Case Report

Successful Percutaneous Coronary Intervention in the Setting of an Anomalous Origin of Left Main Coronary Artery: A Case Report

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Abstract

Anomalous origin of the left main coronary artery (LMCA) from the right sinus of Valsalva is an extremely rare congenital anomaly.The clinical presentation of congenital anomalous origins of coronary arteries is highly variable from asymptomatic to sudden death, even in the absence of significant atherosclerotic stenosis. Many patients with anomalous LMCA arising from the right coronary sinus die before the age of 20 years and usually during or shortly after vigorous exertion.Percutaneous coronary intervention (PCI) of anomalous coronaries is technically difficult and challenging. Here we describe PCI of a patient to left anterior descending artery in whom LMCA had anomalous origin that coursebetween the aorta and the pulmonary artery.

Keywords: coronary artery anomalies, chronic coronary syndrome, percutaneous coronary intervention.

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Introduction

Coronary artery anomalies (CAAs) are a diverse group of congenital disorders whose manifestations and pathophysiological mechanisms are highly variable [1]. Congenital anomalies of the coronary artery are rare it ranges between 0.2-1.3% [2]. Anomalous origin of the left coronary artery from the right sinus of Valsalva is very rare with an incidence of 0.15% [3]. The clinical presentation of congenital anomalous origins of coronary arteries is highly variable, but most patients remain asymptomatic [4]. However, these abnormalities may be responsible for angina pectoris, acute coronary syndrome, heart failure and increased risk of sudden death [5]. It is important to define the course of these anomalies and exclude malignant ones especially if intervention is contemplated [3]. ECG-gated multi-detector computed tomography coronary angiography (CTCA) is an excellent non-invasive modality which allows for the accurate imaging of an anomalouscoronary artery origin, course, and relationship with cardiac structures and major arteries [6]. Percutaneous coronary intervention (PCI) of anomalous coronaries is technically difficult and challenging [7]. It requires a proper selection of hardware and adequate/appropriate expertise of the operator to perform the intervention [7].

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Case Presentation

A 46 yrs old migrant worker admitted in our hospital for PCI. He is hypertensive, diabetic and dyslipidemic. Electrocardiography was within normal limits (Figure 1). Laboratory investigations revealed- Hemoglobin 13.4 gm/dl; Fasting blood sugar: 6.7 mmol/L; HbA1c: 6.8%; Serum creatinine: 1.2 mg/dl and Fasting lipid profile: Total cholesterol- 209 mg/dl, High density lipoprotein- 32 mg/dl, Low density lipoprotein-108 mg/dl, Triglyceride- 276 mg/dl. Echocardiography revealed no regional wall motion abnormality with good left ventricular systolic function (Ejection fraction: 60%).

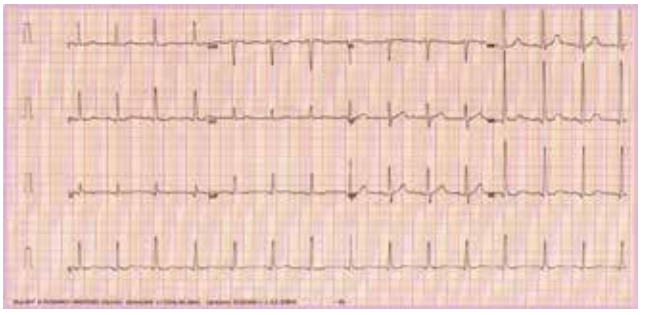


Figure 1: Electrocardiography

Coronary angiographic report from discharge summary revealed triple vessel disease with abnormal origin of left main (LM) anatomy and CTCA report revealed malignant course of LM. Heart team of foreign country advised for coronary artery bypass grafting (CABG) but patient denied. Patient came to home and we opted to PCI of left anterior descending artery (LAD).

Coronary angiography (Figure 2) revealed right coronary artery dominant vessel and free of disease. Left main coronary artery (LMCA) (canulate by Right Judkins catheter) had anomalous origin, arises from non-coronary sinus near of right coronary sinus. LAD had significant stenosis in its mid segment (80-90%) and 99% stenosis in its distal part. Left circumflex (LCX) artery free of significant stenosis and obtuse marginal $(OM)_1$ is good size vessel having 60-70% stenosis at its origin.

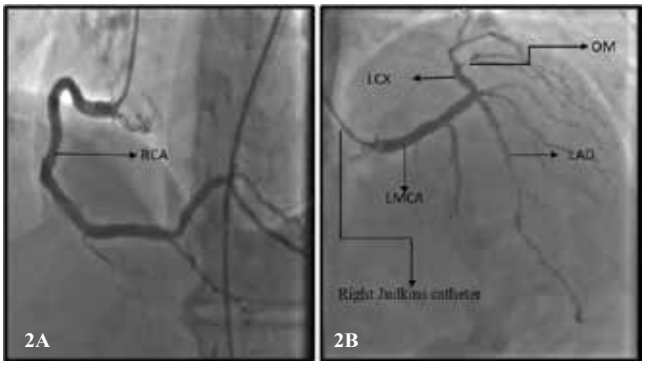


Figure 2: A) Right coronary artery; B) Left main coronary artery & its branches.

The anomalous LM was cannulated with an Amplatz Right (AR-1) 6F guiding catheter & two floppy wires were wired in LM to LAD & LCX. Pre-dilatation done with 2.0x12 mm non-complaint (NC) balloon. A 2.5x30 mm drug-eluting stent (DES) successfully delivered with anchoring technique (Figure 3A). Parallel wire & balloon were removed from LAD. Stent was deployed at 14 ATM ((Figure 3B).

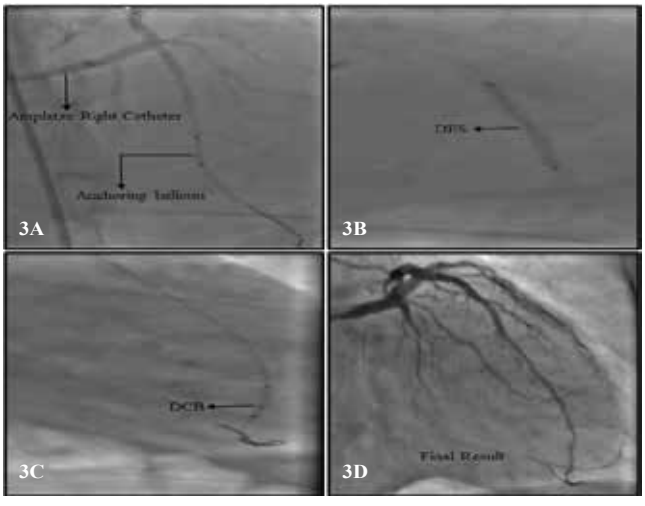


Figure 3: A) Cannulation of left main coronary artery; B) Deployment of drug-eluting stent; C) Deployment of drug-coated balloon; D) Final angiographic image.

Post dilatation was done with 2.75x12 mm NC balloon at 16 ATM. A drug coated balloon (DCB) 2.25 x 15 mm was inflated at 10 ATM for 70 second at distal part of LAD (Figure 3C). Final image showed excellent result (Figure 3D).The clinical course was uneventful and the patient was discharged at day 3.

A CTCA scan after one month revealed good antegrade flow across the stented LAD segments and also demonstrated the malignant course of the LM (Figure 4 A-D). After the PCI, he remained asymptomatic.

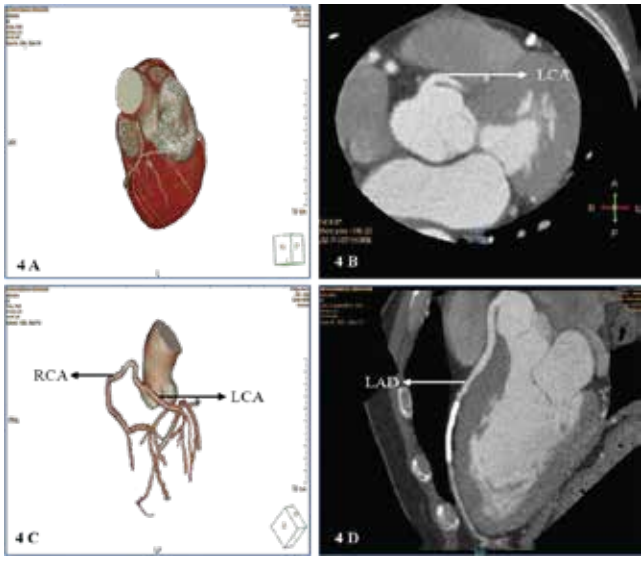


Figure 4: Computed tomography (CT) image of coronary arteries. A & B): Computed tomography image showing malignant course of left main coronary artery; C): CT image showing separate ostia of both right and left main coronary artery; D): CT image showing stented left anterior descending artery. RCA: Right coronary artery; LCA: Left coronary artery; LAD: Left anterior descending.

Discussion

The present case report illustrates the use of an effective PCI approach in the setting of chronic coronary syndrome in a patient with an aberrant left main coronary artery (LMCA) from the right sinus of Valsalva. It is very rare CAAs with an incidence of 0.02-0.15% [6].This anomaly is further subdivided in to 4 subtypes depending on the course it follows [8]: i) The LMCA courses between the aorta and the pulmonary artery; ii) The LMCA tracks anteriorly over the right ventricular outflow tract; iii) The LMCA takes an intra myocardial course before resurfacing at the proximal portion of the inter ventricular groove; and iv)The LMCA passes posteriorly around the aortic root.Of these; the first anomalous configuration is classically considered the most dangerous placing patients at the highest risk of sudden cardiac death [9].

Many patients with anomalous LMCA arising from the right coronary sinus die before the age of 20 years and usually during or shortly after vigorous exertion [2].The clinical presentation of congenital anomalous originsof coronary arteries is highly variable from asymptomatic to exertional

chest pain, dyspnoea, cardiomyopathy, syncope, ventricular arrhythmias, acute coronary syndrome or sudden death, even in the absence of significant atherosclerotic stenosis [4,10]].In the recent medical literature, researchers have generally concluded that left coronary artery from the right sinus of Valsalva is the most lethal kind of CAA in patients past infancy because of its intramural aortic course [9]. In these patients, the pathophysiologic mechanisms of ischemia were initially [10,11] speculated to be i) external compression of the ectopic vessel related to the position of the anomalous trunk "between the aorta and pulmonary artery"; ii) a decrease in blood pressure related to the acute angulation of the artery's slit-like, tangential origin; iii) a flap- or valve-like mechanism; iv) superimposed spasm; or v) an ostial ridge, possibly of an atherosclerotic nature.

Due to the documented potential relationship between coronary anomalies and major adverse cardiac events,further anatomical evaluation by CTCA is of paramount importance to (i) assess coronary anatomy and the course of coronary arteries, (ii) determine the relationship between coronary arteries and the large vessels, and (iii) identify high-risk anatomical features, such as an intramural course and ostia anomalies (slit-like orifice, acute angle take-off or orifice 1 cm or more above the sino-tubular junction) [4].

PCI of anomalous coronaries is difficult, technically challenging, and requires significant experience for suc¬cessful intervention [7]. However, a failed PCI and sub¬sequent bypass surgery in an acute myocardial infarction situation with anomalous left main coronary artery has even been described [12]. Stable guiding catheter seating andoptimal back-up support is the key to abnormally arising coronaries, to aid wire and device passage [13]. Various authors have described different types of guide catheters, such as Judkins Right, MB1, Eric Cohen Right, EBU (Extra back-up), Amplatz Right, Amplatz Left, Multipurpose cath¬eter, etc., for intervention in such situations[4,6,7,13]. We used Amplatz Right catheter in our case to engage LMCA. Back-up support can be increased by using: a) a larger diameter or a different-shaped guiding catheter, or with deep intubation into the target vessel, b) a stiffer wire or buddy wires, c) a buddy balloon, or d) the anchor technique [14]. Anchoring technique was used in our case to deliver the stent.

In our case, patient aged 43 years(many patients with anomalous LMCA arising from the right coronary sinus die before the age of 20 years); LMCA had malignant course; heart team decision CABG; patient denied CABG; distal LAD had significant stenosis (confusing result of CABG as revascularization method). Considering all these factors, we decided to go for PCI.

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