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CASE REPORT

# A CASE OF COEXISTENCE OF PULMONARY EMBOLISM AND ANOMALOUS ORIGIN OF CORONARY ARTERY

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## ABSTRACT

Coronary artery anomalies are a set of congenital conditions that may cause serious clinical problems and sudden deaths. We aim to present the case of a patient with a massive pulmonary embolism that coexisted with a malignant coursed coronary artery, which was detected on cardiac computed tomography. A 65-year-old female patient with complaints of chest pain, shortness of breath, diabetes mellitus, hypertension, and hyperlipidemia was referred to the radiology department on March 28th 2019. In cardiac computed tomography examination, only one coronary artery originating from the right coronary cusp was observed. The left main coronary artery arrived at its normal position after an interarterial course between the aorta and right ventricular outflow tract after the bifurcation. The patient had an embolism extending from the distal right main pulmonary artery to the lower and upper lobe segmental arteries. The patient's informed consent was obtained. When pulmonary embolism is seen in interarterial course of the coronary artery in conjunction with the isolated coronary artery, it becomes a severe case. Coronary course anomalies can be detected on computed tomography angiography of pulmonary arteries and aorta. Therefore, radiologists should be careful to document these pathologies.

**Keywords:** Computed tomography angiography, coronary vessels, sudden death, anomalous origin, pulmonary embolism

## INTRODUCTION

Coronary artery anomalies (CAAs) are a set of congenital conditions, marked by an aberrant origin or course of one or more of the three primary epicardial coronary arteries (1). Congenital CAAs are really common in clinical cardiology and cardiac surgery due to their relationship with myocardial ischemia and sudden death (2). Physiological variations and pathophysiologically relevant abnormalities are included in CAAs' clinical and anatomical ranges (3). Most of the subspecies are not hemodynamically related and are often found by accident (3). The detection of rare and associated abnormalities that cause associated shunt volumes leading to myocardial ischemia or ventricular tachyarrhythmias with the risk of sudden cardiac death (SCD) is crucial (3). There are so many forms of CAAs like atresia of the left main stem, coronary fistulae, and anomalous origin of the left coronary artery from the pulmonary artery have also been implicated in cases of sudden death (4). Aside from anomalies originating in the coronary arteries, there are some cases where prepulmonic, transseptal, retroaortic, or interarterial courses are seen (5). Among these anomalies, the anomaly of the interarterial course is defined as malignant and is known as the most serious coronary artery anomaly, since it significantly increases the mortality rate by SCD (5).

A blockage in one of the pulmonary arteries in the lungs is known as pulmonary thromboembolism, which typically presents with shortness of breath and chest pain (6). Because of the restriction in pulmonary blood flow, pulmonary thromboembolism is a serious clinical condition that is commonly observed and can be fatal (6). Today, computed tomography angiography (CTA) is the imaging method primarily used in emergency departments

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for the diagnosis of pulmonary thromboembolism due to its advantages such as having high sensitivity and specificity values, accessibility, and fast application with immediate results. While the detection of a clot on a pulmonary angiography is the gold standard for diagnosis, computed tomography (CT) pulmonary angiography is one of the most often employed imaging modalities (7). We present the case of a patient with a massive pulmonary embolism coexisting with a malignant coursed coronary artery detected on a coronary CTA. As CAAs are rare conditions that can cause serious clinical problems, we hope to contribute to the literature and raise awareness about CAAs.

## CASE REPORT

A 65-year-old female patient with diabetes mellitus, hypertension, and hyperlipidemia was consulted at the radiology department on 28 March 2019 with chest pain and shortness of breath for 2 months. Blood pressure was in the normal range (135/75 mm Hg), S1 and S2 were normal, and there was no additional pathological sound on physical examination. Echocardiography revealed concentric left ventricular hypertrophy and mild tricuspid, mitral and aortic valve insufficiency. The patient was referred as a medium risk of CTA. In CTA examination, it was observed that only one coronary artery was originating from the right coronary cusp; this presentation is anatomically correct. There was a bifurcation 4.5 mm distal to the origin. The right coronary artery (RCA) was observed in the normal course of the right atrioventricular groove. RCA and its main branches were patented. The left main coronary artery (LMCA), on the other hand, was arriving at its normal position through an interarterial course between the aorta and right ventricular outflow tract after the bifurcation (Figure 1). The patient also had an embolism extending from the distal right main pulmonary artery to the lower and upper lobe segmental arteries (Figure 2). The patient was discharged from the hospital after diagnosis. The patient did not present to our hospital again. The treatment and follow-ups of the patient were carried out in the city where the patient currently resided.

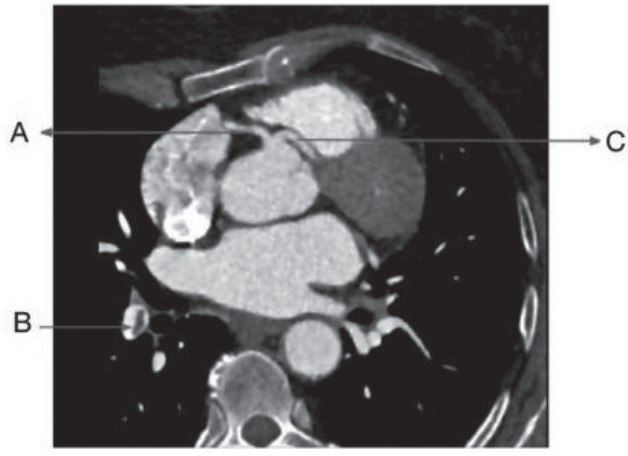


**Figure 1:** CT angiography image of the left main coronary artery originating from the right coronary cusp.

CT: Computed tomography, A: Right coronary artery, B: Pulmonary embolism, C: Left main coronary artery

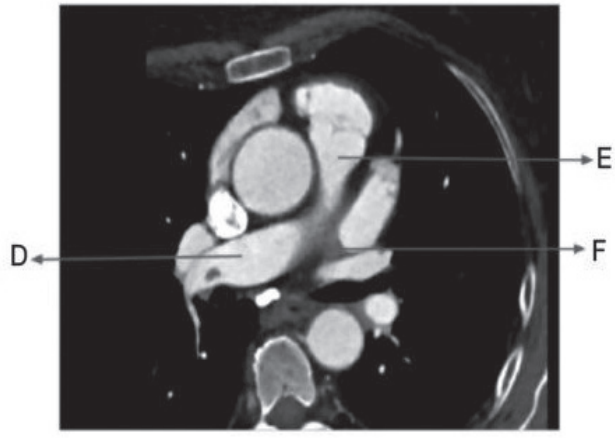


**Figure 2:** CT image of embolism in the right main pulmonary artery.

CT: Computed tomography, D: Right pulmonary artery, E: Pulmonary truncus, F: Left pulmonary artery

## DISCUSSION

Coronary artery anomalies are a group of rare congenital diseases whose pathophysiological mechanisms are extremely variable, ranging from silent anomalies to SCD (8). A single coronary artery is described as an isolated coronary artery, originating from the aortic root through a single ostium in the absence of another one (5). The isolated coronary artery is the only source of blood supply to the whole heart (5). Single CAAs usually go unnoticed, but people should be aware of the potential consequences of these anomalies such as the risk of SCD (5). Some types of single coronary artery abnormalities can cause SCD, especially during exercise (9). Isolated coronary artery abnormalities can also cause clinical conditions such as chest pain, myocardial infarction, cardiomyopathy, arrhythmia, dyspnea, and heart failure (10). Interarterial course of coronary arteries is one of the most dangerous types of cardiovascular diseases. In this type of anomaly, there is a high risk of sudden death if the coronary artery travels between the aorta and pulmonary artery. Even if it does not travel between these arteries, it can still cause dangerous situations and lead to serious conditions such as cardiac ischemia, ventricular fibrillation, and heart failure (10). Although cardiovascular disorders are seen at a lower rate in young patients, if they have coronary anomalies, the risk of SCD is much higher than in elderly patients. Younger patients were significantly more likely than older patients (≥30 years old) to die suddenly (62% vs. 12%) (11). Death in these young patients often occurs after intense physical activity because the enlarged coronary artery between the pulmonary artery and the aorta is compressed by them during exercise. Some studies reported that the interarterial course of the LMCA has a high sudden death rate (82%) (11). Therefore, early detection by CTA and surgical operation of this pathology is essential.

Pulmonary embolism is another fatal cardiovascular disorder that is caused by an embolism that travels to the lungs. Pulmonary embolism, which is detected by computer tomography has symptoms that are usually nonspecific (12). One of the most dangerous types of embolism is the saddle embolism, which gets stuck where the main pulmonary artery branches off into a Y-shape to go into each lung (12). Saddle pulmonary embolisms are not stable, and are usually larger than other embolism types, which can cause more risk of splitting and blocking the right and left pulmonary arteries (12).

In conclusion, this case is particularly important because coroner artery anomalies such as interarterial course of coronary arteries are usually rare cases of which medical doctors should be aware. Pulmonary embolism is a cardiovascular condition that can be fatal, and when these two pathologies are seen together, they can cause additional clinical conditions and may increase the mortality rate. Coronary course anomalies can be detected and observed on the CTA of pulmonary arteries and aorta. Therefore, radiologists should be careful and document these pathologies when they encounter them.

**Ethics Committee Approval:** N/A

**Informed Consent:** The patient's consent was obtained.

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