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Anomalous origin of the left anterior descending artery from the right coronary artery: a rare and malignant anomaly

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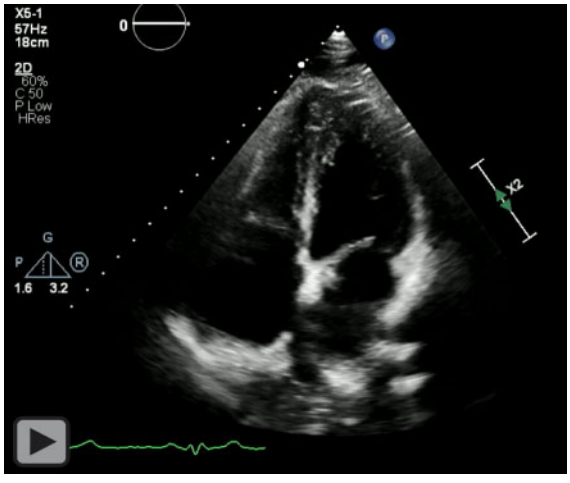
A 53-year-old gentleman with no risk factors for coronary artery disease was assessed with a three month history of exertional chest pain. Transthoracic echocardiogram showed global mild impairment of left ventricular systolic function with an ejection fraction of 40–50% and no regional wall motion abnormalities (*Video 1*). Coronary computed tomography angiography (CTCA) was performed, rather than coronary angiography as per patient wishes.

CTCA demonstrated the left anterior descending (LAD) coronary artery arising from the proximal segment of the right coronary artery (RCA) with a tortuous bend, coursing between the aortic root and the right ventricular outflow tract and taking an intramyocardial course at the distal LAD territory. The left circumflex artery arose directly from left coronary cusp with minor atherosclerosis. The RCA was dominant with minor proximal wall thickening (Figure 1). At the cardiology multi-disciplinary meeting it was felt that the LAD course was malignant. Coronary angiography was performed as per the request of the cardiac surgeons and confirmed an aberrant LAD origin from the proximal RCA, taking an anterior pathway (*Video 2*). The patient underwent successful coronary artery bypass grafting with a left internal mammary artery graft to the LAD.

Coronary artery anomalies (CAAs) are rare and observed in 0.5–2% of the general population.[1] Management of CAAs requires careful consideration with accurate mapping of the coronary arteries. CTCA is the state-of-the-art technique for this purpose. If a patient is



Video 1 Transthoracic echocardiogram showing global mild impairment of left ventricular systolic function with an ejection fraction of 40-50% and no regional wall motion abnormalities.

Video 2 Invasive coronary angiography confirmed an aberrant LAD origin from the proximal RCA, taking an anterior pathway.

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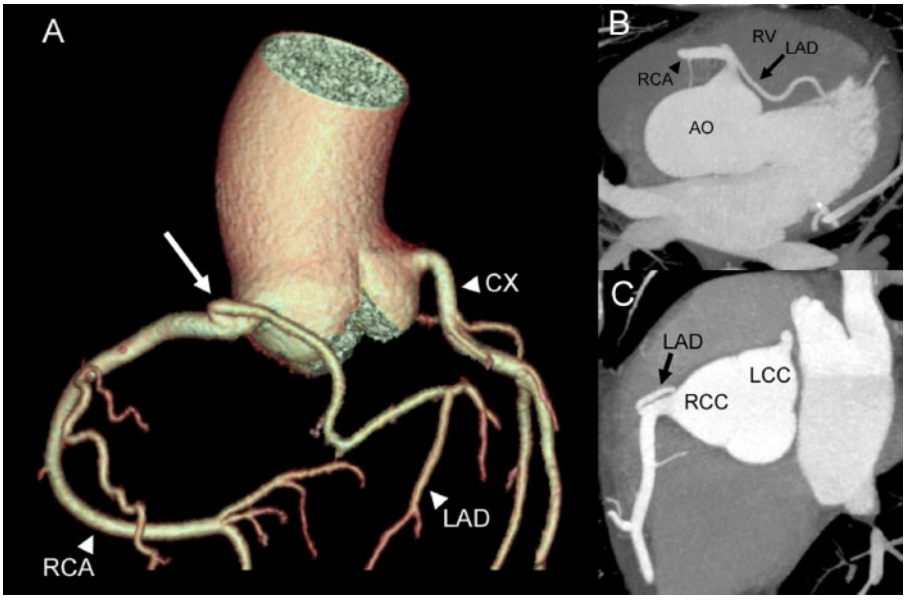

Figure 1 Coronary computed tomography angiography. (*A*) Computed tomography coronary angiogram 3D tree view demonstrating the left anterior descending artery originating anomalously (long arrow) from the dominant right coronary artery with a tortuous proximal bend, and then traversing across anterior to the aorta to supply the typical distal left anterior descending artery territory. (*B* and *C*) Computed tomography coronary angiogram maximum intensity projections showing the left anterior descending artery originating abnormally off the right coronary artery. In *B*, the left anterior descending artery can be seen to traverse between the aorta and the right ventricle in the region of the lower right ventricular outflow tract, on its anomalous and partly intramyocardial course which ends in the usual distal left anterior descending artery territory. In *C*, the proximal left anterior descending artery is seen to have a very tortuous bend as it arises from the proximal right coronary artery, and the circumflex artery is seen arising from the left coronary cusp. AO, aorta; CX, circumflex artery; LAD, left anterior descending artery; LCC, left coronary cusp; RCA, right coronary artery; RCC, right coronary cusp; RV, right ventricle.

identified to have a malignant anatomy, they are at risk of sudden cardiac death due to the increase in the pressure in the arteries producing a compression of the vessel; therefore, treatment should be offered, even if the patient is asymptomatic.[2] The surgical options include bypass grafting or coronary ostium reimplantation.[2,3] An anomalous LAD originating from the RCA, as described here, given its inter-arterial malignant course should be considered for surgery.

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Consent: The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: none declared.

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