



## RE-STENOSIS IN ANOMALOUS RIGHT CORONARY ARTERY ORIGINATING FROM OPPOSITE AORTIC SINUS - A CHALLENGE

### Cardiology

**Dr Shaikh Swalehin Bux**

MD DM, Department of Cardiology, Thumbay hospital, Hyderabad, Telangana-500024, India

### ABSTRACT

Coronary artery anomalies prevail in around 0.64-5.6% of patients undergoing coronary angiography. Percutaneous coronary intervention (PCI) is considered as the preferred treatment for patients over the age of 30 years with such anomalies. Here, we report a case of a 62-year-old diabetic woman, with a history of PCI to the anomalous right coronary artery (RCA) originating from the left aortic sinus, angiographically diagnosed with 99% re-stenosis in mid RCA. Drug eluting stents (DES) were successfully implanted into the diseased vessels and the patient is asymptomatic at 6 month follow-up.

### KEYWORDS

anomalous right coronary artery, congenital coronary anomaly, drug eluting stent, percutaneous coronary intervention, re-stenosis

### INTRODUCTION

Among the anomalies of coronary arteries, abnormal origin of coronary artery from the opposite sinus has a higher risk of sudden death in young patients. The anomalous right coronary artery (RCA) originating from the opposite sinus of Valsalva generally remains benign but serious complications such as myocardial infarction or sudden cardiac death may develop in patients with age less than 30 years (1). In younger patients, with unusual chest pain, syncope or provokable ischemia; surgical corrections have been considered as the preferred treatment (1). The patients who survive from such serious events may have higher risk of development of significant epicardial atherosclerotic diseases due to local endothelial injury at later stage of life which can be treated by coronary interventions (1-3).

All these complications may develop in patients with anomalous arteries due to occurrence of acute take-off angle, slit-like orifice, luminal compression of the intramural portion of the coronary artery or compression of coronary artery between the aorta and the pulmonary artery, which narrows the orifice and ultimately restricts the blood flow. At present, percutaneous coronary intervention (PCI), though a challenging method, has been considered as the favoured option to treat occlusive anomalous coronary arteries mostly for patients with age greater than 30 years (4, 5).

Here, we present a case of a 62-year-old diabetic woman, with a 9 month old history of PCI to anomalous RCA originating from the left sinus of Valsalva. Her current angiogram revealed presence of multi-vessel disease with 99% re-stenosis of mid RCA and 80% lesions in ramus. Two drug eluting stents (DES) were successfully implanted into mid RCA and ramus. The patient is doing well and under regular follow-up upto 6 months.

### Case presentation

A 62-year-old diabetic, non-hypertensive female presented with chest pain and shortness of breath (class IV). She had a 9 month old history of PCI to anomalous RCA originating from the left aortic sinus. At that time, her ejection fraction was found to be 30% and severe mitral regurgitation was observed. After medical treatment, she had been stable and her ejection fraction raised to 35% and mitral regurgitation also decreased (mild to moderate).

Her present angiogram revealed multi-vessel disease, involving 99% re-stenosis of mid RCA, 80% diseased lesion in ramus, 60% stenosis in diagonal and total occlusion in OM. It was decided to treat RCA and ramus by implanting sirolimus-eluting stent (SES). The OM was left untreated as it was small in length and served the minor part of myocardium. The RCA lesion was crossed with 0.014" Sion Blue wire and subsequently pre-dilated with 1.25x6 mm Biotronik balloon. Then a 2.5x20 mm Tetriflex (Sahajanand Medical Technologies Pvt. Ltd., Surat, India) SES was implanted at 12 atm and re-dilated with same stent balloon at 14 atm. Post-procedure angiogram showed good TIMI III flow. Ramus was crossed with 0.014" Sion Blue wire and pre-dilatation was done with 1.25x6 mm Biotronik balloon followed by implantation of a 2.5x28 mm Tetriflex stent at 12 atm and post-dilated

using 2.5x8 mm Quantum Maverick balloon. The final angiogram demonstrated good TIMI III flow without any complication. The patient is asymptomatic and under regular follow-up upto 6 months.

### DISCUSSION

Coronary artery anomalies are congenital aberrations of the normal coronary anatomy which prevails in around 0.64-5.6% of patients undergoing coronary angiography (3). The incidences of anomalous coronary artery originating from opposite sinus of Valsalva are 1.07%, accounting for six to ten times higher prevalence for the anomalous RCA (0.92%) originating from left aortic sinus (4, 6).

Formerly, congenital coronary anomalies were considered as surgical diseases but in recent times coronary interventions have also been considered as the treatment alternative for such anomalies. The PCI is considered as the preferred treatment for patients over the age of 30 years, as the structural rigidity of coronary stents allows reconstruction of the slit-like ostium of anomalous RCA to a more anatomically cylindrical shape and hence can withstand the compression of the vessel during systole (7).

In a case series, Wirash K and colleagues had mentioned 7 cases of anomalous origin of coronary artery that underwent PCI. In one of those cases, a 69-year-old female with anomalous RCA originating from left sinus of Valsalva underwent PCI to RCA. After 6 months, her angiogram revealed presence of re-stenosis in the RCA and was stented using same Endeavor RX stent (Medtronic) again. She had recurrent angina even after second PCI and died due to sudden death after 2 years (1). Here, in the present case also the patient was diagnosed with 99% re-stenosis in previously stented anomalous RCA which was treated with repeat PCI using Tetriflex. It had been stated in literature that use of DES should be considered as the treatment of choice in the repeat PCI procedures as it reduces the chances of re-stenosis, however the choice of DES also influences the treatment outcomes. The probable mechanism which leads to development of recurrent angina and re-stenosis in anomalous RCA may be due to presence of high take-off angle or presence of slit-like origin of the vessel from the aorta, but the exact reason is still not known (8, 9).

Though various studies have revealed the feasibility of PCI for abnormal coronary artery diseases, the selective cannulation of such aberrant vessel has always remained as a challenge for the interventional cardiologists. Hence, selection of optimal guiding catheter and backup support system has been deliberated as the crucial task before the procedure. Varieties of guiding catheters are available and employed for cannulation of anomalous RCA including Judkins left (JL) catheter, Amplatzer left (AL) catheter as well as Extra Backup guiding (EBU) catheter along with several modifications within them. The choice of guiding catheter is based on the take-off angle and course of the anomalous vessel and there are no standards as each patient has different anatomy and hence choice of catheter should be personalised (2, 10).

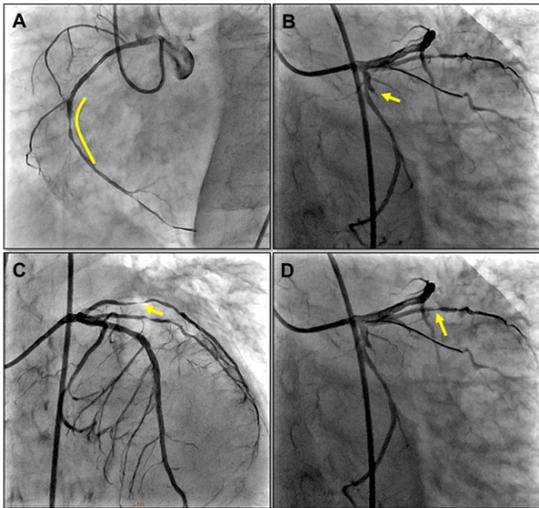
At present, a number of non-invasive imaging modalities are available

such as trans-oesophageal echocardiography, trans-thoracic echocardiography, magnetic resonance image, electron-beam computed tomography, multi-slice computed tomography and intravascular ultrasound, to precisely portray the courses and the anatomy of abnormal arteries (7). These modalities should be employed along with conventional coronary angiography for correct morphological revelation of anomalous vessels which helps the cardiologist for diagnostic and therapeutic interventions.

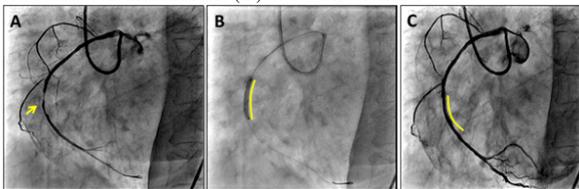
**Conclusion**

The prevalence of anomalous RCA arising from left aortic sinus is not a very uncommon case; however the present case is a rare one as the patient develops re-stenosis in the previously stented aberrant RCA which was again treated with PCI using DES. Long term follow-up has been recommended in this patient to avoid future complications. The other newer imaging modalities should be used for the assessment of anomalous coronary arteries for better anatomical understanding as well as for selection of optimal treatment option.

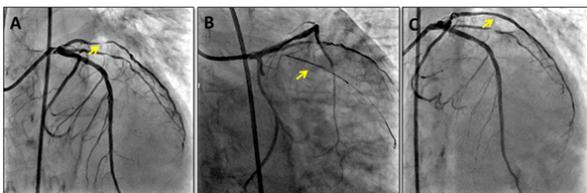
**FIGURES**



**Figure 1:** Pre-procedure coronary angiogram: (A) 99% re-stenosis in anomalous right coronary artery, (B) Total occlusion in OM1, (C) 80% diffuse lesions in ramus and (D) 60% stenosis in D1



**Figure 2:** Stenting of anomalous right coronary artery (RCA): (A) Cannulation using AL-1 3.5 Fr guiding catheter, (B) Deployment of 2.5 x 20 mm Tetriflex stent and (C) Final result after stent delivery, resulting in <5% residual stenosis



**Figure 3:** Stenting of ramus artery: (A) Diffused lesion with 80% proximal stenosis, (B) 2.5 x 28 mm Tetriflex stent is negotiated and (C) Final TIMI-III flow after stent deployment

**FIGURE LEGENDS**

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