

Left Coronary Artery Originating from Right Coronary Sinus – A Rare Coronary Artery Anomaly

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Abstract Anomalous origin of the left coronary artery from the right sinus of Valsalva is a congenital anomaly. When the left coronary artery (LCA) originates from the right sinus of Valsalva, the anomalous artery pathway can present in four variants. We report a case in which a patient presented with episodes of atypical chest pain and during coronary angiography it was found that his left coronary artery originated anomalously from the right coronary sinus and course of the LCA was confirmed by CT coronary angiography. Importance of anomalous origin of coronary artery and specially its course shall be discussed in this case report.

Keywords: anomalous origin, left coronary artery, right coronary sinus, Coronary angiography

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1. Introduction

Congenital anomalies of the coronary arteries occur with a reported incidence of 0.3% to 1.3% of the population undergoing a coronary angiography procedure. One of the rarest forms of coronary anomalies is an origin of the entire left coronary artery (LCA) from the right sinus of Valsalva. Although these anomalies are present at birth, they are often not diagnosed until late adolescence or adulthood, due to the lack of symptoms or because the symptoms may not be recognized. When the LCA originates from the right sinus of Valsalva, the anomalous artery pathway can present in four variants. The deadliest of pathways, with the worst prognosis, is the inter-arterial course. This is when the LCA makes its course between the aortic root and right ventricular outflow tract (RVOT). Myocardial ischemia, ventricular fibrillation, syncope, congestive heart failure and sudden cardiac death are associated with this anomaly. Most literature suggests that coronary angiography is the primary modality for diagnosing these anomalies. There are other modalities, including multi-slice computed tomographic angiography (CTA), magnetic resonance angiography (MRA) that have also been used to diagnose anomalous pathways.

Herein, we report a case along with review of literature where left coronary artery originating from the right sinus of Valsalva along with right coronary artery, initially diagnosed on conventional coronary angiography and the course of LCA was confirmed by CT coronary angiography.

2. Case Report

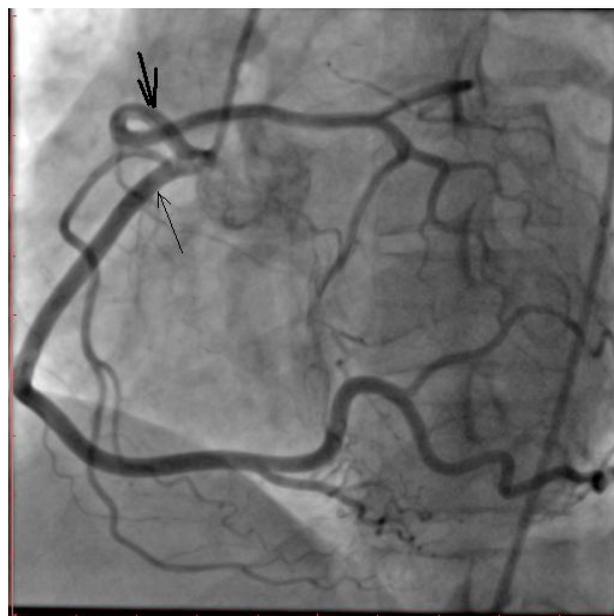


Figure 1. Coronary angiography view showing both left coronary artery (thick arrow) and right coronary artery (thin arrow) originating from right coronary sinus

A 45-year-old male was admitted to the department of cardiology of Sawai Man Singh Medical College & hospital, Jaipur, Rajasthan, India after the recurrent episodes of shortness of breath atypical chest pain not responding to antianginals in form of nitrates. Patient was also evaluated for his shortness of breath for any pulmonary cause but it revealed no abnormality. Cardiac Treadmill Test was inconclusive because test terminated prematurely due to fatigue. He was a smoker and there were no other risk factors and his baseline ECG was normal. The day following hospital admission, coronary

angiography was performed to investigate the patient's symptoms. Coronary angiography revealed the anomalous origin of the Left coronary artery from the right coronary sinus. The right coronary artery (RCA) appeared to have a normal course (Figure 1). It was evident that he had no significant coronary artery disease.

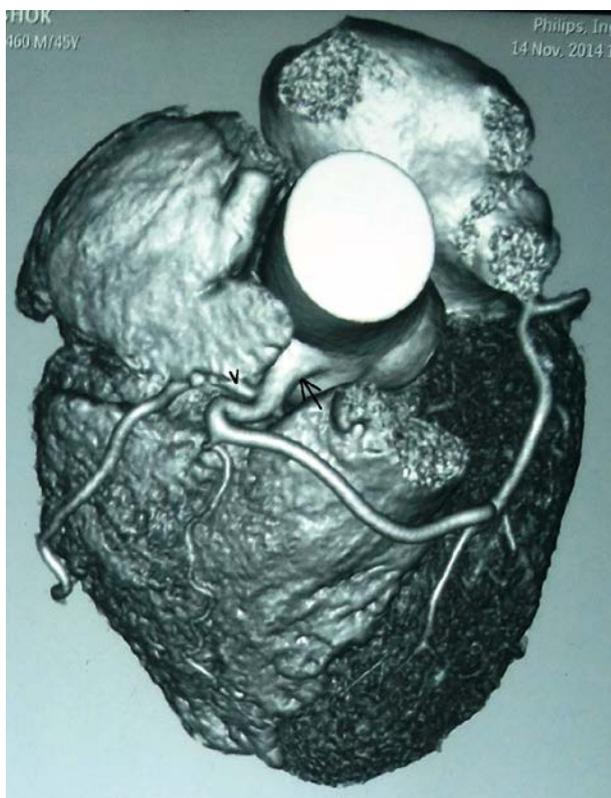


Figure 2. CT coronary angiography showing course of anomalous originating left coronary artery anterior(arrow) to pulmonary trunk

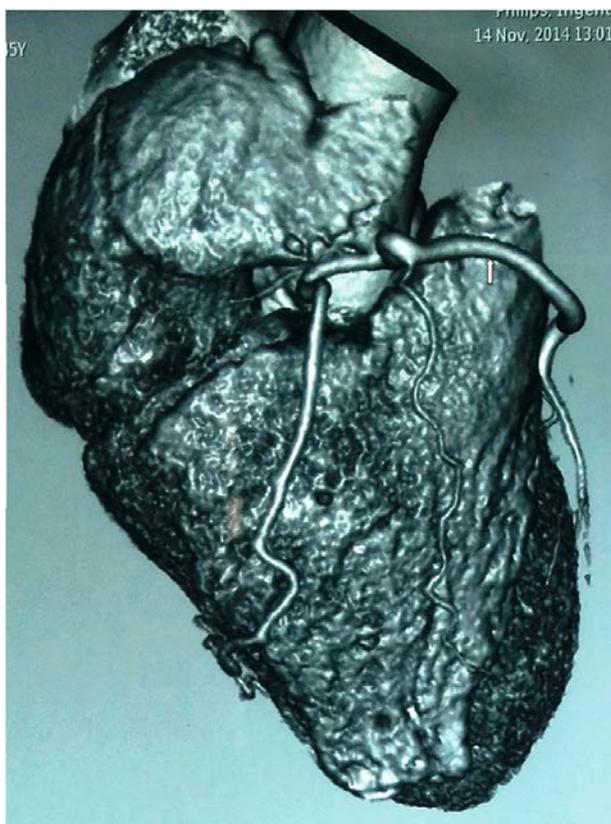


Figure 3. CT coronary angiography showing course of left coronary artery traversing anterior to pulmonary trunk(White arrow)

A 64-slice CT-Angiography was performed to determine the course of the anomalous coronary arteries. CT coronary angiography showed that Left coronary artery originates from right coronary sinus and courses anteriorly to right ventricle outflow tract after that divides in to left anterior descending artery and left circumflex artery (Figure 2, Figure 3). The RCA was confirmed as to having a normal course. As there was no inter-arterial course, patient was reassured and discharged.

3. Discussion

Congenital coronary artery anomalies are rare occurrences, with a reported incidence of 0.3% to 1.3%. [1,2] Prevalence of coronary artery anomalies based on CT coronary angiography studies varies widely in the literature from 2.69% to 24.5% with no significant gender difference [3,4]. However, anomalous origin of the LCA from the right sinus of Valsalva is reported in 0.09% to 0.15% of cases. [5,6,7] The anomalous LCA can take various courses. These various proposed courses are classified according to the pathway to left (contralateral) aspect of the heart:

- Type-A–Anterior: LCA turns anteriorly in front of RVOT;
- Type-B–Inter-arterial: LCA lies between the aorta and RVOT;
- Type-C–Septal: LCA courses through the crista supraventricularis portion of the septum;
- Type-D- Posterior: LCA turns posteriorly behind aorta [8,9]

Most of the anomalies were detected during coronary angiography for another reason or evaluation of patient of angina. The inter-arterial course has been known to have the worst prognosis and be associated with sudden cardiac death (>50%), particularly during or shortly after exercise. [10] Many have hypothesized as to why this phenomenon occurs. Myocardial ischemia and cardiac death can occur due to impaired coronary flow either by coronary structure (acute angulation at the origin) or expansion of the aortic root and RVOT. [11] The expansion of the roots compresses or “squeezes” the coronary artery lumen during the systolic phase, which in return, impedes flow to the heart muscle. As previously stated, during or shortly after vigorous exercise is when this compression of the artery takes place. These types of coronary anomalies are responsible for approximately 13% of sudden cardiac death in young athletes. [12,13] This type of anomaly(type B) have the worst prognosis and needs surgical correction, rest all variants have benign course.

The gold standard for discovering such anomalies is coronary angiography. However, coronary angiography provides only two-dimensional views of a vessel's complex three-dimensional path, so the anatomic course of the anomalous vessel with respect to the aorta and RVOT may be difficult to differentiate. Furthermore, during the coronary angiography procedure, the anomalous vessel may be erroneously overlooked, or assumed to be occluded since it is not in the correct anatomical position. [14] Therefore, alternative imaging methods have been suggested, such as CT coronary angiography or MR angiography. [15] The use of CTA establishes a capacity to view the heart in the necessary three-dimensional view

to precisely identify coronary pathways and other potential anomalous structures. In this case presented, after having been diagnosed by coronary angiography, a 64-slice CT angiography was performed with to confirm the course of the Left coronary artery anterior to pulmonary trunk.

This course is being regarded as benign, so patient was reassured and discharged.

4. Conclusion

We report this case because of the uniqueness and rarity of this patient's congenital anomaly. This case demonstrates the need for angiography and CTA in establishing a diagnosis and treatment course. Special care should be taken when evaluating young individuals and athletes with chest pain resembling angina, since sudden death can occur with an anomalous origin of LCA. Finally, the importance of recognizing symptoms and understanding various coronary anomalies by physicians will help anticipate the needs of future patients.

Statement of Competing Interests

Authors have no competing interests.

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