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Case Reports

A new anomaly of the left anterior descending artery: Type X dual LAD

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ABSTRACT

Dual left anterior descending (LAD) coronary artery anomaly is traditionally classified as four types anomaly by classical coronary angiogram. Nowadays, coronary computed tomographic angiography (CCTA) allows clinicians to understand other variants of dual LAD anomaly. Up to date, 9 types of dual LAD variants detected from not only classical coronary angiogram but also CCTA imaging have been reported.

In the present case, we aimed to show a novel dual LAD anomaly, which is demonstrated by CCTA during preoperative evaluation and it has not been previously reported.

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1. Introduction

Dual left anterior descending (LAD) artery anomaly is a rarely observed congenital coronary artery anomaly. It may affect reperfusion strategy, especially in patients with congenital heart disease.[1] In this congenital anomaly, there are two distinct segments of the vessel. It is feeding the anterior interventricular sulcus (AIS) of the heart and generally shows a short LAD terminating in the proximal AIS and a long LAD (which proximally courses outside the AIS), terminating in the distal AIS.

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Dual LAD anomaly is traditionally classified into four types based on classical coronary angiogram.[2] However, coronary computed tomographic angiography (CCTA) imaging allows clinicians to notice other variants of dual LAD anomaly in current era.[3] Uptil date, 9 types of dual LAD variants detected from not only classical coronary angiogram but also CCTA imaging have been reported.[2–6]

In the current case, we tried to present a novel case of dual LAD anomaly demonstrated by CCTA during preoperative evaluation which has not been previously reported.

2. Case

A 39-year-old woman presented with complaints of palpitation and dyspnea on exertion (NYHA Class-III). She had a history of acute rheumatic fever at the age of 12. During the physical examination, she was diaphoretic and tachypneic. Her arterial blood pressure was 110/60 mmHg and heart rate was 90 ppm (irregular). On inspection, pectus excavatum deformity was observed. Cardiac auscultation revealed a loud first heart sound and an opening snap in early diastole followed by a holodiastolic decrescendo rumbling murmur and loud holosystolic murmur. Moreover, second pulmonary sound was found to be louder. Also, fine crackles were heard on basal segments of both lungs. Resting ECG revealed atrial fibrillation accompanied with biatrial abnormality and mild right axis deviation. Transthoracic echocardiography showed moderate to severe mitral stenosis, severe mitral, and tricuspid insufficiency combined with moderate pulmonary hypertension. After administration of medications for her clinic condition, it was consulted with cardiothoracic surgeons regarding mitral valve replacement. Classical coronary angiography demonstrated that aberrant LAD was originating from the right coronary sinus (RCS) without evidence of epicardial coronary artery disease (Fig. 1a and b). It was thought that, this anomaly may cause surgical complication during sternotomy because of pectus excavatum deformity, and preoperative CCTA should be carried out.

Colored 3D volume rendered CCTA image showed both the long LAD and right coronary artery (RCA) originating from the RCS with different ostia on 320-row MDCT scanner (Toshiba Aquilion One, Toshiba Medical System, Japan) as shown in Fig. 2a. Short LAD originated from the left main coronary artery (LMCA) and terminated in the proximal AIS. However, it was noticed that long LAD originated from the RCS with separate ostium and followed an anomalous prepulmonic course anterior to the right ventricle outflow tract (RVOT), and entered mid to distal AIS (Fig. 2b). Moreover, it was found that proximal part of long LAD coursed in very close proximity to the sternum due to excavatum deformity (Fig. 2c).

The patient underwent successful robotically assisted mechanical mitral valve replacement (St. Jude, 29 mm) and she was uneventfully discharged from hospital 5 days later.

3. Discussion

In healthy people, LAD originates from the LMCA, courses in the AIS towards the cardiac apex, and gives diagonal and septal branches. While septal branches extend to interventricular septum, diagonal branches extend to left ventricle (LV) anterior wall and sometimes to right ventricle (RV) anterior wall.[1,2]

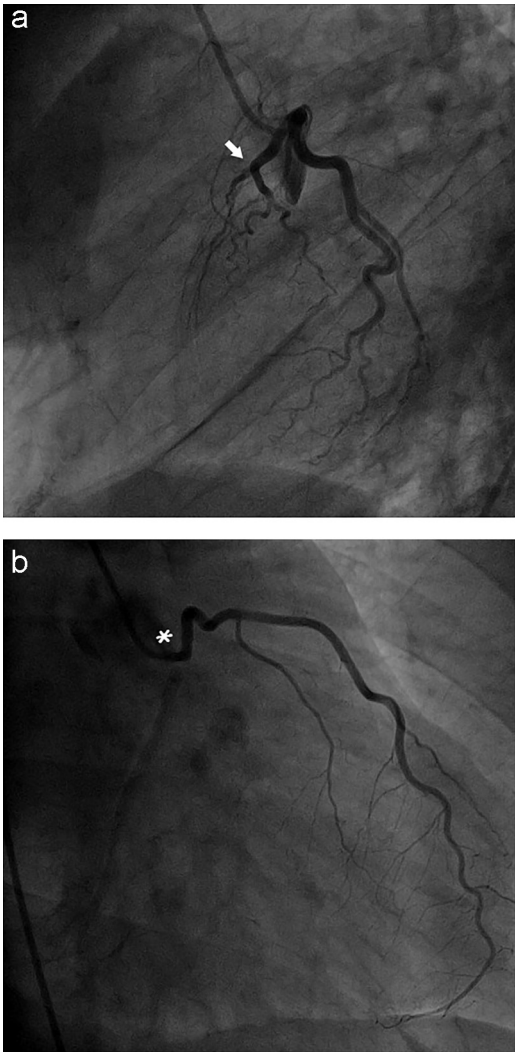

Fig. 1 – Left lateral (a) and right anterior oblique views (b) showing short LAD (arrow) and long LAD (asterisk) originated from right coronary sinus with different ostium.

Dual LAD is a rare congenital coronary anomaly traditionally classified into 4 types.[2] In that anomaly, the functional LAD is divided into a short and a long segment.[1,2] Although the short LAD typically arises from the LAD proper and terminates high in the interventricular groove,[1,2] the long LAD takes a more variable course around the short segment and returns to the interventricular groove distally.[1,2]

In spite of the fact that four subtypes of dual LAD had initially been described by Spindola-Franco based on morphoanatomical features of the coronary arteries, five additional subtypes including new variant of type 7 were later published as shown in Table 1.[2–6] Diagonal and septal branching patterns may be different among the dual LAD anomalies. In general, major septal branches arise from the short and proper LADs, while diagonal branches arise from the long and proper LADs.

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