Research Article
E-ISSN : 3048-1368
Volume 15, Issue No. 07. 2025
P-ISSN : 3048-1376

The International Journal of Medical Science and Health Research

Challenging Primary PCI in Anomalous Origin of Right Coronary Artery: A Case Report and Literature Review

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Article History :

Received date : 2025/05/07
Revised date : 2025/06/15
Accepted date : 2025/07/21
Published date : 2025/08/27

E-ISSN :
ISSN 3048-1368
9 773048 136000

P-ISSN
ISSN 3048-1376
9 773048 137007

ABSTRACT

Anomalous origin of the coronary artery is quite rare, seen in only 0.2% to 1.2% of cases. The unusual ostium locations create significant challenges in engaging the artery, which can be time-consuming and may delay intervention during acute coronary syndrome (ACS). Herein, we describe a 59-year-old patient who presented with inferior STEMI, high-degree AV block, and cardiogenic shock. The patient underwent primary percutaneous coronary intervention (PCI) after a temporary pacemaker (TPM) had been inserted previously. During angioplasty, we faced difficulties locating the ostium of the right coronary artery (RCA) due to its anomalous position. We successfully cannulated using a 6 Fr EBU 3.5 Guiding Catheter (GC), which revealed total occlusion in the proximal segment. Additionally, we encountered other challenges during the procedure, including a lack of support from the guiding catheter and difficulties in achieving stable coaxial alignment. However, the intervention was successful

without any perioperative complications.

Keywords : Anomalous Right Coronary Artery, Primary Percutaneous Coronary Intervention, Guiding Catheter, Cardiology, Case Report

INTRODUCTION

Anomalous origin of the coronary artery is quite rare, seen in only 0.2% to 1.2% of cases. An anomalous origin of RCA from the left sinus of Valsalva has been reported in 6% to 27% of patients with coronary anomalies. Most of these anomalies were detected incidentally during coronary angiography, as they are often asymptomatic.[1-3] The unusual orifice locations can make it challenging to perform selective cannulation, achieve coaxial alignment, and provide adequate guide catheter support, thereby increasing the technical complexity and procedure time of undertaking PCI. The rising technical complexity may also lead to increased use of large iodinated contrast volumes and greater radiation exposure.[4,5]

CASE PRESENTATION

A 59-year-old male was admitted to the ED with a chief complaint of left chest pain radiating to the back and diaphoresis, 10 hours before admission. His ECG showed inferior STEMI with high-degree AV block (Fig. 1). His cardiovascular risk factors are smoking and hypertension. His blood pressure was 90/60 mmHg on dopamine support, irregular pulse rate 72 bpm, with normal physical exams. Laboratory examination showed Trop. I elevated at 30.8 ng/ml, while renal function and electrolytes were normal.

He was administered a dual-loading antiplatelet and a 5000 IU IV heparin bolus before catheterization. TPM was done before PCI. A coronary angiogram was performed through femoral route, revealing significant stenosis in mid left anterior descending (LAD) artery and distal left circumflex coronary (LCx) artery; however, the RCA ostium wasn't found in the right coronary cusp (RCC) (Fig.2). Nonselective contrast injection in the left sinus of Valsalva showed the artery arising from the left coronary cusp (LCC), inferior left main coronary artery (LMCA) ostium. Due to the anomalous position of the RCA, we were unable to engage it using a Judkins right (JR) 3.5 catheter. The RCA was cannulated using a 6 Fr Extra back up (EBU) 3.5 GC, revealing total occlusion in the proximal segment with thrombus (+) (Fig. 3). Wiring through the total occlusion

was complicated because the GC easily disengaged from the RCA ostium; however, the wire eventually went through, and we decided not to aspirate the thrombus due to a lack of support from the GC, so we opted to direct stent using a 3.5/16 mm DES in the culprit lesion. We achieved TIMI-3 flow; however, residual thrombus remained (Fig. 4). We completed the procedure without any peri-procedural complications and administered LMWH at 0.6 cc twice daily through subcutaneous injection for 5 days.

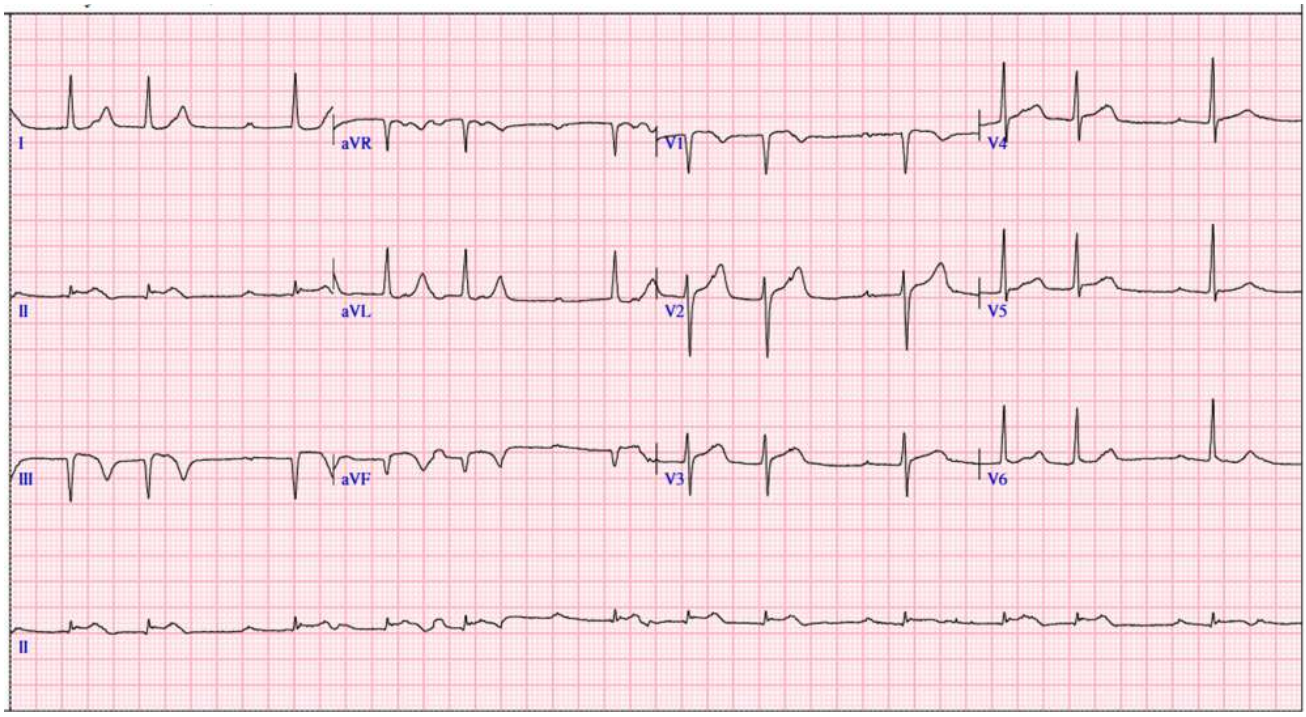

Fig. 1. An electrocardiogram revealed ST-segment elevation in the II, III, and aVF leads.

Fig. 2. Coronary angiogram revealed significant stenosis in mid-LAD and distal LCx, while the RCA ostium was not located in the RCC.

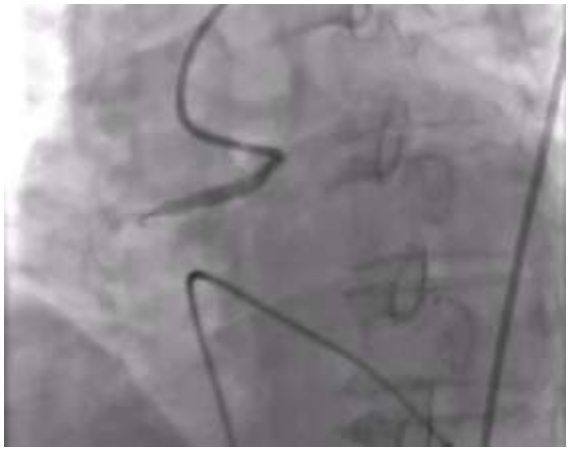

Fig. 3. Coronary angiogram revealed that the artery originated from the inferior LMCA ostium, showing total occlusion in the proximal segment.

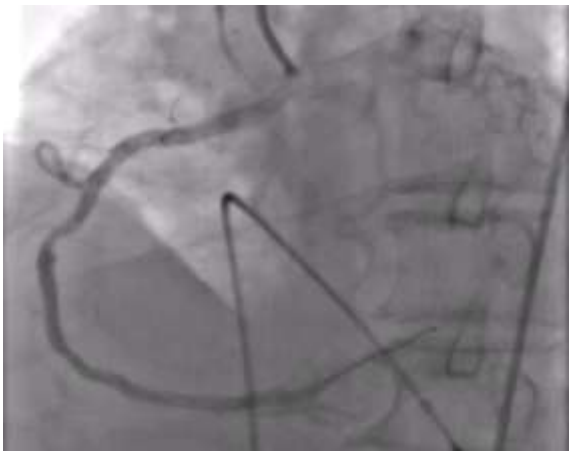

Fig. 4. Final result after stent deployment.

DISCUSSION

The RCA typically arises from the right coronary sinus and courses in the right AV groove toward the crux cordis. Anomalous RCA (ARCA) can originate from various locations within the sinus of Valsalva, including above or below the LMCA ostium. It may also arise from the commissure between the right and left cusps, or from the right cusp trending toward the left cusp. An aortic root angiogram in two orthogonal views can help identify the origin of an anomalous coronary artery. Conventional use of catheters to locate these abnormal origins may result in delays during ACS, where time is of paramount importance.[5,6] Delayed reperfusion often occurs due to difficulties in locating the abnormal RCA ostium, and more serious complications can arise from technical challenges during the procedure.[7] In non-acute coronary syndrome, computed tomographic angiography may be preferred, as it provides rapid and accurate information regarding the origins and course of the coronary arteries.[5,6,8]

These different origins require a different type of catheter for easy cannulation and prompt access to opening the culprit artery. The selection of an appropriate guide catheter is crucial for achieving selective engagement, stable coaxial alignment, and adequate support for successful PCI in ARCA. Misalignment of the catheter can lead to ineffective aspiration, potentially leading to stroke or acute limb ischemia if the thrombus detaches from the suction tip and exits the RCA,

distal embolization, or even vessel trauma. Several case reports have shown successful cannulation of an ARCA from left sinus using Amplatz Left and Judkins Left guide catheters, as well as manually manipulated catheters such as the Extra Back Up (EBU) GC, Leya catheter, and the recently developed Heartrail Ikari right 1.5 GC.[3,6,9] Praharaj et al have reported use of Voda guiding catheter to cannulated the anomalous orifice of RCA in the left sinus with excellent results.[10] Uthayakumaran et al reported that the EBU catheter was most successful in engaging the RCA ostium, with its enhanced curve, which allows the EBU catheter to sit well in the aortic root and provides good support for the RCA originating below the LMCA.[11] In this report, we successfully cannulated the RCA below the LMCA ostium with an EBU guiding catheter.

CONCLUSION

Precise guiding catheter selection is mandatory for the successful PCI of anomalous coronary artery origins. The optimal selection of a guiding catheter should be appropriately referenced based on the origin site of the RCA, the anatomic ostium, and other comprehensive considerations.

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