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Original Article

Tools and techniques for angioplasty of anomalous origin of right coronary artery



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ABSTRACT

Objective: To explore the technical challenges in percutaneous coronary intervention of anomalous origin of right coronary artery (AORCA).

Methods: The study cohort consists of 20 patients who underwent PCI for an angiographically significant stenosis in AORCA between 2010 and 2014. The procedural details such as access, hardware, techniques, radiation time, volume of contrast and complications have been assessed.

Results: The most frequent site for AORCA is from the right coronary sinus (55%), followed by the left coronary sinus (30%), ascending aorta (10%) and non-coronary sinus (5%). Male to female ratio was 3:1. Mean age of the study population was 61.1 ± 10 years. PTCA was done successful in 18 cases (90%). Angioplasty was performed transradial in 60% and transfemoral in 40%. The average number of guide catheters used were two. The guide hooked the coronary selectively in 40%, off ostium in 55% and in 5% it was deep engaged. Buddy wires to enhance the guide support was used in 40% and balloon predilatation was needed in 50% cases. A staged procedure was needed in 3 patients (15%). The average fluoroscopy time was 22 min, the mean volume of contrast volume used was 124 ml.

Conclusions: PCI of AORCA is technically challenging but feasible with reasonable amount of contrast and radiation. Proper pre-intervention localisation of ostium and selection of suitable guide catheter is the crux of success. Radial approach is equally effective and safe using nearly the same guide catheters and hardware as by femoral approach.

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1. Background

The incidence of anomalous coronary arteries in patients with normal cardiac anatomy is 0.3%–1.3%¹ and the majority (81%)

have a benign natural course.² Among isolated coronary anomalies, anomalous aortic origin of the RCA is the most common (30–40%).³ Anomalous right coronary artery is not immune to atherosclerosis, rather is more prone to premature atherosclerosis. Significant atheromatous burden is seen in

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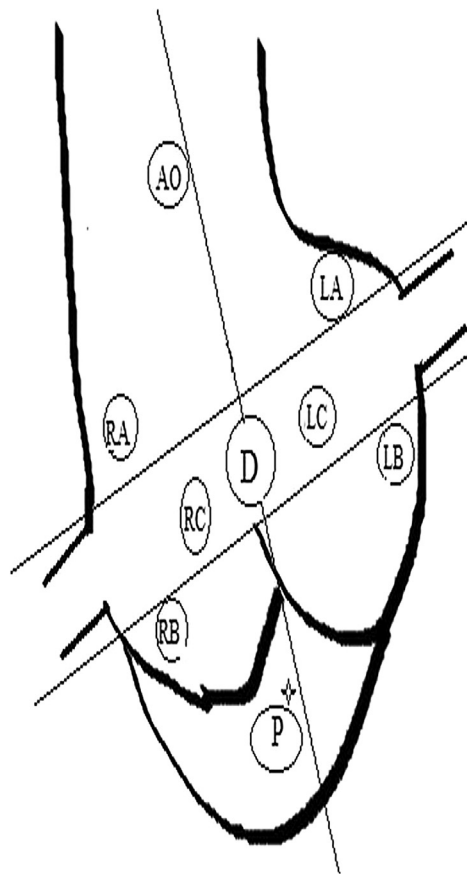


Fig. 1 – Hypothetical anomalous origin of AORCA in LAO cranial 30 degrees from usual 4 sites in patients undergoing PCI is shown. Origin from right coronary sinus (RCS) are labelled as high take off (RA), low take off (RB) anterior or posterior to normal origin but not from midline of aorta (RC),.Origin from Left coronary sinus (LCS) are similarly classified as LA, LB AND LC respectively. Origin either from RCS or LCS in the midline are labelled D. Origin from noncoronary sinus (NGS) called P (posterior sinus in tricuspid aortic valve). Origin from aortic wall far above the sinotubular junction are labelled as AO.

Table 1 – Demographic profile.

Features	Number of Patients (%)
Age range in years (± 1 S.D)	61 \pm 10 Yrs.
Male:Female	3:1
Risk factors	
Diabetes	5 (25%)
Hypertension	16 (80%)
Smoking	8 (40%)
Family history of CAD	2 (10%)
Family history of sudden death	0
Dyslipidaemia	9 (45%)
Clinical presentation	
Chronic stable angina	14 (70%)
Unstable angina/NSTEMI	4 (20%)
Acute MI	2 (10%)

30–60%.⁴ The relation between the anomaly and presenting symptoms is frequently unclear with majority being detected incidentally during routine angiography. The angiographic incidence of AORCA is 0.09% to 0.25%.^{4,5} An interventional cardiologist can sometimes have a very challenging situation on seeing an anomalous RCA with a lesion in it needing prompt tackling. AORCA is seen in 0.2%–1.2% of patients undergoing PCI.^{6,7} Selective cannulation of anomalous coronary arteries is often difficult. In such vessels angioplasty presents a technical challenge⁸ and sometimes needs innovation to reach to the aberrant ostium⁹ along with consensus based intervention tricks. Because of the rare incidence of finding an AORCA with significant coronary disease, the learning curve to intervene this needs further reiteration, especially through the transradial access. The experience to intervene is limited to anecdotal cases reports and a few series.^{10,11} The experience from a single centre, based on large series of cases adds to this armamentarium.

2. Material and methods

This prospective study presents the challenges encountered in intervening AORCA at a tertiary care centre in south India between the years 2010 and 2014. A total of 20 patients underwent PCI for an angiographically significant lesion in the right coronary artery of anomalous origin. We looked into the angiographic and interventional details of these cases. The anatomy of the ectopic artery, the imaging approach required

Table 2 – Angiographic profile.

Feature	Number of patients (%)
Access	
Radial	19 (95%)
Femoral	1 (5%)
Demonstration of AORCA	
Selective angiogram	2 (10%)
Nonselective angiogram	18 (90%)
Anomalous RCA location	
Right coronary sinus	11(55%)
Left coronary sinus	6 (30%)
Non coronary sinus	1 (5%)
Ascending aorta	2 (10%)
Disease Severity	
Single vessel disease	9 (45%)
Multi vessel disease	11 (55%)
Disease distribution	
Ostio-proximal disease	6 (30%)
Mid segment disease	13 (65%)
Distal disease	3 (15%)
Lesion classification	
Type A	2 (8%)
Type B1	8 (34%)
Type B2	12 (50%)
Type C	2 (8%)
Fluoro time(range) in minutes	2 to 15
Contrast (range) in ml	30–70
Dominance	
Right dominant	18 (90%)
Co-dominant	2 (10%)

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