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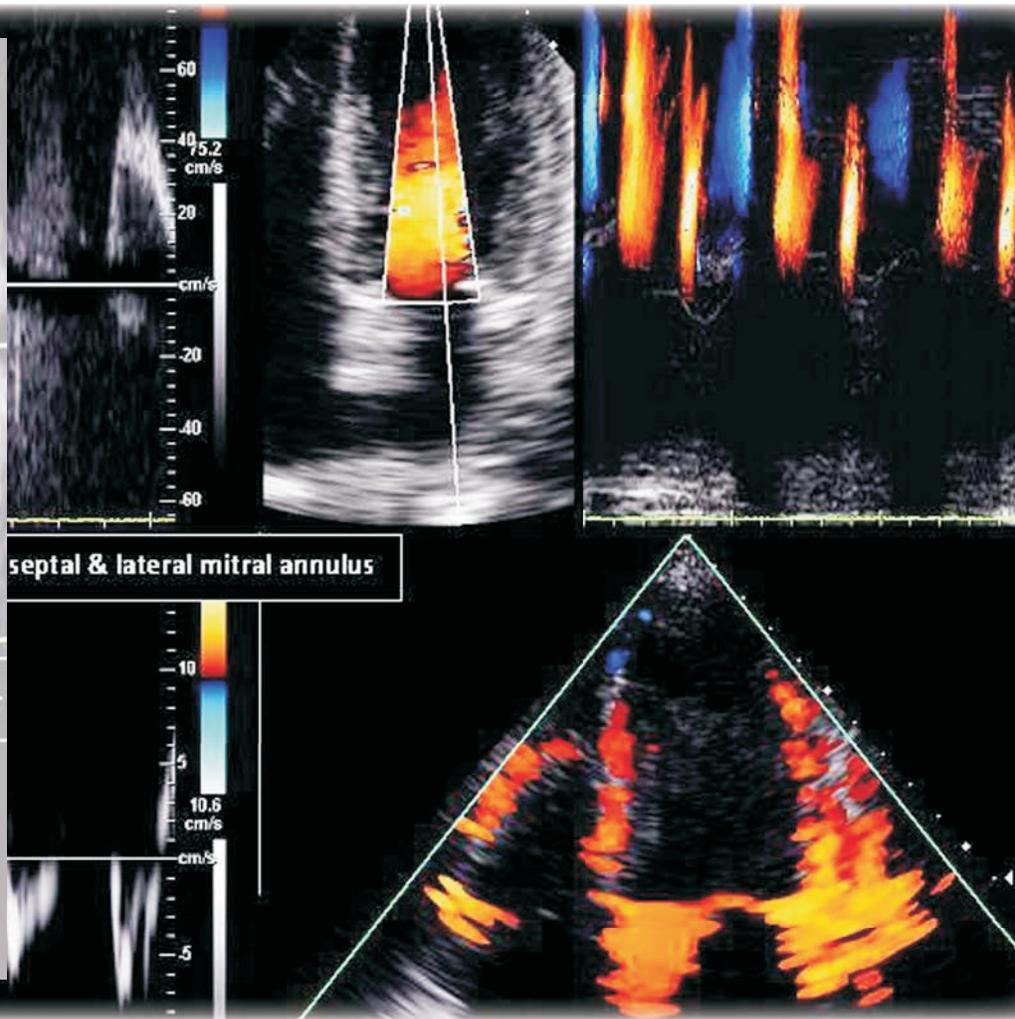
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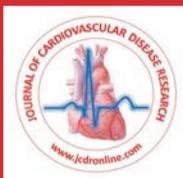
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Successful Primary Percutaneous Intervention with Stenting in Anomalous Right Coronary Artery Arising from left Coronary sinus in case of Acute Inferior wall Myocardial Infarction Complicated by Cardiac Tamponade

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ABSTRACT

Anomalous origin of the right coronary artery (RCA) from the left sinus of valsalva is a rare congenital abnormality. The unusual location and non-circular orifice of this anomaly poses a great technical challenge for selective catheterization and percutaneous coronary intervention (PCI). Hemopericardium leading to tamponade complicating acute MI is rare and leads to hemodynamic instability. We report a case of acute inferior wall MI with a moderate pericardial effusion in cardiac tamponade who was treated with immediate pericardiocentesis followed by PCI and stenting of an anomalously arising RCA from the left sinus.

Key words: Anomalous coronary artery, Primary PCI, Tamponade, Hemo-

pericardium, Inferior wall MI.

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INTRODUCTION

Coronary artery anomalies are encountered in 0.2%-1.2% of the population undergoing percutaneous coronary intervention(PCI).¹ An anomalous origin of the right coronary artery (RCA) from the left sinus of valsalva is a rare congenital abnormality and has been reported in 6-27% of patients with coronary anomalies.² Anomalous RCA origin sites include pulmonary artery, left ventricular outflow tract, left main coronary artery, aorto-left ventricular canal, non coronary sinus of valsalva and from above the sinus of valsalva. The unusual location and noncircular orifice of this anomaly poses a great technical challenge for selective catheterization and PCI, especially with regard to adequate guide catheter support during the procedure. We report a case of acute inferior wall MI with a moderate pericardial effusion in cardiac tamponade who was treated with immediate pericardiocentesis followed by PCI and stenting of an anomalously arising RCA from the left sinus.

CASE REPORT

A 65 year old hypertensive, chronic smoker male patient presented to the emergency with history of acute onset severe retrosternal chest pain which had started 4 h prior. He also complained of vertigo and profuse sweating associated with the pain. He had complained of a similar pain on the previous day which had subsided on its own within 10 min and no medical intervention was sought. His heart rate was 110 beats/min and blood pressure was not recordable and neck veins were distended. ECG showed ST elevation in leads II, III and aVF. Urgent echocardiography was done which revealed moderate pericardial effusion with diastolic RV collapse suggestive of tamponade. Left ventricular ejection fraction was 40% with hypokinesia of inferior and posterior wall. Immediate pericardiocentesis was done through subcostal approach (Figure 1) and about 250 ml of hemorrhagic pericardial fluid was drained. Intravenous fluids were administered which led to an improvement in blood pressure to 110/70 mmHg. Right femoral artery was punctured and 6F femoral sheath inserted. Since guidewire could not be negotiated, a peripheral angiogram through femoral sheath

showed complete occlusion of Right common Iliac artery (Figure 2). Therefore, coronary angiography was done from right radial artery using 5Fr Tiger catheter which revealed 50% stenosis in proximal LAD and LCX. However right coronary artery could not be cannulated using 5Fr Tiger, Judkins right or Amplatz (AL1) catheters. Hence left femoral artery was punctured and RCA cannulation was tried using Judkins right 3.5 and 4 cm curve, Amplatz AL1 and AR1 catheters but was unsuccessful. Nonselective injection of the aortic root revealed an anomalous origin of the RCA from the left sinus of Valsalva near the origin of left main coronary artery (Figure 3). A 6 Fr Judkins left 3.5 cm curve guiding catheter was then used to engage the aberrant RCA selectively which revealed total thrombotic occlusion of the mid RCA (Figure 4). The lesion was crossed with a 0.014" Whisper guidewire and predilated with 1.25-12 mm Sprinter balloon (Medtronic, Inc). A 3.0 X 32 mm Yukon Choice flex (Translumina therapeutics, Germany) stent was deployed at 14 atm with good end result (Figure 5). The Judkins left catheter provided good stability and support throughout the procedure. The patient made a good postoperative recovery. The pigtail catheter was removed the next day with minimal residual pericardial effusion. The patient was discharged two days after the procedure.



Figure 1: Dye injection into pericardial space demonstrating pericardial effusion and confirming catheter entry into pericardium

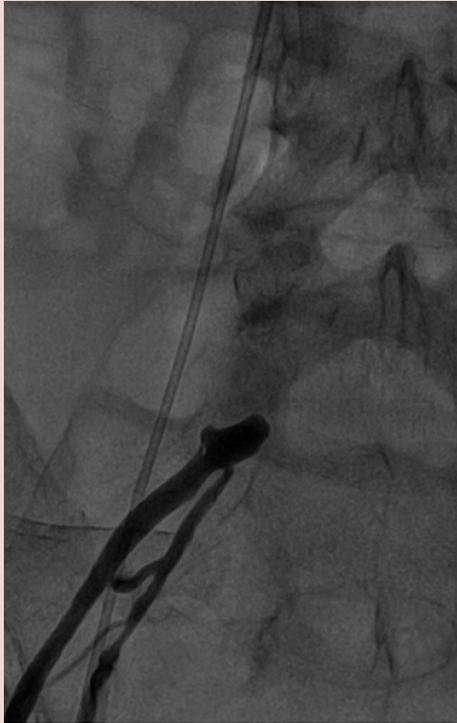


Figure 2: Peripheral hand injection into right femoral sheath showing complete occlusion of right common iliac artery

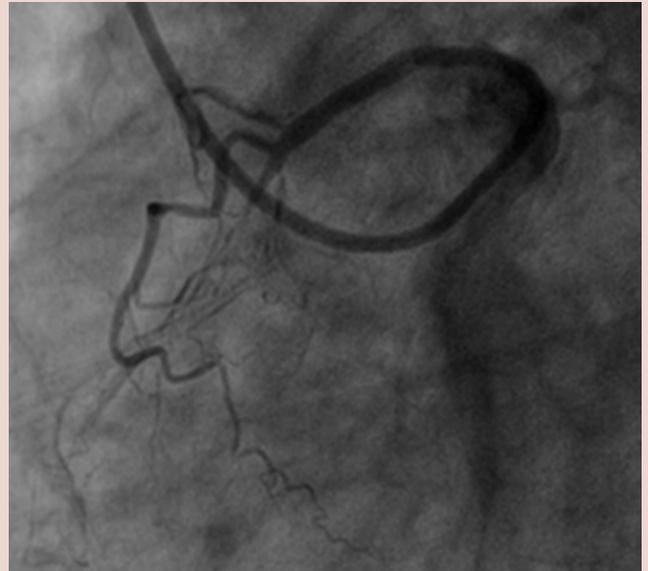


Figure 4: Selective cannulation of anomalous right coronary artery using Judkins Left 3.5cm curve catheter



Figure 3: Nonselective hand injection into left coronary sinus of Valsalva demonstrating anomalous origin of right coronary artery near left main coronary ostium

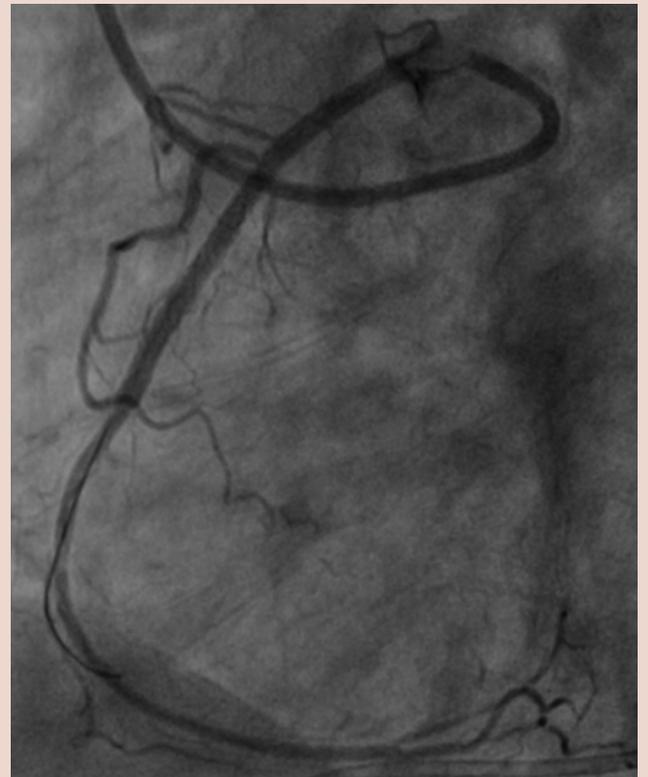


Figure 5: Post stenting image of the right coronary artery

DISCUSSION

Coronary artery anomalies may have significant implications to myocardial perfusion. The coronary anomalies most commonly leading to myocardial ischemia or infarction are anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA), large coronary arteriovenous fistulas, and those anomalies associated with a coronary artery coursing between the great vessels.³ Ectopic origin of the coronary arteries from aortic sinus poses a technical challenge to PCI in Acute

coronary syndrome cases. The acute angle of the origin of anomalous RCA (from the left sinus) can create a slit like orifice that may prevent selective cannulation, co axial alignment and adequate guide catheter support, which are essential for PCI. The inability to adequately engage the coronary ostium may lead to poor angiographic visualisation of the coronary anatomy. Hence a good knowledge of the variations in origin

of the coronary arteries helps in selecting the appropriate catheters for diagnostic and therapeutic intervention.⁴

The anomalous RCA arising from left sinus most commonly lies anterior and cephalad to the left main coronary artery. It takes an abrupt caudal and rightward course anterior to the aorta, between the great vessels prior to continuing into the right atrioventricular groove. Kalaichelvan Uthayakumaran *et al* concluded that for anomalous RCA originating above the left sinus of valsalva just adjacent to the LCA, the JL catheter with a larger secondary curve than the one used to cannulate the left coronary ostium was successful in providing engagement for anomalous RCA.⁵

There are a few case reports of coronary interventions in anomalous right coronary arteries originating from the left sinus of valsalva.⁶⁻¹³ The Amplatz AL-1 guiding catheter has been used successfully in three cases.⁶⁻⁸ However, Oral *et al.*⁹ could not achieve stable support with the use of an Amplatz AL-2 guiding catheter. Lorin *et al.*¹³ recently published two cases of stenting in an anomalous RCA by use of a 6 Fr Judkins left 5.0 cm guiding catheter through right radial approach. Our case report is in accordance with the reports of Cohen *et al.*¹⁴ who used 6 Fr Judkins left 4.0 cm and 5.0 cm guiding catheters for successful PCI in anomalous RCA.

While earlier studies showed pericardial effusions to be present in 15% to 28% of patients presenting with a first myocardial infarction,¹⁵ more recent studies demonstrate an incidence of 6.6 to 10%.^{16,17} Pericardial effusion in such cases is usually small to moderate and represents a benign reaction to the MI. Hemopericardium leading to tamponade complicating acute MI is rare and is usually due to cardiac rupture, hemorrhagic pericarditis, or aortic dissection involving the right coronary artery. Figueras *et al*¹⁷ demonstrated that even in the absence of electromechanical dissociation or cardiac tamponade, moderate PE doubled the mortality risk in MI. Hence, early echocardiography to detect PE can

detect patients with high mortality risk. Also, when PE in a parasternal short-axis view exceeds 10 mm, a possibility of free wall rupture should be strongly considered. Cardiac tamponade in our case was an unanticipated complication which required urgent pericardiocentesis and intravenous fluid administration which led to a favourable outcome.

CONCLUSION

Our case combines a continuum of complications which can be faced by interventionists. Successful PCI of an anomalous coronary artery relies on good knowledge of coronary anatomy and distribution, optimal guiding catheter seating and backup support.

ACKNOWLEDGEMENT

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

Ethical approval: "All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards."

Informed consent: "Informed consent was obtained from all individual participants included in the study."

ABBREVIATION USED

MI: Myocardial infarction; **LAD:** Left anterior descending; **LCX:** Left circumflex; **RV:** Right ventricle; **PE:** Pericardial effusion; **LCA:** Left coronary artery.

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