patients to confirm the diagnosis and choose the appropriate course of action. Despite its debatable effectiveness, coronary artery bypass grafting may be an option for young patients suffering from CAAs with interarterial courses, such as the left major coronary artery originating from the right coronary artery. ***(Iranian Heart Journal 2024; 25(1): 93-97)***

KEYWORDS: Rare cardiovascular disease, Coronary artery abnormalities, Sudden death, LMCA, Coronary anomalies.

[1] Department of Cardiology and Vascular Medicine, Faculty of Medicine, Airlangga University – Soetomo General Hospital, Surabaya, Indonesia.

*** Corresponding Author:** Meity Ardiana, MD; Department of Cardiology and Vascular Medicine, Faculty of Medicine, Airlangga University – Soetomo General Hospital, Surabaya, Indonesia.
Email: meityardiana@fk.unair.ac.id **Tel:** +62 812-5980-8492

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The incidence of coronary artery abnormalities (CAAs), rare congenital deformities in 0.3% of all autopsies and 1% to 6% of individuals undergoing coronary angiographies, has been documented in the literature. [1] CAAs are the second most frequent cause of sudden cardiac death in young athletes in the United States, accounting for 12% of deaths. [2] While these anomalies are present at birth, most CAAs are found incidentally later because either there are no symptoms or symptoms may go unrecognized. Clinical findings can vary according to the subtype of the anomaly and its trajectory in the heart, yet a potential malignant course can lead to myocardial ischemia, myocardial infarction, and sudden death. [1] The risk of sudden cardiac death in middle-aged or elderly individuals with an incidentally discovered coronary anomaly is unclear but is probably negligible. The anomaly most frequently associated with sudden cardiac death is the anomalous origin of a coronary artery, particularly with a course between the aorta and the pulmonary artery. [3]

We herein describe a patient with an anomalous coronary artery and severe aortic stenosis.

Case Presentation

A 50-year-old Melanesian man referred to us from another hospital complained of shortness

of breath, chest pain, and fainting during physical activity of 1 year's duration. Three days before admission to our hospital, he again felt shortness of breath, which worsened with activity. The patient then visited a cardiologist, who performed an echocardiographic examination and diagnosed rheumatic heart disease and aortic stenosis. He was given furosemide (40 mg once a day) and ramipril (2.5 mg once a day) and was referred to our hospital for further treatment.

In the emergency department of our hospital, the patient complained of dyspnea on exertion and compressing chest pain. He had no history of cardiovascular and metabolic diseases, nor did his family. A physical examination revealed a blood pressure of 113/70 mm Hg, a regular heart rate of 68 bpm (normal range = 60–100 bpm), a respiration rate of 20 breaths per minute (normal range = 12–20/min), and an oxygen saturation level of 98% on free air (normal range = 95%–100%). His body mass index was 23.43 kg/m^2. There were no positive physical examination findings. All other laboratory values were within the normal range.

An ECG (Fig. 1a) illustrated a sinus rhythm of 68 bpm, a normal frontal axis, a counter-clockwise rotation, and left ventricular hypertrophy. A thoracic X-ray showed a normal impression (Fig. 1b). An echocardiographic examination demonstrated severe aortic stenosis (high flow-high gradient) with moderate aortic regurgitation and mild mitral regurgitation (Fig. 2). Hence, the patient underwent an urgent coronary angiography, during which a normal right coronary artery (RCA) was detected, but the left main coronary artery (LMCA) could not be cannulated. An ostial anomaly and chronic total occlusion of the LMCA were suspected (Fig. 3). Next, a computed tomography (CT) cardiac examination confirmed the abnormalities and their locations. The origin of the coronary anomaly in the LMCA was where the ostium originated from the proximal RCA (Fig. 4). Consequently, the patient underwent thoracic cardiovascular surgery.

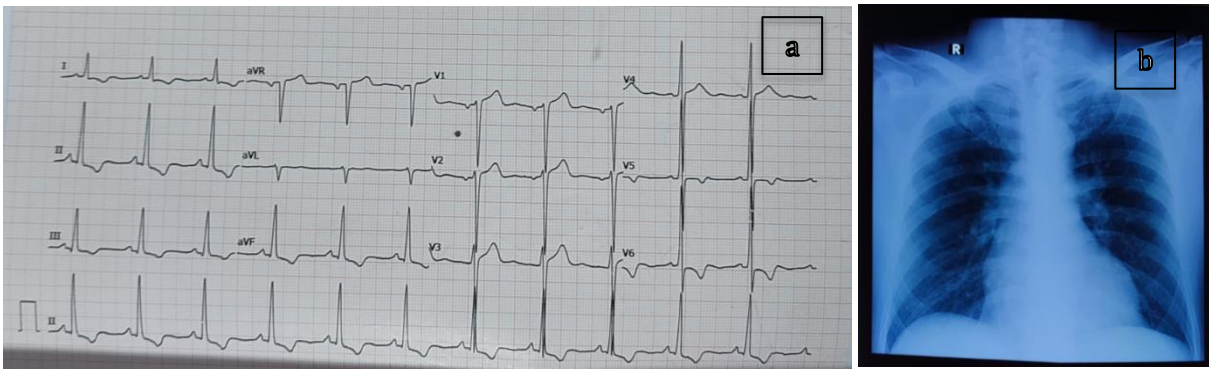

Figure 1: The images present the patient's ECG (a) and thoracic X-ray (b).

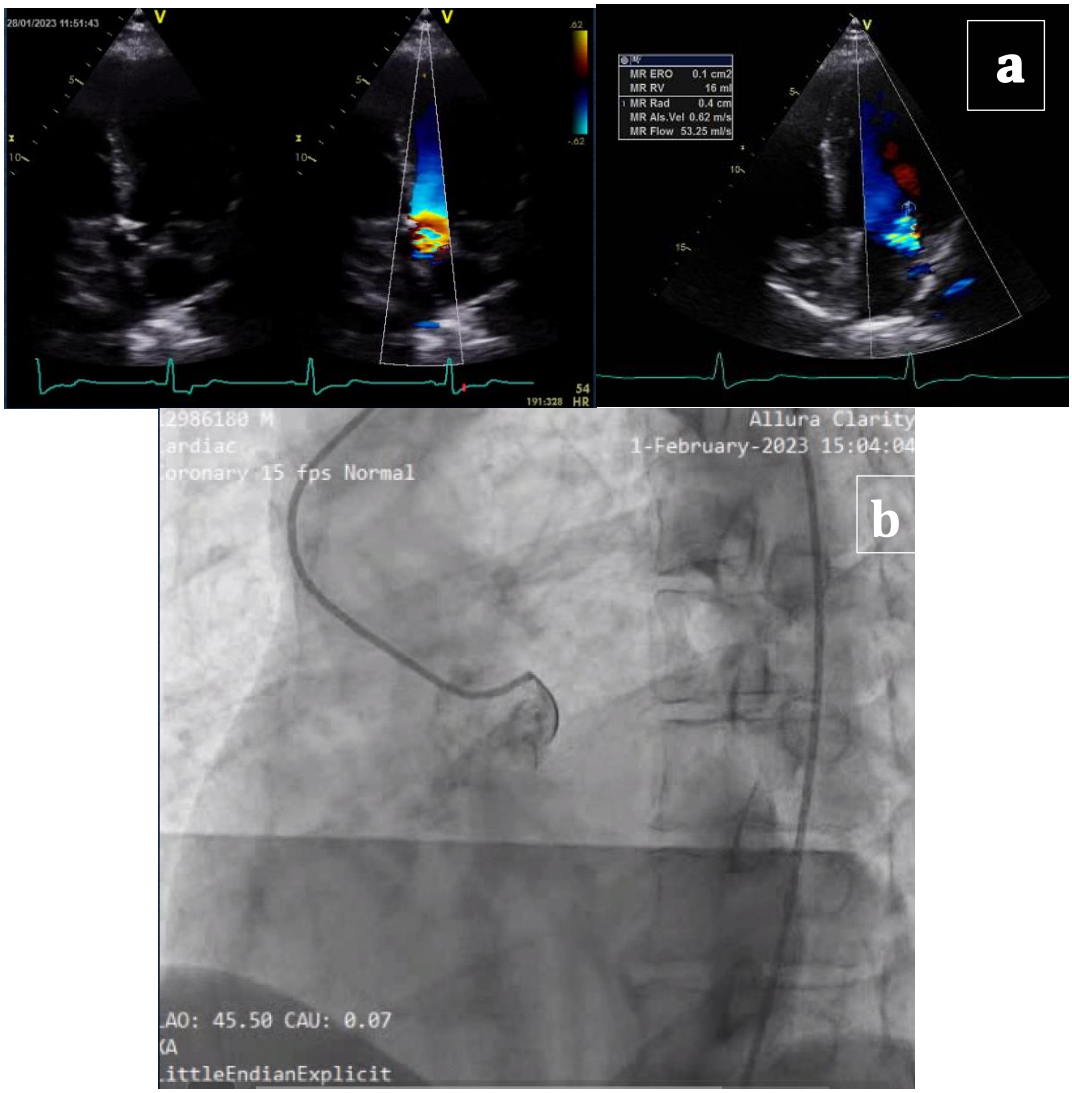

Figure 2: The images present the patient's (a) echocardiography, showing multiple valvular diseases, and (b) coronary angiography, showing no flow in the left main coronary artery.

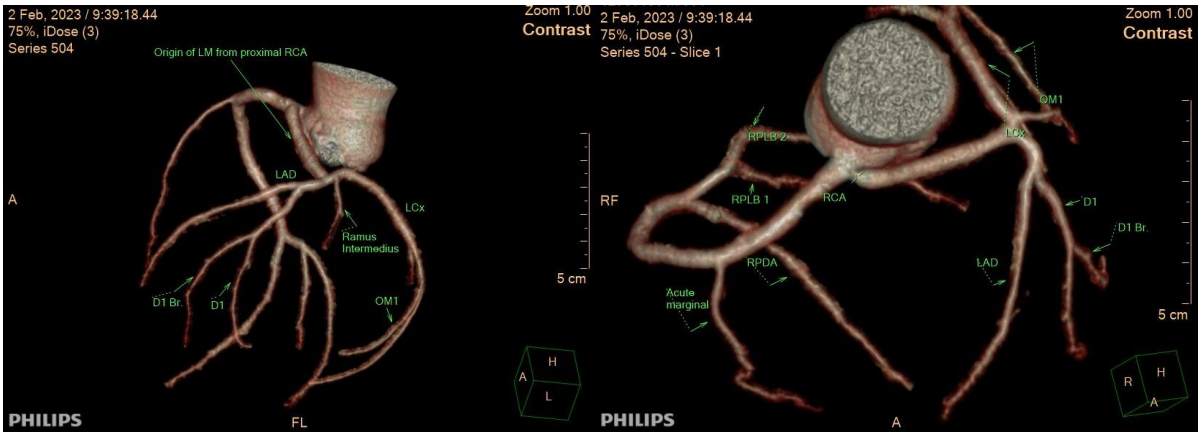

Figure 3: The patient's 3D tree view shows that the left main coronary artery (LMCA) ostium originates from the proximal right coronary artery (RCA).

DISCUSSION

CAAs occur only in approximately 1% of patients. The left circumflex artery arising from the RCA or the right coronary venous is the most prevalent origin and course of these abnormalities. Cerrito et al [4] stated that the abnormal origin of the left coronary artery (LCA) was 6 to 8 times less frequent than that of the RCA. LCA abnormalities are categorized into several classifications. In our patient, the coronary artery anomaly occurred in the LMCA and originated from the proximal RCA. An LMCA that branches out from the RCA and runs between the aorta and the pulmonary artery before branching into the left anterior descending artery and the left circumflex artery is included in the "between" classification. [4] Because these abnormalities are exceedingly rare, they often go undetected, even though they could prove a fatal form of congenital heart disease. [5]

The literature contains reports of chest discomfort, myocardial infarction, and sudden cardiac death linked to coronary anomalies. [6] These problems may be caused by inadequate coronary blood flow due to malformation associated with various causes, such as abnormalities in the narrow orifice, vasospasm, and the compression of the anomalous artery between an enlarged aorta and the pulmonary trunk. Our patient's chest pain may have been the result of an artery anomaly or caused by a valve abnormality.

The occurrence of CAAs along with valve abnormalities is a rare phenomenon. Nacar [7] reported a similar case of a single ostium from the right coronary venous in a patient with severe aortic stenosis. In such cases, establishing the definite cause is challenging.

The abnormal origin of the LCA from the proximal RCA may result in severe angina even while at rest, which may be an indication that coronary artery bypass grafting is required. [8] Our patient felt chest pain during activity, hence the possibility of chest pain due to valvular abnormalities. In addition, he had no previous cardiac complaints, so the complaints arose due to the exacerbation of the valvular disease. The European Society of Cardiology guidelines for the management of adult congenital heart disease advise surgery for the anomalous aortic origin of a coronary artery. [5]

CONCLUSIONS

Since the incidence of CAAs is extremely rare, professionals rarely consider them in their evaluation of patients. However, CAAs could cause severe symptoms. Our case can add information related to the symptoms and descriptions of patients with CAAs.

Conflict of Interest: None

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