Percutaneous Coronary Intervention in A Rare Case of Single Coronary Ostium Presented with ST Elevation Myocardial Infarction

Yavuzer Koza, Hakan Tas, Selim Aydemir

Cite this article as: *Koza Y, Tas H, Aydemir S. Percutaneous Coronary Intervention in A Rare Case of Single Coronary Ostium Presented with ST Elevation Myocardial Infarction. Eurasian J Med 2019; DOI: 10.5152/eurasianjmed.2019.18436.*

ORCID IDs of the authors:
Y.K. 0000-0002-2824-2701
H.T. 0000-0003-0009-4396
S.A. 0000-0001-6654-2521

Department of Cardiology, Ataturk University School of Medicine, Erzurum, Turkey

Received: November 30, 2018
Accepted: February 28, 2019
Available Online Date: August 20, 2019

Correspondence to: Yavuzer Koza
E-mail: yavuzerkoza@hotmail.com

DOI 10.5152/eurasianjmed.2019.18436

ABSTRACT

Anomalous aortic origin of the left coronary artery (AAOLCA) from the right sinus of Valsalva is a very rare coronary anomaly that can lead to sudden cardiac death (SCD), usually during or after strenuous exercise. The anatomical variation can follow five different courses: interarterial, subpulmonic (intraconal or intraseptal), prepulmonic, retroaortic, or retrocardiac. The interarterial variation is the pattern that has a stronger relationship with SCD. In patients with AAOLCA, ST-segment elevation myocardial infarction (STEMI) is a rare clinical presentation, and the management of an anomalous infarct-related coronary artery may be technically challenging. We report a case of a patient with an AAOLCA who presented with inferior STEMI and who underwent a successful percutaneous coronary intervention of the right coronary artery.

Keywords: Coronary Vessel Anomalies, percutaneous coronary intervention, myocardial infarction

Introduction

Coronary artery anomalies presenting with ST-segment elevation myocardial infarction (STEMI) are uncommon and often are challenging to manage [1]. The reported incidence of the right-sided origin of the left coronary artery (LCA) is only 0.02%-0.15% [2, 3]. An anomalous aortic origin of the left coronary artery (AAOLCA) coursing between the aorta and the pulmonary artery (PA) has a fatal risk of altered coronary flow due to the compression of the anomalous coronary artery between the great vessels during exercise [4]. We report a case of a successful percutaneous coronary intervention (PCI) of the right coronary artery (RCA) in a patient who presented with inferior STEMI and an anomaly of the left and right coronary arteries with a single coronary ostium in the right sinus of Valsalva. The presentation of this rare coronary anomaly with its imaging features and possible management options were also discussed.

Case Presentation

A 47-year-old man was admitted with a diagnosis of ongoing inferior STEMI. He was thrombolysed with reteplase at another center and referred to our hospital for rescue angioplasty on the same day. During diagnostic coronary angiography, it was impossible to engage the left coronary ostium. The right coronary angiography revealed that the right and left main coronary arteries were arising from the right sinus of Valsalva with a common ostium (Figure 1). The left anterior descending and left circumflex (LCX) coronary arteries were found to be free of any coronary artery disease (CAD). A residual thrombotic lesion in the proximal RCA was found, and we decided to perform rescue PCI with stenting. A 6F JR4 guiding catheter was used to engage the right ostium, and the lesion was crossed with a 0.014-inch floppy guidewire (Abbott Corporation, San Francisco, CA, USA) and predilated with a 2.5×12 mm Invader balloon (Alvimedica, Istanbul, Turkey). During predilatation, the guiding catheter sucked in the vessel, and pressure damping was noted. Since difficulty was encountered during stent delivery, buddy-wire technique was used, and a 3.0×20 mm drug-eluting stent (Boston Scientific Corporation, Marlborough, MA, USA) was successfully implanted to the proximal RCA lesion. Subsequent coronary computed tomography angiography (CTA) revealed a RCA originating from the usual location and a LCA arising from the same ostium coursing between the aorta and the PA (Figure 2). At 1-month follow-up, myocardial scintigraphy revealed no arguments for cardiac ischemia. At 6-month follow-up, no evidence of ischemia or arrhythmia was detected. Written informed consent was obtained from the patient to publish this case report.

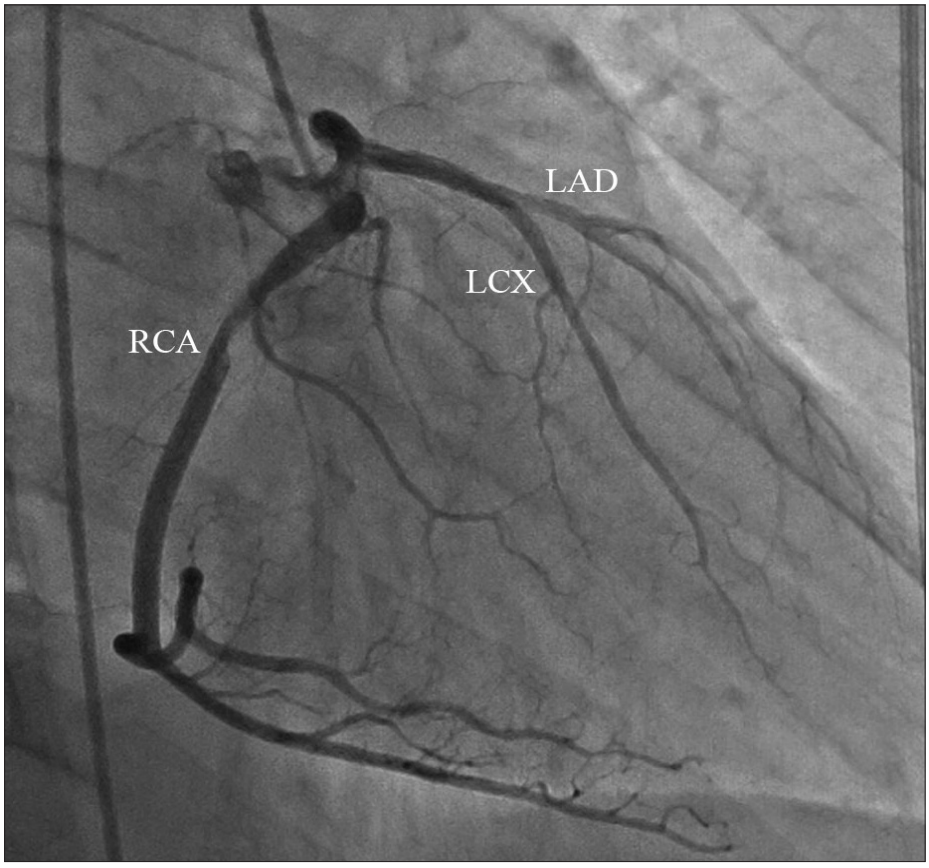

Figure 1. Coronary angiography image (right anterior oblique view) showing the anomalous left main coronary originating from a common trunk
RCA: right coronary artery; LAD: left anterior descending; LCX: left circumflex

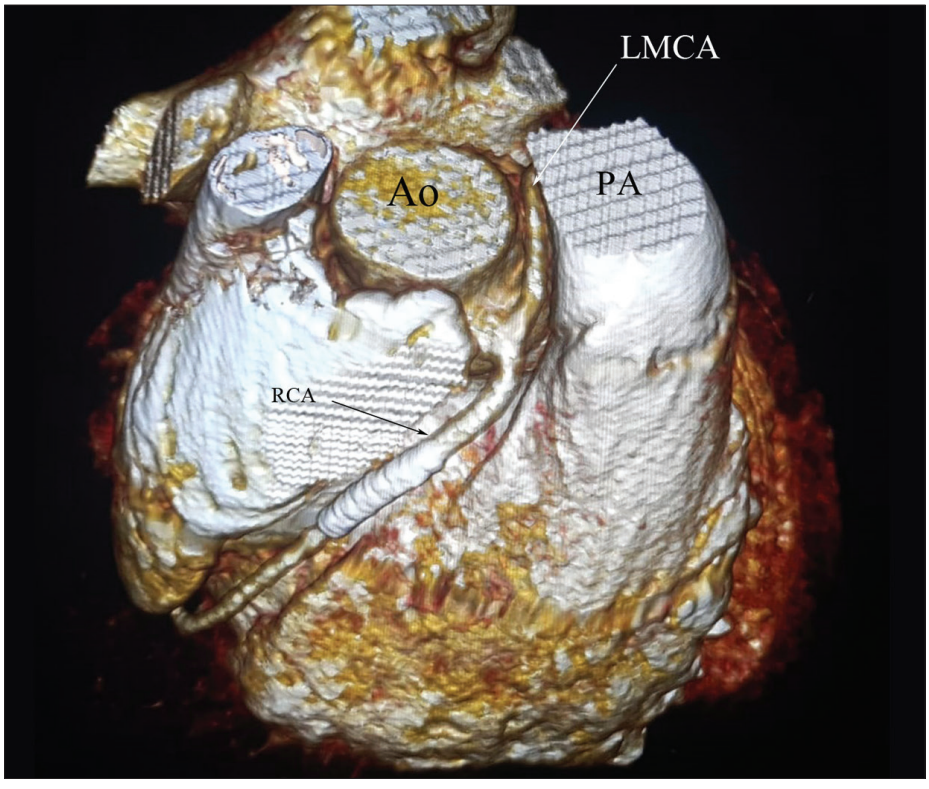

Figure 2. Three-dimensional reconstruction computerized tomography image demonstrating the course of the LMCA between the Ao and the PA
LMCA: left main coronary artery; Ao: ascending aorta; PA: pulmonary artery

Discussion

The incidence of coronary anomalies during routine coronary angiography is approximately 0.6%-1.3% [2]. The rarest anomaly among coronary anomalies with miscellaneous variations is the anomalous aortic origin of a coronary artery (AAOCA) from the opposite coronary sinus [5, 6]. The incidence of AAOCA from the opposite sinus is reported to be between 0.1% and 0.7%, with an anomalous aortic origin of the right coronary artery (AAORCA) reported more commonly than an AAOLCA [2, 3]. Patients with an AAOLCA should be sought for other congenital heart diseases, such as bicuspid aortic valve, mitral valve prolapse, and pulmonary stenosis [7]. In our patient, the origin of the LCA from the right sinus occurred in isolation. An AAOLCA has an intramural aortic course that can lead to impaired coronary flow due to the compression of the anomalous left main coronary artery between the great vessels during exercise in the majority of cases [2, 4, 5].

Coronary artery anomalies have several classification systems. Hauser [5] classified the anomalous origin of the LCA from the right sinus of Valsalva into one of four types: (1) the LCA courses between the aorta and the PA, posteriorly and adjacent to the pulmonary trunk; (2) the LCA courses anteriorly over the right ventricular outflow tract; (3) the LCA courses along the crista supraventricularis subendocardially or intramyocardially, surfacing in the proximal interventricular sulcus; and (4) the LCA may rise to the right of the RCA and course posteriorly to the aortic root or anterior to the pulmonary trunk. Angelini et al. [2] suggested a slightly different classification according to the anatomical course within the interventricular sulcus and atrioventricular groove, as well as the location of penetrating side branches.

Coronary anomalies can be related to sudden cardiac death (SCD). However, they have a benign character most of the time [3]. The clinical manifestations of coronary anomalies may range from clinically benign to severe symptoms, including arrhythmias, syncope, myocardial infarction, or SCD. SCD risk is high in young individuals who have anomalies coursing between the aorta and the PA. Several potential mechanisms have been proposed to account for myocardial ischemia in patients with AAOCA; these include compression of the anomalous coronary artery between the great vessels, especially during exercise; an oblique take-off from the aorta associated with ostial stenosis; ostial ridge; spasm of the anomalous coronary artery, probably due to endothelial injury; or a hypoplastic intramural course [4, 6].

The "interarterial course" is usually the one associated with angina pectoris, acute coronary syndrome, and sudden death in the absence of significant CAD [3]. Although the presence of an anomalous coronary artery does not appear to be associated with an increased risk for development of coronary atherosclerosis [8], Sohrabi et al. [9] demonstrated that there is a high prevalence of atherosclerotic CAD in patients who had an AAORCA. This may be explained by altered blood flow pattern. Garg et al. reported that the incidence of coronary atherosclerosis in patients with coronary artery anomaly is found to be 10.25% [7]. In a study that consisted of 126,595 coronary angiographies, the most common coronary artery anomaly (anomalous LCX originating from the RCA/the right sinus of Valsalva) was identified in 467 cases [3]. In that study, AAOLCA was found in only 22 patients. Interestingly, none of these patients had angina pectoris or acute coronary syndrome. However, some patients with an AAOCA can present with STEMI due to atherosclerosis of a normally arising coronary artery as in our case [10].

In conclusion, the culprit lesions in an interarterial course may pose a great challenge in stented cases due to the compression of the vessel during strenuous exercise. It is important to know the course of the arteries before any intervention in PCI of anomalous coronary arteries. CTA is a useful diagnostic tool to delineate a probably malign variation to be stented or the anatomical relationship of the anomalous coronary trunk with the other cardiac structures. As demonstrated here, CTA should be performed even after successful revascularization for detection of a malignant course. Although PCI appears really attractive, it may be performed only in selected cases and after an exhaustive study of the anatomy. PCI is currently not considered a routine option for revascularization except in patients presenting with myocardial infarction and/or cardiogenic shock [1, 4]. There is also no guideline recommendation for the optimal time window for PCI after fibrinolysis in patients with an AAOCA.

Informed Consent: Written informed consent was obtained from the patient who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - Y.K., H.T.; Design - H.T., S.A.; Supervision - Y.K., H.T.; Resources - S.A., H.T.; Materials - Y.K., S.A.; Data Collection and/or Processing - S.A., H.T.; Analysis and/or Interpretation - Y.K., S.A.; Literature Search - S.A., Y.K.; Writing Manuscript - Y.K., S.A.; Critical Review - Y.K., H.T.; Other - S.A., H.T.

Conflict of Interest: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

References

1. Marchesini J, Campo G, Righi R, Benea G, Ferrari R. Coronary artery anomalies presenting with ST-segment elevation myocardial infarction. Clin Pract 2011; 1: e107. [CrossRef]
2. Angelini P, Velasco JA, Flamm S. Coronary anomalies: incidence, pathophysiology, and clinical relevance. Circulation 2002; 105: 2449-54. [CrossRef]
3. Yamanaka O, Hobbs RE. Coronary artery anomalies in 126,595 patients undergoing coronary arteriography. Catheter Cardiovasc Diagn 1990; 21: 28-40. [CrossRef]
4. Erez E, Tam VK, Doublin NA, Stakes J. Anomalous coronary artery with aortic origin and course between the great arteries: improved diagnosis, anatomic findings, and surgical treatment. Ann Thorac Surg 2006; 82: 973-7. [CrossRef]
5. Hauser M. Congenital anomalies of the coronary arteries. Heart 2005; 91: 1240-45. [CrossRef]
6. Lee BY. Anomalous right coronary artery from the left coronary sinus with an interarterial course: is it really dangerous? Korean Circ J 2009; 39: 175-9. [CrossRef]
7. Garg N, Tewari S, Kapoor A, Gupta DK, Sinha N. Primary congenital anomalies of the coronary arteries: a coronary arteriographic study. Int J Cardiol 2000; 74: 39-46. [CrossRef]
8. Gowda RM, Chamakura SR, Dogan OM, Sacchi TJ, Khan IA. Origin of left main and right coronary arteries from right aortic sinus of Valsalva. Int J Cardiol 2003; 92: 305-6. [CrossRef]
9. Sohrabi B, Habibzadeh A, Abbasov E. The incidence and pattern of coronary artery anomalies in the North-West of Iran: a coronary arteriographic study. Korean Circulation Journal 2012; 42: 753-60. [CrossRef]
10. Jim MH, Siu CW, Ho HH, Miu R, Lee SW. Anomalous origin of the rightcoronary artery from the left sinus is associated with early development of coronary artery disease. J Invasive Cardiol 2004; 16: 466-8.