

## Split right coronary artery: a report of two cases

Ayrık sağ koroner arter: İki olgu sunumu

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Split right coronary artery (RCA) is a congenital anomaly of the coronary arteries where either two separate arteries arise from the aortic trunk or RCA bifurcates into two major arteries immediately after its origin from the right sinus of Valsalva. We present two cases (59-year-old male, 50-year-old female) who sought treatment for exercise-induced angina pectoris. Coronary angiography revealed a split RCA in both cases. In the first case, the RCA consisted of two well-developed arteries bifurcating immediately after its origin from the sinus of Valsalva. In the second case, the RCA split from adjacent ostia into two major arteries almost identical in size. In both cases, the split RCAs had a parallel course. Both patients were scheduled to receive medical treatment and had an uneventful follow-up of 15 and 11 months, respectively.

*Key words:* Coronary angiography; coronary vessel anomalies.

Ayrık sağ koroner arter (SKA), doğuştan koroner arter anomalisi olarak SKA'nın aort kökünden iki ayrı damar halinde çıkması ya da sinüs Valsalva'dan çıktıktan hemen sonra iki ana dala ayrılması durumudur. Bu yazıda, egzersiz ile ortaya çıkan göğüs ağrısı yakınmasıyla başvuran iki olgu (59 yaşında erkek, 50 yaşında kadın) sunuldu. Her iki olgunun koroner anjiyografi ile değerlendirilmesinde ayrık SKA saptandı. İlk olguda SKA, sinüs Valsalva'dan hemen sonra iyi gelişmiş iki ana dala ayrılmaktaydı; ikinci olguda ise, birbirine komşu ostiumlardan, büyüklük bakımından hemen hemen aynı iki ana dal çıkmaktaydı. Her iki olguda da ayrık SKA'nın dalları paralel seyretmekteydi. İki hasta, medikal tedavi programına alınarak 15 ve 11 ay süreyle sorunsuz takip edildi.

*Anahtar sözcükler:* Koroner anjiyografi; koroner arter anomalisi.

There is considerable variety related to origin, location, size, course, and functions of the coronary arteries.<sup>[1]</sup> Congenital coronary artery anomalies are detected in about 0.6%-1.3% of adult patients undergoing coronary arteriography.<sup>[2-4]</sup> Split right coronary artery (RCA) was reported as the most common (1.2%) type of right coronary anomalies.<sup>[1]</sup> Barthe et al.<sup>[5]</sup> were the first to report two different right coronary arteries arising from a common ostium, coursing down the right atrioventricular groove. We report on two cases with exercise-induced angina pectoris, whose coronary angiographies revealed split RCAs.

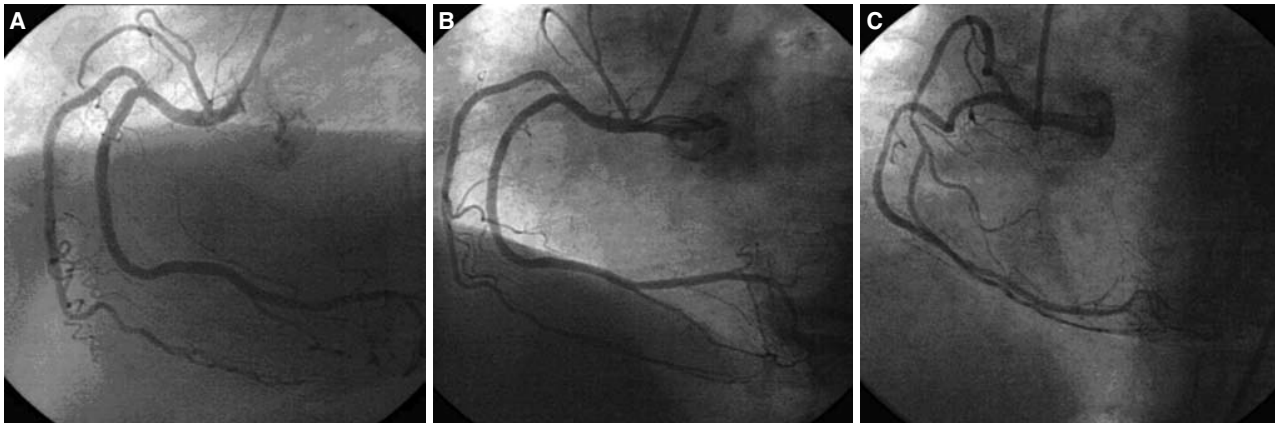
### CASE REPORT

**Case 1-** A 59-year-old male patient presented with exercise-induced angina of two-month history, that continued several minutes at rest. Risk factors were smoking, family history of coronary artery disease,

and hyperlipidemia. Physical examination was unremarkable. The resting electrocardiogram and routine biochemistry were normal. Transthoracic echocardiography showed normal wall motion and normal valvular functions. During exercise stress test, he developed typical chest pain associated with 1-mm horizontal ST depression that relieved in one minute after stopping the exercise. Coronary angiography showed normal left coronary system. Right coronary injection showed that the RCA consisted of two well-developed arteries bifurcating immediately after its origin from the sinus of Valsalva (Fig. 1). Both arteries were coursing parallel to each other before and beyond the crux. They were almost equally dominant, and terminated as the posterior descending and posterolateral arteries supplying the left ventricular inferior and posterolateral walls, respectively. Both RCAs were free from atherosclerotic disease.

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**Figure 1.** The right coronary artery showing two major branches immediately after its origin from the right sinus of Valsalva. (A) Left anterior oblique view. (B) Right anterior oblique view. (C) Left cranial view.

**Case 2**— A 50-year-old diabetic female with no relevant previous cardiac history presented with pressure sensation on the left side of her chest on exertion, of eight-month history. The patient was hypertensive and hyperlipidemic. The electrocardiogram was normal without ischemic ST-T changes. On transthoracic echocardiography, cardiac chambers were of normal size with no wall motion abnormality. Because of the presence of angina and risk factors, coronary angiography was performed. Left coronary injection showed a noncritical stenosis in the left anterior descending artery, and right coronary injection showed a split RCA consisting of two major arteries almost identical in size (Fig. 2). Their ostia were adjacent to each other at the level of the sinus of Valsalva, and they were coursing parallel to each other. There was a 60-70% stenosis in one of the twin arteries.

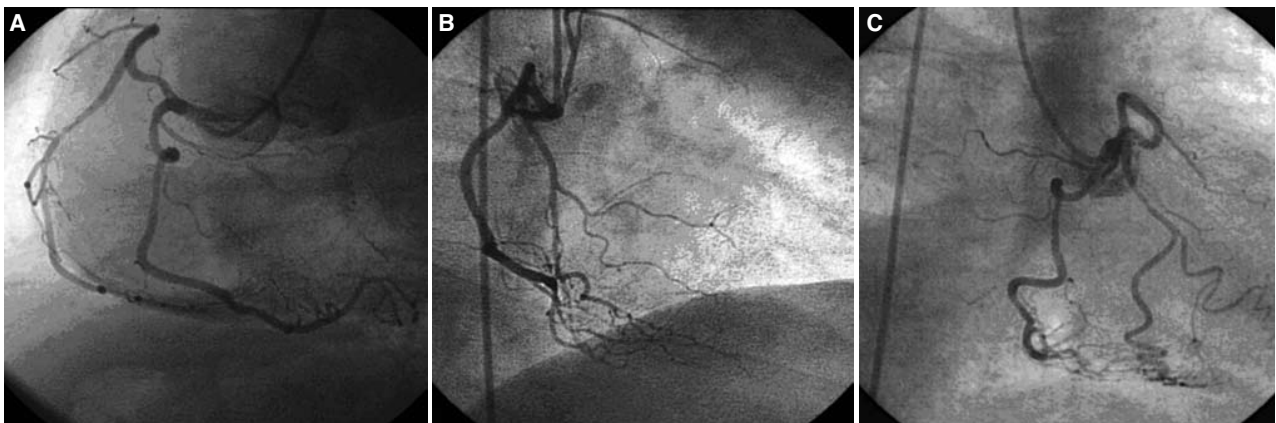
Both patients were scheduled to receive medical treatment with beta-blocker, statin, aspirin, and additionally oral antidiabetic therapy for the diabetic

patient. They were followed-up without any cardiac events for 15 and 11 months after coronary angiography, respectively.

#### DISCUSSION

Although split RCA is a very frequent coronary artery variation, selective cannulation of the RCA may prevent detection of this anomaly. In this case, multidetector computed tomography has been shown to be useful.<sup>[6,7]</sup> Both computed tomographic angiography and magnetic resonance imaging allow three-dimensional comprehension of the coronary artery system.

Angelini<sup>[8]</sup> argued that the incidence of split RCA was underestimated and the condition was improperly named as “double right coronary artery”<sup>[6,7,9-11]</sup> on the grounds that this was not a rare coronary anomaly with a frequency of 1.2%,<sup>[11]</sup> and actually, there were not two RCAs, but only split portions of the posterior descending branch of the RCA, with two separate proximal courses. Thus, a literature search with the



**Figure 2.** Double right coronary artery originating from adjacent ostia. (A) Left anterior oblique view. (B) Right anterior oblique view. (C) Left cranial view.

key words of “double right coronary artery” would probably yield a lower frequency of this condition.

Based on previous reports on split RCA, the clinical course of this variation appears to be generally benign and does not warrant a special management, except for the presence of atherosclerosis, which can be challenging during percutaneous coronary intervention.<sup>[11]</sup> Because of the parallel course of both arteries over the free wall, there is no risk for compression between the major arteries nor any detrimental effect on coronary circulation. However, during percutaneous coronary intervention, it can be very challenging to cannulate the correct artery without interruption of the blood flow to the other artery. Selective cannulation may deceive the interventionalist into thinking that the patient has a normal single RCA, who actually would have a critical stenosis in the other branch. For this reason, we recommend to perform the first injection as nonselective as possible. Slight withdrawal of the catheter before the first or final injections may also reveal the second artery originating from the same ostium or adjacent ostium. Since both arteries are usually in similar caliber and size and their courses are parallel to each other, cardiac surgeons should also be careful during cardiac surgery and be familiar to the anatomy before coronary bypass operation in order to choose the correct artery and to have complete cardioplegia.

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