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*Case Report / Olgu Sunumu*

# A new surgical approach for aorta-right atrial tunnel with right coronary artery orifice

*Sağ koroner arter çıkışını içeren aort-sağ atriyal tünelde yeni bir cerrahi yaklaşım*

**Ömer Ulular, Bülent Bolat, Öner Gülcan**

Department of Cardiovascular Surgery, Adana Acıbadem Hospital, Adana, Turkey

***ABSTRACT***

Aorta-right atrial tunnel is a rarely seen congenital anomaly with an unknown etiopathology. Due to its life-threatening complications, it must be treated either surgically or by transcatheterization technique as soon as possible. Planning the treatment strategy considering the relation between the aorta-right atrial tunnel and coronary arteries is of utmost importance. Herein, we report a young case of a right coronary artery ostium originating from the proximal part of aorta-right atrial tunnel and her successful treatment with a new surgical technique using a pericardial patch.

***Keywords:*** Aorta-right atrial tunnel, congenital heart disease, coronary artery anomaly.

***ÖZ***

Aorta-sağ atriyal tünel, etyopatolojisi bilinmeyen, nadir görülen doğumsal bir anomalidir. Yaşamı tehdit eden komplikasyonları nedeniyle, cerrahi olarak veya transkateterizasyon yöntemi ile en kısa sürede tedavi edilmelidir. Aorta-sağ atriyal tünel ile koroner arterler arasındaki ilişki göz önünde bulundurularak tedavinin planlanması çok önemlidir. Bu yazıda, sağ koroner arter ostiumu aorta-sağ atriyal tünelin proksimal kısmından çıkan ve perikardiyal yama kullanılarak yeni bir cerrahi teknik ile başarılı bir şekilde tedavi edilen genç bir kadın olgu sunuldu.

***Anahtar sözcükler:*** Aorta-sağ atriyal tünel, konjenital kalp hastalığı, koroner arter anomalisi.

Aorta-right atrial tunnel (ARAT) was first described in 1980 by Coto et al.[1] In this congenital anomaly, a large extracardiac vascular link is established a shunt originating from one of the aortic sinuses of Valsalva and terminating in the right atrium or superior vena cava.[1-3] It can be asymptomatic or can present with symptoms such as palpitations, respiratory distress, and fatigue.[1,4] Moreover, this anomaly can be associated mostly with atrial septal defect (ASD) and a coronary artery anomaly.[4]

## CASE REPORT

A 27-year-old female patient was referred to our clinic with a complaint of palpitations. Her physical examination showed a continuous murmur of 4/6 grade. Electrocardiography (ECG) revealed atrial fibrillation. Echocardiography showed an ARAT between the aorta and right atrium. Aortography, coronary arteriography, and catheterization showed an ARAT from which right coronary artery emerged and also pulmonary hypertension (Figure 1a). Computed tomography angiography (CTA) showed ARAT between the right sinus of Valsalva, consuming right coronary artery, and right atrium (Figure 1b). It also showed that right coronary artery ostium emerged 2 cm distal to the proximal ARAT (Figure 1c).

After proper preparations, the patient was scheduled for surgery. The ARAT was seen after median sternotomy and pericardiotomy (Figure 1d). After right atriotomy, the orifice of the ARAT in the

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**Correspondence:** Ömer Ulular, MD. Adana Acıbadem Hastanesi, Kalp ve Damar Cerrahisi Kliniği, 01130 Seyhan, Adana, Türkiye.
Tel: +90 322 - 455 44 87 e-mail: omerulular@gmail.com

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right atrium and patent foramen ovale, which was diagnosed at the time of surgery, were primarily closed with 4/0 propylene sutures. The proximal opening of the ARAT, which drained into aorta, was dissected and it revealed that sinoatrial node artery emerged from 0.5 cm and right coronary artery ostium emerged from 2 cm distal to proximal part of ARAT. The ARAT was dissected throughout its joining with aorta to the distal of right coronary artery (RCA) orifice. A tunnel, which the upper surface was made by pericardial patch fixed in glutaraldehyde, was made from the ARATs emerging from the ascending aorta to the distal of RCA including the outlets of RCA and sinus node artery (SNA). Meanwhile, the orifice of the ARATs was constricted and a proper way for RCA and SNA was constituted (Figure 2). Ending the cardiopulmonary bypass (CPB), the ECG of the patient was normal in sinus rhythm. Echocardiographic examination was done on postoperative Day 3 and the patient was discharged from hospital on postoperative Day 4 with an uneventful recovery. At one month of follow-up, the patient was uneventful. A written informed consent was obtained from the patient.

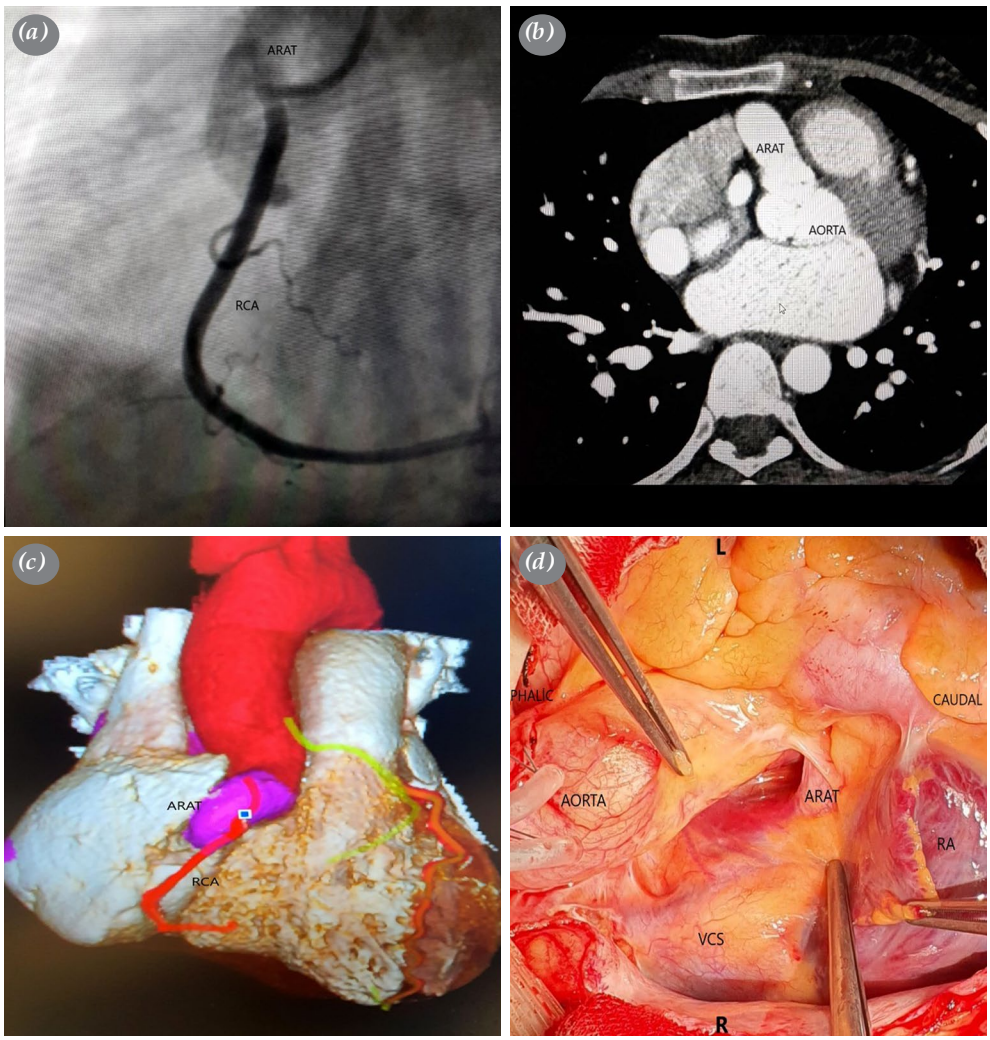


**Figure 1. (a)** Coronary arteriography and catheterization showing the right coronary artery originating from ARAT. **(b)** A thoracic computed tomography scan showing ARAT between right sinus of Valsalva and right atrium. **(c)** A volume-rendered computed tomography angiogram. **(d)** ARAT between aorta and right atrium.

ARAT: Aorta-right atrial tunnel; RCA: Right coronary artery.

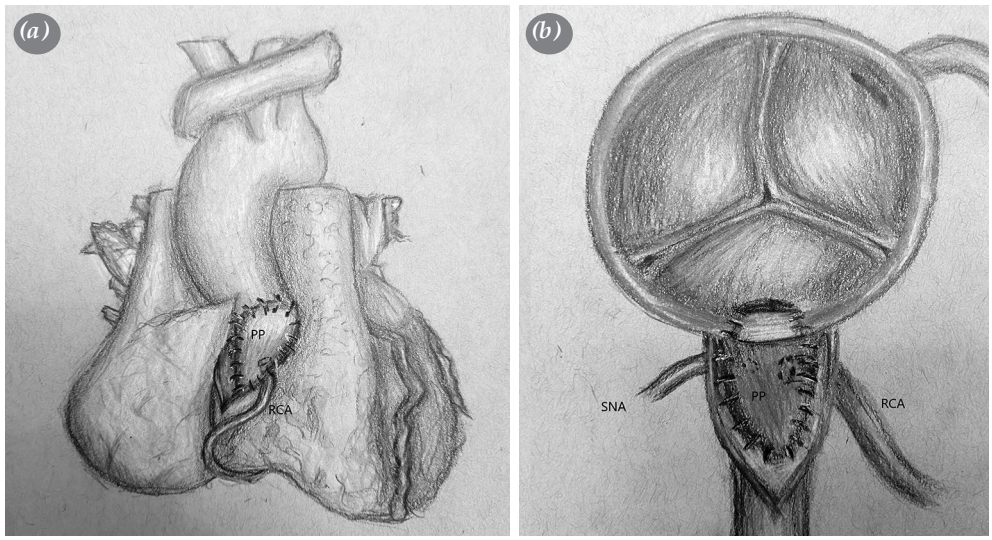


**Figure 2. (a, b)** A tunnel was formed between aorta and right coronary ostium which also consumed the sinus node artery with pericardial patch.
PP: Pericardial patch; SNA: Sinus node artery.

## DISCUSSION

There are few cases of ARAT in the literature. In general, ARAT is a rarely seen congenital cardiac pathology which can be seen with ASD, patent ductus arteriosus, and coronary arterial anomalies. With the advanced ages, the risks of left ventricular loading symptoms, aneurysmal dilatations, calcification of aortic wall, aortic insufficiency, cardiac failure, pulmonary hypertension, and infected endocarditis are more common and these patients should be treated as soon as possible.[2]

In the treatment, both transcatheterization technique with coiling and embolization and surgical ligation under hypotensive anesthesia without using CPB or closing the openings along the right atrium and aorta under CPB can be used.[4] The most important factors in deciding the type of technique are the relationship of ARAT to coronary arteries and the width of ARAT.

In situations where coronary ostium originating from ARAT, the ostium is anastomosed to aorta again under CPB or coronary artery bypass grafting.[3] In our case, for the first time, we used a pericardial patch and, with this patch, we closed ARAT and a tunnel was made from the ARAT ostium (aortic ostium) to right coronary artery. Pericardial patch technique is a new technique to be used in ARAT operations, but a similar technique is used in arterial switch operations to lengthen the left coronary ostium and some coronary arterial anomalies.[5] To avoid further development of aneurysm and rupture, we not only closed the tunnel, which was distal to the right coronary origin, but also used a patch.

In conclusion, in this rarely seen congenital anomaly, planning the treatment strategy considering the relation between the aorta-right atrial tunnel (ARAT) and coronary arteries is of utmost importance. In the treatment, the pericardial patch technique can be used, as well as the other frequently used techniques, particularly in cases where coronary arteries originate within the aorta-right atrial tunnel. Cases in which direct ostium transfer cannot be performed, pericardial patch technique can be considered as a better alternative to the commonly used ones.

**Declaration of conflicting interests**

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