

# Right Coronary Artery Originating From Distal Left Circumflex Artery - A Rare Anomaly

Hasan TURHAN, MD, Ş. Funda BIYIKOĞLU, MD, Ramazan ATAK, MD, Ertan YETKİN\*, MD, Erdal DURU, MD

Türkiye Yüksek İhtisas Hospital, Department of Cardiology, Ankara, \*İnönü University, Medical Faculty, Department of Cardiology, Malatya, Turkey

## OLDUKÇA NADİR BİR KORONER ARTER ANOMALİSİ: SOL SİRKUMFLEKS DİSTALİN-DEN ORJİN ALAN SAĞ KORONER ARTER

### ÖZET

Tek koroner arter koroner sirkülasyonun nadir bir konjenital anomalisidir. Sağ koroner arterin sol sirkumfleks distalinden orijin aldığı tek koroner arter tipi oldukça nadirdir. Biz bu olguda, sağ koroner arterin sol sirkumfleks distalinden orijin aldığı tek koroner arter sistemine sahip bir hasta sunduk. Hastada eşlik eden başka bir kardiyak anomali tespit edilmedi. *Türk Kardiyol Dern Arş 2002; 30: 455-457*

**Anahtar kelimeler:** Konjenital koroner anomali, tek koroner arter, koroner anjiyografi

Single coronary artery (SCA) is a rare congenital anomaly of the coronary circulation where only one coronary artery arises from the aorta by a single coronary ostium supplying the entire heart (1,2). It is often associated with other congenital cardiac malformations (1,2). Anomalous origin of one or more coronary arteries occurs in about 0.6% of patients undergoing coronary angiography (3). In the present case, we report a patient with SCA as an isolated anomaly, in whom the right coronary artery (RCA) originated from the distal left circumflex coronary artery.

### CASE REPORT

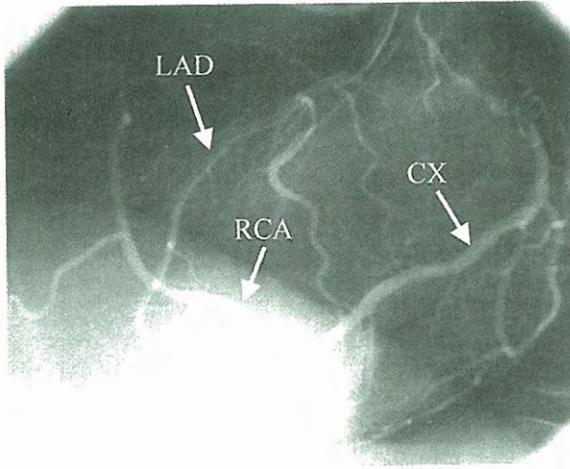
A 52 year-old man was admitted to our hospital for evaluation of chest pain. He described his complaint as retrosternal sharp or pressure like chest pain which was sometimes precipitated by effort but often occurred at rest. The pain usually lasted about 30 minutes. Past medical history revealed hypertension and cigarette smoking as atherosclerotic risk factors. On physical examination, no abnormal findings were detected. Electrocardiogram and telecardiogram were normal. Transthoracic echocardiographic findings were within normal limits. Treadmill exercise test showed 1mm ST-segment depression in leads V<sub>4</sub> to V<sub>6</sub> at

heart rate of 130 beats/minute, but the patient did not experience chest discomfort. Cardiac catheterization was performed. Initially, RCA could not be cannulated in its usual location. The left coronary artery and its branches were normal in origin and distribution. However, RCA arose from the distal left circumflex coronary artery and followed the course, retrogradely, of the normal RCA distribution (Figure 1 and 2). The distal portion of RCA was tapered and terminated near the right sinus of Valsalva. There were no obstructive lesions of the coronary arteries. Subsequently, dobutamine stress echocardiography was performed by an experienced cardiologist unaware of the coronary status of the patient which indicated no evidence of ischemia.

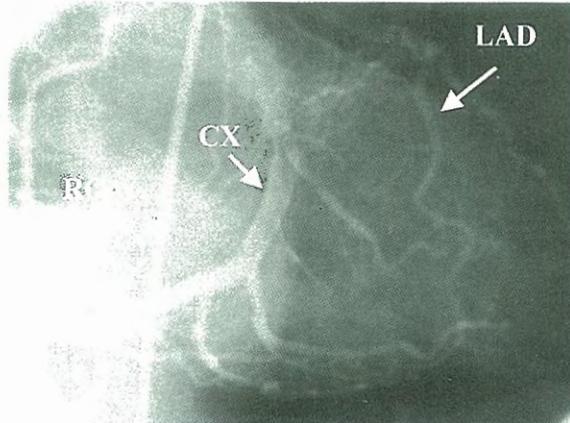
### DISCUSSION

Congenital anomalies of the coronary circulation are relatively uncommon. SCA is a rare congenital anomaly of the coronary circulation and is commonly associated with other congenital cardiac malformations such as ventricular septal defect, pulmonary atresia, infundibular stenosis, annuloaortic ectasia, sinus of Valsalva aneurysm, transposition of the great vessels, tetralogy of Fallot, truncus arteriosus, coronary arteriovenous fistula, bicuspid aortic valve, or situs inversus totalis (1,2,4,5). Here, we presented an extremely rare variety of SCA, RCA arising from the distal left circumflex artery. In the present case, RCA originated from the distal left circumflex coronary artery and crossed the crux to continue toward the right sinus of Valsalva. There was no other associated cardiac anomaly.

Although most patients with anomalous origin of the coronary arteries are asymptomatic, some of these anomalies have been associated with sudden death and ischemic complications, particularly in cases of aberrant origin of the left main coronary artery from the pulmonary artery and aberrant origin of the left main and RCA from the right and left sinuses, respectively (6). The case described here represents a



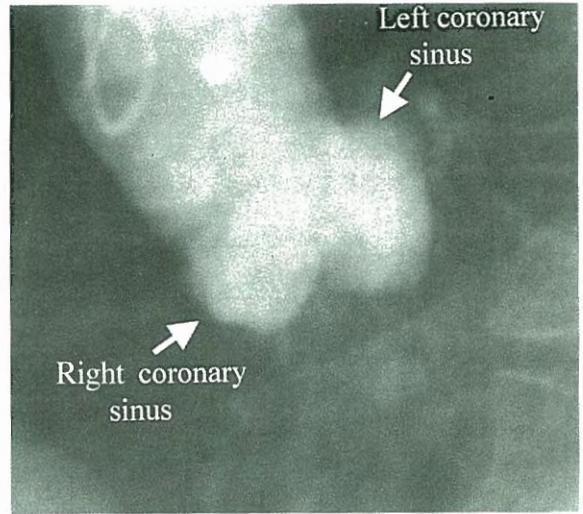
**Figure 1.** Left anterior oblique cranial view of left main coronary injection showing that the right coronary artery arises from the distal left circumflex coronary artery and followed the course, retrogradely, of the normal right coronary artery distribution (LAD: Left anterior descending, CX: Left circumflex coronary artery, RCA: Right coronary artery).



**Figure 2.** Right anterior oblique cranial view of left main coronary injection showing that the right coronary artery arises from the distal left circumflex coronary artery and followed the course, retrogradely, of the normal right coronary artery distribution (LAD: Left anterior descending, CX: Left circumflex coronary artery, RCA: Right coronary artery).

very rare and mostly benign form of isolated congenital coronary anomaly. It is not expected to cause ischemia or any other complication. Exercise stress test showed 1 mm ST-segment depression in leads V<sub>4</sub> to V<sub>6</sub>, which was most likely a false positive finding as his chest discomfort most commonly occurred at rest and he had no chest pain during exercise stress test and no evidence of ischemia on dobutamine stress echocardiography.

Limited number of cases regarding this particular anomaly have been reported in the past (6-11) with an incidence of 0-0.035% (6,12). Sağkan et al presented



**Figure 3.** Left anterior oblique view of aortic root angiography showing the absence of right coronary ostium.

the case of an anomaly in which the circumflex coronary artery arose as a terminal extension of the right coronary artery (13). In 1979 Lipton et al. (12) proposed a very useful angiographic classification. Our case is an example of L-1 type of this classification where there is a single left coronary artery with congenital absence of the right coronary ostium. The left circumflex is dominant and provides the posterior descending branch after which it ascends along the atrioventricular groove in the distribution of RCA and supplies the right ventricular branches.

For therapeutic and diagnostic reasons, the knowledge of possible variations of the coronary circulation, their different origins and their course is of great importance. During coronary angiography, one should attempt to exclude a coronary abnormality when coronary branches cannot be opacified by direct injection of contrast medium. Injections into the sinus of Valsalva as well as aortic angiographies in two different views can identify some anomalies. In our case, aortic angiography demonstrate the absence of right coronary ostium (Figure 3).

In this case, a unique SCA anomaly was presented. RCA arose as a terminal extension of the left circumflex artery. Every angiographer should be aware of anatomical variations to make the right diagnosis and therapeutic decision.

## REFERENCES

1. **Agden JA, Goodyear AN:** Patterns of distribution of the single coronary artery. *Yale J Biol Med* 1970; 43:11-21
2. **Longnecker CG, Reemisa K, Creech D, Jr:** Surgical implications of single coronary artery. *Am Heart J* 1961; 61: 382-6
3. **Butto F, Lucas RV Jr, Edwards JE:** Persistent truncus arteriosus: Pathologic anatomy in 54 cases. *Pediatr Cardiol* 1986; 7: 95-101
4. **De la Cruz MW, Cayre R, Angelini P, Noriega RN, Sadowinski S:** Coronary arteries in truncus arteriosus. *Am J Cardiol* 1990; 66: 1482-6
5. **Kimbiris D, Iskandrian A, Segal B, Bemis C:** Anomalous aortic origin of coronary arteries. *Circulation* 1978; 58: 606-15
6. **Frescura C, Basso C, Thiene G, et al:** Anomalous origin of coronary arteries and risk of sudden death: A study based on an autopsy population of congenital heart disease. *Hum Pathol* 1998; 29: 689-95
7. **Ayala F, Badui E, Murillo H, et al:** Right coronary ostium agenesis with anomalous origin of the right coronary artery from an ectatic circumflex artery. *Angiology* 1995; 46: 637-9
8. **Tavernarakis A, Voudris V, Ifantis G, Tsaganos N:** Anomalous origin of the right coronary artery arising from the circumflex artery. *Clin Cardiol* 1986; 9: 230-2
9. **Shammas RL, Miller MJ, Babb JD:** Single left coronary artery with origin of the right coronary artery from distal circumflex. *Clin Cardiol* 2001; 24: 90-2
10. **Vrolix MC, Geboers M, Sionis D, De Geest H, Van De Werf F:** Right coronary artery originating from distal left circumflex: an unusual feature of single coronary artery. *Eur Heart J* 1991; 12: 746-7
11. **Sheth M, Dohnarsky M, Cha SD, Kini P, Maranhao V:** Single coronary artery: Right coronary artery originating from distal left circumflex. *Cathet Cardiovasc Diagn* 1988; 14: 180-1
12. **Lipton LJ, Barry WH, Obrez E, Silverman JF, Wexler L:** Isolated single coronary artery: Diagnosis, angiographic classification, and clinical significance. *Radiology* 1979; 130: 39-47
13. **Sağkan O, Örnek E, Yeşildağ O:** Sol Sirkumfleks Arterin Sağ Koroner Arterin Terminal Dalı Olarak Çıkışı. *Türk Kardiyol Dern Arş* 1994;22:53-54