

## Case Report

# Optimizing a diagnostic tool: coronary computed tomography angiography-guided percutaneous coronary intervention of anomalous coronary artery presenting as an acute coronary syndrome

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## ABSTRACT

Anomalous coronary artery presenting with acute coronary syndrome is relatively rare. Achilles heel of percutaneous coronary intervention in a such patient is difficult cannulation of the culprit artery. Coronary CT angiography provides detailed information about the origin and course of the anomalous coronary artery. A few additional information like exit angle and orifice configuration provided exclusively by CT helps in appropriate hardware selection for angiographic success.

**Keywords:** Acute coronary syndrome, Anomalous origin, Coronary CT angiography

## INTRODUCTION

The spectrum of coronary artery anomaly includes anomalies of origin and course, anomalies of intrinsic arterial anatomy, anomalies of coronary termination, and abnormal anastomotic vessels.<sup>1</sup> The commonest is an anomaly of origin and course, however, reported by catheter angiography. Anomalous origin from opposite sinus is a subset of anomalous origin which is clinically most relevant considering their association with episodic ischemia and sudden cardiac death.<sup>2</sup>

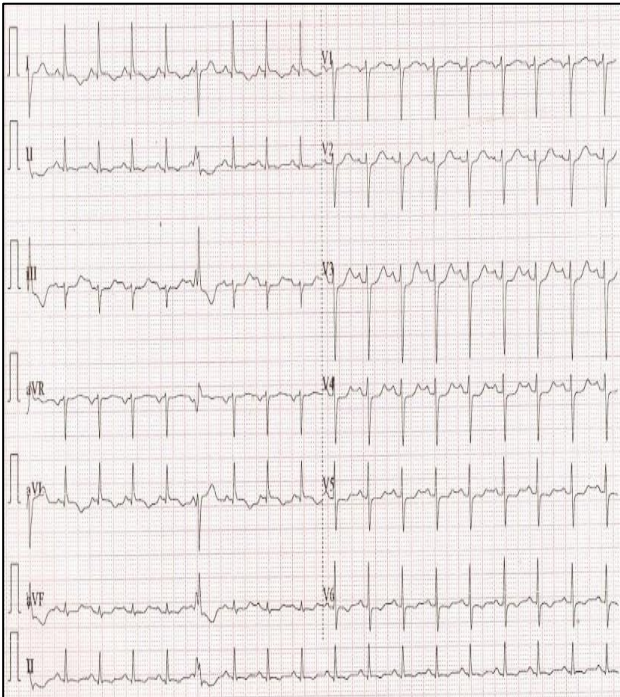
Acute coronary syndrome in anomalous coronary arteries is relatively uncommon.<sup>3</sup> The culprit left circumflex (LCX) artery arising from the right sinus or right coronary artery (RCA) is the commonest anomaly in some reported series.<sup>4,5</sup> Percutaneous coronary intervention (PCI) in such a situation is limited by the inability to cannulate the culprit coronary artery.<sup>6</sup>

Origin, course and termination of the anomalous coronary artery is more precisely delineated by coronary computed tomographic angiography (CCTA) as catheter angiography can acquire limited projections.<sup>7</sup> 3D reconstruction of acquired images can be viewed in desired projections to accurately describe the course of anomalous vessel.<sup>8</sup> As a course of vessel is related to functional significance in anomalous coronary such information has bearing with clinical management.<sup>9</sup>

We are presenting a rare case of anomalous coronary, presenting with acute coronary syndrome. Catheter angiography showed common origin of left anterior descend in artery (LAD), LCX as well RCA from right aortic sinus and a small branch from left aortic sinus. CCTA provided better insight about origin of coronary artery which helped in co axial engagement of guiding catheter and successful PCI of culprit artery.

## CASE REPORT

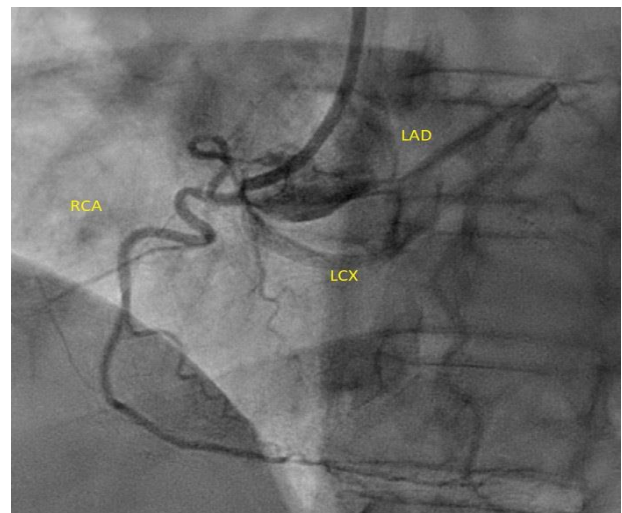
A 38-year-old female hypertensive, non-diabetic, non-smoker presented to our causality with chest pain of 6 hours duration. At presentation her blood pressure was 200/110 mmHg, pulse rate was 92bpm. EKG was suggestive of NSTEMI-ACS (q wave in lead I, aVL and ST depression in v3to v6) (Figure 1). ECHO showed hypokinesia of anterolateral wall with mild LV systolic dysfunction. Patient received loading doses of antiplatelet (aspirin and clopidogrel), heparin, beta blocker and was shifted for cardiac catheterization. Right radial access was used for diagnostic angiogram using 5 F Tiger (terumo) catheter. A single small sized coronary artery originating from left aortic sinus could be visualised (Figure 2). Three coronary arteries apparently with common origin from right aortic sinus were seen during right sinus injection (Figure 3). Co axial engagement and selective angiography of left anterior descending (LAD) and non-dominant right coronary artery (RCA) was possible with Tiger catheter but dominant circumflex (CX) could not be engaged. However non selective injection showed severe tubular stenosis of obtuse marginal (OM). Diagnostic catheter was exchanged for guiding catheter 6F Judkins right 3.5 catheter and selective engagement of CX was tried by parking a buddy wire in LAD as well as RCA. Multiple attempts to selectively engage CX failed despite using another guiding catheter like ECR and multipurpose. Procedure was deferred due to excessive use of iodinated contrast. Patient was hydrated with isotonic soda bicarbonate @ 1.5 ml/kg/hr for 6 hours and nitro-glycerin infusion was started to keep blood pressure in normal range.



**Figure 1: ECG showing q waves and T inversion in lead I and aVL.**

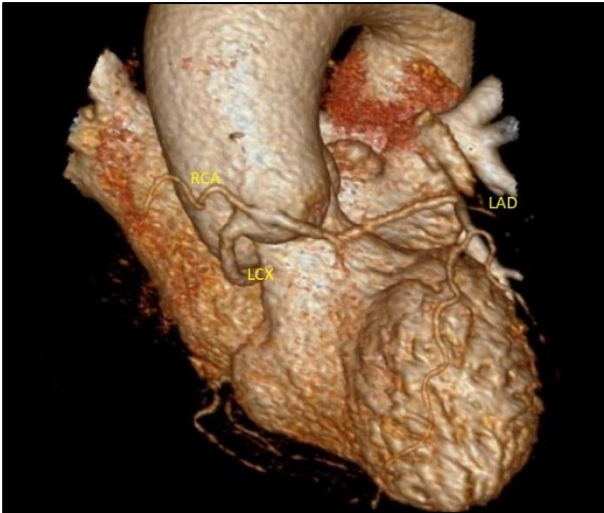


**Figure 2: Left sinus angiogram showing origin of a small single artery.**

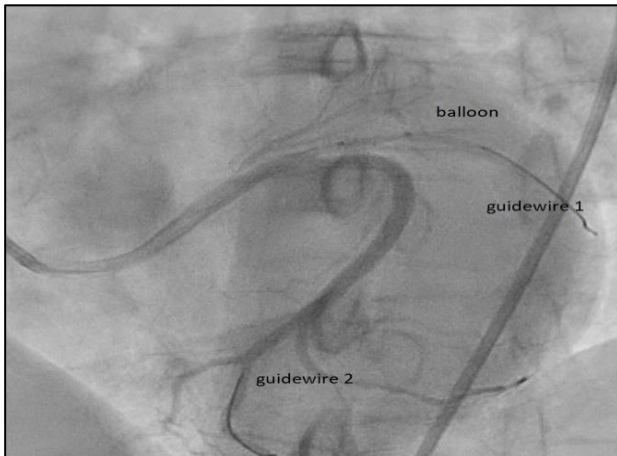


**Figure 3: Origin of three coronary artery from right aortic sinus.**

CT coronary angiography was done to precisely define origin and course of anomalous coronaries which showed separate and posterior origin of LCX from right sinus (Figure 4). Two separate samples sent 12 hours apart did not show any rise in serum creatinine (0.6 mg/dl in each sample). Patient was shifted for left heart catheterization again. RCA was engaged with 6F JR 4.0 through right femoral access and run-through (Terumo) coronary guidewire was parked distally. Coronary guidewire parked in RCA was used as anchor and guiding catheter was disengaged and rotated clockwise to position it near CX ostium. This maneuver helped in wiring CX with other Balanced middle weight (Abbott) guidewire. Guidewire parked in RCA was removed and used to cross lesion in major OM (Figure 5). Anomalous circumflex was engaged co axially with the support of two guide wires. Lesion in major OM was predilated with 2x10 compliant balloon and stented with 2.75x20 DES (Figure 6).



**Figure 4: 3D reconstruction of CCTA showing common origin of LAD, RCA and separate posterior origin of LCX from right coronary sinus.**



**Figure 5: Pre dilatation of obtuse marginal lesion after co axial engagement of circumflex. A buddy wire was parked in distal circumflex.**



**Figure 6: Post procedure angiogram.**

## DISCUSSION

PCI with angiographic as well as clinical success is inherently challenging in anomalous coronary artery particularly in acute coronary syndrome setting.<sup>10</sup> Co axial engagement of guiding catheter to culprit artery and easy delivery of hardware to target lesion requires precise visualisation of orifice configuration as well as exit angulation. CCTA elaborately provides such information.<sup>11</sup>

In this case report, patient PCI was not successful during index procedure as culprit artery could not be cannulated. Coronary angiography in different projection gave the impression that there is common origin of all three coronary artery. However minor manipulation of guiding catheter keeping a wire in non-culprit RCA as well as LAD could not achieve co axial engagement of LCX.

Separate and posterior origin of LCX was clearly visualised in CCTA images. Procedure was re attempted and guiding catheter was rotated clockwise taking support from buddy wire parked in RCA. Another guidewire was used to wire LCX and taking support on this wire, co axial engagement was possible. One guidewire was used to cross lesion in obtuse marginal and another buddy wire was parked in distal LCX to complete the procedure.

## CONCLUSION

We emphasize the importance of CCTA for PCI in anomalous coronary artery not only for accurate localization of origin and course but also for visualising orifice configuration and exit angulation. These insights help in co axial engagement of culprit artery.

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