

Anomalous Right Coronary Artery Originating from the Left Sinus of Valsalva: Rare But Outstanding Cause of Syncope

Osman Sonmez¹, Sukru Karaarslan², Enes Elvin Gul³, Orhan Ozbek⁴, Kurtulus Ozdemir³

ABSTRACT

Coronary anomalies are relatively common but rarely associated with syncope, myocardial ischemia, and sudden cardiac death. An anomalous right coronary artery from the left sinus of valsalva is now recognized as an important causative factor in sudden death and myocardial infarction and syncope. This case report presents an anomalous right coronary artery (RCA) originating from the left sinus of Valsalva with syncope and will be focused on the diagnostic variation and management.

Key words: Coronary artery anomalous, right coronary artery, syncope

Sol Sinüs Valsalvadan Köken Alan Sağ Koroner Arter Anomalisi: Nadir Ama Senkobun Göze Çarpan Nedeni

ÖZET

Koroner anomaliler göreceli olarak yaygın olmasına rağmen nadiren senkop, miyokardiyal iskemi ve ani kardiyak ölümle ilişkilidir. Sol sinüs valsalvadan köken alan sağ koroner arter anomalisi ani ölüm, miyokardiyal iskemi ve senkobun en önemli sebepleri arasındadır. Bu vaka takdiminde sol sinüs valsalvadan köken alan sağ koroner arter anomalisinin tanısal çeşitliliği ve hasta yönetimini ele alınmaktadır.

Anahtar kelimeler: Koroner arter anomalisi, sağ koroner arter, senkop

INTRODUCTION

Congenital anomalies of the right or left coronary arteries can be asymptomatic or associated with syncope, atypical chest pain, myocardial ischemia, and sudden cardiac death. The overall incidence of anomalous coronary arteries in the general population is estimated at 1% to 2% (1). Variations in the origin and/or course of anomalous coronary arteries are well documented in the literature.

This case report will be focused on the diagnostic variation and management of a male patient with an anomalous right coronary artery (RCA) originating from the left sinus of Valsalva. In addition, diagnostic capability of

Multi Slice CT Anjiography (MSCA) for syncope assessment demonstrated compression of the RCA because of interatrial course, i.e., between the aorta and the main pulmonary artery.

CASE

A 55-year-old man without coronary artery disease (CAD) history was applied to the cardiology department complaining of a 7-day course of chest pain during exercise. He described syncope for two minutes without chest pain. Cardiac markers were normal, and patient had normal electrocardiography (ECG) findings. Transthoracic echocardiography revealed normal find-

¹Department of Cardiology, Bezmialem Vakif University, Istanbul, ²Department of Cardiology, Niğde State Hospital, Niğde, Selçuk University, Meram School of Medicine, Departments of Cardiology³ and Radiology⁴, Konya, Turkey

Received: 18.06.2011, Accepted: 15.01.2012

Enes Elvin Gul, M.D.
Department of Cardiology, Meram Faculty of Medicine, Selçuk University, Konya, Turkey
Phone: 903322236072 Fax:903322236181
E-mail: elvin_salamov@yahoo.com



Figure 1. Multi Slice CT Angiography shows an anomalous RCA from the left sinus of valsalva. RCA, right coronary artery; LAD, left anterior descending artery; Cx, circumflex artery.

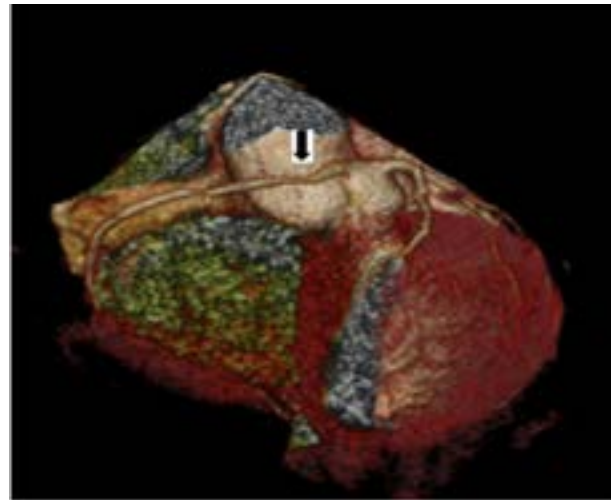


Figure 2. Black arrow points significant compression of right coronary artery between the aorta and pulmoary artery during the systolic phase where the initial course of RCA is not intramural.

ings. During treadmill test, although no significant ischemic ECG changes were obtained, the test was stopped due to severe typical chest pain in the early phase of the exercise. A decision to proceed coronary angiography was made because of crescendo angina, syncope and chest pain in the early phase of treadmill test. The patient was recommended conventional coronary angiography (CCA) but he preferred MSCA because of non-invasive procedure. MSCA showed the right coronary artery (RCA) originating from the left sinus valsalva and

the course of the artery was interatrial, i.e., between the aorta and pulmonary artery (Figure 1). There was systolic compression observed in the anomalous RCA. Significant coronary narrowing was seen between the aorta and pulmonary artery during the systolic phase (Figure 2). The initial course of RCA was not intramural, and the lumen of the artery was normal. Left anterior descending (LAD) and left circumflex (LCx) coronary arteries were also clear. We performed CCA to confirm the patient's coronary atherosclerotic status, but we could not demonstrate the significant narrowing of the anomalous right coronary artery (Figure 3). Because of MSCA results, early phase chest pain in the treadmill test and history of syncope, we referred the patient to the surgery.

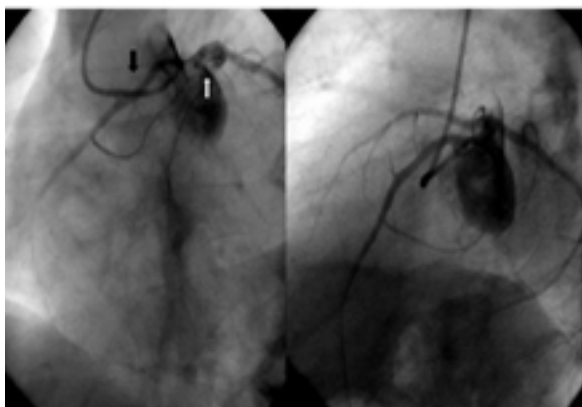


Figure 3. Black arrow points an anomalous RCA, white arrow points left main coronary artery.

DISCUSSION

Coronary anomalies are relatively common, with incidence of 0.2%-1.3% in the general population (1). The most frequent anomaly describes a separate ostia for the left anterior descending and the circumflex arteries. The next most frequent anomaly is an aberrant origin of the left circumflex from the right sinus of Valsalva. (1-2) A single coronary artery arising from either the left or the right sinus of Valsalva has also been described. Although origin of the left Cx or LAD from the right si-

nus of Valsalva occurs more often than its counterpart, origin of the RCA from the left sinus of Valsalva is an unusual anomaly, with a prevalence of approximately 0.15% during routine CCA (2).

An anomalous RCA from the left sinus of Valsalva is now recognized as an important causative factor in sudden death and myocardial infarction. There are three subtypes of anomalous origin of the RCA from the left sinus of Valsalva based on the path of the anomalous artery: retro-aortic, interarterial, and anterior to the pulmonary trunk (3).

Possible mechanisms of coronary ischemia and ischemia associated condition in patients with RCA anomalies has been well defined in literature (4). One of the mechanisms of coronary ischemia and ischemia associated conditions such as syncope or sudden cardiac death in patients with RCA anomalies are likely due to abnormal radiation and ostial morphology of this vessel. The ostium is usually slit-like in shape instead of being round and oval (1-4). The initial course of RCA becomes intramural within the aortic wall and this intramural portion of anomalous coronary artery can narrow during myocardial contraction. Vessel and coronary narrowing between the aorta and the main pulmonary explain the other mechanisms of coronary ischemia during both arteries systolic phase. Vasospasm is another controversial possible mechanism of ischemia (5) Acute vasospasm in the proximal portion of an anomalous RCA was shown by angiography in a patient with no demonstrable stenosis or thrombus (5). Another controversial issue is an increased propensity for atherosclerosis because of endothelial injury due to turbulent flow in the anomalous coronary artery. However, in the Coronary Artery Surgery Study registry, the spread of atherosclerosis and seven-year survival was similar between patients with normal and aberrant origin of the RCA or the left main coronary artery (6).

It is clear that patients with an anomalous RCA from the left coronary sinus with interarterial course can be associated with symptoms of myocardial ischemia manifested as exertional angina, angina at rest, myocardial infarction, ventricular tachycardia, syncope, and even sudden cardiac death. Symptomatic patients should therefore be offered surgery to relief and prevent associated risks of myocardial ischemia, infarction, and sudden death (7).

The ideal imaging tool for the diagnosis and delineation

of coronary artery anomalies is angiography supported by imaging modalities including MSCA, Magnetic Resonance Imaging (MRI), and Transesophageal Echocardiography (TEE), but the specificity and sensitivity of various imaging modalities are not well defined. Cardiac catheterization remains the gold standard for the evaluation of coronary anatomy; recent studies suggest a complementary role for CT, MRI, and TEE for the diagnosis, origin and course of these anomalous coronary arteries (8-10).

In conclusion, this case may contribute to our practice the role of numerous imaging modalities to detect coronary anomalies. We believe that, if the CCA was performed before the MSCA, we would not be able to detect significant narrowing of the anomalous right coronary artery because of its interatrial course. It is obvious that patients with an anomalous coronary artery can be asymptomatic or can be presented with symptoms of myocardial ischemia, ventricular tachycardia, syncope, and even sudden death. In these conditions, we should perform MSCA, MRI, and TEE because of their complementary role for the diagnosis, management, origin and course of anomalous coronary arteries.

REFERENCES

1. Yamakama O, Hobbes RE. Coronary anomalies in 126,595 patients undergoing coronary arteriography. *Cathet Cardiovasc Diagn* 1990; 21:28-40,
2. Waller F. Nonatherosclerotic coronary heart disease, in Fuster V, Alexander RW, O'Rourke RA, et al ed. *Hurst's the Heart* 10. ed New York NY, McGraw Hill; 2001, p. 1161-69
3. Dirksen MS, Bax JJ, Blom NA, et al. Detection of malignant right coronary artery anomaly by multi-slice CT coronary angiography. *Eur Radiol.* 2002;12:177-80
4. Roberts WC. Major anomalies of coronary arterial origin seen in adulthood. *Am Heart J* 1985; 111:941-63
5. Kaku B, Kanaya H, Ikeda M, et al. Acute inferior myocardial infarction and coronary spasm in a patient with an anomalous origin of the right coronary artery from the left sinus of Valsalva. *Jpn Circ J* 2000; 64:641-43
6. Click RL, Holmes DR Jr, Vlietstra RE, Kosinski AS, Kronmal RA. Anomalous coronary arteries: Location, degree of atherosclerosis and effect on survival: A report from the coronary artery surgery study. *J Am Coll Cardiol* 1989; 13:531-37

7. Pelliccia A. Congenital coronary artery anomalies in young patients. New perspective for timely identification (editorial comment). *J Am Coll Cardiol* 2001; 37:598-601
8. Dawn B, Talley JD, Prince CR, et al. Two-dimensional and Doppler transesophageal echocardiographic delineation and flow characterization of anomalous coronary arteries in adults. *J Am Soc Echocardiogr* 2003;16:1274-86
9. Salm LP, Bax JJ, Lamb HJ, et al. Evaluation of rerouting surgery of a coronary artery anomaly by magnetic resonance angiography. *Ann Thorac Surg* 2003; 76:1748
10. Gulati GS, Naik N, Sharma S, Bisoi AK. Anomalous right coronary artery from the left sinus of Valsalva diagnosed by multislice computed tomography. *Indian Heart J* 2003;55:663-65