

## Anomalous Origin of Left Circumflex Artery and Left Atrial Circumflex Artery from Super-Dominant Right Coronary Artery

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### Abstract

Coronary artery anomalies refer to various congenital abnormalities of epicardial coronary arteries involving their origin, course, and structure. Despite the low prevalence, they are important to recognize since they are associated with an increased risk of sudden cardiac death, syncope and angina. We present a case of a 83 years old male presenting with exertional angina who was found to have a very unique and rare coronary anomaly on coronary angiography which has never been reported in the past.

### Introduction

Any variation observed in less than 1% of the general population is defined as anomalous or abnormal. The presence of coronary abnormalities has been observed in 1.3% of the patients undergoing cardiac catheterization [1]. It is important since after hypertrophic cardiomyopathy, coronary artery abnormalities are the second most common cause of sudden death in young athletes [2] and are associated with increased risk of developing coronary atherosclerosis within the variant vessel [3].

Increasing use of diagnostic coronary catheterization may reveal even more number of such anomalies and their association with cardiovascular events. We report on a patient with typical angina, a large left atrial artery arising from superdominant right coronary artery in the presence of small and anomalously arising left circumflex artery.

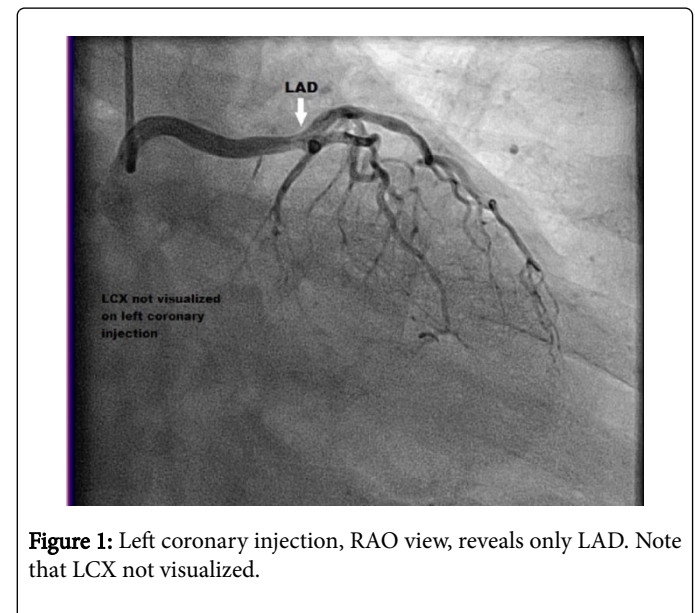
### Case Report

We present a case of 83 years old male who presented with six months history of typical exertional angina. Patient was a smoker. There was no history of prior episodes of myocardial infarction, stroke, coronary artery disease, or personal or familial histories of sudden cardiac death. He was normotensive and general physical and systemic examination did not reveal any abnormality. All laboratory tests were normal including normal blood sugar levels and lipid profile. The resting electrocardiogram showed left bundle branch block.

Echocardiogram revealed normal left ventricular systolic function with no regional wall motion abnormality. Patient underwent elective coronary angiography through a right radial approach. Left coronary angiogram demonstrated only a type A left anterior descending artery arising from left sinus of valsalva which was showing minor plaques. We could not see left circumflex artery in left coronary injections (Figures 1 and 2).

Right coronary angiogram showed the normal origin of right coronary artery from right sinus of valsalva which was super-dominant as it was going much beyond crux running in the atrio-ventricular groove supplying posterolateral and the lateral aspect of left ventricle.

Right coronary angiogram also showed anomalous origin of left circumflex artery from the proximal right coronary artery (Figure 3). A long tortuous left atrial branch was seen arising from the posterolateral branch of right coronary artery in the left posterior atrioventricular groove traversing upwards going well above aortic sinus (Figure 4). Patient was treated with a single antiplatelet agent and low dose statin. Patient was advised a regular follow up but was unfortunately lost to follow up.



**Figure 1:** Left coronary injection, RAO view, reveals only LAD. Note that LCX not visualized.

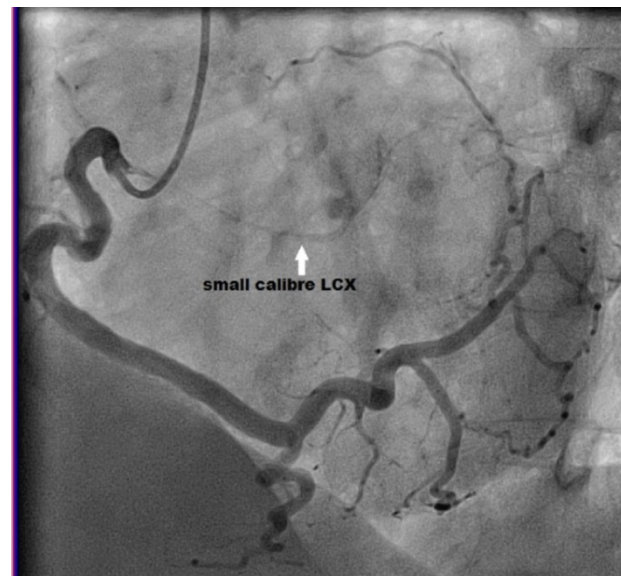
### Discussion

Variant origin of the LCX from the right sinus of valsalva or right coronary artery was first described by Antopol and Kugel in 1933 [4]. This has been previously reported to be one of the common congenital

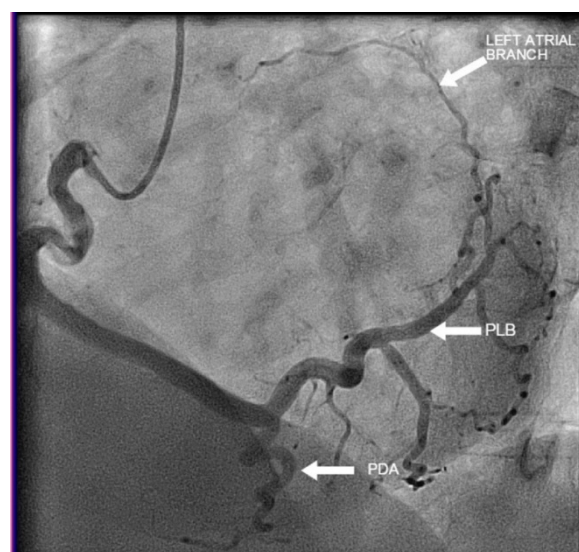
coronary variant, with a prevalence of 0.67 to 0.80% at coronary angiography [1]. This anomaly is usually considered benign [5] and despite being mostly asymptomatic, there are reports of patients presenting with myocardial ischemia, manifesting as angina, syncope, arrhythmias, and even sudden death [6].

Similarly origin of left atrial circumflex from right coronary artery has also been described as a very rare coronary anomaly with only a few case reports available. Earlier studies have shown that it is important to have a detailed knowledge of left atrial branches during catheter ablation for atrial fibrillation [7]. Presence of both the above mentioned anomalies together has never been reported in the past. One should expect absent left circumflex artery in the presence of super-dominant right coronary artery especially if it is not visualized in left coronary injection.

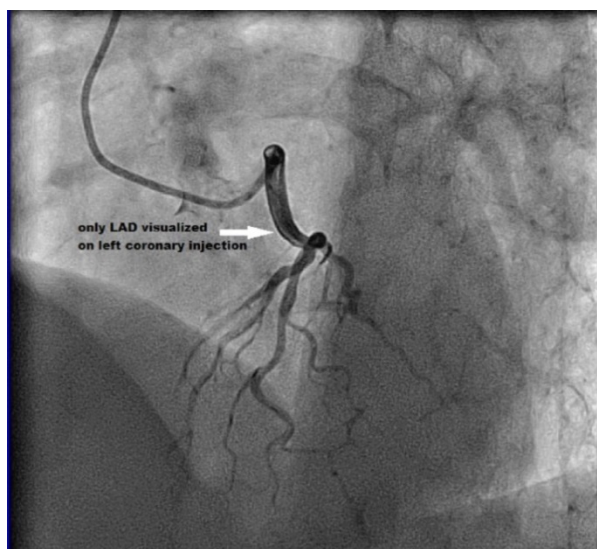
In our case left coronary injection demonstrated left anterior descending artery only with no evidence of filling of left circumflex artery. However, right coronary injection showed a small caliber left circumflex artery arising anomalously from proximal part of super-dominant right coronary artery. In addition right coronary artery also gave rise to a long, tortuous left atrial branch arising in the left posterior atrioventricular groove going upwards well above the aortic sinus. Presence of anomalously arising left circumflex artery and a prominent left atrial branch from super-dominant right coronary artery make our case unique as it has never been reported previously.



**Figure 3:** Small calibre LCX (arrow) arising from RCA.



**Figure 4:** A large left atrial branch arising from posterolateral branch of RCA.



**Figure 2:** LAO cranial view reveals only LAD on left coronary injection.

### Contributor's Statement

NG, AK, RB and KM made the diagnosis and performed the investigations and were involved in the management of the patient. KM wrote the manuscript and performed the literature search. RS, SR and SS corrected the manuscript and gave conceptual advice. All authors read and approved the final version of the manuscript.

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