Journal of
**Cardiology and Vascular Medicine**

JScholar
Fostering Scholarly Communication

Case Report Open Access

# Coronary Anomaly: The Left Anterior Descending Coronary Artery Originating from the Proximal of Right Coronary Artery

**Huanhuan Ding[1], Xuju Qin[2], Shengxiang Zhao[3], Xuguang Qin[3,*]**

[1]Department of Cardiology, Rizhao People's Hospital of Shandong Province, Rizhao 276800, China
[2]Department of Burn and Plastic Surgery, Liyin People's Hospital of Shandong Province, Linyi, 276002, China
[3]Department of Cardiology, Beijing North Asia orthopedics Hospital, Beijing 102445, China

***Corresponding author:** Dr. Xuguang Qin, Department of Cardiology, Beijing North Asia Orthopedics Hospital, Beijing 102445, China; Tel: 86-10-13910186197; Fax: 86-010-60306101, E-mail:qin_xuguang0712@163.com

Huanhuan Ding and Xuju Qin done equally to this study

**Received Date:** September 14, 2019 **Accepted Date:** October 12, 2019 **Published Date:** October 14, 2019

**Citation:** Huanhuan Ding (2019) Coronary Anomaly: The Left Anterior Descending Coronary Artery Originating from the Proximal of Right Coronary Artery. J Cardio Vasc Med 5: 1-5.

## Abstract

Coronary artery anomalies (CAAs) are a diverse group of congenital disorders whose manifestations and pathophysiological mechanisms are highly variable. They are present at birth, but are usually asymptomatic and are found during coronary angiography (CAG) or multi-slice computed tomography (MSCT) detection. Their prevalence is less than 1.3% based published series [1-3]. The most common anomaly is origination of the left circumflex artery (LCX) artery from the proximal of right coronary artery (RCA) or right sinus of Valsalva. The second most common coronary anomaly is separate origination of the left anterior descending coronary artery (LAD) and left circumflex coronary artery (LCX) from the left sinus of Valsalva. The third most common anomaly is the anomalous right coronary artery rises from the left sinus of Valsalva. We present the case is that the anomalous left descending coronary artery (LAD) originates from the proximal of the right coronary artery. In order to confirm the origin and course of anomalous LAD artery, a 64-slice computed tomography (MSCT) demonstrates that the anomalous LAD artery originates from the proximal of the RCA, and the anomalous LAD coursing between the aorta and pulmonary artery. This is extremely uncommon case.

**Keywords:** coronary anomaly; left main coronary artery; left anterior descending coronary artery; coronary angiography; computed tomography

## Case Presentation

42 year-old young man complaint of continuous chest pain for more than 20 minutes and companied with sweat, presented with none ST elevation myocardial infarction (NSTEMI), and was admitted to our department on July 15th 2013. He suffered from diabetes mellitus, hypertension and hyper-lipidemia for five years. Electrocardiogram was normal, but CK-MB concentration elevated to 44.62 ng/mL and troponin T concentration was 0.547ng/mL. The patient underwent cardiac catheterization through trans-radial approach because of onset of none ST elevation myocardial infarction after ten days. In the left anterior oblique (LAO) caudal projection, the left anterior descending (LAD) coronary artery was absent (Figure 1). Angiography demonstrated that the LAD artery originates from the proximal of right coronary artery (Figure 2). The LAD artery had 80% stenosis in the distal segment, the LCX artery was patent, and the RCA was patent and dominant, the intermediate branch had 99% stenosis in the proximal segment. A 6F left Judkins 3.5 guiding catheter was used to engage the left coronary system to perform percutaneous coronary intervention (PCI) on the intermediate branch and one stent was implanted. A 6F Amplatz 1.0 guiding catheter was used to the ostium of the right coronary artery, and a BMW wire was inserted to the anomalous LAD and another stent deployed in the distal of LAD segment successfully. The final angiographic result was excellent (Figure 3).

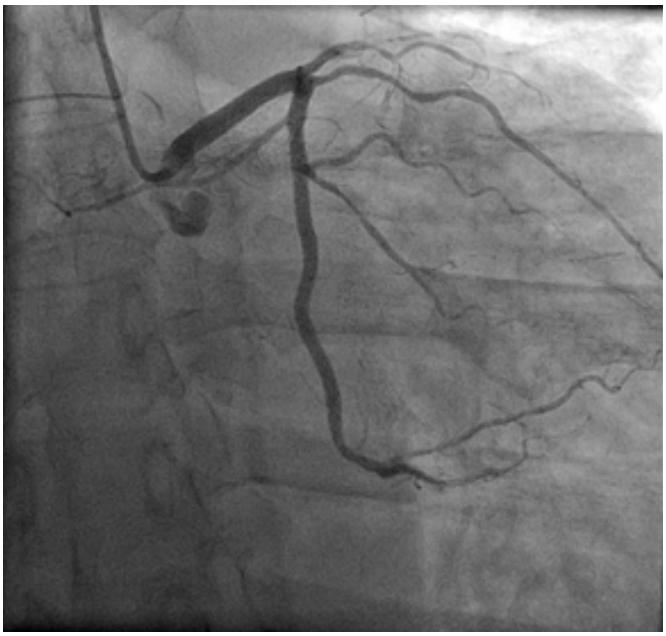

Figure 1. LAO caudal projection shows the LAD artery was absent, the intermediate branch had 99% stenosis in the proximal segment

Figure 2. RAO cranial view demonstrates the anomalous LAD originating from the proximal of RCA segment and had 80% stenosis in the distal segment

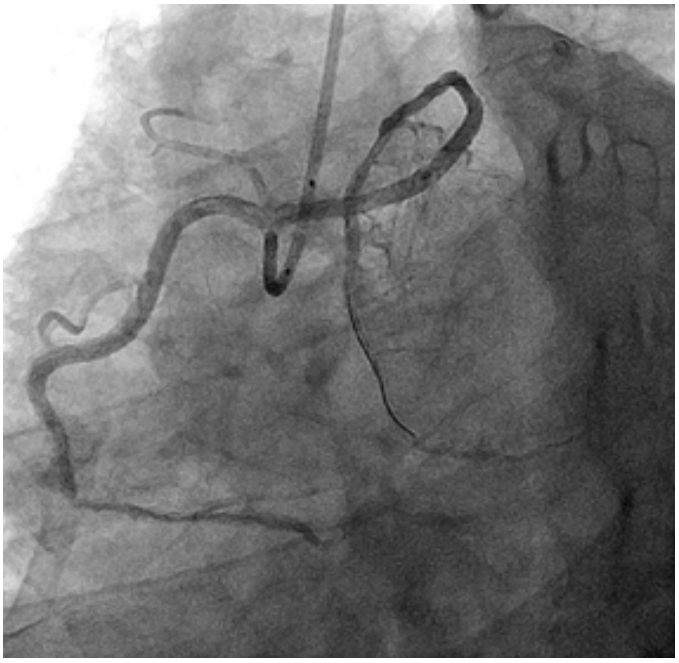

Figure 3. The finally results of angiography after PCI procedure.

In order to confirm the origin and course of anomalous LAD artery, a 64-slice computed tomography (MSCT) of the heart was performed on a 64-slice machine (Philips 64 Slice, Philips, Netherland) after 7 days of PCI operation. The results showed the anomalous LAD artery originating from the proximal of the RCA, the anomalous LAD coursing between the aorta and pulmonary artery. According to Lipton's classification, the coronary anomaly was classified as type R-IIB subtype (Figure 4,5).

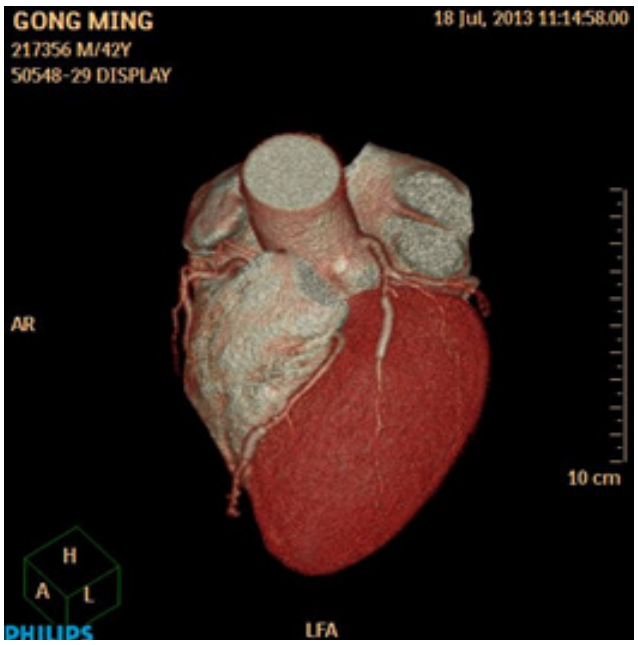


Figure 4. Reconstructed three-dimensional image obtained by volume-rendering technique shows the anomalous LAD and coursed between the aorta and pulmonary artery

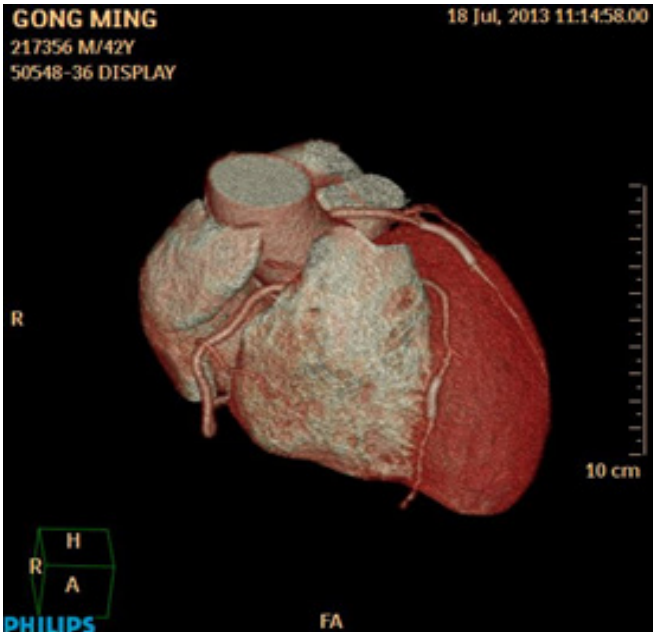


Figure 5. Reconstructed three-dimensional image illustrates stent was implanted in the intermediate branch and the distal of LAD segment seperately.

## Discussions

Coronary artery anomalies (CAAs) are a diverse group of congenital disorders whose manifestations and pathophysiological mechanisms are highly variable. They 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 [1-3]. The most common anomaly is origination of the left circumflex artery (LCX) artery from the proximal of right coronary artery (RCA) or right sinus of Valsalva. The second most common coronary anomaly is separate origination of the left anterior descending coronary artery (LAD) and left circumflex coronary artery (LCX) from the left sinus of Valsalva. The third most common anomaly is the anomalous right coronary artery rises from the left sinus of Valsalva. We present the case is that the left descending coronary artery (LAD) originates from the proximal of the right coronary artery. The case is very rare. The entire left coronary artery arises from the right sinus of Valsalva. The right coronary may arise separately, or share a common ostium with the anomalous left coronary and is considered a form of single coronary artery (SCA). It is defined as an artery that arises from an arterial trunk of the coronary sinus of Valsalva and nourishes the entire myocardium. The incidence of SCA is a rare congenital occurring in approximately 0.024% of the population according to Lipton's reports [2]. 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, or III anomalies. 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 RCA. Five anatomical subtypes exist and are classified according to the relationship of the anomalous coronary artery with the aorta and pulmonary artery, i.e., "anterior," "between," "septal," "posterior," and "combined." In this series, the "septal" subtype was the most common, whereas the "between" type was rare [1,2,3,4]. However, the left anterior descending coronary artery (LAD) derives from the proximal of the RCA is extremely rare. It's prevalence is less than 0.018% [3].

The case we presented is that the anomalous LAD arises from the proximal of right coronary artery (RCA). The origin and course of anomalous LAD was confirmed by MSCT technique, the results demonstrated that the anomalous LAD coursed between the aorta and pulmonary artery. It is very rare

case. We bring forth the case in an attempt to highlight its significance. These anomalies are considered to be an independent risk factor for adverse cardiovascular events including sudden cardiac death and dealing with their lesions is a challenge to cardiologists.

Most coronary anomalies are discovered as incidental findings during coronary angiography or at autopsy, but relatively few symptomatic during childhood [1,2]. 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 [4,5]. In few decades, with development in science and technology, MSCT (multi-slice computed tomography) technique has the potential to accurately visualize the coronary artery and clearly demonstrate the surrounding cardiovascular structures of the anomalous coronary artery [6,7,8]. In this case, the MSCT images clearly demonstrated the origin and course of the anomalous the left anterior descending coronary artery. The results showed the anomalous LAD artery originating from the proximal of the RCA, the anomalous LAD coursing between the aorta and pulmonary artery. According to Lipton's classification, the coronary anomaly was classified as type R-IIB subtype. So we bring forth the extremely case in an attempt to highlight its significance, and make cardiologist understood what important the anomaly is. Coronary artery anomaly provides a unique challenge to cardiologists when dealing with critical lesions of coronary vasculature, which would otherwise have been easily amenable to angioplasty. Presence of coronary artery anomalies create challenges during coronary angiography, Percutaneous coronary interventions, and coronary artery bypass graft surgery [9].

## References

1. Yamanaka O, Hobbs RE (1990) Coronary artery anomalies in 126,595 patients undergoing coronary arteriography. Cathet Cardiovasc Diag 21: 28-40.

2. Lipton MJ, Barry WH, Obrez I, Silverman JF, Wexler L (1979) Isolated single coronary artery: diagnosis, angiographic classification, and clinical significance. Radiology 130: 39-47.

3. Kardos A, Balsai L, Rudas L, et al. (1997) Epidemiology of congenital coronary artery anomalies: A coronary arteriographic study on a central European population. Cathet Cardiovasc Diagn 42: 270-275.

4. Angelini P, Velasco JA, Flamm S (2002) Coronary anomalies incidence, pathophysiology, and clinical relevance. Circulation 105: 2449-2454.

5. Serota H, Barth CW 3rd, Seuc CA, et al. (1990) Rapid identification of the course anomalous coronary artery in adults: The "dot and eye" method. Am J Cardiol 65: 891-898.

6. Catarina A. Oliveira, Paula Mota, Susana P. Basso, Rui P. Catarino (2014) Congenital Coronary Variants and Anomalies: Prevalence in Cardiovascular Multislice Computed Tomography Studies in a Single Center. Open Journal of Radiology 4: 163-172.

7. Schmid M, Achenbach S, Ropers D, Komatsu S, et al. (2008) Assessment of changes in non-calcified atherosclerotic plaque volume in the left main and left anterior descending coronaries over time by 64-slice computed tomography. Am J Cardiol 101: 579-584.

8. Rodenwalt J (2003) Multi-slice computed tomography of the coronary arteries. Eur Radiol 13: 748-757.

9.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.