

Single Arterial Trunk Supplying The Myocardium: A Rare Ensemble of Coronary Arteries.

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Abstract

Single coronary artery (SCA) is a rare congenital anomaly which occurs in a structurally normal heart. We came across a patient presenting with typical angina radiating to left shoulder. Past history was unremarkable. Electrocardiogram (ECG) showed features of lateral wall myocardial infarction. Conventional angiogram (CAG) revealed a SCA (resembling Type R-III)¹ supplying the entire myocardium with insignificant lesion in the distal half of right coronary artery (RCA). Cardiac computed tomography (CT) was done which confirmed the presence of SCA originating high above the right sinus of Valsalva. Conservative management was planned.

Keywords: Single coronary artery (SCA); Lipton's R-III subtype; Myocardial ischemia; Cardiac Computed tomography (CT). MINOCA (myocardial ischemia in non obstructive coronary artery disease).

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Introduction

Congenital coronary anomalies are usually incidental findings. They may present with varied symptoms such as angina pectoris, myocardial infarction, syncope, cardiac arrhythmias, sudden death and congestive heart failure. Incidence varies between 0.6-1.3% during angiographic studies.² Symptomatic single coronary artery

(SCA) anomalies are reported with angina pectoris, myocardial infarction, ventricular arrhythmias or sudden cardiac death. Coronary angiogram (CAG) is gold standard for initial evaluation but excellent spatial resolution is obtained with cardiac computed tomography (CT). Lipton's Type R-III¹ constitutes <0.1% of isolated coronary artery anomalies.^{2,3} We present a variant of Type R-III with high origin and dual left anterior descending (LAD) which till now has not been reported in literature.

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Case Report

A 50-year-old non-diabetic male visited the hospital for the first time with complaints of left sided chest pain. He was evaluated with a 12 lead ECG; which showed features of high lateral wall

myocardial ischemia (**Fig. 1**). Troponin-T test was negative. He was admitted for observation and CAG. 2 dimensional trans-thoracic echocardiogram (2D echo) showed basal and mid posterior segments as hypokinetic with preserved wall thickness and ventricular ejection fraction. Cardiac enzymes were elevated CK-923 U/l, CK-MB-54 U/L. CAG showed the absence of left coronary ostium with an anomalous right coronary artery (RCA) arising from aorta at the level of sino-tubular junction, giving rise to left coronary

arteries form its proximal part. Distal RCA has 50–60% blockage (**Fig. 1b**). Cardiac CT was done to study the anatomical origin and course of the arteries. The right main coronary artery divided into 4 branches-continuation of RCA, dual LAD and Circumflex (Cx) (**Fig 2a**). CT calcium score was 111 Agatston units. In view of insignificant RCA lesion, medical management and follow up was planned. Patient was discharged with dual anti-platelets and statins; symptom free upon follow up after 2 years.

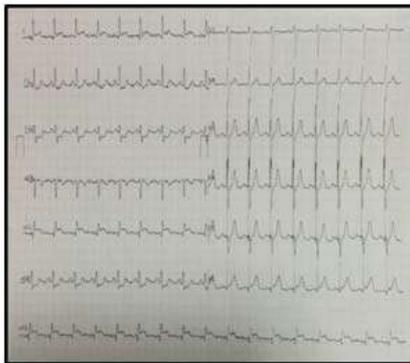


Fig 1a: ECG showing ST elevations in Lead I and aVL, reciprocal changes in Leads II, aVf.

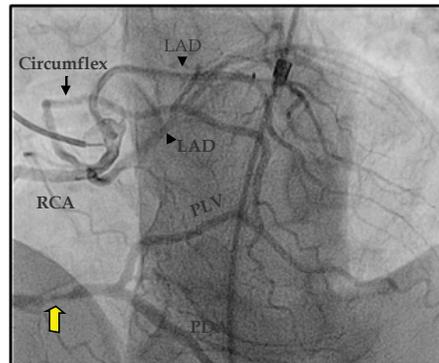


Fig 1b: LAO caudal view, demonstrating high origin of SCA and its branches. (yellow arrow-lesion).

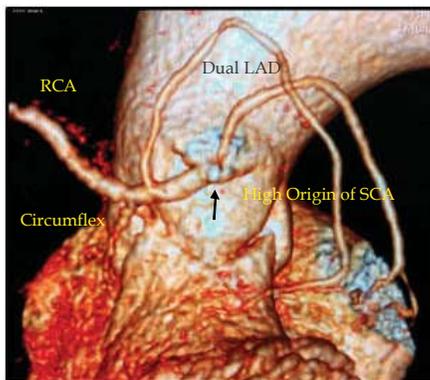


Fig 2a: Volume rendered 3D reconstruction. SCA and its branches. Origin is at the level of Sino-Tubular Junction. Calcium deposits (arrow).

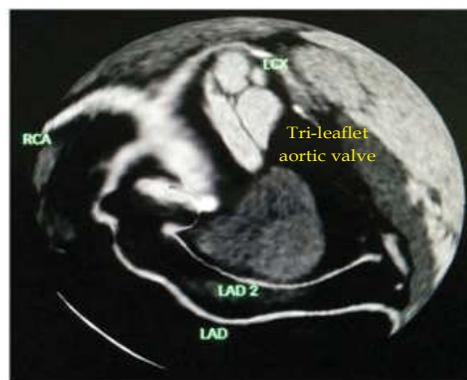


Fig 2b: Globe 3D reconstruction. Note the LAD going to the inter-ventricular groove, circumflex in retro-aortic groove.

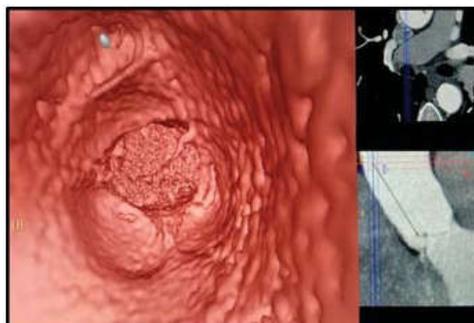


Fig 2c: Endo 3D reconstruction. Note the origin with calcium deposit (arrow).

Discussion

Coronary artery anatomy is described by the epicardial arteries and their territory of supply. The three elementary arteries are considered essential and the anomalies revolve around their origin, course, distribution and termination.

Angiographic classification of SCA, described by Lipton *et al* has been the basis for describing and reporting the anomalies but has undergone various modifications.³ Our case falls partially into Lipton's Type R-III. The origin of SCA is high (**Fig. 2a, 2c**) this has not been accounted for in earlier classification. We also noted dual LAD arising from the RCA coursing the inter-ventricular groove (**Fig. 2b**).

Previous thought of ostial origin of coronary arteries from the coronary buds arising from aorta has changed. Tomanek has provided convincing description about the in growth of vasculature from the distal epicardial network into the aorta. Origin of coronary ostia is also explained by the same mechanism⁴. Congenital ostial atresia provides numerous pathways for collateralization. Three anastomotic arteries are present which interconnect the left and the right system during development. Pre-conal Vesuvian artery runs anterior to aorta and Kugel's artery occupies the retro-aortic course.⁵ As in our case, dual LAD represents the persistence of Vesuvian arterial ring (conal arteries) and OM by the Kugel's artery. This is a rare phenomenon where the congenital collateral vessels is being represented in adulthood.

Patients are usually asymptomatic for long time, others may present with chest pain, failure or sudden cardiac death. Surgery is indicated for symptomatic patients with significant flow limiting lesions. Patients presenting with features

of myocardial ischemia with insignificant CAD not requiring therapeutic interventions may be categorized as MINOCA. Recognition and management of these patients play a major role in reducing MACE (major adverse cardiac events) and initiate secondary prevention strategies.⁶

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