

A rare case of dual left anterior descending arteries arising from left main coronary artery and right sinus of Valsalva

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Abstract:

Duplication of left anterior descending (LAD) artery is an uncommon coronary anomaly. Type IV dual LAD is the rarest variety where short LAD arises from left main stem and long LAD arises from right coronary artery or right sinus of Valsalva. I present a case of 60-years-old lady with dilated cardiomyopathy with incidental detection of type IV dual LAD during coronary angiography. The patient was treated conservatively.

Key Words: dual left anterior descending artery; coronary anomaly

Introduction:

Coronary anomalies are uncommon. Incidence ranges from 0.6% to 1.3% in various case series [1,2]. Duplication of left anterior descending artery (LAD) is rare [3]. TYPE IV dual LAD [4] is the rarest variety where short LAD arises from left main coronary artery and long LAD arises from either right coronary artery (RCA) or right sinus of Valsalva. I report a case of TYPE IV dual LAD detected incidentally in a patient of dilated cardiomyopathy (DCM) during coronary angiography.

Case Report:

A 60-years-old female patient, known diabetic and hypertensive on medications, presented with exertional dyspnoea for last 6 months with New York Heart Association (NYHA) class II severity. Electrocardiogram (ECG) was normal with sinus rhythm. Echocardiogram revealed dilated left ventricle with global hypokinesia with ejection fraction of 30%. Diagnosis of dilated cardiomyopathy (DCM) was made. Coronary angiography (CAG) was performed to rule out associated coronary artery disease. CAG revealed: in the left coronary

system, left main artery trifurcated into a short left anterior descending (LAD) artery, a ramus intermedius branch and non-dominant left circumflex (LCX) artery (FIGURE 1, FIGURE 2). The short LAD gave rise to few small septal branches and terminated in anterior interventricular sulcus (AIVS) well before reaching the left ventricular apex (FIGURE 1, FIGURE 2). The right coronary system revealed the right coronary artery (RCA) was dominant and normal (FIGURE 3). Another long artery was arising from the right sinus of Valsalva near the origin of RCA, it reached the AIVS, gave rise to numerous diagonal and septal branches and terminated in left ventricular apex (FIGURE 3). So, this artery was identified as dual LAD type IV (FIGURE 3). All coronary arteries were normal in calibre without any flow limiting lesion. CT coronary angiography was advised to further delineate the course of anomalous long LAD and its relation to great arteries. But the patient was not willing for further investigations. Patient had the final diagnosis of nonischaemic DCM with stage C heart failure with normal coronaries with diabetes and systemic hypertension. Patient was treated conservatively and she is doing well with regular follow up visits.

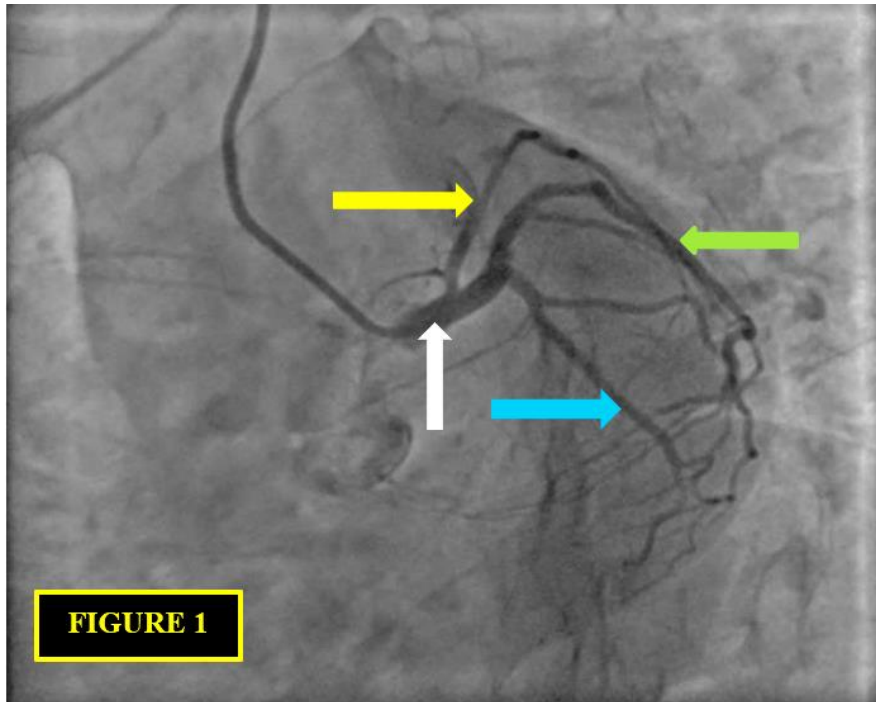


Figure 1: LAO caudal view showing left main coronary artery (white arrow) trifurcated into short left anterior descending artery (yellow arrow), ramus intermedius (green arrow) and non-dominant left circumflex artery (blue arrow). (LAO: left anterior oblique)

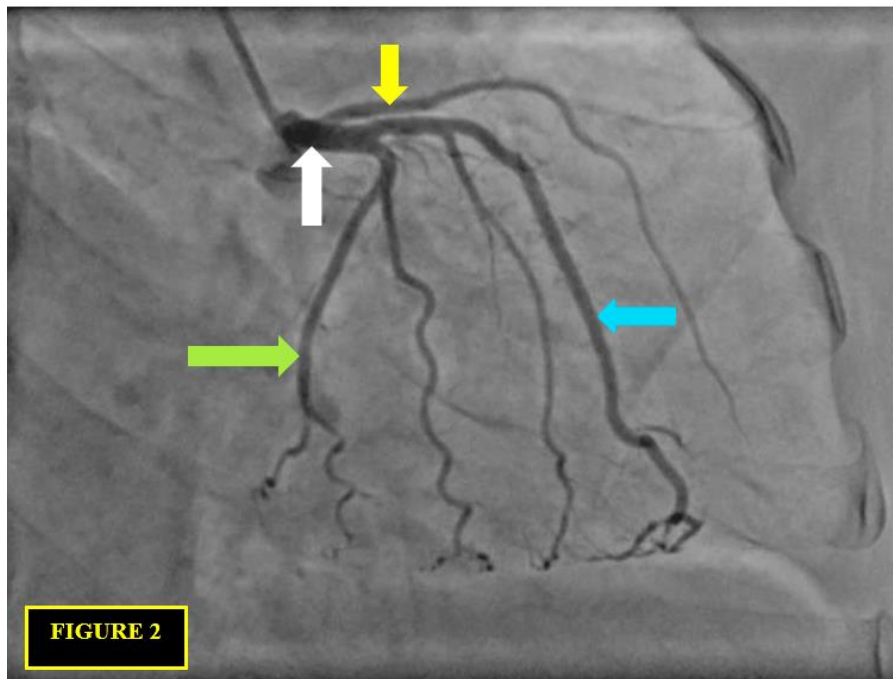


Figure 2: RAO caudal view showing left main coronary artery (white arrow) trifurcated into short left anterior descending artery (yellow arrow), ramus intermedius (green arrow) and non-dominant left circumflex artery (blue arrow). (RAO: right anterior oblique)

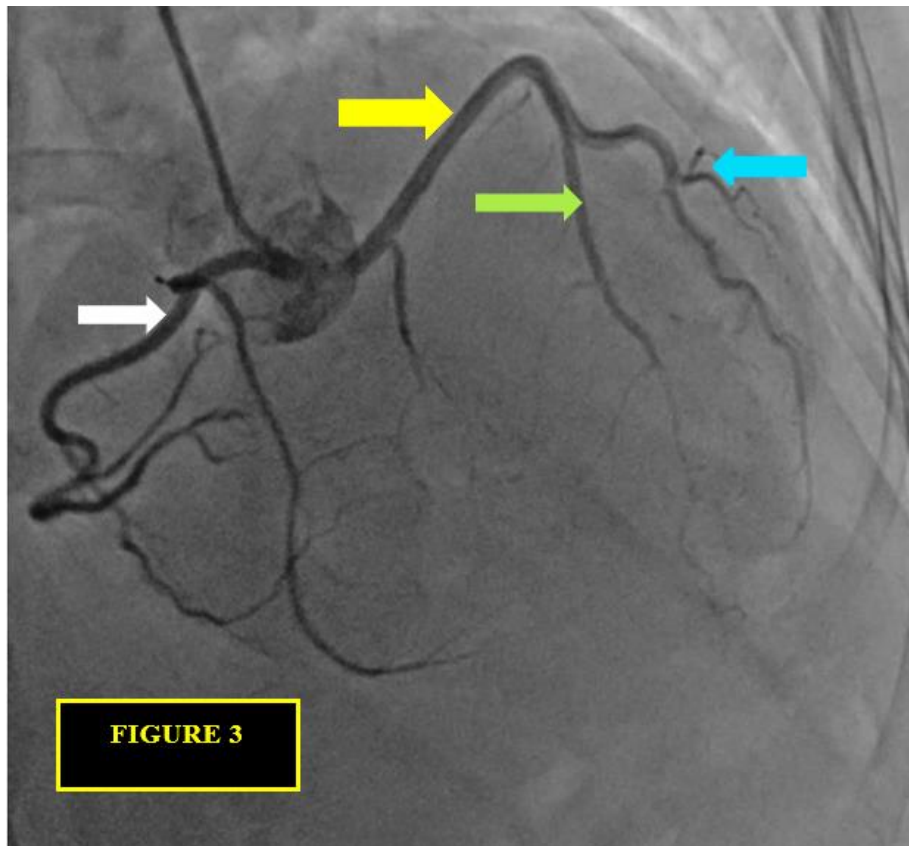


FIGURE 3

Figure 3: LAO cranial view showing right coronary artery (RCA) (white arrow), long left anterior descending artery (LAD) (yellow arrow) arising from right sinus of Valsalva with septal (green arrow) and diagonal (blue arrow) branches. Long LAD had a separate origin away from RCA origin. (LAO: left anterior oblique.)

Discussion:

LAD has the most constant course among all the coronary arteries. Dual LAD consists of two branches [4] which supply the usual distribution of the LAD. One branch (short LAD) terminates in the proximal aspect of the AIVS. A second, longer branch has a variable course outside the AIVS and returns to the AIVS distally. Spindola-Franco et al. [4] first described and classified dual LAD into four types based on the origin, course and termination of the long and short LAD. The classification is as follows: Type I: The short LAD runs in the AIVS and is generally the source of all major proximal septal perforators. The long LAD also runs in the AIVS, descending on the left ventricular side of the AIVS, re-entering the distal AIVS to reach the apex. Type II: The short LAD is the same as in type 1, but the long LAD descends over the right ventricular side before re-entering the AIVS. Type III: The short LAD is consistent with that in types 1 and 2. The long LAD travels intramyocardially in the ventricular septum. Type IV: The short LAD originates from the LMCA. The major

septal perforators and the diagonal branches originate from this vessel. The long LAD arises from the RCA. It is extremely rare among the four types. In my case, the short LAD was arising from left main coronary artery and was terminated in AIVS before reaching the left ventricular apex (FIGURE 1, FIGURE 2). The long LAD originated from right sinus of Valsalva near RCA origin, reached AIVS, gave multiple septal and diagonal branches and terminated at left ventricular apex (FIGURE 3), fulfilling the criteria of type IV dual LAD as per the description of Spindola-Franco et al. (4). With newer anomalies being reported dual LAD was reclassified into six types by Lee et al (5) (TABLE 1). In this newer classification [5] types IV, V, and VI have one of the LADs arising from the right coronary circulation. CT coronary angiography is essential to subclassify right sided origin long LAD as per Lee et al [5] because it describes the relation of long LAD with RVOT and aortic root. Unfortunately, in our case we could not do the CT imaging as the patient was not willing.

Types	Origin short LAD	Origin long LAD	Course of long LAD
I	Proximal LAD	Proximal LAD	Epicardial course on the LV side of proximal AIVG, re-entering the distal AIVG
II	Proximal LAD	Proximal LAD	Epicardial course on the RV side of proximal AIVG, re-entering the distal AIVG
III	Proximal LAD	Proximal LAD	Intramyocardial course in the proximal septum
IV	LCS	Proximal RCA/RCS	Epicardial course anterior to the RVOT continuing to the distal AIVG
V	LCS	Proximal RCA/RCS	Intramyocardial course within the septal crest emerging epicardial in the distal AIVG
VI	LCS	Proximal RCA/RCS	Epicardial course between the RVOT and the aortic root, continuing to the mid or distal AIVG

(LAD: left anterior descending, LV: left ventricle, RV: right ventricle, AIVG: anterior interventricular groove, RCA: right coronary artery, LCS: left coronary sinus, RCS: right coronary sinus, RVOT: right ventricular outflow tract.)

Table 1: Type and origin of dual LAD. Adapted from Lee et al [5]

Most of the coronary anomalies are benign and do not necessitate any form of intervention [6]. In my case, there was no flow limiting lesion in coronaries. So, the patient was treated conservatively. Type IV variant of dual LAD is very rare and can be missed on angiography [7]. In acute coronary syndrome situations, in presence of flow limiting lesions, proper assessment of the angiogram and knowledge of the coronary anomalies is required during percutaneous coronary interventions and surgical revascularization.

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