

Anomalous Origin of the Right Coronary Artery Arising from the Anterior Descending Artery, A Finding in Acute Myocardial Infarction

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ABSTRACT

Coronary anomalies are infrequent findings, with a prevalence of less than 1% in the general population, and are usually identified incidentally during imaging studies or catheterizations performed for other reasons. There are multiple anatomical variants that, although they deviate from classical anatomy, are not associated with adverse events and are considered normal variations. These include coronary dominance (right, left, or codominant), trifurcation of the left main coronary artery, and origin of the conus artery directly from the right coronary sinus. However, other anomalies may have clinical implications and are classified into three main categories: anomalies of origin, course, and termination. Anomalies of origin, such as the emergence of coronary arteries from contralateral sinuses or the pulmonary artery, can have significant hemodynamic consequences. Course anomalies involve abnormal trajectories of the epicardial arteries, while termination anomalies are related to fistulas or stenoses.

Single coronary arteries represent an extremely rare subgroup. In this context, we present the case of a 58-year-old male with non-ST-elevation acute coronary syndrome, in whom diffuse coronary ectasia and an anomalous origin of the right coronary artery from the left anterior descending artery were identified—an uncommon finding with few cases reported in the literature. This case highlights the importance of recognizing coronary anomalies, particularly in acute clinical settings, in order to guide appropriate therapeutic decisions and improve patient outcomes.

KEYWORDS: Coronary anomalies, abnormal origin of the right coronary artery, coronary ectasia, acute coronary syndrome, percutaneous coronary intervention.

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INTRODUCTION

Coronary anomalies represent a rare condition found in <1% of the general population, according to the literature. This low prevalence is in accordance with the fact that there are interindividual anatomical variations in the course and distribution of the collateral branches of the main epicardial arteries (right, anterior descending and circumflex) that are considered normal variants, since they are not associated with major adverse events. Examples of these variations are the origin of the posterior descending artery, which translates coronary dominance, which can appear as a branch of the right coronary artery (70%), the left coronary artery (10%), or have a double origin, known as codominance (20%). Another frequently found variant is the presence of a trifurcated left arterial trunk, due to the presence of an

intermediate branch (20%).¹

CASE REPORT

We present the clinical case of a 58-year-old male patient with a history of systemic arterial hypertension of 10 years of diagnosis, treated with losartan 50 mg/hydrochlorothiazide 12.5 mg every 24 hours. The patient went to the emergency room with symptoms of one hour of evolution, consisting of oppressive retrosternal chest pain, of sudden onset while he was seated, with intensity 7/10, associated with diaphoresis, without radiation. Prior to arrival, he was evaluated by a private doctor, who gave acetylsalicylic acid 500 mg in a single dose, being referred to our unit for diagnostic complementation. If acute coronary syndrome is suspected, an electrocardiogram is performed in the emergency

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department, without presenting ST-segment elevation or other change in relation to diagnostic suspicion. The first determination of high-sensitivity troponin I was performed, with values above the 99th percentile established by the laboratory, making a diagnosis of acute myocardial infarction without ST-segment elevation. It was decided to enter the cardiology service, with a plan to perform primary percutaneous coronary intervention (PCI). Among the findings of PCI in the left coronary sinus, a short left coronary artery trunk was observed, with increased caliber, which bifurcates normally with the presence of a dominant circumflex artery, ectatic, with the presence of diffuse atheromatous disease. The anterior descending artery (AD) is reported as Gensini 4, an ectatic vessel with the presence of abnormal origin of the right coronary artery (DC) coming from its middle segment. A grade V thrombus image was also observed in the marginal obtuse artery (OM). The right coronary sinus cannot be cannulate. Due to findings, it was decided to administer a bolus of 25 mg of Tirofiban, with subsequent infusion for 16 hours in the coronary intensive care unit. The patient presented a favorable evolution, being discharged 48 hours later with double antiplatelet therapy with acetylsalicylic acid 150 mg 24 hrs, Clopidogrel 75 mg every 24 hours, in addition to Atorvastatin 80 mg every 24 hrs, Losartan 50 mg every 24 hrs, Nifedipine 60 mg every 24 hrs, Dapagliflozin 10 mg every 24 hrs, Metoprolol 50 mg every 12 hours.

DISCUSSION

The origin of the cone artery, commonly a branch of the right coronary artery, directly from the right coronary sinus is another frequently contracted variant (prevalence of 10-50% in different case series). Other variants are related to the blood supply to the lower wall of the myocardium, which can be provided by posterolateral branches originating in the circumflex or right artery; while the anterior descending artery can supply a portion of the lower face, according to its length, in approximately 30% of cases. Due to these

variations, there is a need to classify coronary anomalies into 3 large groups: anomalies of origin, anomalies of course and anomalies of term. Anomalies of origin, as their name indicates, are those in which there is a birth different from the expected anatomical one (left coronary sinus on the part of the left arterial trunk, and right coronary sinus on the right coronary artery). These anomalies in turn present variants, classified as those originating from the pulmonary artery, abnormal origin of the coronary sinuses (for example, the birth of the right coronary artery of the left coronary sinus, or the birth of the left coronary trunk of the right coronary sinus) and congenital atresia of the left coronary trunk. Course anomalies refer to the path taken by the epicardial arteries after birth, which are classified as retroaortic, interarterial, subpulmonary (intraconal or intraseptal), prepulmonary or retrocardial, which may be associated with some anomaly of origin. Finally, term abnormalities may present as arteriovenous fistula or stenosis¹.

Patients with single coronary arteries generally account for between 0.008% and 0.067% of cases undergoing coronary angiography. In the literature, only 36 cases of right coronary artery with an abnormal origin in the anterior descending artery have been reported, and which runs anterior to the outflow tract of the right ventricle to supply the usual myocardial territory of the right coronary artery². The clinical case presented also has the particularity of being associated with coronary ectasia, all revealed by the presence of an acute coronary syndrome, which is why it becomes even more relevant.

CONCLUSION

Coronary anomalies represent a low prevalence in the general population, most of them found incidentally in cabinet studies or catheterizations performed for another cause. The recognition of these anomalies is necessary, in order to offer appropriate management to the patient if necessary, as in the case presented associated with an acute coronary syndrome.

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FIGURES

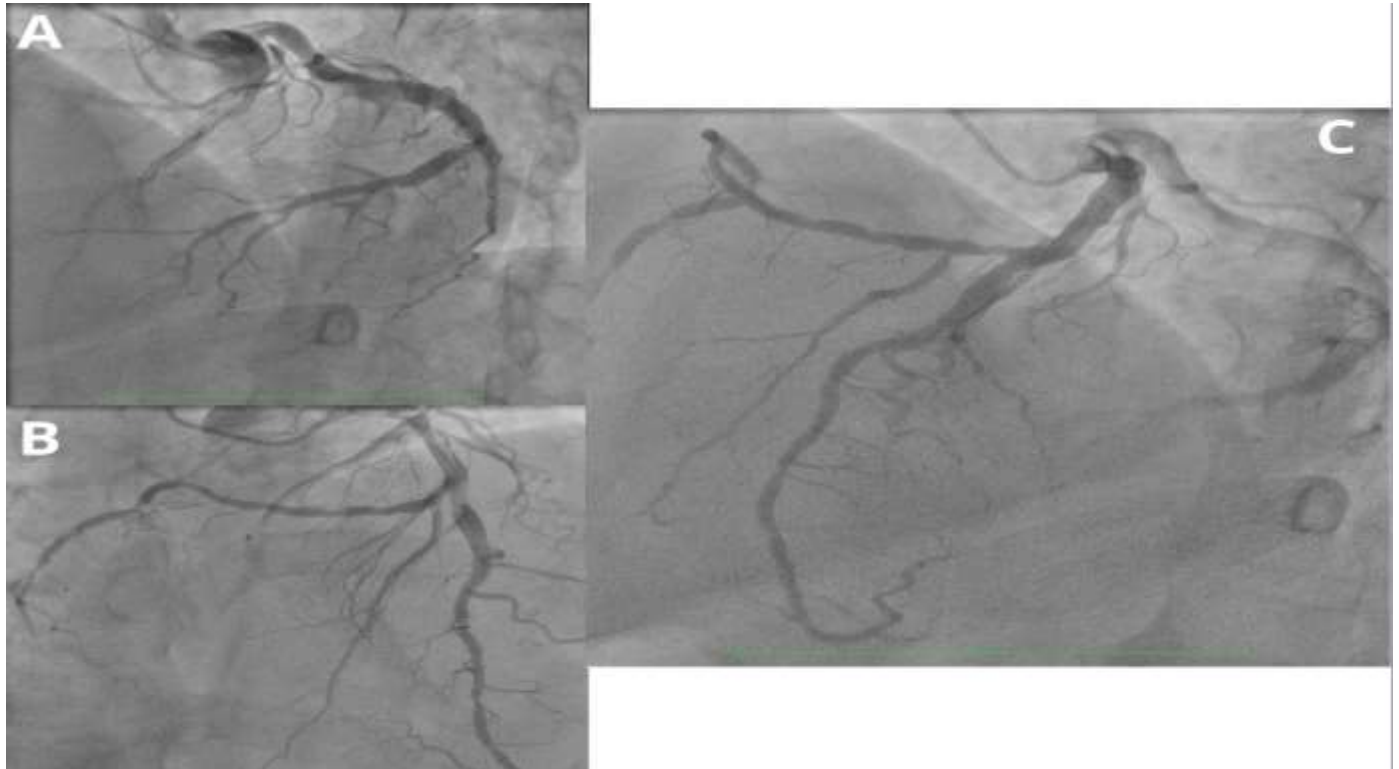


FIGURE 1.

- A. Left anterior oblique projection, skull 45°/35° with dominant circumflex and diffuse disease not significant.
- B. Right Anterior Oblique Projection skull focused on RV 10°/40° with ramo from the middle segment of AD that runs towards the right ventricular (AV) groove and gives marginal ramo of the RV, in addition to giving ramo to the lateral wall of the RV.
- C. Left Anterior Oblique Projection skull focused on RV 45°/30° with ramo from the middle segment of DA that runs towards the right AV groove and gives marginal ramo of the RV, in addition to giving ramo to the lateral wall of the RV.

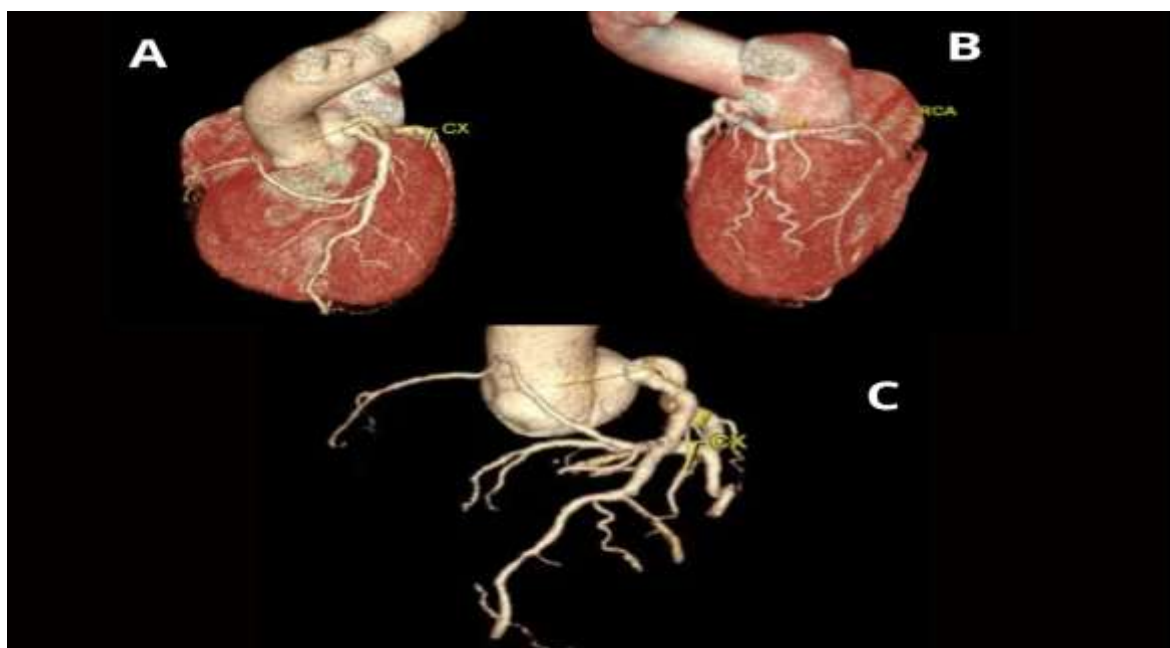


FIGURE 2. A and B) Coronal CT angiography with 3D reconstruction where ACD from the anterior wall through the AV sulcus is seen.
C) 3D reconstruction of the coronary tree.

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