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Anomalous Origin of the Right Coronary Artery from the Left Anterior Descending Coronary Artery in a Patient with Ascending Aortic Aneurysm

Asendan Aort Anevrizmalı Olguda Saptadığımız Sol Ön İnen Arterden Köken Alan Sağ Koroner Arter

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ABSTRACT

The incidence of coronary artery anomalies has been reported between 0.6 to 1.3% in angiographic series and 0.3% in autopsy series. An isolated single coronary artery (SCA) is even a rarer congenital anomaly occurring in approximately 0.02% of the population. The ectopic origin of the right coronary artery (RCA) from the left anterior descending (LAD) artery is relatively rare and more benign than other types of anomalous origin of the RCAs. We report a case of an adult male patient with SCA anomaly in which the RCA takes off from the mid LAD. To the best of our knowledge, SCA anomaly coinciding with ascending aortic aneurysm which was treated with Bentall operation has never been described before.

Key Words: *Aortic aneurysm; coronary vessel anomalies.*

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ÖZET

Koroner arter anomalilerinin görülme sıklığı anjiyografi serilerinde %0.6-1.3, otopsi çalışmalarında %0.3 olarak bildirilmiştir. İzole tek koroner arter ise toplumun %0.02'sinde görülen daha da nadir bir konjenital anomalidir. Sağ koroner arterin sol ön inen arterden köken aldığı bu anomali oldukça nadir bir durum olmakla beraber, diğer sağ koroner arter anomalilerine nazaran daha iyi huylu bir seyir izlemektedir. Biz burada sağ koroner arteri sol ön inen arterin orta kısmından kaynak alan tek koroner arter anomalisine sahip yetişkin bir erkek hastayı sunduk. Bildiğimiz kadarıyla tek koroner arter anomalisine asendan aort anevrizmasının eşlik ettiği ve Bentall operasyonu ile tedavi edilen bir olgu daha önce bildirilmemiştir.

Anahtar Kelimeler: *Aort anevrizması; koroner damar anomalileri.*

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INTRODUCTION

An isolated single coronary artery (SCA) is a rare congenital anomaly occurring in approximately 0.02% of the population[1]. They are usually asymptomatic and of benign course while some of them may present with symptoms such as angina pectoris, myocardial infarction, arrhythmias, syncope, and even sudden cardiac death[2]. We report a case of an adult male patient with SCA anomaly in which the right coronary artery (RCA) takes off from the mid left anterior descending artery (LAD). To the best of our knowledge, SCA anomaly coinciding with ascending aortic aneurysm which was treated with Bentall operation has never been described before.

CASE REPORT

A 71-year-old man was evaluated for uncontrolled systemic hypertension. He was just complaining about severe headache. On physical examination, there was a high pitched diastolic murmur at the left sternal border. Rest ECG demonstrated normal sinus rhythm. Chest X-ray showed mediastinal enlargement. The echocardiographic examination revealed left ventricular hypertrophy, moderate degree aortic regurgitation and ascending aortic aneurysm with a diameter of 5.5 cm. Computed tomography (CT) of the chest was performed to confirm the diagnosis. Chest CT identified the ascending aortic aneurysm with maximal dimension of approximately 5.6 cm. As part of his preoperative evaluation, coronary angiography was performed. Cannulation of the left main coronary artery displayed normal courses of the left main, left circumflex (LCX), and LAD arteries. An anomalous RCA was arising from the mid LAD artery and coursing anteriorly down the right atrioventricular groove (Figure 1). There was no significant stenosis in any of the coronary arteries. Aortography demonstrated ascending aortic aneurysm, aortic regurgitation and a single coronary artery originating from the left sinus of valsalva (Figure 2). We consulted with cardiovascular surgery and he underwent both aortic valve and ascending aorta replacement with single button reimplantation according to the Bentall technique.

DISCUSSION

SCA anomaly occurs at a rate of 0.02-0.06% in various angiographic series. Lipton et al. have divided SCA anomalies into three different groups which were divided into subgroups on the basis of coronary angiographic images (R, L, I-III)[3]. Depending on the anatomical course of the artery, they were referred to as group I, II or III. In group I, the artery follows the anatomical course of either a right or a left

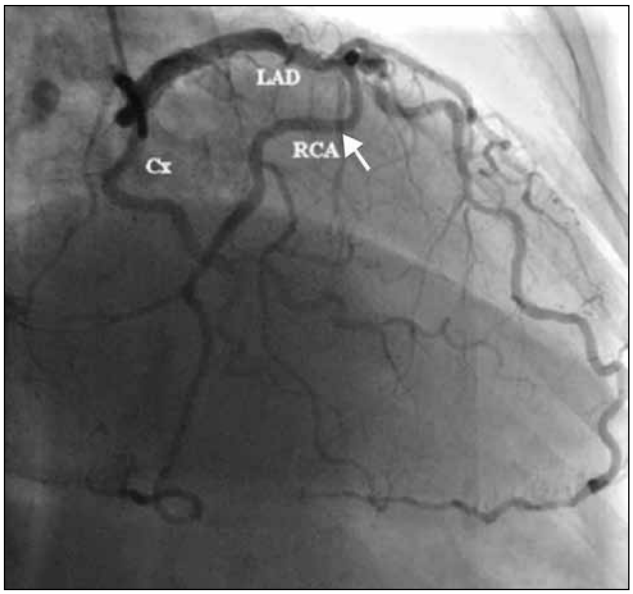

Figure 1. Left coronary angiogram showing the right coronary artery (white arrow) originating from the midportion of left anterior descending coronary artery after the first diagonal branch (right anterior oblique position)
(LAD: Left anterior descending artery, Cx: Circumflex artery, RCA: Right coronary artery).

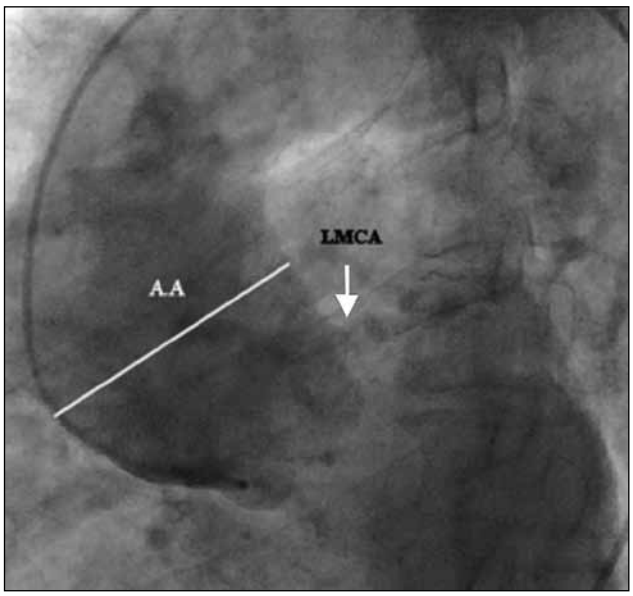

Figure 2. Aortography: ascending aortic aneurysm, aortic regurgitation and a single coronary artery originating from the left coronary cusp (white arrow)
(LMCA: Left main coronary artery, A.A: Ascending aorta).

coronary artery. In groups II and III, single coronary artery crosses the base of the heart to give contralateral coronary artery after arising from the right or left coronary sinus. Type

L means that the RCA arises from the left main stem. Type R means that the coronary artery originates from the RCA. "A" denotes a path anterior to the great vessels, while "P" denotes a posterior course. "B" indicates a path between the aorta and the pulmonary artery. In our particular patient, the presented SCA is classified as L II-A according to the angiographic images and surgical exploration.

The ectopic origin of the RCA from the LAD artery is relatively rare and more benign than other types of anomalous origin of the RCAs[4]. The causes of myocardial ischemia in this anomaly remain unclear, but the acute angle take-off and kinking of the RCA as it arises from the LAD, compression of the RCA when it courses between the aorta and the pulmonary artery, and spasm of the anomalous RCA have been thought to be the possible mechanisms[5]. As in our case, a route anterior (A-type) to the pulmonary artery does not result in significant mechanical compression and is usually benign. Therefore he never experienced angina pectoris and did not get a diagnosis of SCA until his preoperative evaluation with coronary angiography.

After we detected that he was suffering from ascending aortic aneurysm, he underwent both aortic valve and aortic root replacement with single coronary ostia reimplantation. The importance of this case was the possibility of ostial coronary stenosis after surgery. Gelatin-resorcin-formaldehyde glue was used to reinforce the aortic coronary button and to facilitate hemostasis. This may lead to an inflammatory and proliferative response, with subsequent extrinsic compression and narrowing of the coronary ostia. Other causes of coronary stenosis after Bentall operation are an imperfect suture technique or a direct damage of the coronary ostia caused by technical issues including twist, tension, external packing, and trauma due to the instrumentation for direct anterograde cardioplegia. If we have encountered this complication, entire myocardium could have been jeopardized and redo operation would be risky. Fortunately, surgery was successfully performed, the patient was discharged in a good condition , and remains well after one month follow-up without complications. We evaluated myocardial perfusion by stress-redistribution Thallium-201 scintigraphy and detected no ischemia.

In conclusion, single coronary artery may be an asymptomatic congenital alteration or may cause myocardial ischemia even sudden cardiac death. In our case, we detected this anomaly incidentally while evaluating for ascending aortic aneurysm. Abnormal course of coronary artery could complicate the cardiac surgery and single button reimplantation was the challenging part of the surgical procedure.

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