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Case Report

Single Coronary Anomaly: Anomalous Right Coronary Artery Originates from the Distal Part of Left Circumflex Coronary Artery

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Introduction

Congenital anomalies of coronary arteries (CAAS) are very rare and usually documented as an incidental finding during routine catheter or CT angiograms performed for other reasons. Their prevalence is less than 1.3% based on published series [1-4]. The most common coronary artery anomaly is origination of the left circumflex coronary (LCX) artery from the proximal part of right coronary artery (RCA) or right sinus of Valsalva. The second is separate origination of the left anterior descending coronary artery (LAD) and LCX artery from the left sinus of Valsalva. Herein, we present two cases that the anomalous RCA arises from the distal part of left circumflex coronary artery. It is belonging to single coronary artery (SCA). These cases are extremely rare. we bring forth them in an attempt to highlight their significance, and make cardiologist, especially cardiac surgeon to understand what important the anomalies are.

Keywords: Anomalous right coronary artery; Computed tomography; Coronary angiography; Single coronary anomaly

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, hypertension and heavy smoking. 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 the other part arose from the distal segment 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 (Fig.1a). 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 the other part arising from the distal of left circumflex coronary artery (Fig.1b-d). There was severe stenosis in the proximal segment of the anomalous right coronary artery. The anomalous RCA was classified as single coronary anomaly(SCA), L-I subtype.

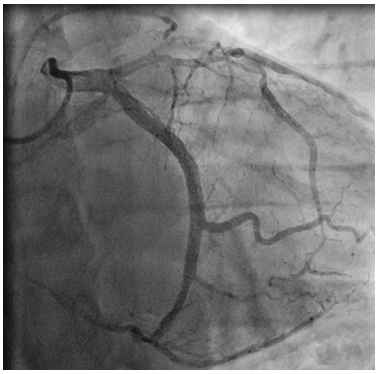

Figure 1: (A) AP caudal view demonstrates the anomalous right coronary artery originating from the distal part of left circumflex coronary artery and there is severe stenosis in the proximal of anomalous right coronary artery segment.

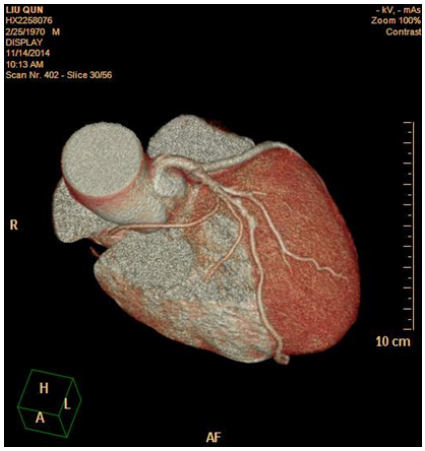

Figure 1: (B) Reconstructed three-dimensional image obtained by volume-rendering technique demonstrates part of the anomalous RCA course between aorta and pulmonary artery.

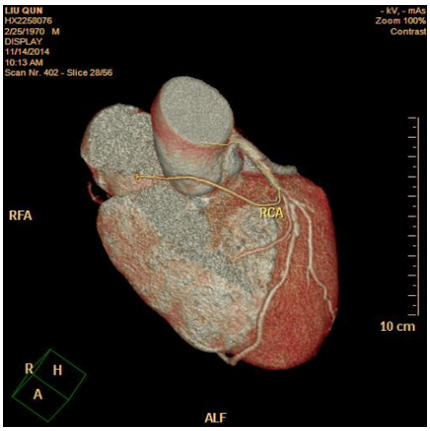

Figure 1: (C) Reconstructed three-dimensional image obtained by volume-rendering technique demonstrates part of the anomalous RCA originating from the mid of the left anterior descending coronary artery.

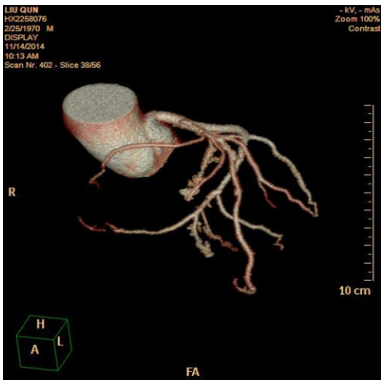

Figure 1: (D) Reconstructed three-dimensional image obtained by volume-rendering technique demonstrates the other part of the anomalous RCA originating from the distal of the left circumflex coronary artery.

Case 2

A 67-year-old woman presented with progressive chest pain after physical exertion for 1 month, 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 coronary artery (LAD) and the left circumflex coronary artery (LCX) are patent (Figure 2A-B). 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.

Figure 2: (A) RAO caudal view demonstrates the anomalous right coronary artery originating from the distal of left circumflex coronary artery and there is 90% stenosis in the proximal of obtuse marginal branch segment.

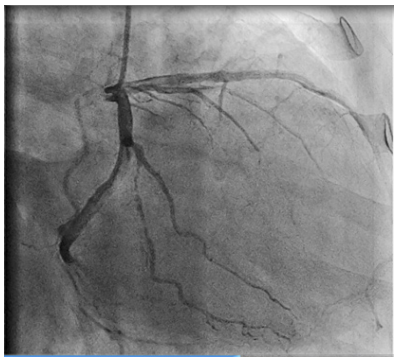

Figure 2: (B) RAO cranial view shows the anomalous right coronary artery and left anterior descending coronary artery are patent, and there is 90% stenosis in the proximal of obtuse marginal branch segment.

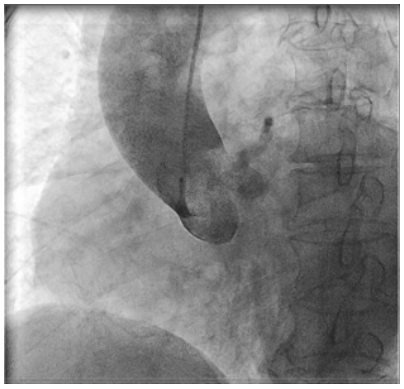

Figure 2: (C) LAO projection demonstrates no right coronary artery was found in non-selective angiogram.

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

Discussion

Congenital Anomalies of Coronary Arteries (CAAS) are very rare and usually documented as an incidental finding during routine catheter or CT angiograms performed for other reasons. Their prevalence is less than 1.3% based published series [1-4]. The most common coronary artery anomaly is the origination of the left circumflex coronary (LCX) artery from the proximal of right coronary artery (RCA) or right sinus of Valsalva. The second is separate origination of the left anterior descending coronary artery (LAD) and LCX artery from the left sinus of Valsalva. The two cases we presented are the anomalous RCA arises from the distal part 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 [2]. 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 1(A-D) (Figure 2(A-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 [3-5]. MSCT coronary angiography has proven to be effective not only in the identification and characterization of coronary artery disease, but also in the evaluation of the anatomical coronary details, and clearly demonstrate the surrounding cardiovascular structures of the anomalous coronary artery [6,7]. In the present cases, 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, cardiac surgeon understands what important the anomalies are.

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