Anomalous Right Coronary Artery Originates from the Distal of Left Circumflex Coronary Artery

Huanhuan Ding¹
Xuguang Qin²*
Weiguo Xiong²
Enben Guan³

¹Department of cardiology, The People’s Hospital of Rizhao City Shandong Province, China
²First Affiliated Hospital of Tsinghua University, China
³Department of Pediatrics, The Affiliated Hospital of Qingdao University Shandong Province, China

Introduction

Coronary artery anomalies (CAAs) are present at birth, but are usually asymptomatic and are found during coronary angiography or multi-slice computed tomography (MSCT) detection. Their prevalence is less than 1.3% based published series [1-4]. The most common coronary anomaly is separate origination of the left anterior descending coronary artery (LAD) and left circumflex coronary artery (LCX) from left sinus of Valsalva. The second most common anomaly is origination of the LCX artery from the right coronary artery (RCA) or right sinus of Valsalva. Herein, we present two cases that the anomalous RCA arises from the distal of left circumflex coronary artery. It is belonging to single coronary artery (SCA). The case is rare. we bring forth these cases in an attempt to highlight their significance, and make cardiologist understood what important the anomalies are.

Case Presentation

Case 1: A 42-year-old man presented with a history of progressive angina pectoris of 3 months duration. He had a ten-year history of diabetes mellitus and hypertension. Electrocardiography and echocardiography examination is normal. Coronary angiogram was performed through trans-radial access. An angiogram demonstrated a single coronary artery: the anomalous right coronary artery (RCA) partly originated from the mid of left anterior descending coronary artery (LAD) and another part arose from the distal of left circumflex artery (LCX). There was 80-90% stenosis in the proximal of the anomalous RCA segment, and the left anterior descending coronary artery (LAD), LCX were patent (Figure 1A-B). A 6Fr left EBU 3.5 guiding catheter was engaged to the left coronary system to perform percutaneous coronary intervention (PCI) on the anomalous RCA and two stents were deployed. The final angiographic result was excellent.

Before the coronary angiography, a 64-slice computed tomography (MSCT) of the heart was performed on a 64-slice machine (Philips 64 Slice, Philips, Netherland). The results showed the anomalous right coronary artery part originating from the mid of the left anterior descending coronary artery, and another part arising from the distal of left circumflex coronary artery (Figure 1B-D). There was severe stenosis in the proximal of the anomalous right coronary artery. The anomalous RCA was classified as single coronary anomaly, L-I subtype.

Case 2: A 67-year-old woman presented progressive chest pain after physical exertion for 1 months, she was admitted to our hospital on November 6th 2008. She suffered from diabetic mellitus, hyperlipidemia and hypertension for eight years. Coronary angiogram was performed
through trans-radial access. An angiogram demonstrated a single coronary artery anomaly: the anomalous right coronary artery originating from the distal of left circumflex coronary artery, and there was 90% stenosis the proximal of obtuse marginal branch segment. The left anterior descending artery (LAD) and the left circumflex artery (LCX) are patent (Figure 2A and 2B). In LAO projection there was no coronary artery found on the ostium of right sinus (Figure 2C). Based on the findings, percutaneous coronary intervention (PCI) was performed one stent was implanted on the proximal of obtuse marginal branch segment (Figure 2D). The final angiographic result was excellent after PCI procedure. She was free of chest pain during a 6-year follow-up.

Discussion

The most common an anomalous right coronary artery (RCA) is that originates from the aortic trunk of ascending artery or left sinus of Valsalva. The two cases we presented are the anomalous RCA arises from the distal of left circumflex coronary artery. It is belonging to single coronary artery (SCA) [1]. The anomalous coronary artery is first designated with “R” or “L” depending upon whether the ostium is located in the right or left sinus of Valsalva. It is then designated as group I, II, III. Group I has anatomical course of either a right or left coronary artery. Group II anomalies arise from the proximal part of the normal right or left coronary artery, and cross the base of the heart before assuming the normal position of the inherent coronary artery. Group III describes the anomaly where the LAD and LCX arise separately from the proximal part of the normal right coronary artery. The two cases we presented is type L-I anomaly. The L-I pattern occurs where the right coronary artery is congenitally absent and the LCX is markedly dominant (Figure 1A-D and Figure 2A-D). The LCX artery provides the posterior descending branch and ascends in the right AV groove where it provides branches to the right atrium and right ventricle. The extremely rare Group I anomalies generally have a benign clinical course [2]. PCI was performed to the first obtuse marginal artery and one stent was deployed into it through trans-radial approach. The patient has none ischemic symptoms on physical exertion during 6-year follow-up.

Coronary anomalies are usually detected during coronary angiography. However, X-ray angiography is limited by its inability to provide information regarding the spatial orientation of the anomalous artery with regarding to the surrounding cardiovascular structures [3-4]. MSCT technique
Figure 1D: Reconstructed three-dimensional image obtained by volume-rendering technique demonstrates another part of the anomalous RCA originating from the distal of the left circumflex coronary artery.

Figure 2A: RAO caudal view demonstrates the anomalous right coronary artery originating from the distal of left circumflex coronary artery and there is severe stenosis in the proximal of obtuse marginal branch segment.

Figure 2B: RAO cranial view shows the anomalous right coronary artery and left anterior descending coronary artery are patent, and there is severe stenosis in the proximal of obtuse marginal branch segment.

Figure 2C: LAO projection demonstrates no right coronary artery was found in non-selective angiogram.

Figure 2D: The final angiographic result was excellent after PCI procedure was performed.

has the potential to accurately visualize the coronary artery [5] and clearly demonstrate the surrounding cardiovascular structures of the anomalous coronary artery [6-8]. In the present case, the MSCT images clearly demonstrated the origin and course of the anomalous right coronary artery. So we bring forth these cases in an attempt to highlight their significance, and make cardiologist understood what important the anomalies are.

References
1. Lipton MJ, Barry WH, Obrez I, Silverman JF, Wexler L (1979) Isolated single coronary artery: diagnosis, angiographic classification, and clinical significance. Radiol 130: 39-47.
2. Yamanaka O, Hobbs RE (1990) Coronary artery anomalies in 126,595 patients undergoing coronary arteriography. Cathet Cardiovasc Diagn 21: 28-40.
3. Sheth M, Dovnarsky M, Cha SD, Kini P, Maranhao V (1998) Single coronary artery: right coronary artery originating from distal left circumflex Cathet Cardiovasc Diagn 14: 180-181.
4. Roberts WC, Siegel RJ, Zipes DP (1982) Origin of the right coronary artery from the left sinus of Valsalva and its functional consequences: Analysis of 10 necropsy patients. Am J Cardiol 49: 863-868.

5. Barth III CW, Ray M, Roberts WC (1986) Sudden death in infancy associated with origin of both left main and right coronary arteries from a common ostium above the left sinus of Valsalva. Am J Cardiol 57: 365-366.

6. Angelini P, Velasco JA, Flamm S (2002) Coronary anomalies. Incidence, pathophysiology and clinical elevation. Circulation 105: 2449-2454.

7. Xiong W, He D, Lu C, Qin X, Li H, et al. (2014) Coronary artery anomalies: the left main coronary artery or left anterior descending coronary artery originating from the proximal of right coronary artery. Chinese Medical Journal 127: 2392-2394.

8. Tariq S, Muddassir S, Patel JK (2012) Single coronary artery anomaly: Branching of left coronary artery from right coronary artery with 2 distinct patterns. J Invas Cardiol 24: E67-71.