



Right Coronary Artery Anomaly Coursing on the Right Atrium in a Patient Undergoing Coronary Artery Bypass Grafting

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Anomalous right coronary artery is a rare entity. Here we present an anomalous right coronary artery coursing on the right atrium detected during CABG operation and confirmed by multislice computed tomography thereafter. The images demonstrated that RCA arises from the right coronary sinus of Valsalva and runs forward between the pulmonary trunk and the right auricle. Then it was giving branch to the right ventricle and coursing approximately 0.5 cm on the right side of atrioventricular junction on the right atrium.

Key Words: Coronary Vessel Anomaly; Coronary Artery Bypass; Coronary Disease.

Koroner Arter Bypass Operasyonu Yapılan Bir Hastada Sağ Atrium Üzerinde Seyreden Sağ Koroner Arter Anomalisi

Sağ koroner arter anomalisi nadir bir anomali olup CABG operasyonu esnasında sağ atrium üzerinde seyrettiğini tespit ettiğimiz ve daha sonra da multislice bilgisayarlı tomografi ile kanıtladığımız sağ koroner arter anomalisini sunmayı amaçladık. Görüntülerde sağ koroner arterin, sağ koroner sinüsünden çıkmakta ve ana pulmoner arter ile sağ aurikula arasında ilerlemekte olduğu izledik. Anormal arter sağ ventrikül dalını verdikten sonra atrioventriküler bileşkenin 0,5 cm sağında sağ atrium üzerinde seyretmekte idi.

Anahtar Kelimeler: Koroner Damar Anomalisi; Koroner Arter Bypass; Koroner Hastalık.

Introduction

The right coronary artery (RCA) arises from the right coronary sinus of Valsalva (SV) and runs forward between the pulmonary trunk and the right auricle. It descends almost vertically in the right atrioventricular groove, giving branches to the right atrium and right ventricle. At the inferior border of the heart it continues posteriorly along the atrioventricular groove to anastomose with the left coronary artery. The origin and course of the RCA may sometimes vary.¹ Anomalous right coronary artery is a rare entity with an incidence of 0.26%. The anomalous origin usually arises

from the left SV. An anomalous right coronary artery coursing on the right atrium is very rare. Unrecognised coronary anomalies may lead to errors in clinical diagnosis and surgical problems.²

When planning coronary angioplasty on anomalous coronary arteries, there is an even greater need to accurately define the origin and course of these vessels.³

RCA may have clinical importance due to its course on the right atrium which may cause myocardial ischemia or myocardial infarction owing to surgical trauma. Here we present an anomalous right coronary artery coursing on the right atrium detected during CABG operation and confirmed by multislice computed tomography thereafter.

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Case Report

A 57-year-old male was admitted to the cardiology department due to chest pain lasting for two months. His heart rate was 75 beats/min, with regular pattern, and blood pressure was 140/80 mmHg. Electrocardiogram was in sinus rhythm and there were Q waves on D2-D3-AVF segments. Echocardiogram demonstrated normal left ventricle ejection fraction (55%).

Coronary angiography showed 70% stenosis on the RCA, 80% stenosis on the well-developed acute margin artery and 100% on the left anterior descending artery (Figure 1). We observed an anomalous right coronary artery coursing on the right atrium detected during operation (Figure 2). The left internal mammary artery was anastomosed to the left anterior descending artery, and saphenous vein was used to bypass the right coronary artery and right coronary acute margin artery branch under cardiopulmonary bypass. There was no complication in the postoperative period. The patient was discharged from the hospital on the 6th postoperative day.

To confirm the anomalous course of right coronary artery the patient underwent multislice computed tomography which was performed using a 64-slice Toshiba multislice Aquilion system (Toshiba Medical Systems, Otawara, Japan) after surgery.

The images demonstrated that RCA arises from the right coronary SV and runs forward between the pulmonary trunk and the right auricle. Then it was giving branches to the right ventricle and coursing approximately 0.5 cm on the right side of atrioventricular junction on the right atrium. At the inferior border of the heart it was going on posteriorly along the atrioventricular groove to anastomose with the left coronary artery (Figure 3).

Discussion

In a large series of 126,595 coronary angiograms anomalous right coronary artery has been reported as 0.26%. An anomalous right coronary artery usually originates from the left sinus valsalva, left main coronary artery, thoracic aorta and the pulmonary artery.⁴

Anomalous RCA from the pulmonary trunk (PT) was first described by Brooks⁵ upon necropsy in 1885. Anomalous RCA from the PT was first diagnosed by angiography in 1962 and by echocardiography in 1985.⁶ One third of patients with anomalous RCA from the PT have had other congenital cardiac malformations,

and most of these have been aortopulmonary window (36%) or tetralogy of Fallot (23%).⁶

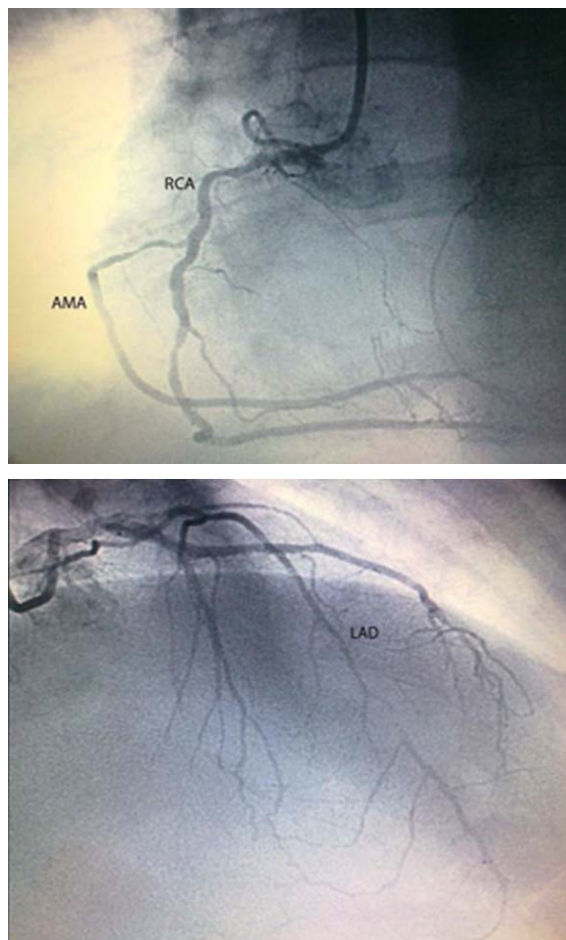


Figure 1. Coronary angiography shows 70% stenosis on the RCA, 80% stenosis on the acute margin artery and 100% on the left anterior descending artery. RCA: right coronary artery; LAD: left anterior descending artery.

The anomalous origin of RCA from the left SV or from the pulmonary artery is thought to be malignantly anomalous. It was observed on angiographic studies that the anomalous origin of the RCA from the left SV courses usually between aorta and pulmonary trunk.¹ It has been postulated that the reduction of coronary blood flow may produce acute myocardial ischemia in this condition resulting in cardiac arrhythmia and sudden death. Several mechanisms have been proposed to explain how the anomalous origin of the RCA from the left SV can cause myocardial ischemia and sudden death. First of all because of the acute take-off, the ostium of the anomalous coronary artery is slit-like, which is different from the round orifice of the normal-ising coronary artery.⁷ Second, the first segment of the RCA runs between the aorta and pulmonary trunk,

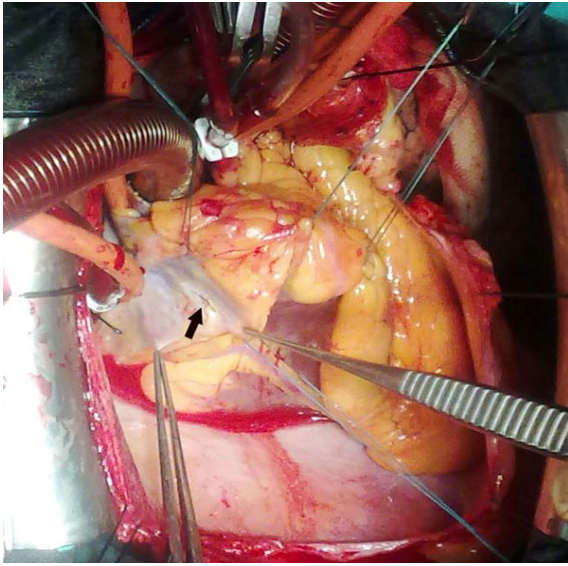


Figure 2. Intraoperatif appearance of right coronary artery coursing on the right atrium (Black arrow).

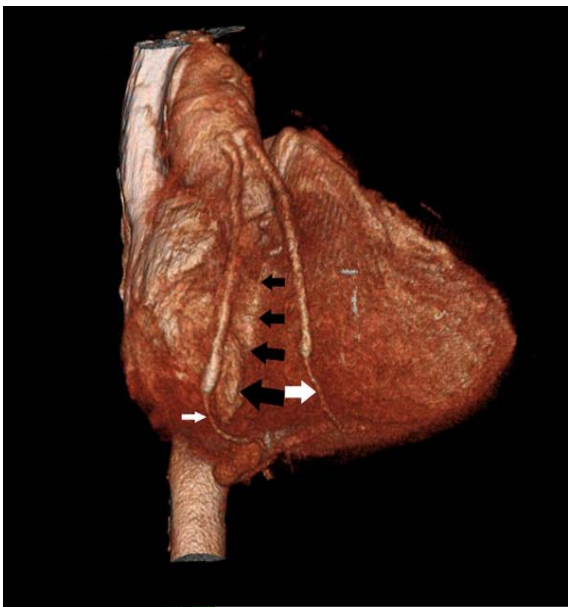


Figure 3. 3D volume-rendered CT angiography shows that RCA coursing on the right atrium. (Black arrows show atrioventricular groove, small arrows shows right coronary artery, large arrow shows acute marginal artery).

it might be compressed during pressure increase in these vessels, such as during exercise.¹ Also, the intramural course of the RCA in the aortic tunica media may be crucial because it produces a slit-like lumen; when the diastolic filling time of the coronary arteries is shortened, such as during effort tachycardia, adequate

blood flow through the anomalous artery may be compromised.¹

Only one case in 135 cases, in which the origin of the RCA was from the left SV in the series of Yamanaka and Hobbs⁸, had the RCA orifice posterior to the left main ostium and a course posterior to the aorta.

The in vivo identification of anomalous coronary artery disease is still a challenge, due to insufficient warning signs, although angina pectoris, myocardial infarction, ventricular tachycardia, syncope, palpitations, and sudden death in the absence of coronary atherosclerosis have been reported.⁹

Zeppili et al.¹⁰ studied in vivo detection of coronary artery anomalies in asymptomatic 3150 athletes by echocardiographic screening and found two athletes (0,06%) with an RCA origin from the left sinus. Taylor et al.¹¹ observed that, anomalous with the highest rate of sudden death with or without exercise (left or right coronary artery from the contralateral coronary sinus), 66% of patients were asymptomatic at the time of death. If there are symptoms, they are less common in origin of the RCA from the left SV than the left main coronary artery from the right SV. Therefore, greater effort for early detection of these anomalous is warranted. Anomalous origin of the RCA above the left SV is exceedingly rare. In 1978, Yans et al.¹⁴ first described this anomaly in a 66-year-old patient. King et al.¹² reported that patients with anomalous origin of the RCA above the left SV had associated bicuspid aortic valve disease, while other authors did not observe this.⁹ The length of high take-off of the RCA arising above the left SV in the range 1-4 cm.¹ Grollman et al.¹³ demonstrated systolic compression of the RCA arising from above the left sinus of Valsalva by aorta and pulmonary artery angiographically and postulated that the severity of the stenoses may be related to how far the ectopic origin is displaced toward the left and posteriorly, as well as the height of origin above the left SV.

In our case, we present an anomalous right coronary artery coursing on the right atrium detected after atrial cannulation and confirmed by multislice computed tomography. It arises from the right coronary SV and runs forward between the pulmonary trunk and the right auricle. Then it was giving branches to the right ventricle and coursing approximately 0.5 cm on the right side of atrioventricular junction on the right atrium. Cardiac surgery may cause myocardial ischemia, myocardial infarction or rupture owing to surgical trauma. Therefore, cardiac surgeons must be careful during atrial cannulation and surgical procedures.

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Angiographic recognition and multislice computed tomography of coronary artery anomalies are important because of their clinical significance and applied importance in patients undergoing coronary angioplasty or cardiac surgery.

In conclusion; although coronary artery anomalies are usually diagnosed during coronary angiograms also multislice computed tomography may be beneficial in the diagnosis. It is an effective and non-invasive method to identify the coronary artery anomalies especially in clinical practice. When planning cardiac surgery on the right atrium, there is a very important to accurately define the course of these vessels.

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