

# Anomalous origin of the three coronary arteries with separate ostia from right sinus of Valsalva in a young patient presenting with myocarditis: a very rare congenital anomaly

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Coronary artery anomalies are a relatively uncommon congenital condition.<sup>1</sup> Origin of all three major coronary arteries with separate ostia from the right coronary sinus is a very rare congenital anomaly. In a systematic review of 12 457 consecutive adult patients that underwent coronary angiography, origin of all the major coronary arteries from the right coronary sinus was found to have a prevalence of 0.008% and comprised 0.89% of all congenital anomalies found in the sample population.<sup>2</sup>

A 28-year-old man with no significant past medical history was admitted with chest pain that started during a gym session. He described the chest pain as a tight squeezing pain that radiated to his jaw and both arms. Pain was worse on exertion but relieved on sitting forward. He also reported a significant episode of gastroenteritis 4 weeks prior to admission. He does not have a family history of cardiomyopathy although his grandfather suffered a myocardial infarction at 44 years old. Initial physical examination and electrocardiogram were unremarkable. High-sensitivity troponin on admission and after 1 h was 144 and 275, respectively. White cell count was 16.4 and C-reactive protein was <5.

He underwent coronary angiography that showed a dominant right coronary artery but the origin of the left system couldn't be visualized. Computed tomography (CT) coronary angiogram was done to assess the origin of the coronaries. The CT coronary angiogram showed anomalous origin of the left anterior descending artery and left circumflex artery (LCX) from the right coronary sinus. The left circumflex had a septal course in its proximal part between the right ventricular outflow tract and the ascending aorta. There was a small non-calcified plaque at the mid LCX with no flow limitation.

Left anterior descending artery had a pre-pulmonic course and entered the anterior interventricular groove at its distal segment (Figure 1).

To clarify the diagnosis further and assess the functional significance of the coronary anomaly, adenosine stress cardiac magnetic resonance imaging (MRI) was undertaken. This did not demonstrate any inducible ischaemia, but did show striking, patchy epicardial late enhancement in the basal to mid inferior and posterior walls, in keeping with myocarditis (Figure 2). A follow-up study performed at 6 months found substantial resolution of these changes, providing further evidence that the index presentation was likely myocarditis, and the coronary anomalies incidental. Both cardiac MRIs showed a normal systolic function. T2-STIR imaging was only performed on the repeat MRI and did not show any oedema. As a result of this, as well as a negative exercise tolerance test (to stage 4 of the Bruce protocol), conservative management of his coronary artery anomalies was advocated. He was advised that he can do regular exercise but to avoid competitive sport.

This case highlights the usefulness of CT coronary angiogram in patients with difficult to locate origins of the coronary arteries, tracking the course and the relation to the great arteries. This case highlights the usefulness of CT coronary angiogram in patients with difficult to locate origins of the coronary arteries, tracking the course and the relation to the great arteries. The latter is of particular importance, as an interarterial course that traverses between the aorta and pulmonary trunk can augur an increased risk of sudden cardiac death. The results of serial cardiac magnetic resonance studies were subsequently able to provide clarity and support a

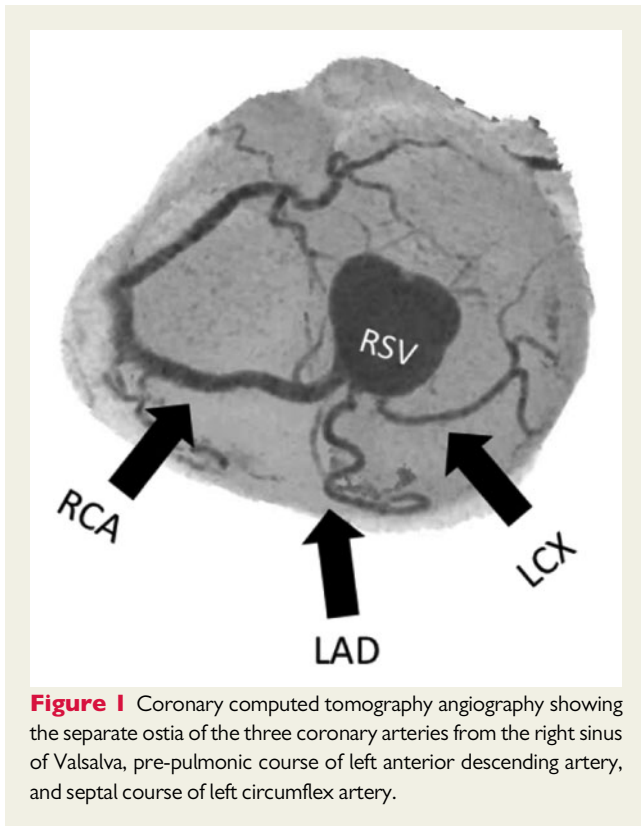
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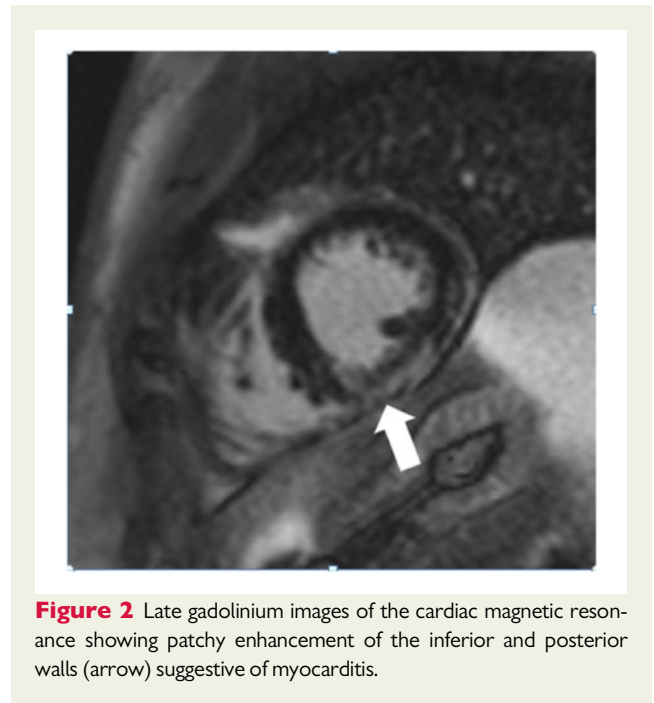
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**Figure 1** Coronary computed tomography angiography showing the separate ostia of the three coronary arteries from the right sinus of Valsalva, pre-pulmonic course of left anterior descending artery, and septal course of left circumflex artery.

conservative management strategy. Present guidelines recommend all cases of uncorrected anomalous coronary arteries should refrain from competitive exercise.<sup>3</sup>

**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.



**Figure 2** Late gadolinium images of the cardiac magnetic resonance showing patchy enhancement of the inferior and posterior walls (arrow) suggestive of myocarditis.

**Conflict of interest:** none declared.

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