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Case Report

Internal Medicine Section

# Percutaneous Coronary Intervention of Hidden Coronary Artery-Unusual Type of Isolated Single Coronary Artery

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## ABSTRACT

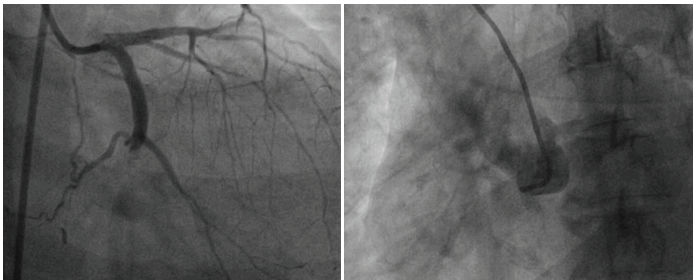
Single coronary artery is a rare congenital coronary artery anomaly, the incidence of which is 0.024-0.066% as described in literature. Report of cases having single coronary artery along with acute myocardial infarction are scanty and reports of percutaneous intervention in such a situation are even fewer, technically challenging and potentially cataclysmic. As single coronary artery supplies the entire myocardium, occlusion of this can result in significant ischemic insult, resulting in severe biventricular dysfunction. Percutaneous Coronary Intervention (PCI) of single coronary artery is technically challenging and carries high risk which may be equated to left main intervention. We report a rare interesting case of L1 variety of single coronary artery which presented as acute inferoposterior myocardial infarction with successful rescue PCI to Left Circumflex Artery (LCx).

**Keywords:** Biventricular dysfunction, Inferior wall myocardial Infarction, Left circumflex artery

## CASE REPORT

A 55-year-old woman presented to the Emergency Department with typical angina of 4 hours duration. Patient was diagnosed as having acute coronary syndrome-acute Inferoposterior wall myocardial infarction. Patient had past history of hypertension, diabetes mellitus, dyslipidemia and hypothyroidism for last five years for which she was on following medication: Telmisartan 40mg once daily, glimepride 1mg once daily, thyroxin 25µg once daily. Patient had no family history of coronary artery disease.

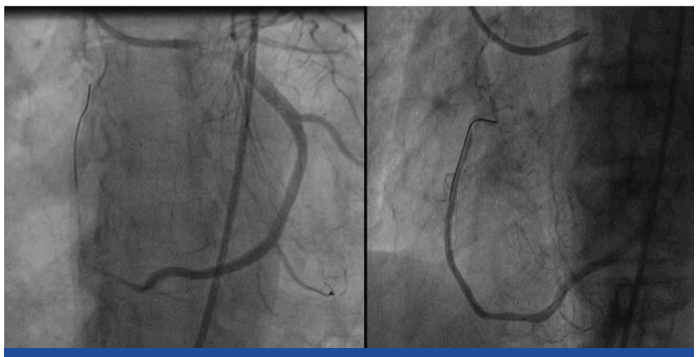
Initial physical examination revealed, heart rate of 62 beats per minute, blood pressure of 110/70mmHg, and was otherwise unremarkable. An Electrocardiogram (ECG) revealed a normal sinus rhythm with Inferoposterior wall myocardial infarction. A two dimensional echocardiogram revealed LV segmental hypokinesia and an ejection fraction of 40%. Patient was immediately treated with thrombolytic therapy. As patient had failed thrombolysis by persistent angina and unresolved ST segment by ECG, hence, rescue PCI was considered. Coronary angiography was performed which revealed LCx total occlusion and RCA could not be cannulated [Table/Fig-1,2]. Hence, anomalous origin was suspected and proceeded with PTCA to LCx, pending Computed Tomography Coronary Angiogram (CT CAG) to identify origin of RCA. During PTCA when LCx was predilated, interestingly it was noted that RCA was arising from distal LCx (single coronary artery was noted). Right coronary artery also had 90% stenosis at the site of origin from distal LCx (RCA was hidden within occluded LCx which also had critical lesion). After predilatation of LCx, Successful Percutaneous Transluminal Coronary Angioplasty (PTCA) with stent to Right Coronary Artery (RCA) was done with 2.5mm x12mm Drug eluting stent (which was arising from distal LCx) followed by stenting of LCx with 3.5x40mm drug eluting stent [Table/Fig-3]. Later CT CAG was done to demonstrate course of RCA which confirmed L1 variety of single coronary artery [Table/Fig-4-6]. Patient tolerated the procedure well, and patient was discharged in stable condition with optimal medical management. Patient is doing well at 6 month follow-up.



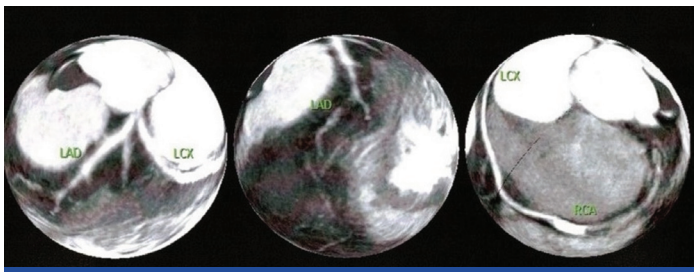
**[Table/Fig-1]:** Ccoronary angiogram showing distal left circumflex artery total occlusion. **[Table/Fig-2]:** Coronary angiogram sinus shoot which could not localize ostium of Right coronary artery (Absence of Right coronary artery origin from right sinus).

## DISCUSSION

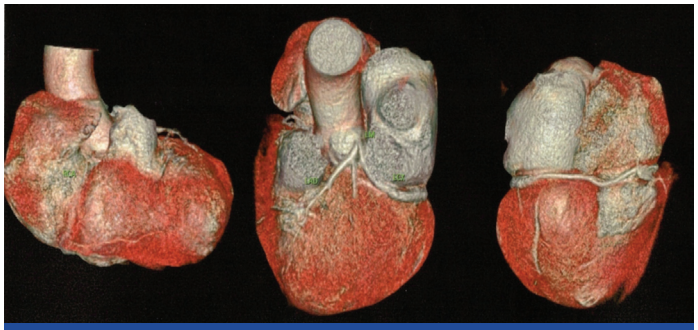
Single coronary artery is a rare congenital coronary artery anomaly, the incidence of which ranges from 0.024-0.066% as described in literature [1,2]. As per Lipton classification our patient had L 1



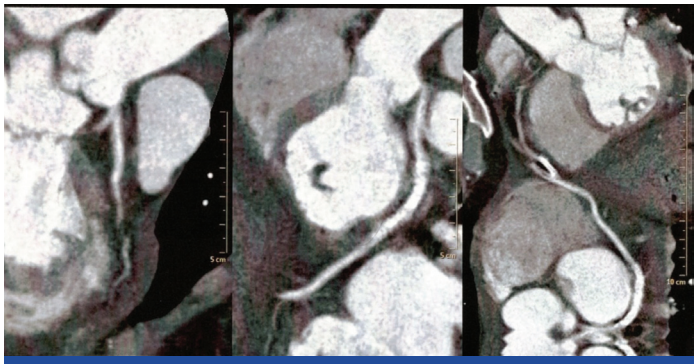
**[Table/Fig-3a&b]:** Post percutaneous transluminal coronary angioplasty image showing right coronary artery arising from distal left circumflex artery.




**[Table/Fig-4]:** CT coronary angiogram showing left circumflex artery continuing in atrioventricular groove giving origin to right coronary artery.



**[Table/Fig-5]:** CT 3D reconstruction image showing stented left circumflex artery and right coronary artery seen arising from distal left circumflex artery.



**[Table/Fig-6]:** CT Coronary angiogram demonstrating right coronary artery which arises from left circumflex artery traversing in right AV groove.

variety as single coronary artery arises from left sinus and continues in atrioventricular groove as LCx and even beyond crux of heart into right atrioventricular groove to supply right ventricle.

As mentioned by Moodie et al., in their study, an association exists between single coronary artery of type R-IIB (in which the anomalous left main trunk runs between the great vessels) and sudden death during exercise [3]. The compression between great vessels was thought of as a possible reason initially, however this hypothesis was later contested because hydrostatic pressure in pulmonary artery is much lower than coronary perfusion pressure during exercise. Hence, the 'Kinking' of the left main coronary artery at its origin from the RCA by an increased angulation caused by the distension of the aorta during exercise was proposed as the pathogenic mechanism [4].

Anatomical malformation such as acute angle take off, narrow slit like orifice that collapses in a valve like manner thereby limiting blood flow are also implicated in causing ischemia [5,6].

In our case atherosclerosis is the reason for acute coronary syndrome, as patient had conventional risk factors like diabetes mellitus, dyslipidemia and post menopausal age.

PCI in anomalous coronaries is technically challenging because of following difficulties faced such as: during angiogram difficult visualization and during angioplasty difficulty in obtaining co-axial alignment of catheter, also need for significant curve in the guide wire and difficulty in passing the stent delivery system [7].

Stable guiding catheter seating and optimal back-up support is the key to PCI of abnormally arising coronaries. Proper choice of guide catheters and other equipments are essential to prevent complications like dissection jeopardizing the entire myocardium. The procedural risk of PTCA is very high and multi-slice computed tomography is needed to determine the course, prognosis and to guide therapy.

### Implications to Clinical Practice

- Single coronary artery occlusion impairs blood supply to almost entire myocardium which can result in severe biventricular dysfunction.
- PCI of single coronary artery is technically challenging and carries high risk which may be equated to left main intervention.
- The guiding catheter should correspond to the sinus of origin rather than the artery for which PCI is to be done.

## CONCLUSION

Single coronary artery with origin of the right coronary artery from the left circumflex artery is an extremely rare finding. Association with acute STEMI is even rarer. The main importance of single coronary artery resides in difficulties in diagnosis during coronary angiogram & cardiac surgery. So every treating doctor should therefore be familiar with the existence & anatomical types of this congenital anomaly.

The coronary artery anomaly can be associated with myocardial ischemia and some variety with increased risk for sudden cardiac death, particularly if the anomalous artery traverses within the aortic wall or between the aorta and pulmonary artery.

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