

## Case Report

## A Rare Coronary Artery Anomaly Presented With Acute Myocardial Infarction in a Young Patient

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Received -16 August 2018

Initial Review – 7 October 2018

Accepted – 23 October 2018

### ABSTRACT

Single coronary artery (SCA) anomaly is a rare angiographic finding and majority of the patients are asymptomatic; however, myocardial ischemia and sudden death have been reported. We report a 26 year old male patient with SCA with acute myocardial infarction, in whom successful coronary angioplasty was performed to the left anterior descending artery through an anomalous of the right coronary artery, originating from the proximal part of the circumflex coronary artery. The patient was discharged with uneventful recovery.

**Key words:** Single coronary artery, Coronary anomaly, Acute myocardial infarction, Primary Angioplasty.

Coronary abnormalities are usually diagnosed during routine angiography and are ranged from 0.6% to 2% [1,2]. Isolated single coronary artery (SCA) is an extremely rare congenital coronary artery anomaly (CAA), and especially an aberrant origin of the right coronary artery from the left main stem artery, represents one of the all coronary anomalies. Patients with an isolated single coronary anomaly may present with angina pectoris, myocardial infarction (MI), arrhythmia, syncope, sudden death and congestive heart failure [3,4]. Percutaneous coronary intervention (PCI) in SCA with acute MI might be challenging and potentially catastrophic. We present a case of successful primary PCI performed to left anterior descending (LAD) artery in a patient with a SCA which classified as type LII-A according to modified Liptons's classification multi-slice computerize tomography examination.

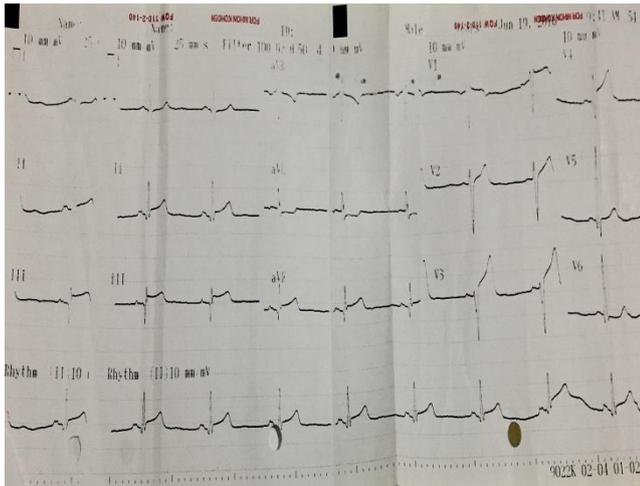
### CASE REPORT

A 26-year-old man was admitted to the emergency room

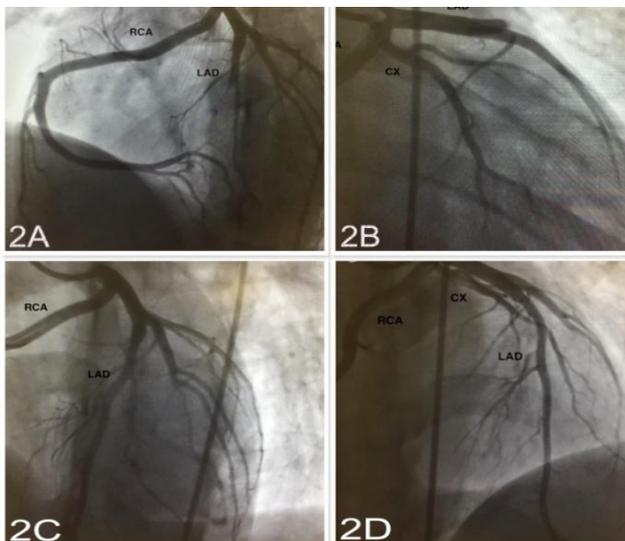
after soccer play with severe chest pain of crushing nature and radiating to back for 30 minutes. In the emergency room, his heart rate was 75/min, blood pressure was 120/80 mmHg and his physical examination was normal. He had no history of smoking, dyslipidemia, diabetes, or any other family history of ischemic heart disease. The electrocardiogram showed ST-segment elevation in leads DII, DIII, aVF, V3-5, and ST depression in leads D1, aVL, V6, suggesting an acute infero-septal MI [Fig 1]. Echocardiography showed hypokinesia in septal and middle part of the anterior myocardial wall, and ejection fraction was 55% by biplane method.

The patient was administered with acetylsalicylic acid 300 mg p.o. and intravenous heparin 10,000 UI; he was then carried directly to the catheter laboratory for primary PCI. Door-to-balloon time was 40 minutes. Right coronary artery (RCA) was not visualized with a 7 French Judkins right diagnostic catheter during angiography and left coronary angiography was performed. Left coronary angiography showed a dominant left coronary artery

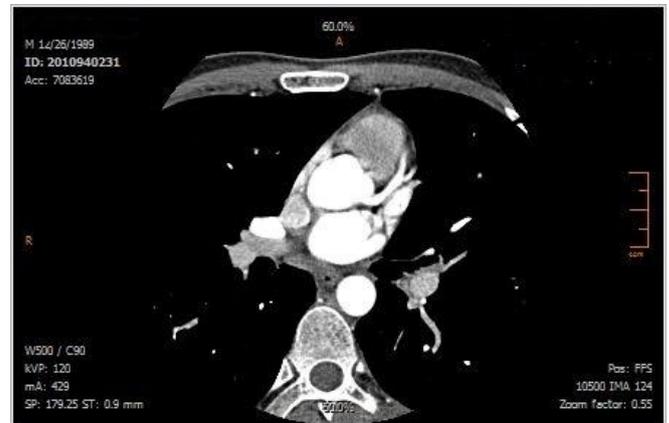
(LCA) and an anomalous RCA originating from the distal part of the left main coronary artery (LMCA) [Fig. 2A and movie clip 1]. Also, circumflex artery (CxA) was originating from the proximal part of the RCA, and complete thrombotic occlusion of the middle LAD was observed with thrombolysis in myocardial infarction (TIMI) flow grade 0 [Fig. 2B, 2C 2D and movie clip 1].



**Figure 1:** Electrocardiogram showed ST segment elevation in leads DII, DIII, aVF, V3-5, and ST depression in leads D1, aVL, V6.



**Figure 2:** 2A. Right coronary artery originating from the distal part of the left main coronary artery 2B. Complete thrombotic occlusion of the middle LAD 2C. & 2D. Achieved TIMI-3 flow of LAD by coronary stent implanting (RCA: Right coronary artery, LAD: Left anterior descending artery, Cx: Circumflex artery)



**Figure 2:** Cardiac Computed Tomography angiography showed that RCA appeared retro-aortic and benign course

The lesion was crossed with a guide wire, and 2.0 ×15 mm balloon catheter was inflated. A 3.0 ×18 mm coronary stent was implanted (movie clip 2), and successful TIMI-3 flow was achieved [Fig. 2D and movie clip 3]. Aortography performed, and no other coronary exit site was found either in left sinus valsalva or any other ectopic site. Cardiac Computed Tomography angiography was performed and showing RCA appeared retro-aortic and benign course [Fig. 3]. We investigated the possible causes of MI in this age. There was no cocaine usage in the history and coagulation parameters, and homocysteine levels were normal. Patent foramen ovale and atrial septal defect was not observed throughout echocardiography examination. The patient was discharged without any complications. At clinical follow-up, the patient with a normal ejection fraction had full recovery of cardiac function and was asymptomatic.

## DISCUSSION

Majority of the patients with SCA is asymptomatic and usually diagnosed during angiography incidentally and ranged from 0.6% to 1.3 [1,2,5]. These patients can be presented with chest pain, syncope, ventricular fibrillation, MI or sudden death. These anomalies are reported to be related to 19% of sudden deaths in young athletes [6]. SCAs are considered potentially dangerous when the course of coronaries between the aorta and pulmonary artery and it is highest related to adverse outcomes. There isn't alternative collateral circulation in SCA due to which lesions which are developed at the coronaries affect large myocardial regions and might cause severe ischemia and generate critical hemodynamic consequences [7].

Compression by the ascending aorta can cause an impairment of coronary flow when the SCA courses posterior to the aorta [8].

The screening method used to assess anomalous coronary arteries, is crucial because this anomaly can be related to ischemic heart disease and sudden cardiac death. The gold standard diagnostic method for SCA is coronary angiography; however, non-invasive imaging methods such as magnetic resonance imaging and multi-slice computed tomography, are suggested for misinterpretation. Our patient's anomaly was classified as type LII A according to modified Lipton's classification [9] and did not feature an inter-arterial course of the coronaries. The clinical importance of SCA lies mainly in their course related to the great vessel. Anterior and posterior routes are the most common courses to be considered benign [10]. Patients with an inter-arterial course are malignant form that might develop coronary obstruction, secondary to great vessels dilation during exercise.

Classification for single coronary artery was first introduced in 1979 by Lipton *et al.* for describing the origin and course of single coronary anomalies [9]. Yamanaka *et al.* reported that there is no significant correlation between coronary artery anomalies and coronary artery atherosclerosis [11]. On the other hand, Hutchins *et al.* has suggested that anomalous coronary artery predisposes to atherosclerosis [12]. Also, some reports state that the junction point of the anomalous artery and the free section as it wraps around the aorta area is vulnerable to lipid accumulation and finally increased atherosclerosis [13].

When the initial clinical presentation is ST segment elevation MI, primary PCI is defined as angioplasty and/or stenting which are the therapeutic option despite technical difficulties. Use of large sized guiding catheters or balloon catheter may have potential risks on the blood flow for a significant amount of myocardium [14]. Appropriate selections of the equipments are essential for PCI and care must be taken to avoid catastrophic events. Also, appropriate choice of guiding catheter helps the operator to complete the procedure quickly and with less radiation.

## CONCLUSION

We report a case of primary PCI in a patient with SCA and acute myocardial infarction. PCI is a safe and effective

method of revascularization for ST segment elevation of a single coronary artery.

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**How to cite this article:** Asoglu R, Karakus A, Turkmen S, Akturk E, Cetin M, A Rare Coronary Artery Anomaly Presented With Acute Myocardial Infarction in a Young Patient, *Eastern J Med Sci.* 2018;3(4):80-83.

*Funding: None; Conflict of Interest: None Stated.*

