Heart Dominated by Solitary Coronary: A Case Report

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ABSTRACT

The prevalence of coronary artery anomalies has been detected in 0.6% to 1.5% of coronary angiography. They are found since birth but usually with no significant symptoms and it does not generally manifest as myocardial ischemia however, malignant outcomes have been reported. Single coronary arteries are rare congenital anomalies in which the entire circulation for the heart is supplied by a coronary artery originating from a single ostium. It is challenging to recognize the anomaly of the patient's coronaries, experiencing percutaneous coronary intervention (PCI) procedure, undergoing coronary artery surgery, or receiving a prosthetic valve replacement. In our case, we document a patient who underwent PCI for multi-vessel coronary lesions and in whom the atypical origin of the single left coronary artery, with the right coronary artery (RCA) emerging from the distal left circumflex artery (LCX), which was previously undetected.

Keywords: Anomalous origin of single coronary artery variant, coronary artery disease, left circumflex artery, non-ST segment elevation myocardial infarction (NSTEMI).

1. Introduction

There are few reported cases of a single left coronary artery with an anomalous origin, where the right coronary artery arises as an extension of the distal left circumflex artery. Certainly, the presence of a single coronary artery, identified without any accompanying congenital heart disease, is exceptionally rare in routine coronary angiography reports, with an incidence ranging from 0.02% to 0.04%. Atypical angina is the most common presenting symptom; they seek attention for coronary angiography, which is when the diagnosis is typically made. In clinical practice, it is challenging to clearly identify the direct correlation between symptoms and coronary artery anomalies. Furthermore, the presence of coronary compression by them is crucial. However, we are presenting a 59-year-old male who experienced NSTEMI and was diagnosed with an unusual origin of the left circumflex artery, originating from the right coronary artery. In our reported case, symptoms were different as a result of cardiovascular comorbidities, and a coronary anomaly was identified at coronary angiography, which was performed for different indications.

2. Case Report

A 59-year-old male arrived at the emergency department complaining of chest pain. His cardiovascular examination didn’t show any notable findings. His medical history included hypertension, chronic renal disease, hyperlipidemia, and diabetes. An electrocardiogram (EKG) showed normal sinus rhythm with left ventricular hypertrophy with a strain pattern (Fig. 1). An echocardiogram revealed normal systolic function of the left ventricle (with an estimated ejection fraction of 55%) and mild mitral regurgitation. The troponin I level was above normal. The patient was treated with heparin, nitroglycerin, beta-blockers, statins, and aspirin. Coronary angiography was done that showed 70% proximal stenosis and an 80% long lesion in the mid-Left anterior descending artery (LAD), RCA was noted to have origin from the Left circumflex artery (LCX) and showed diffused disease. LCx showed 80% stenosis at the midpart, this anomaly was not detected earlier. The administration of contrast medium failed to disclose any arteries originating from the right coronary cusp. (Figs. 2 and 3). Multi-vessel percutaneous coronary intervention (PCI) was done as the patient refused cardiac surgery and was discharged with appropriate medical therapy in stable condition.
3. Discussion

Any variation with a prevalence of >1% is usually measured as a normal variant and not as an anomaly. However, anomalous coronary anatomy is characterized by morphological features that occur in less than 1% of the population, which usually happens during the third week of fetal development. Earlier, these anomalies were described by autopsy. However, imaging modalities pose remarkable development for detecting them non-invasively. It is usually identified by chance via interventional coronary angiography, CT coronary angiography and in uncommon instances, transthoracic or transesophageal echocardiography [1]. Single coronary arteries are frequently linked with additional congenital anomalies [2] and may contribute to the emergence of cardiac ischemia, cardiomyopathy, sudden cardiac death, and congestive heart failure [3]. This specific anomaly is noted to follow a clinically benign course unless there are notable atherosclerotic lesions that impede coronary flow [4].

Lipton-Yamanaka classification in 1979 classifies Single Coronary Artery (SCA) based on the origin, course and branching pattern of the artery into two primary types: “L”, representing the left type originating from the left coronary sinus and “R” representing the right type originating from the right coronary sinus [5]. The perfusion of
the left ventricle in these patients is very identical to that of normal subjects with an LCX-dominant coronary system. The major variation could be RV perfusion through RV branches. We suggested that the most exposed part to ischemia in these patients could be in RV [6] or RV infarction since collateral circulation from proximal to distal RCA is not developed [7].

The mortality and morbidity depend on the course and location of the coronary variant, which make them risk factors [8]. The significant aspect of anomaly recognition and management lies in the technical obstacles encountered during coronary angiography and percutaneous coronary intervention, arising from abnormal positions and challenging angles. Anomalous coronary arteries cause considerable difficulties for the interventional cardiologist. To understand the clinical impact, the main obstacle involves establishing a robust foundation for a particular variant of anomalies and a process capable of interfering with the coronary artery’s function, which is to provide adequate blood flow to the dependent myocardium. Sudden cardiac death in individuals with coronary artery anomalies may occur due to the twisting of the silt like vessel, divergent origin during exercise, resulting in ischemia and subsequent arrhythmia [9].

The existence of obstructive disease in a vessel of large allocation makes it essential that the anomaly be identified and angiographically established, especially in ischemia [10]. There has been conflicting data regarding the association between coronary artery anomalies and an elevated risk of atherosclerosis. Certain researchers suggest that coronary branches following an anomalous pathway may be prone to atherosclerosis, contributing to the complexity of incidents involving coronary artery anomalies presenting with STEMI [11]. Certain variants also expand the risk of epicardial vessel atherosclerotic disease if a segment of anomalous artery is intramural, constricing the vessel during systole [12]. One study unveiled a similar risk of atherosclerotic disease in comparison to atherosclerotic risk in the general population, while another study demonstrated increased atherosclerosis with the presence of a coronary artery anomaly [13]. Our case report emphasizes the importance of considering the potential diagnosis of congenital coronary artery anomalies when dealing with patients experiencing acute myocardial infarction.

4. Conclusion

Congenital coronary artery anomalies could result in acute coronary syndrome with technical difficulties during percutaneous coronary interventions. Cardiologists should be competent enough and undergo specific training to deal with these carriers, especially in the context of sporting or military activities.

4.1. Learning Object

Identifying these vessels through angiography is crucial as arterial compression or structural variations can restrict blood supply, leading to myocardial ischemia.

Conflict of Interest

Authors declare that they do not have any conflict of interest.

References


