CASE REPORT

Anomalous origin of the right coronary artery from the proximal left anterior descending artery and a single coronary artery anomaly: Three case reports

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The anomalous origin of the right coronary artery (RCA) as a branch of the left anterior descending (LAD) artery is a very rare variation of single coronary artery. We have reported three cases in the last 10 years. Among 15,000 coronary angiograms, at least 40 cases have been described previously in the literature. The vast majority of previous reports have described a single anomalous vessel with its origin after the first septal perforator of the LAD. Two of our patients presented with acute coronary syndrome and were found to have three vessel disease and left main. They underwent coronary artery bypass graft surgery (CABG) and third case presented with tachycardia had only mild coronary artery disease (CAD) and was treated medically.

Keywords: Anomalous coronary artery, Right coronary artery, Left anterior descending artery

Case report

Case 1

A 55-year-old female who had no past medical history was presented to the hospital with a primary complaint of chest pain. She had had a positive stress test in another hospital and was referred for cardiac catheterization. She came as a day case for coronary angiography and was found to have critical stenosis of left main (LM) with 90% ostial left anterior descending (LAD) artery lesion and 80% ostial left circumflex artery (LCX) lesion (Fig. 1). Right coronary artery (RCA) is anomalous and arising from proximal LAD (Fig. 2). Intra-aortic balloon pump (IABP) was inserted and immediately taken for an emergency coronary artery bypass graft surgery (CABG). Echocardiogram showed normal ejection fraction > 55% and no valvular disease. She had CABG × 2 (left internal mammary artery (LIMA) to LAD and saphenous vein graft (SVG) to LCX). She tolerated the surgery well. The IABP was removed on the first postoperative day. She had a smooth postoperative course. She was discharged home in stable

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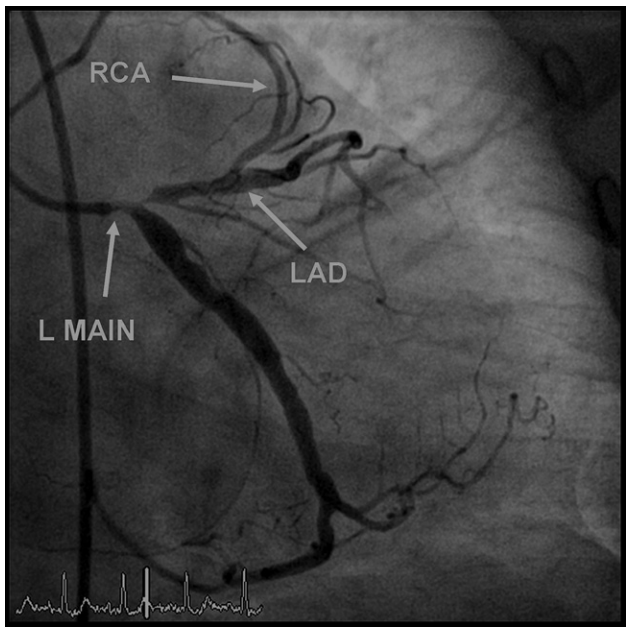

Figure 1. Caudal coronary angiography view showed critical stenosis of LM with 90% ostial LAD lesion and 80% ostial LCX lesion.

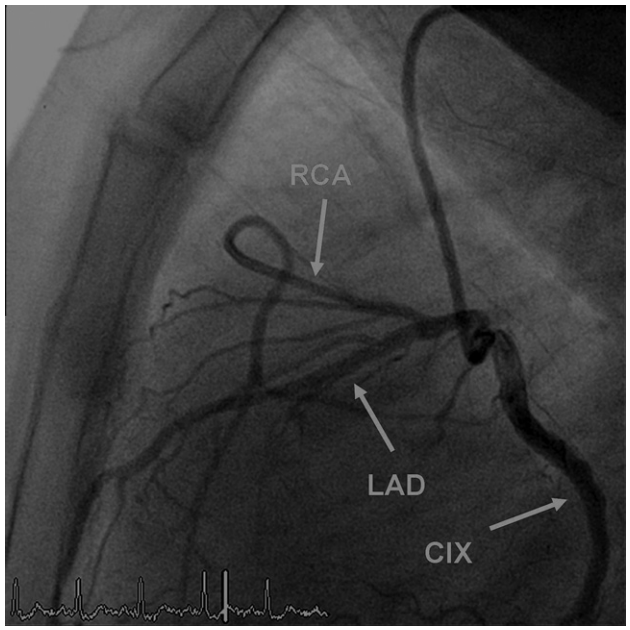

Figure 2. Lateral coronary angiography view showed RCA is anomalous and arising from proximal LAD.

condition on day six on multiple medications including Perindopril, Atorvastatin, Acetyl salicylic acid and Clopidogrel.

Case 2

A 71-year-old female, known to have diabetes mellitus, dyslipidemia, and hypertension, presented to emergency room with a main complaint of chest pain. She is blind in the left eye. The patient was admitted as a case of atrial tachycardia and unstable angina (acute coronary syndrome). Echocardiogram showed the left ventricle is mildly dilated and the left ventricular systolic function is severely reduced. Ejection fraction = 25%, severe global hypokinesis of the left ventricle, mild mitral regurgitation, moderate tricuspid regurgitation, mild to moderate valvular aortic stenosis and mild aortic regurgitation. She received anti-ischemic and anti-anginal therapy and was then referred to cath lab where we found mild coronary artery disease with anomalous RCA arising from proximal LAD (Fig. 3), with normal right side pressures. The attack of atrial tachycardia responded to B-blocker (Metoprolol 50 mg twice daily and Digoxin 0.25 mg/d was added. The patient was discharged in stable condition.

Case 3

A 75-year-old male patient, known to have diabetes mellitus, hypertension and dyslipidemia, was admitted with acute coronary syndrome (non-ST-elevation myocardial infarction) in 2004, was found to have three-vessel coronary artery disease and anomalous origin of RCA from LAD (Figs. 4 and 5). He underwent CABG surgery in 2004, Lima to LAD, SVG to RCA and SVG jump Y graft to OM1 and OM2. Since 2004, the patient had a very good follow-up in the clinics and remained stable for 5 years. Recently he presented to the emergency department complaining of

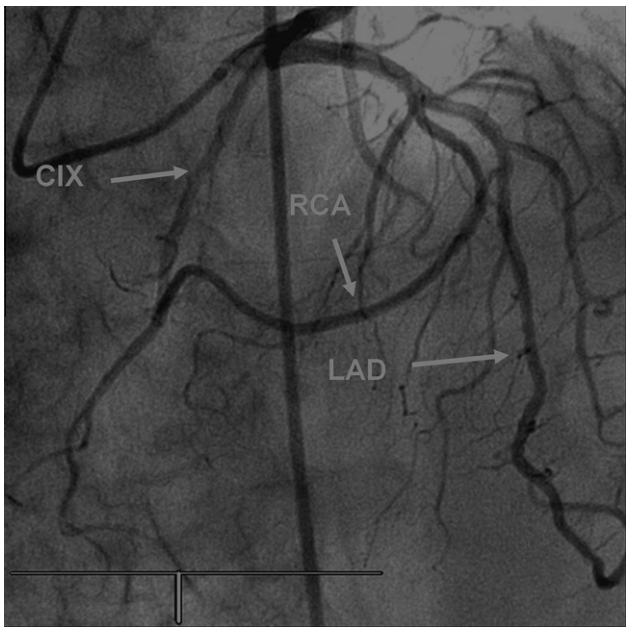

Figure 3. Cranial coronary angiography view showed anomalous RCA arising from proximal LAD.

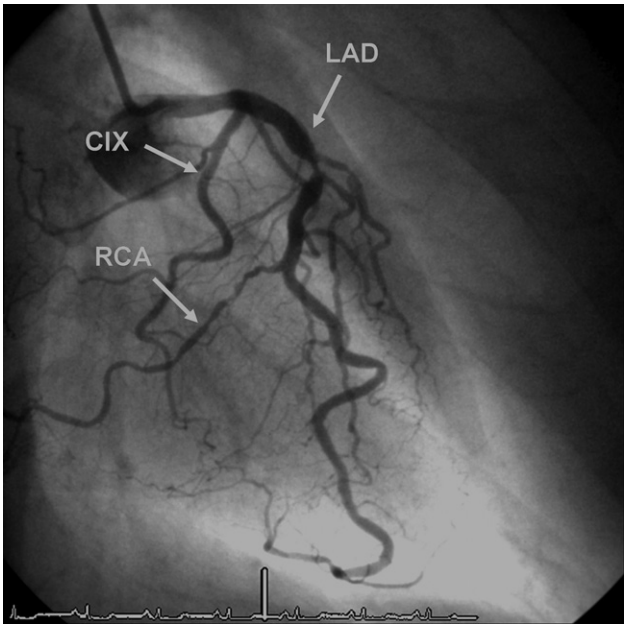

Figure 4. Cranial coronary angiography view showed abnormal origin of RCA from mid LAD and significant stenosis.

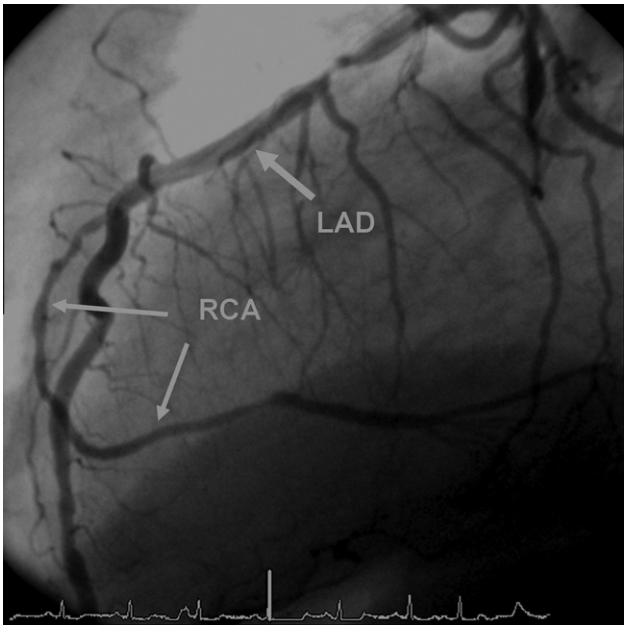

Figure 5. Lateral coronary angiography view showed the anomalus origin of diseased RCA from mid LAD.

chest pain and shortness of breath for three days. Patient was admitted to CCU and started on ACS medication. Echocardiogram and left ventricular systolic function were normal. Ejection Fraction > 55%, cardiac enzymes troponin $I = 2.9$. Patient was treated for Non- ST segment elevation myocardial infarction (STEMI) using ASA,GP IIb IIIa, Plavix, Statins, LMWH, and ACE inhibitors.

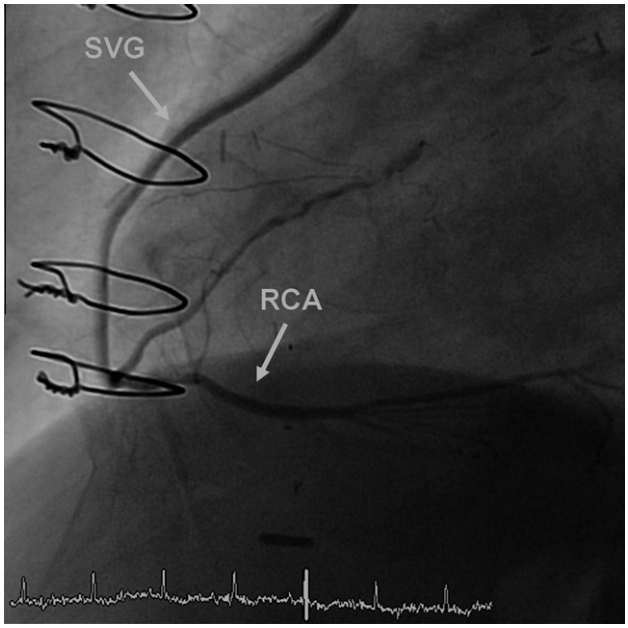

Figure 6. LAO Coronary angiography view showed a patent SVG graft to RCA.

Coronary angiography showed a patent SVG graft to RCA (Fig. 6) and a large clot in the SVG to OM 1. Suction was done for the clot and the patient was discharged in very stable condition.

Discussion

The anomalous origin of the RCA as a branch of the LAD artery is a very rare variation of single coronary artery which was reported as single cases [1,2]. At least 36 cases have been described previously in the literature. The vast majority of previous reports have described a single anomalous vessel with its origin after the first septal perforator of the LAD, which courses anterior to the right ventricular outflow tract to reach the territory normally served by the right coronary artery [3]. Prevalence of anomalous origin of coronary artery was detected by the multi-detector computed tomography at one center. In 5869 consecutive subjects who underwent coronary MDCT (Aquilion 64, Toshiba Medical Systems Corporation, Otowara, Japan) at one center, the prevalence of AOCA was 89 (1.52%) patients. Single coronary arteries were found in five cases (0.09%) [4]. Coronary artery anomalies are found in 0.2% to 1.3% of patients undergoing coronary angiography and 0.3% of autopsy series. Prevalence of coronary artery anomalies in 12,457 adult patients who underwent coronary angiography, coronary artery anomalies were found in 112 patients (0.9% incidence), while an isolated single coronary artery was seen in 2 (1.78%) patients [5]. Percutaneous

coronary intervention of a stenotic left anterior descending artery with anomalous origin of right coronary artery [6], in another reported case the anomalous right coronary artery, appeared to be unique in that it courses intraseptally rather than rightwards proximally and has obstructive atherosclerotic lesions resulting in inferior ischemia. Moreover, the acute angle made by the anomalous right coronary artery to turn toward the atrioventricular groove may have reduced the flow velocity and contributed to the development of inferior ischemia. [7].

Anomalous right coronary artery is a rare entity with an incidence of 0.26%. The anomalous origin usually arises from the left sinus valsalva. An anomalous right coronary artery arising from the left anterior descending artery is rare. It is usually known as a benign entity but may have clinical importance due to its course between the aorta and pulmonary artery which may cause myocardial ischemia or sudden cardiac death [8].

Conclusion

The pattern of coronary artery anomalies in our patient population was almost identical with previous studies. Cardiologists should be aware of the coronary anomalies which may be associated with potentially serious cardiac events; recognition of these coronary anomalies is mandatory in order to provide the best therapy for each patient according to his orher presentation.

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