CASE REPORT

CONGENITAL SINGLE CORONARY ARTERY: A RARE ANOMALY

Rashid Ahmed, Binish Rasheed, Shahzad Babar Kureshi

ABSTRACT

Congenital coronary artery anomalies (CAAs) affect approximately 1% of general population undergoing coronary angiography. The incidence of single coronary artery is very rare specially in the absence of any structural heart disease and accounts for 0.024% – 0.044% of cases. This case report describes a single coronary artery arising from right aortic cusp which was trifurcating into right coronary artery (RCA), circumflex artery (CX) and left anterior descending artery (LAD). The left anterior descending (LAD) followed a malignant course between main pulmonary artery and aorta making it vulnerable to ischaemia. The advantage of multi detector computed tomographic angiography (MDCTA) lies primarily in its high diagnostic and anatomic accuracy because of its three dimensional (3D) capability and flexible post processing.

Keywords: Coronary artery anomalies (CAAs),Single coronary artery, Multi detector computed tomographic angiography (MDCTA)

INTRODUCTION

Coronary artery anomalies affect approximately 1% of general population undergoing coronary angiography.[1] The incidence of single coronary artery is extremely rare and it accounts for 0.024% – 0.044%.[2] Majority of coronary artery anomalies are associated with structural congenital heart diseases including mitral prolapse, Tetralogy of Fallot, Rubella syndrome, Hurler's syndrome etc.[3] Transposition of great vessels is particularly associated with single coronary artery.

The conduction is traditionally diagnosed on catheter-based angiography. With recent advances in computed tomography, computed tomography based angiography using multi-detector technology (MDCTA) can provide multidimensional imaging allowing a non-invasions diagnosis.

Advanced Radiology Clinic (Pvt.) Ltd. Karachi, Pakistan.
Correspondence: Dr. Rashid Ahmed, M. D Advanced Radiology Clinic (Pvt.) Ltd. Karachi, Pakistan.
E-mail:arcra@cyber.net.pk
Received: August 06, 2008; accepted: November 27, 2008

This case report describes the isolated occurrence of single coronary artery in an adult male.

CASE REPORT

A 47 years old male was referred for CT angiography with recurrent chest pain for last 4 years. Coronary risk factors elicited on history and available laboratory reports included positive family history for angina, hypertension, borderline Diabetes mellitus, and hypercholesterolemia.

On physical examination his blood pressure was 120/80 mmHg. Heart rate was 60 beats/min. He had no previous cardiac evaluation. Rest of the physical examination was normal.

MDCTA was performed with standard protocol which revealed single coronary artery arising from right aortic cusp with trifurcation into right coronary artery (RCA),

left anterior descending artery (LAD), and circumflex artery (CX). The LAD followed a malignant course proximally between aorta and pulmonary artery and distally intramuscular course with only non-significant proximal disease (Figures 1 and 2). The CX, postero-lateral ventricular (PLV) and posterior descending (PDA) arteries showed normal course. No other structural cardiac disease was found.

The case was referred to cardiologist for symptomatic management and follow up.

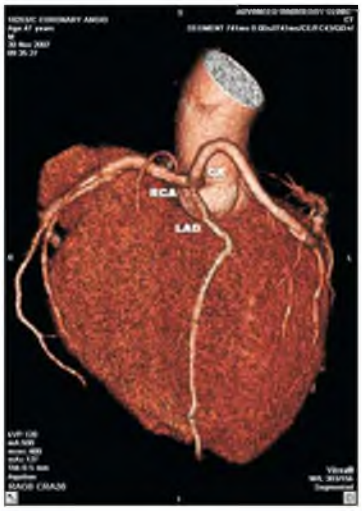

Figure 1: Volume rendered image showing single coronary artery arising from right sinus of Valsalva and trifurcating RCA, LAD and Cx.

Figure 2: MIP image showing malignant proximal course of LAD between aorta and pulmonary artery (PA).

DISCUSSION

Majority of CAAs are insignificant hemodynamically and only 20% cause symptoms.[4] The symptoms range from angina, syncope, arrythmias, myocardial infarct, and sudden death. About 5 – 35% of sudden death in young people are due to CAAs.[5]

Broadly coronary artery anomalies are classified as anomalies of origin, course and termination. Single coronary artery comes under anomalies of origin.[6]

This case stands in R-III B subgroup single coronary artery according to Lipton's classification modified by Yamanka and Hobbs.[7,8] This classification is based on the site of origin and anatomical distribution of branches and is grouped as I, II and III. It is designated with "R" or "L" depending on whether the ostium is located in right or left sinus of Valsalva; further described with letter "A", "B" and "P" for 'Anterior', 'Between' and 'Posterior' pattern with respect to aorta and pulmonary artery.[7,8]

The prognosis of single coronary artery varies from normal life expectancy to sudden death. The chances of sudden death increases with proximal stenosis of single coronary artery in the absence of collateral or if a major coronary branch follows the malignant interarterial course between aorta and pulmonary artery.[9] As LAD in this case followed this malignant course, it is more prone to ischaemia even in the absence of atherosclerosis. The cause of ischaemia might be compression between grade vessel, kinking of anomalous vessel, myocardial squeezing and vasopasm.[10]

The diagnostic modality used for diagnosis was multi-detector computed tomographic angiography (MDCTA). The advantage of MDCTA among other modalities like magnetic resonance angiography (MRA), transesophageal echo (TEE) and conventional angiography lies primarily in its high diagnostic and anatomic accuracy.The topography of anomalous vessel is clearly displayed in 3D images as opposed to two dimensional conventional angiography. This technique offers excellent spatial resolution with flexible post processing like multiple intensity projection, volume rendering and multiplaner reconstruction.

So MDCTA is an ideal non-invasive method to detect and delineate course of anomalous vessels and thus facilitates cardiac catheterization, later on if such be required.

REFERENCES

1. Angelini P, Velasco JA, Flamm S. Coronary anomlies: incidence, pathophysiology, and clinical relevance. Circulation 2002; 105: 2449 - 54.

2. Desmet W, Vanhaecke J, Vrolix M et al. Isolated single coronary artery: a review of 50,000 consecutive coronary angiographies. Eur Heart J 1992; 13: 1637 –40.

3. Cademartiri F, Runza G, Luccichenti G et al. Coronary artery anomalies: incidence, pathophysiology, clinical relevance and role of diagnostic imaging. Radiol Med 2006; 111 : 376 –91.

4. Datta J, White CS, Robert C et al. Anomalus coronary arteries in adults: Depiction at multi-detector row CT angiography. Radiology 2005; 235: 812-8.

5. Basso C, Carrado D, Thiene G. Congenital coronary artery anomalies as an important cause of sudden death in the young. Cardiol Rev 2001; 9: 312-7.

6. Greenberg MA, Fish BG, Spindola-Franco H. Congenital anomalies of coronary arteries: classification and significane. Radiol Clin North Am 1989 ;27 : 1127-46.

7. Lipton MJ, Barry WH, Obrez I et al. Isolated single coronary artery: Diagnosis, angiographic classification and clinical significance. Radiology 1979; 130: 39-47.

8. Yamanka O, Hobbs RE. Coronary artery anomalies in 126595 patient undergoing coronary artery arteriogrpahy. Cathet Cardiovasc Diagn 1990; 21 : 28 - 40.

9. Kim SY, Seo FB, Do KH et al. Coronary artery anomlies: classification and ECG gated multi detector row CT findings with angiographic correlation. Radiographic 2006; 26: 312-34.

10. Taghipour HR, Dadjou Y, Mafi AR et al. A very rare case of single coronary artery anomaly, with left anterior descending and left circumflex arteries originating separately from proximal right coronary artery. J Card Surg 2008; 23: 67-9.