

The right coronary artery originating from the distal circumflex artery

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Abstract

We report a case of anomalous origin of the right coronary artery in a 58-year-old male patient. The patient had a single coronary ostium originating from the left sinus valsalva. Right coronary artery was originating from the distal circumflex artery. There was no other cardiac anomaly in association with this rare case. Our patient had only severe atherosclerosis in the proximal left anterior descending artery with normal coronary flow in the circumflex artery. Generally, cases with single coronary ostium are considered to be benign. However, these patients experience the symptoms of coronary artery disease more critically because of dependence on one coronary artery.

Key words: coronary angiography, cardiovascular abnormalities, coronary vessel anomalies

ДИСТАЛЬДЫ АЙНАЛДЫРА ҚОРШАЙТЫН АРТЕРИЯДАН БАСТАЛАТЫН ОҢ ЖАҚ КОРОНАРЛЫҚ АРТЕРИЯ

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ТҰЖЫРЫМДАМА

Бұл жұмыста біз 58 жастағы ер адамда оң жақ коронарлық артерияның аномалды ағып кету жағдайын қарастырамыз. Науқаста Вальсальваның сол жақ синусынан ағатын жалғыз коронарлық саға болды. Оң жақ коронарлық артерия дистальды айналдыра қоршайтын артериядан ағатын. Бұл сирек кездесетін жағдаймен байланысты басқа ешқандай жүрек ақауы болған жоқ. Біздің пациентте сол жақ коронарлық артерияның проксимальды алдыңғы төмен түсетін бөлігінде ауыр атеросклероз ғана болды, айналдыра қоршайтын артерияда қалыпты коронарлық қан ағымы болды. Әдетте, бір коронарлық сағасы бар ісіктер қатерсіз болып саналады. Алайда, мұндай пациенттер бір коронарлық артерияға тәуелді болғандықтан, жүректің ишемиялық ауруының белгілерін қатты сезінеді.

Негізгі сөздер: коронарлық ангиография, жүрек-қан тамырлары бұзылыстары, коронарлық артериялық аномалиялар

ПРАВАЯ КОРОНАРНАЯ АРТЕРИЯ, ОТХОДЯЩАЯ ОТ ДИСТАЛЬНОЙ ОГИБАЮЩЕЙ АРТЕРИИ

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РЕЗЮМЕ

В данной работе рассматривается случай аномального отхождения правой коронарной артерии у 58-летнего мужчины. У пациента было единственное коронарное устье, отходящее от левого синуса Вальсальвы. Правая коронарная артерия отходила от дистальной огибающей артерии. Никакого другого порока сердца, связанного с данным редким случаем не было. У нашего пациента был только тяжелый атеросклероз в проксимальной передней нисходящей ветви левой венечной артерии с нормальным коронарным кровотоком в огибающей артерии. Как правило, случаи с одним коронарным устьем считаются доброкачественными. Тем не менее, такие пациенты испытывают симптомы коронарной болезни сердца более серьезно в связи с зависимостью от одной коронарной артерии.

Ключевые слова: коронарная ангиография, сердечно-сосудистые нарушения, аномалии коронарных сосудов

Introduction

A single coronary artery (SCA) occurring in isolation, without being associated with other structural heart disease is very rarely reported in medical literature. Its occurrence in less than 0.02 to 0.06 % of the general population [1]. Classifications have been determined by different anatomical variations depend

on either angiographically or necropsy findings [2]. We hereby present a case of a patient with one vessel disease and all coronary arteries originating from a single ostium in the left sinus of Valsalva with an anomalous course of the right coronary artery (RCA) originating as a branch of the distal circumflex artery (CX).

Case report

A 58-year-old man complaining of atypical chest discomfort with no family history of coronary artery disease (CAD) was admitted to İstinye University Liv Hospital. The associated risk factors included smoking and hypercholesterolemia. Cardiac auscultation and peripheral pulses were normal. The baseline electrocardiogram was normal. An echocardiogram revealed normal atrioventricular morphology with no regional wall motion abnormality. Serial cardiac enzymes were normal. The treadmill test was positive for inducible myocardial ischemia. He underwent coronary angiography whereby RCA could not be selectively cannulated. A non-selective injection revealed no coronary artery originating from the right sinus valsalva. The selective injection of the left coronary sinus revealed only left main coronary artery (LMCA) (Figure 1). After a short course, LMCA was divided into two branches: left anterior descending artery (LAD) and CX. CX was the dominant vessel. CX was located in the normal anatomical region and there was no lesion in the CX. In the distal part of CX, a lateral branch was observed along the RCA track (Figure 2). This side branch was normal along the posterior sulcus atriventricularis to the level of RCA. There was no other cardiac anomalies. A critical lesion was detected in proximal (osteal) LAD. Due to being not suitable for percutaneous coronary intervention (PCI), our patient was referred for surgery. During surgery, our patient was operated under cardiopulmonary bypass. His heart

was arrested with intermittent antegrad cold blood cardioplegia. Distal anastomosis to LAD was performed by using left internal mammarian artery insitu. The aortic cross-clamping time was 57 minutes and extracorporeal circulation was 70 minutes. Early postoperative course was uneventful. Our patient died in late postoperative course due to unknown reason of extracardiac manifestation.

Discussion

There are many factors in the embryological development of coronary vessels. These factors include chemotactic agents, adhesion molecules and multiple growth factors. Abnormalities of these signaling pathways may be responsible for coronary artery anomalies [3]. In our case, RCA ostium agenesis was present. There was a SCA originating from a single ostium in the left sinus of Valsalva.

The classification of SCA determined by Lipton et al. categorizes patterns according to the site of origin and anatomical distribution [1, 4-7]. Our patient was classified as L-I subtype of SCA in accordance with the modified Lipton et al. classification and an abnormal RCA originating from the distal left circumflex artery. A single coronary ostium with RCA originating from the distal left circumflex artery is a very rare anomaly. In literature review, there are few patients similar to our case [2,3,5,8-31] (Table 1). There were five cases reported in Turkey.

Table 1

Summary of characteristics of cases with right coronary artery (RCA) originating from distal circumflex artery (CX).

Author/year	Age/sex	Presenting symptom	Angiography	Associated conditions	Treatment
Tavernarakis et al. 8	57/M	TCP	LAD lesion	None	NA
Sheth et al.9	60/M	ATCP	No lesion	None	None
Vrolix et al.10	51/M	TCP	CX lesion	None	CABG
Shammas et al.11	44/F	Chest pain	No lesion	None	None
Shammas et al.11	30/M	Dyspnea/ Chest discomfort	No lesion	None	None
Asha et al.3	62/M	TCP	CX lesion	None	CABG
Turhan et al.5	52/M	ATCP	No lesion	None	None
Yoshimoto et al.12	63/M	ATCP	No lesion	Atrial fibrillation	Oral anticoagulation for AF
Chou et al.13	42/M	TCP	No lesion	None	Medical
Nielsen et al.14	55/F	TCP	No lesion	None	None
Kunimasa et al.15	61/M	MI	LAD lesion	None	NA
Celik et al.16	57/M	TCP	No lesion	None	Medical
Canbay et al.17	69/M	Chest pain	No lesion	None	NA
Araki et al.18	76/M	TCP	CX lesion, LAD lesion	None	None
Tanawuttiwat et al.19	44/F	ATCP	No lesion	None	Medical
Datta et al.20	69/F	Chest pain	No lesion	None	Medical
Cung et al. 2	77/F	TCP	LAD Lesion	None	PCI on LAD
Choi et al. 7	68/F	ATCP	No lesion	None	NA
Ghaffari et al. 21	65/F	Dyspnea	No lesion	Massive pulmonary embolism	Medical
Voyce et al. 22	76/F	AMI	LAD and CX lesion	None	PCI on CX
Sönmez et al.23	63/F	Subacute MI	LAD lesion	None	PCI on LAD
Turfan et al. 24	58/M	Exertional dyspnea and chest pain	Mid LAD lesion	Severe mitral regurgitation	Mitral valve surgery
Ma et al. 25	39/M	RVMI	Distal CX occlusion	None	PCI on CX
Blaschke et al. 26	59/F	TCP	No lesion	None	None
Pourbehi et al.27	47/M	MI	CX & LAD lesion	None	PCI
De Agustin et al.28	40/M	ATCP	No lesion	None	Conservative
Pourafkari et al.29	44/M	MI	LAD lesion	None	PCI
Sing et al.31	60/M	ATCP	No lesion	None	Medical
García-Blas et al.30	87/M	Senkop	CX lesion	Severe aortic stenosis	PCI on CX
Present case	58/M	ATCP	LAD lesion	None	CABG

Male: M, Female:F, ATCP: Atypical chest pain, TCP: Typical chest pain, MI: Myocardial infarction, AMI: Akut Myocardial infarction, RVMI: Right Ventricular Myocardial Infarction, PCI= Percutaneous coronary intervention, CABG= Coronary artery bypass grafting, NA: Not available.

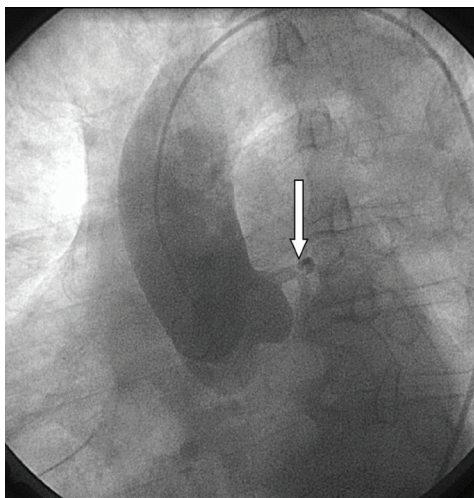


Figure 1 - Aortography revealing left main coronary artery (arrow) arising from left sinus of Valsalva and absence of right coronary ostium.

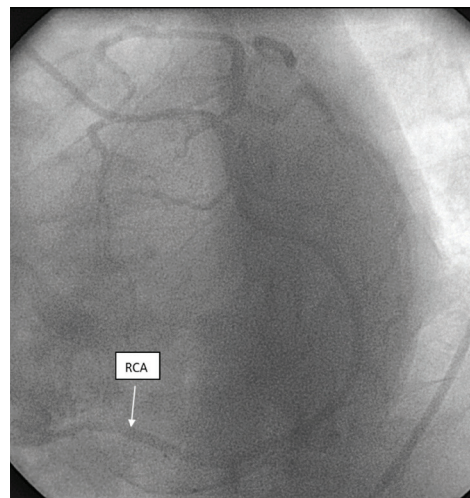


Figure 1 - Coronary angiogram from right caudal anterior oblique view showing the dominant circumflex artery (CX) with right coronary artery (RCA) (arrow) originating from the distal segment of CX.

Anomalous of coronary arteries are associated with ischemia and sudden death, which could be the result of compression by the aorta and pulmonary artery. However, ischemia is also reported when an anomalous coronary artery does not run between the great vessels as in our case. Although SCA is generally considered benign, it has been associated with myocardial infarction and heart failure [15,22]. In our case, our patient did not have any history of myocardial infarction even though he had severe stenosis in LAD (osteal). Myocardial ischemia was detected with treadmill test. Myocardium ischemia was found in 20.6 % of the cases [15,22,23,25,27,29]. Lesions were detected in both LAD and CX in three cases. Also, lesions were detected in LAD in six cases and CX in four cases. The location of the atherosclerotic lesion in this anomaly does not intervene clinically unless it corrupts the coronary flow. Percutaneous coronary intervention was performed in some cases with lesions. Only two patients with CX lesions underwent coronary artery bypass grafting (CABG) [3,10]. Due to being unsuitable for PCI, our patient was referred for CABG surgery.

The associated factors have been reported to be atrial fibrillation (AF), mitral valve insufficiency and massive pulmonary embolism in different cases. Ghaffari et al. reported massive pulmonary embolism in a SCA patient. They stated

that this is the patient's hemodynamic instability. This coronary anomaly is considered as a factor contributing to right ventricular (RV) dysfunction and prolonged unstable state of the patient [21]. In another case, a SCA was detected in one patient with severe mitral valve insufficiency [24]. Yoshimoto et al. reported SCA in a patient with chronic AF [12].

As the L-I variant of SCA is extremely rare, it is difficult to predict whether patients of this type of coronary artery anomaly are at high risk or benign course. Even L-I type of SCA were reported benign in most cases, in our case the patient died on the first postoperative day of his postoperative course because of hemodynamic instability. This could be due to extracardiac manifestation such as pulmonary emboli, RV dysfunction as mentioned above.

Generally, cases with single coronary ostium are considered to be benign. However, these patients experience the symptoms of CAD more critically because of dependence on one coronary artery. Therefore, we think that the recognition of this coronary artery anomaly will contribute to interventional cardiologists and cardiac surgeons.

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