CASE REPORT

A Case of Anomalous Origin of the Right Coronary Artery from the Left Anterior Descending Artery

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A 34-year-old man, ex-smoker, with family history of coronary artery disease presented to the emergency room complaining of an episode of chest discomfort at rest, radiating to the arms, accompanied with palpitations, that started several hours earlier, lasted for several minutes and resolved with a syncopal episode. He did not mention any prior similar episodes and did not have angina or dyspnea on exertion, orthopnea or paroxysmal nocturnal dyspnea. At the time of presentation he was asymptomatic. His physical examination was unremarkable. However, his electrocardiogram revealed sinus rhythm with mild ST depression and T-wave inversion in leads I, avL, V4-V6. The patient was admitted to the coronary care unit with a possible diagnosis of an acute coronary syndrome. Cardiac markers remained normal in consecutive measurements. His echocardiogram was normal and a 24-hour Holter recording did not reveal any significant arrhythmic events. Coronary angiography was performed for further evaluation of the episode; it displayed normal courses of the left main coronary artery (LMCA), dominant left circumflex (LCX), and left anterior descending artery (LAD). An anomalous right coronary artery (RCA) as a separate small branch arose from the distal LAD with subsequent anterior course (**Fig.** 1 & 2).

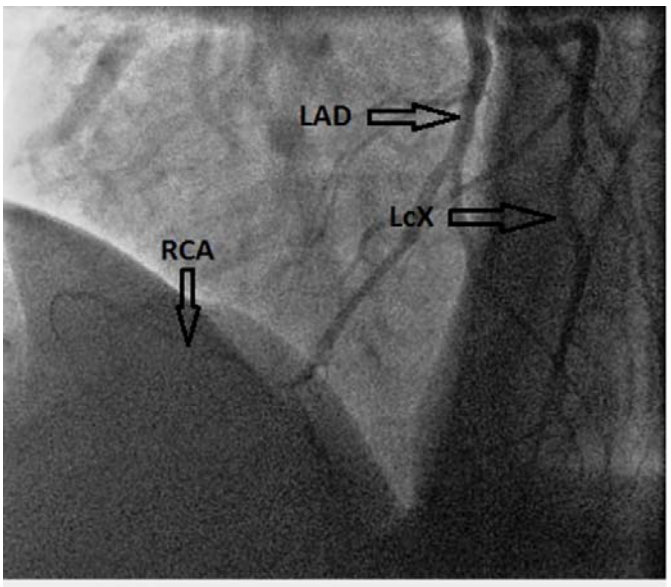

Figure 1

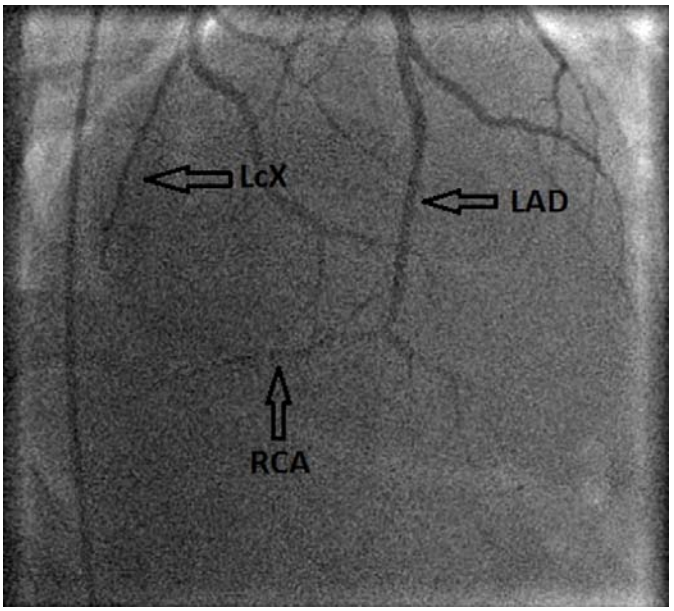

Figure 2

Attempts to cannulate the RCA with the right Judkins catheter were unsuccessful. Aortography did not reveal the presence of an origin of a supplementary RCA from another site (**Fig**. 3). Left ventriculography was normal. No significant coronary artery disease was found.

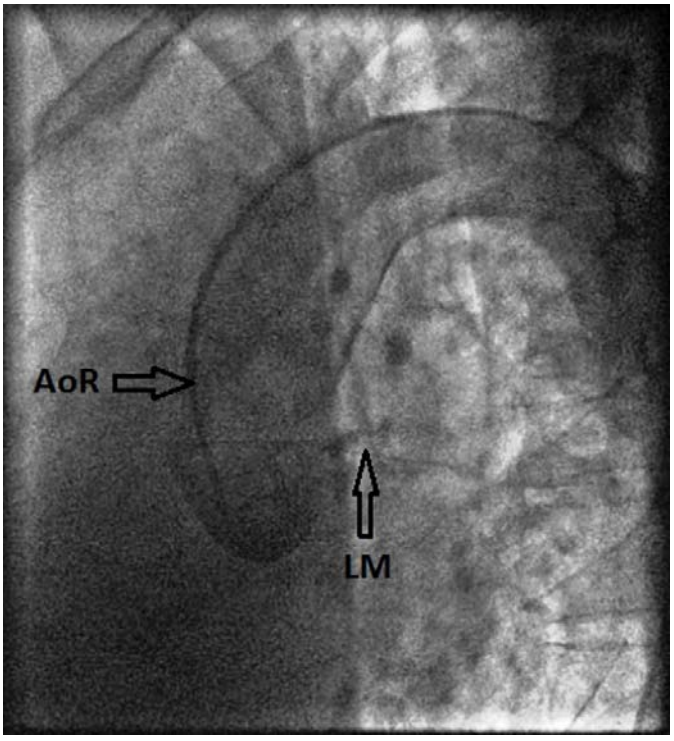

Figure 3

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Coronary artery anomaly (CAA) refers to a wide range of congenital abnormalities involving the origin, course, and structure of epicardial coronary arteries. Coronary artery anomalies are observed in 0.3-1.3% of patients undergoing diagnostic coronary angiography, in approximately 1% of routine autopsy examinations, and in 4-15% of young people who experience sudden cardiac death (SCD).[1,2] Coronary artery anomalies are frequently found in association with other major congenital cardiac defects. Isolated coronary artery anomalies occur in the absence of other major congenital cardiac defects and usually as an incidental finding during coronary angiography. In a recently published study from our centre their incidence was 2.44%. Separate origin of the LAD and the Lcx was the most common anomaly (incidence 0.55%) and anomalies of RCA were in general the second most common.[3] The anomalous origin of the right coronary artery (RCA) as a branch of the left anterior descending (LAD) artery is a very rare variation of single coronary artery that has been reported previously in a few cases, is generally considered benign and clinical significance is associated with the course of the anomalous originated RCA.[4]

Most coronary artery anomalies are clinically silent and do not affect the quality of life or lifespan of the affected individuals. In adults, the clinical interest in coronary anomalies relates to their occasional association with sudden death, myocardial ischemia, congestive heart failure, or endocarditis. In addition, presence of coronary artery anomalies may, at times, create challenges during coronary angiography, percutaneous coronary interventions, and coronary artery surgery. Specific forms of anomaly, such as the origin of the left main coronary artery from the pulmonary trunk, anomalous origin of a coronary artery from the opposite side of the aorta, the aberrant course of the arteries between the great vessels in association with anomalous and slit-like ostium and large coronary artery fistulas, have been associated with myocardial ischemia and increased risk of sudden death. Unfortunately, SCD during strenuous activities may be the first manifestation of a CAA especially in young adults. The “scissors-like” theory, presence of an ostial ridge, that causes obstruction and consequently ischemia during exercise, myocardial bridging, spasm, mural thrombosis at sites of coronary ectasia, rupture (aneurysmal wall degeneration), the “steal phenomenon” (associated with coronary artery fistulas), tangential origin and intramural course (within the aortic wall) of the coronary artery are among the proposed pathophysiological mechanisms. [5-8]

Apart from coronary angiography, computerized tomographic (CTA) and magnetic resonance (MRA) coronary angiography can effectively identify coronary anomalies, while more sophisticated invasive imaging techniques, such as intravascular ultrasonography (IVUS) and optical coherence tomography (OCT), can adequately evaluate severity of stenosis and quantitatively assess the basic defects that may lead to coronary insufficiency.[9, 10]

Persistent challenges include identifying coronary artery anomaly carriers, those for whom invasive imaging is justified, risk stratification for SCD, the indications for intervention and the optimal type of intervention.

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