Cardiac Computed Tomography of Congenital Absent Left Circumflex Coronary Artery: a case report

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Congenital absent left circumflex coronary artery (LCX) is a very rare anomaly. Only a few cases diagnosed by conventional angiography were reported in the literature. We report a case of congenital absent LCX with angina-like symptoms diagnosed by cardiac computed tomography (CT) scan. A 71-year-old male patient with intermittent chest tightness during exercise was referred to our department for cardiac computed tomography (CT) study. The thallium-201 myocardial perfusion study showed positive finding and the result of treadmill exercise electrocardiogram was inconclusive. No evidence of atherosclerotic coronary artery disease but total absence of LCX was found in the CT study. Knowledge of the clinical manifestations and cardiac CT appearances of this rare anomaly are essential for accurate diagnosis and proper treatment.

Congenital absent LCX is a very rare anomaly and only a few cases revealed by coronary angiography have been reported in the literature [1, 2]. In the past, diagnosis of coronary artery anomalies was made with conventional angiography. However, it is an invasive procedure and has a 0.15% mortality and 1.5% morbidity rate [3]. Recently, the use of multislice computed tomography (MSCT) allows faster and safer evaluation of coronary artery anomalies. In this paper, we describe a rare case of total absent LCX with chest pain that was diagnosed by cardiac CT angiography.

CASE REPORT

A 71-year-old man visited our hospital due to intermittent chest pain during exercise for three months. He had no history of hypertension, diabetes mellitus or hyperlipidemia, but was a heavy smoker for more than 30 years. Coronary artery disease with angina was impressed by the cardiologist and stress tests were arranged. The treadmill exercise electrocardiogram showed inconclusive result. The exercise stress thallium-201 myocardial perfusion study revealed reversible perfusion defect in the proximal anterolateral wall of the left ventricle. Then he was referred to our department for a cardiac CT scan.

The cardiac CT study was performed using a 64-slice CT scanner (Aquilion 64, Toshiba, Japan). The initial heart rate of the patient was 71 bpm, therefore 50mg oral metaprolol was given 1 hr before the scan to decrease the heart rate. A spray dose of 0.4mg sublingual nitroglycerin was given before the coronary CT angiography to dilate the coronary tree. We injected 72 ml Iopamiro 370 contrast agent into left antecubital vein through an 18-gauge catheter with a flow rate of 4.0 ml/s. The coronary CT angiography was done using a track bolus technique by putting the region of interest (ROI) in the descending aorta with a trigger threshold of 130 Housefield units. During the scan, the mean heart rate was...
62 bpm. The whole procedure was smooth and the patient stood it well.

The precontrast scan revealed no calcified plaque deposition in the coronary arteries and the calcium score was zero. The coronary CT angiography showed no evidence of luminal stenosis in the coronary tree. However, total absence of the LCX was revealed (Fig. 1). A large diagonal branches coming from left anterior descending (LAD) artery to supply the lateral wall of the left ventricle and the right coronary artery was superdominant with large posterolateral branches (Fig. 2). The cardiac function and wall motion was normal with an ejection fraction of 65%.

**DISCUSSION**

According to the literature, the incidence of coronary artery anomalies is around 1% in general population [4]. They are usually discovered incidentally in patients undergoing diagnostic coronary angiography or during routine autopsy. However, the incidence of each anomaly in unselected general populations is still a question and more data should be collected. Normally, the LCX artery courses in the left atrioventricular groove and gives off obtuse marginal branches to supply the lateral left ventricle. Congenital total absence of LCX is a very rare anomaly and has been reported a frequency of 0.003% in 126595 patients underwent coronary angiography by Yamanaka and Hobbs [5].

In the literature, the absence of LCX is usually regarded as a benign condition and no clinical significance. Interestingly, angina-like symptoms were observed in most of the reported cases of congenital absent LCX, and in the current present case as well. It has been reported that congenital absence of the LCX might associated with systolic click syndrome and could present with chest pain, episodic rapid heart beats, and syncope [6]. Some authors also hypothesized that the chest pain in patient with absent LCX might be due to the “steel phenomenon” of the blood supply from other coronary arteries in order to supply the LCX territory, which might cause transient ischemia in other coronary arterial territories and results in perfusion defects in the stress thallium-201 myocardial perfusion study [6]. However, the true cause of the angina-like symptoms in patients with absent LCX is hard to prove and only can be suggested by circumstantial evidence.

In the present case, the thallium scan revealed reversible perfusion defect in proximal anterolateral wall of the left ventricle, suggestive of myocardial ischemia in the proximal LAD territory. However, no evidence of coronary atherosclerosis was found by cardiac CT angiography and the calcium score was zero. Clinically, the symptoms of congenital absent LCX may not be differentiated from coronary

![Figure 1. 3D volume rendered image of 64-MSCT showing the anatomy of the coronary tree. No left circumflex coronary artery is demonstrated. The left anterior descending coronary artery divides large diagonal branches to supply the lateral wall of the left ventricle.](image1)

![Figure 2. The angiographic emulating image of 64-MSCT showing the absence of the left circumflex artery and the superdominant right coronary artery with large posterolateral branches.](image2)
atherosclerotic disease, and the results of stress tests may be confusing. We emphasize the importance of cardiac CT angiography to identify this anomaly and to exclude the possibility of coronary atherosclerosis safely and effectively, thus prevented the potential risk of an invasive catheterization procedure. Although congenital absence of LCX is a rare anomaly, knowledge of the clinical manifestations and cardiac CT appearances of this anomaly is still essential for correct diagnosis and treatment. 

**REFERENCES**


先天性缺乏左迴旋枝冠狀動脈之心臟電腦斷層影像：
病例報告

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先天性缺乏左迴旋枝冠狀動脈是一個非常罕見的異常。文獻中只有少數以傳統血管攝影診斷出之病例。我們報告一個有類似心絞痛症狀的先天性缺乏左迴旋枝冠狀動脈病例，其接受了心臟電腦斷層掃描。一位七十一歲的男性病患因為運動時有間歇性的胸悶症狀，被轉介來做心臟電腦斷層檢查。他之前所做的鉈–201心肌灌注檢查有異常發現，而運動心電圖檢查則沒有明確結論。心臟電腦斷層血管攝影並沒有發現他有冠狀動脈粥狀硬化疾病，但是發現他缺乏左迴旋枝冠狀動脈。對於這種罕見異常的臨床症狀及心臟電腦斷層表現有所認識，是精確診斷和適當治療的關鍵。