

# Anomalous Twin Circumflex Artery Identified By Invasive Coronary Angiography and Non-Invasive Multidetector CT Angiography in A 75 Year Old Caribbean Male

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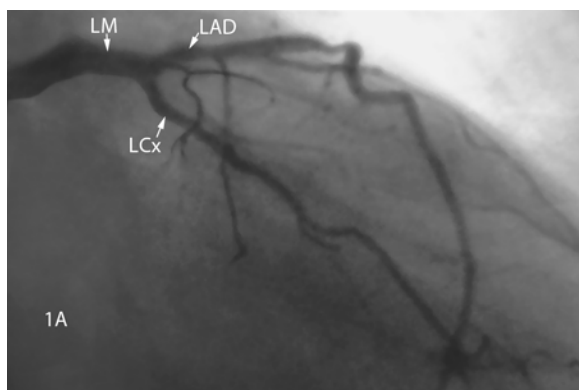
## Abstract

Coronary artery anomalies are clinically important as there have been reports of sudden death, fatal and non-fatal myocardial infarction associated with exercise in persons with certain types of unusual coronary anatomy. Anomalous origin of the circumflex artery is not an uncommon finding; however dual origin of the circumflex artery is a rare anomaly. An extensive search of literature indicates that there have been only two such prior reports, both with non-dominant anomalous left circumflex arteries. We describe here the first report of 'twin' circumflex arteries with the anomalous dominant circumflex coronary artery arising from the right coronary trunk and a non-dominant circumflex artery from left coronary artery. This was diagnosed by conventional coronary angiography and then confirmed with 64-slice multidetector computed axial tomographic (MDCT) angiography. To the best of our knowledge, this is the first report of twin circumflex coronary artery clearly demonstrated by both invasive and non-invasive techniques. No such confirmation by MDCT angiography has previously been reported in literature.

**Keywords:** Coronary anomalies; Twin circumflex arteries; Coronary angiogram

## Introduction

Anomalies of the coronary arteries have been found in 1-2% of patients undergoing coronary angiography [1,2]. In a series of 126,595 patients studied by coronary angiography at the Cleveland Clinic, Yamanaka and Hobbs [2] found the incidence to be 1.3% of the coronary anomalies described. Separate origin of the left anterior descending (LAD) and left circumflex (LCx) was the most common anomaly, occurring in 0.41% of the population followed by the circumflex artery arising from the right sinus of valsalva or from the right coronary artery (RCA) which occurs in 0.37% of the population. Also, Wilkins et al. [3] reviewed 10,000 patients who had undergone coronary angiography and found the most common anomaly to be circumflex coronary artery originating from the RCA or the right sinus of valsalva. None of the two large studies described above have reported any dual origin of circumflex arteries [4-8]. We report here a case of twin circumflex arteries diagnosed by both invasive and non-invasive methods.



**Figure 1A:** Showing the origin of left circumflex artery from left main coronary artery LCx=left circumflex artery, LAD= left anterior descending artery, LM=left main.

## Case Report

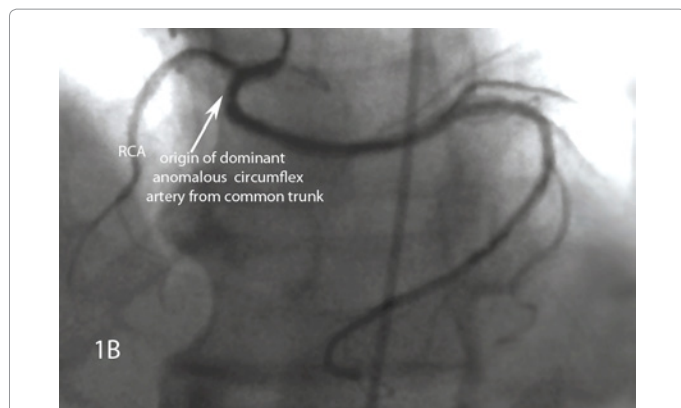
A 75 year-old black male with multiple cardiovascular risk factors presented with a 6 month history of exertional dyspnea and easy fatigueability. He denied syncope, dizziness or chest discomfort at rest or with exertion. His physical examination was essentially normal. An echocardiogram showed normal systolic function and mild (grade 1) diastolic dysfunction but no significant regurgitant or stenotic valvular lesions. Given his symptoms and high cardiovascular risk profile, coronary angiography was performed which revealed twin circumflex coronary arteries as described. The left main (LM) coronary artery bifurcated normally into LAD and LCx. The LAD was fairly large with a short 30% focal lesion in its mid-segment. The LCx (Figure 1A) was a small to moderate sized artery and gave rise to the first obtuse marginal branch. A moderate sized ramus intermedius was identified dividing into anterior and posterior limbs. The posterior limb was severely diseased proximally. The second anomalous circumflex artery and the RCA originated from a common trunk arising from the right coronary cusp (Figure 1B). The RCA were non-dominant with no significant disease. The course of the anomalous circumflex artery was retro-aortic (Figure 2) and it supplied the remainder of the lateral as well as the posterolateral wall of the left ventricle; it appeared free of angiographically significant disease. The anomalous circumflex artery

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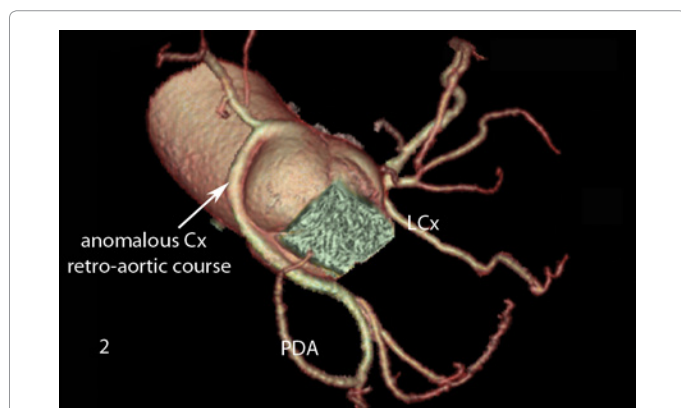
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**Figure 1B:** Showing the origin of dominant anomalous circumflex artery from a common trunk originating from the right coronary cusp. RCA=right coronary artery.



**Figure 2:** MDCT angiography confirming the origin and retro aortic course of dominant anomalous circumflex artery giving rise to PDA. PDA=posterior descending artery, Cx=circumflex.

was dominant producing the second and third obtuse marginal branches before it gave rise to the posterior descending artery. Non-invasive CT angiography was obtained with a 64-slice multidetector CT scanner to better delineate the course of the anomalous circumflex artery (Figure 2). In view of the patient's non-obstructive coronary artery disease and retro-aortic course confirmed by MDCT angiography, decision was made to continue medical management alone.

## Discussion

In 1992, Warner et al reported the first case of twin circumflex arteries in a 52 year-old black female with suspected coronary artery disease, who had two circumflex coronary arteries with one arising from the left main coronary artery and the other from the aorta [9]. A second case was reported by Attar et al in 2008 in a 62 year-old Caucasian male with recurrent anginal episodes. Two circumflex arteries were identified with one from the left main and the second from the right coronary sinus following a retro-aortic course [10].

Our case report represents the first example of twin circumflex artery with the anomalous vessel being dominant confirmed by invasive and non-invasive coronary angiography. There have been many reports of anomalous coronary arteries and their association with accelerated atherosclerosis resulting in myocardial infarction and sudden death,

depending upon their origin, course and termination [11]. Accurate recognition and documentation of coronary artery anomalies and their course at the time of coronary angiography is essential to determine the significance of such findings and to avoid therapeutic complications. Discerning the true three-dimensional course of an anomalous vessel is paramount since its passage between the aorta and pulmonary trunk might lead to mechanical compression resulting in myocardial infarction and sudden death [11]. Non-invasive computed tomography of the coronary arteries done in our patient was superior in identifying the true anatomic course of his aberrant vessel compared with conventional angiogram and confirmed a benign retro-aortic course of the anomalous circumflex artery.

The identification of this anomaly demands a high level of anticipation during the performance of selective coronary angiography to ensure that an adequate study is obtained. Failure to recognize and properly demonstrate the anomaly may result in improper therapeutic decisions that may be hazardous to the patients. Special surgical considerations must be made when performing valvular replacement or coronary artery bypass grafting, if desired in such patients.

## Conclusion

This is the first report of twin circumflex arteries with the anomalous vessel from the right coronary cusp being dominant. This is also the first instance where both invasive coronary angiography and non-invasive 64-slice MDCT angiography were used together to confirm the diagnosis. The use of MDCT angiography to demonstrate the complex course of this anomalous vessel was of particular benefit for charting the management course and should be considered as an adjunctive tool, if the course of the vessel is unclear from conventional coronary angiography.

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