Images in cardiovascular medicine

Type IV dual left anterior descending coronary artery evaluated using multislice computed tomography: anatomy of a rare coronary anomaly

Emilio Chiurlia, Guido Ligabue*, Carlo Ratti, Maria Grazia Modena

*Department of Cardiology, *Institute of Radiology, University of Modena and Reggio Emilia, Modena, Italy*

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Address:

Prof.ssa Maria Grazia Modena

Cattedra di Cardiologia
Policlinico Universitario
Via del Pozzo, 71
41100 Modena
E-mail:
modena.mariagrazia@unimo.it

In the literature it is reported that coronary artery anomalies affect approximately 1% of the general population[1]; a dual left anterior descending coronary artery (LAD) is a rare coronary anomaly consisting of two branches which supply the usual territory of the LAD. In the type IV dual LAD, according to Spindola-Franco et al.[2], one branch is formed by the LAD proper (short LAD), whereas the second (long LAD) is unusual in its origin, from the right coronary artery. We describe a case of a 62-year-old male admitted to our University Hospital with a history of effort angina. Coronary angiography revealed a critical stenosis in the first segment of the right coronary artery, which was treated with a percutaneous coronary intervention and stent, and the presence of a dual LAD with a type IV pattern (Fig. 1). One month after coronary angiography the patient underwent multislice computed tomography (MSCT) evaluation, which is routinely performed in our Institute as a study protocol, to evaluate the stent patency 1b. Our scanner (Light-Speed Plus, GE Medical System, Milwaukee, WI, USA) allows the acquisition of four slices per rotation with

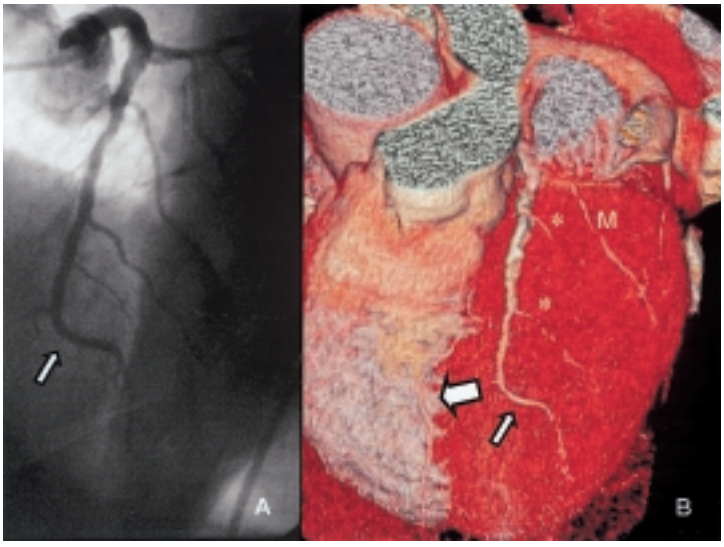

Figure 1. A: *coronary angiogram in the left anterior oblique projection showing the short left anterior descending coronary artery (LAD)* (arrow) *arising from the left main branch that terminates in its middle segment.* B: *three-dimensional volume rendering image from the multislice computed tomography examination showing the short LAD* (small arrow) *and the long LAD* (large arrow) *that courses parallel to the short LAD in the anterior interventricular groove reaching the apex. Two diagonal branches* (*) *arising from the short LAD and a marginal branch (M) are also displayed in the same image.*

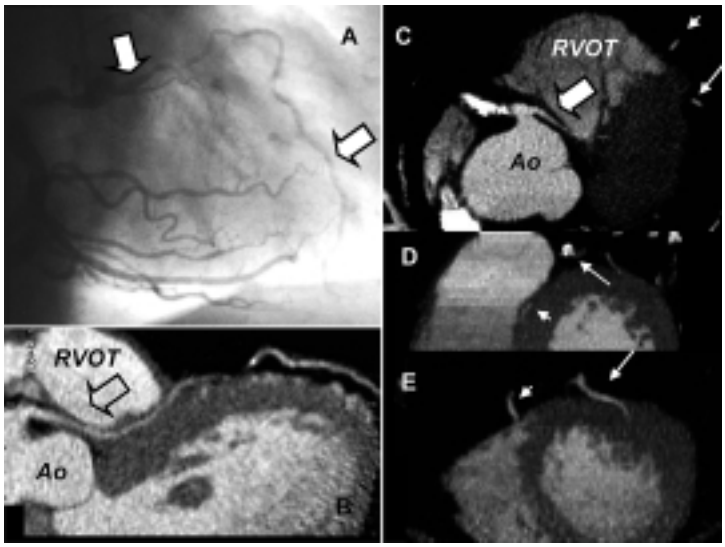

Figure 2. A: *coronary angiogram in the right anterior oblique projection showing the anomalous origin of the long left anterior descending coronary artery (LAD)* (arrows) *from the proximal right coronary artery.* B: *a curved multiplanar reconstruction from the multislice computed tomography examination showing, in more detail, the anomalous origin of this vessel and the abnormal path of the long LAD* (arrow) *that runs between the aortic root (Ao) and the right ventricular outflow tract (RVOT).* C: *transverse multislice computed tomography image depicting the origin of the long LAD* (large arrow) *that passes between the Ao and the RVOT. At the same level it is possible to recognize, in the anterior surface of the heart, both the long LAD* (short thin arrow) *and the short LAD* (long thin arrow). D: *coronary multiplanar reconstruction showing the intramyocardial course of the long LAD* (short thin arrow) *and the epicardial course of the short LAD* (long thin arrow) *that presents heavy parietal calcifications.* E: *coronary multiplanar reconstruction showing the long LAD* (short thin arrow) *that runs in the anterior interventricular groove and the short LAD* (long thin arrow) *that is located slightly to the left.*

a 0.5 s rotation time; the technical parameters were as follows: slice thickness 1.25 mm, interslice gap 0.6 mm, tube current 325 mA with a tube voltage of 120 kV; the overall scan time was 31 s during a single breath-hold. We administered 120 ml of non-ionic contrast agent (Iomeron 350, Bracco, Milan, Italy) at a flow rate of 3.5 ml/s and the transit time was calculated by a previous injection of 20 ml at the same flow rate. The patient's heart rate was 59 b/min and therefore no intravenous beta-blocker was used before MSCT. Images were reconstructed using retrospective electrocardiographic gating at different percentages of the R-R interval (from 30 to 90%, with a 10% increment step) and were transferred to an external workstation for postprocessing (Advantage Window 4.0, GE Medical System). MSCT showed in detail the origin, path and relationship between the two LAD and the main arterial vessels and myocardium (Fig. 2).

Specifically, the long LAD presented a partially intramyocardial course between the interventricular septum and the right ventricular outflow tract and then followed a normal course in the anterior interventricular groove to reach the apex, identifying a myocardial bridging. This report shows the potential usefulness of MSCT for the assessment of a normal as well abnormal anatomy of the coronary arteries that could be relevant for diagnostic and treatment purposes.

References

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2. Spindola-Franco H, Grose R, Solomon N. Dual left anterior descending coronary artery: angiographic description of important variants and surgical implications. Am Heart J 1983; 105: 445-55.