



## Letter: Deciphering a “curious” coronary artery anatomy

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I enjoyed the contribution of Kharel et al<sup>1</sup> about a 74-year-old male patient with anterior wall ST-segment elevation myocardial infarction, in whom coronary angiography showed a bilaterally arising (type IV) dual left anterior descending coronary artery (LAD). A culprit diagonal artery was considered small in size; therefore, the patient was managed medically for the infarction. According to the authors, additional investigation with computed tomography coronary angiography (CTCA) showed a long LAD with a malignant interarterial course arising from the right coronary artery (RCA).

In this letter, I comment on the course of the long LAD connected to the RCA, which I believe is one that passes through the superior aspect of the crista supraventricularis in a subendocardial position and then intramyocardially inside the upper interventricular septum to reach the anterior interventricular sulcus, i.e., an intraseptal course. Previous studies demonstrated that when the initial trajectory of a left main coronary artery (LMCA) or LAD arising from the right aortic sinus, forms a caudal anterior loop to the left in the right anterior oblique (RAO) projection, it follows a subpulmonary or intraseptal course<sup>2</sup>. This course can also be identified by the presence of a septal perforator branch (SPB) that arises from the proximal segment of the anomalous artery as its first branch<sup>2,3</sup>. Furthermore, the site of origin of such an SPB typically indicates the passage of the anomalous artery through

the upper interventricular septum; therefore, this segment of the anomalous vessel often shows angiographic “milking” like a myocardial bridge. In contrast, the interarterial course, i.e., between the aortic root and pulmonary trunk, forms a cranial posterior loop in the RAO projection without proximal branching into an SPB and without phasic external muscular compression. Indeed, in the article in question, the proximal long LAD supplied an SPB as its first branch, which suggests an intraseptal course. Furthermore, the angiographic picture of the long LAD presented in an RAO cranial projection correlates with an intraseptal course, which appears stretched and is longer, more oblique and anterolateral in direction compared with an interarterial course, which is short and curved and is directed posteriorly between the aorta and the main pulmonary artery<sup>4</sup>. In making the distinction between interarterial and intraseptal courses, CTCA is of great value, as the interarterial proximal course of the long LAD would have been depicted above the pulmonary valve and, on coronal images, *en face* as a radiopaque oval structure between the ascending aorta and pulmonary trunk (Angelini/Cheong sign)<sup>4</sup>. However, it is unlikely that the Angelini/Cheong sign was displayed in the article in question, because the intraseptal proximal course of the long LAD was caudal to the pulmonary valve.

An anomalous right-sided LMCA or LAD with an intraseptal course generally has a benign clinical prognosis<sup>3</sup>. However, in

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view of previous reports describing cardiac events, such as stable or unstable angina, malignant arrhythmias and sudden cardiac death, in association with an intraseptal LMCA, this course should be considered important in symptomatic patients<sup>5</sup>. Phasic muscular compression and/or spasm of the intramyocardial ectopic segment are likely mechanisms of ischaemia that can be tackled with pharmacological treatment, although surgery may be required in intractable cases.

### Conflict of interest statement

A.Y. Andreou has no conflicts of interest to declare.

### References

1. Kharel S, Sherpa K, Singh Kc S, Prajapati D, Tamrakar R. A curious case of type IV dual LAD presenting with ST-elevation myocardial infarction. *AsiaIntervention*. 2024;10:34-5.
2. Andreou AY, Avraamides PC, Georgiou GM. Dual anterior interventricular artery type IV: a rare anatomical variation. *Surg Radiol Anat*. 2010;32:699-702.
3. Angelini P, Uribe C, Corno AF. Pathophysiology and Treatment of Intraseptal-Course Left Coronary Anomaly: Surgery for All? *Pediatr Cardiol*. 2023 Nov 9.
4. Nath H, Singh SP, Lloyd SG. CT distinction of interarterial and intraseptal courses of anomalous left coronary artery arising from inappropriate aortic sinus. *AJR Am J Roentgenol*. 2010;194:W351-2.
5. Mogensen UM, Grande P, Køber L, Kofoed KF. Anomalous origin of the left main coronary artery from the right sinus of Valsalva with a septal course: an explanation to disabling angina? *Int J Cardiol*. 2011;151:e74-6.