Türk Göğüs Kalp Damar Cerrahisi Dergisi 2014;22(1):177-179
doi: 10.5606/tgkdc.dergisi.2014.8037

Case Report / Olgu Sunumu

An abnormal origin of the right coronary artery from the left main coronary artery and the management of this condition

Sol ana koroner arterden kaynaklanan anormal çıkışlı sağ koroner arter ve tedavisi

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In this article, we present a 63-year-old diabetic and asthmatic female patient who was admitted to our clinic with exertional dyspnea and palpitation. Cardiac examination revealed a 60% stenosis of a right coronary artery anomalously arising from the left main coronary artery. Computed tomography angiography demonstrated an abnormal origin and the abnormal course of the right coronary artery between ascending aorta and the main pulmonary trunk. The patient with a risk of sudden cardiac death even in the absence of coronary atherosclerosis underwent a successful coronary artery bypass graft surgery.

Key words: Abnormal origin of the right coronary artery; coronary anomaly; coronary artery bypass greft surgery.

Bu yazıda efora bağlı nefes darlığı ve çarpıntı ile kliniğimize başvuran 63 yaşında diyabeti ve astımı olan bir kadın olgu sunuldu. Kalp muayenesinde sağ koroner arterde %60 darlık olduğu ve sol ana koroner arterden anormal çıkış gösterdiği tespit edildi. Bilgisayarlı tomografi anjiyografide sağ koroner arterin anormal çıkışı ve çıkan aort ile ana pulmoner trunkus arasındaki anormal seyri belirlendi. Koroner ateroskleroz yokluğunda dahi ani kardiyak ölüm riski olduğu için hastaya başarılı koroner arter baypas greft ameliyatı yapıldı.

Anahtar sözcükler: Anormal çıkışlı sağ koroner arter; koroner anomali; koroner arter baypas greft ameliyatı.

As the right coronary artery (RCA) emerges from the right sinus of the aortic valsalva, it courses anteriorly in the epicardial fat between the pulmonary conus and the auricle of the right atrium before entering the right atrioventricular groove. When this does not occur, the origin and course variations are known as congenital anomalies of the RCA.[1,2] An example of these anomalies takes place when the RCA originates from the left sinus of valsalva and then courses between the pulmonary trunk and the aorta before continuing within the right atrioventricular groove. Such a variant has been called "malignant" because it is associated with sudden death.[3] In this case report, we present the case of an anomalous RCA which originated in the left main coronary artery (LMCA) and then coursed through the great vessels. This type of anomaly is known to be a potential cause of sudden cardiac death due to myocardial ischemia.

CASE REPORT

A 63-year-old female with a recent history of asthma and diabetes presented to our outpatient clinic with exertional dyspnea and palpitation. Her physical and cardiac examinations were normal at rest, and electrocardiography revealed a normal sinus rhythm. In addition, transthoracic echocardiography (TTE) showed a normal morphology of the ventricles with no segmental wall motion abnormality. On coronary computed tomography angiography (CTA), we observed an anomalous RCA originating from the LMCA of the left sinus valsalva (Figure 1a) that was coursing between the aortic root and the pulmonary trunk (Figure 1b). The initial compression between the ascending aorta and the pulmonary artery was also confirmed when the images were reconstructed via three-dimensional (3D) CT angiography. Furthermore,

Available online at
www.tgkdc.dergisi.org
doi: 10.5606/tgkdc.dergisi.2014.8037
QR (Quick Response) Code

Received: December 10, 2012 *Accepted:* February 15, 2013

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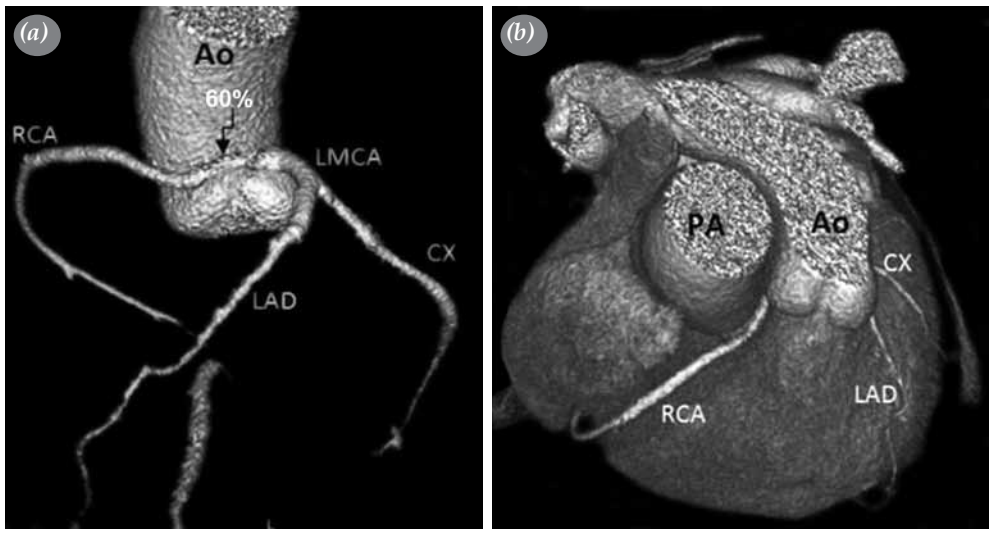

Figure 1. Coronary computed tomography 3D view showing **(a)** the left and right coronary artery originating from the LMCA and **(b)** the right coronary artery with 60% stenosis that was compressed between the great vessels. Ao: Aorta; RCA: Right coronary artery; LMCA: Left main coronary artery; LAD: Left anterior descending; Cx: Circumflex; PA: Pulmonary artery.

cardiac ischemia in this setting is presumed to be caused by this condition. An additional visual evaluation was undertaken, and myocardial perfusion was seen on positron emission tomography (PET), but the results were otherwise normal.

The patient, who was fully aware of the risk of sudden cardiac death and morbidities, preferred the surgical option and gave their consent for coronary artery bypass grafting (CABG). The patient was then scheduled for surgery after the preoperative routines were completed. Following a median sternotomy, off-pump CABG of the RCA using the saphenous vein was performed. No complications were observed, and the operation was successful. The patient recovered uneventfully and was discharged from the hospital on postoperative day six. She was prescribed a treatment regimen composed of acetylsalicylic acid, atorvastatin, and oral antidiabetics.

DISCUSSION

An anomalous origin of the RCA was first described by White and Edwards in 1948,[4] and autopsy studies have revealed a prevalence rate of 0.026% for this rare congenital anomaly.[5] However, various populations have been known to have higher rates.[6] Ayalp et al.[1] sought to determine at what rate the anomalous origin of the RCA via angiography occurs in a Turkish population by analyzing angiographic data collected from the Interventional Cardiology Department. After identifying 5,253 consecutive adult patients who underwent a coronary angiography and carrying out a retrospective analysis, they found that only five patients (0.09%) had an anomalous origin isolated in the RCA.

Coronary CTA, which provides detailed 3D anatomic information that may be difficult to obtain with invasive angiography, is a robust noninvasive imaging modality with several clinical applications. Because it offers some advantages over other imaging procedures, it is now being increasingly used in clinical practice.[7] In addition, coronary CTA also has additional clinical value compared with conventional angiography because it can demonstrate the exact relationship of the anomalous coronary arteries to the aorta and the pulmonary artery, identify the anomalies of the intrinsic anatomy, and determine the termination of the coronary arteries.[8] As with our case, after confirming the initial compression between the ascending aorta and the pulmonary artery via 3D CTA, additional invasive procedures, such as coronary angiography, are not necessary.

Even with the absence of atherosclerosis, an anomalous origin of the RCA may cause angina pectoris, myocardial infarction (MI), or even sudden death,[9] but the pathophysiology of this relationship is still not fully understood. The widely accepted culprit is the mechanical compression of the RCA by the great vessels since the anomalous RCA usually courses through the aorta and the pulmonary artery on the way to its normal position. Some researchers have also suggested that the oblique angle at the juncture of the anomalous RCA and the left coronary sinus might

be a potential source because this creates a narrow orifice in the aortic wall that can collapse during exercise.[9] Moreover, Kaku et al.[10] suggested that a spasm at the proximal portion of the RCA, which is situated between the aorta and the pulmonary artery, might also cause this condition.

Various therapies, such as coronary reimplantation,[11] osteoplasty,[12] bypass grafting of the RCA, and medical therapy[8] have been suggested for the treatment of this congenital RCA anomaly. In addition, percutaneous transluminal coronary angioplasty can also be carried out as an alternative to surgery, especially in cases involving MI.[13] Furthermore, in their study, Kaku et al.[10] treated 56 middle-aged and elderly patients who had an anomalous origin of a coronary artery with beta-blockers, and although episodes of hypotension and arrhythmias were observed in 9% of the patients upon exertion, their five-year follow-up determined that the prognosis for those without atherosclerosis was relatively good, despite the lack of surgical treatment. Their results confirmed that none of the deaths were associated with the congenital anomaly. In our case, the patient was informed of the potential risks related to her condition and was presented with various treatment options. Because of the patient's asthmatic background, medical therapy with beta-blockers was not preferable, and at any rate, the long-term results of this type of therapy have not yet been fully demonstrated.

In our case, the patient chose surgical therapy, which proved to be effective in overcoming the risks of sudden cardiac death and "malignant" arrhythmia. In addition, we recommend surgical treatment for an abnormal origin of the RCA to avoid possible life-threatening complications such as sudden death.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

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