Anomalous Right Coronary Artery Originating from Mid Left Anterior Descending Artery-An Unexpected Encounter during Primary Percutaneous Coronary Intervention

Others Section

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ABSTRACT

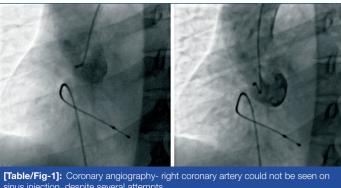
The appearance of single coronary artery with anomalous Right Coronary Artery (RCA) originating from left coronary artery is an extremely rare encounter. Here, the authors report one such case of a 34-year-old male, who was serendipitously encountered with a single coronary artery with anomalous RCA arising from mid Left Anterior Descending (LAD) artery. He presented with anterior wall ST-elevation Myocardial Infarction (STEMI) and developed complete heart block. His mid LAD supplying anomalous RCA was totally occluded which was successfully recanalised using drug-eluting stent. The computed tomographic angiography confirmed single coronary artery with anomalous RCA arising from mid LAD across the stent. Thus, if RCA is not seen during traditional coronary angiography, the interventionalist should keep in mind that RCA can originate from LAD.

> **Keywords:** Congenital coronary artery anomaly, Computed tomographic angiography, Drug-eluting stent, Single coronary artery

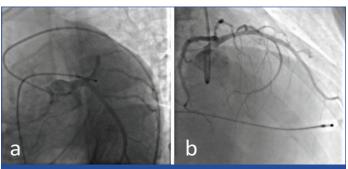
CASE REPORT

A 34-year-old male with complaints of persistent chest pain was referred for further evaluation at the Department of Cardiology, Yashoda Hospital, Malakpet, Hyderabad, Telangana, India. He was thrombolysed with Tenecteplase six hours prior, at another centre, for acute anterior wall myocardial infarction. He had no known atherosclerotic risk factors, but laboratory examination revealed dyslipidemia with high serum triglyceride levels (280 mg/dL). On evaluation, his electrocardiogram revealed persisting ST elevations in anterior leads and complete heart block with heart rates of 38 beats/minute. Echocardiography revealed anterior wall akinesia with moderate left ventricular ejection fraction (40%).

In view of failed thrombolysis, he was subjected to immediate coronary angiography and rescue Percutaneous Coronary Intervention (PCI). He was supported with temporary pacemaker implantation. Surprisingly, his Right Coronary Artery (RCA) was not engaged despite several attempts [Table/Fig-1], thus presence of anomalous RCA was suspected. Left coronary angiogram revealed totally occluded mid Left Anterior Descending (LAD) artery with thrombus burden [Table/Fig-2a] and rescue PCI with a 3.0×28 mm drug-eluting stent was performed. Thrombolysis in myocardial infarction score-3 flow was achieved at the end of the procedure [Table/Fig-2b].



nus injection, despite several attempts.

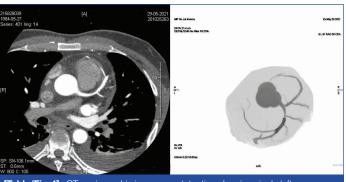


[Table/Fig-2]: a) Left coronary angiogram with temporary pacemaker support; shows totally occluded mid left anterior descending artery; b) Poststenting check angiogram shows right coronary artery originating from mid left anterior descending artery across the stent.

He was stabilised and CT-coronary angiography was planned after two days of the procedure to assess RCA. It confirmed the presence of only single coronary artery arising from left coronary sinus and congenitally abnormal RCA arising from mid LAD lesion across the implanted stent. Anomalous RCA arising from mid LAD across the stent was found passing anterior to pulmonary artery and course towards right A-V groove supplying RCA territory [Table/Fig-3,4]. This blocked anomalous RCA was the reason of his complete heart block. The patient was prescribed dual antiplatelet therapy, statins, and Nikoran postprocedure. The patient was doing well without any adverse events at eight months follow-up visit.



[Table/Fig-3]: CT-angiographic images poststenting showing single left coronary artery arising from left coronary sinus. Anomalous right coronary artery seen arising from mid left anterior descending artery across the stent which runs anterior to pulmonary artery into the right atrioventricular groove.



[Table/Fig-4]: CT-angiographic images poststenting showing single left coronary artery arising from left coronary sinus.

DISCUSSION

Several subtypes or variants of coronary artery anomalies have been reported in literature, however, appearance of single coronary artery with anomalous RCA originating from left coronary artery is an extremely rare encounter with a prevalence of up to 0.035% [1]. The occurrence of single coronary artery is 0.024% of the general population. Literature reported quite a few varieties of anomalous origin of the RCA, however the origin of the RCA from the LAD is an unusual encounter with only very few cases reported till date [2-5]. In most instances, these anomalies remain benign, however few patients may develop ischaemic symptoms primarily due to LAD stenosis as reported in the present case and rarely due to stenosis of anomalous RCA [6]. Furthermore, single coronary artery is commonly encountered with other congenital anomalies [2,7], but the anomalous RCA branching from LAD subtype has not been associated with any other congenital defects excluding two cases with tetralogy of fallot [8,9]. If anomalous RCA courses between the pulmonary artery and aorta, myocardial ischaemia and even sudden cardiac death may occur. However, this variant of single coronary artery with anomalous RCA generally presents with only two courses that are retro-aortic course or anterior to the pulmonary artery trunk course [5]. In the index patient, there were no associated congenital anomalies, and the course of anomalous RCA was also benign (anterior to pulmonary artery towards right A-V groove).

The physiology behind myocardial ischaemia and sudden death in patients with anomalous coronary arteries include coronary vasospasm, slit like orifice, acute angle take off, intramural course, and/or compression by the great vessels such as aorta and pulmonary. The clinical consequence of coronary artery anomalies varies based on their anatomic course. Usually, this anomaly remains benign in case of non interarterial course of anomalous RCA. However, if the anomalous RCA courses between the aorta and the pulmonary artery, myocardial ischaemia and/or sudden cardiac death may occur. The clinical presentation in patients with coronary anomaly does not differ than in those of normal coronary patients which include chest pain, dyspnea, palpitation, syncope, ventricular fibrillation, myocardial infarction, or sudden death [7,10].

Usually, coronary anomalies are incidental findings during coronary angiography. Though there are numerous diagnostic modalities

including echocardiography, invasive coronary angiography, and Magnetic Resonance Angiography (MRA) are helpful for the evaluation of anomalous coronary arteries, use of CT coronary angiography is considered as gold standard as it provide valuable additive investigational information for both anatomical and functional diagnosis of anomalies as well as their anatomic relationship to adjacent structures [7,10]. In the index patient, thrombolysis failed and thus rescue PCI was performed to mid LAD which supplied the anomalous RCA. Although, initially it was difficult to engage RCA, later rescue PCI was opted for mid LAD, as it was totally occluded without a second thought. Later after two days of PCI, CT coronary angiography was performed to confirm the origin of RCA. The patient was discharged in three days with dual antiplatelet therapy and other supportive medications.

CONCLUSION(S)

The present case adds one more evidence to the available literature on occurrence of anomalous RCA as a branch of mid LAD which is a very rare variant of single coronary artery. If RCA is not observed during coronary angiography, interventional cardiologists must consider presence of this type of anomaly and should consider use of advanced coronary imaging modalities for confirmation of the same.

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