

A Case of Coronary Cameral Fistula with Associated Aneurysm: Role of ECG Gated 256- Slice Dual Source Multidetector Computed Tomography in Diagnosis

UMESH KUMAR MITTAL¹, LALIT GARG², HARMEET KAUR RISSAM³, SUNIL KUMAR PURI⁴

ABSTRACT

We report an interesting case of coronary cameral fistula with associated aneurysmal dilatation of coronary artery. The complete evaluation including anatomical relationships with surrounding vascular and non-vascular structures can be achieved with ECG gated multi-detector computed tomography (MDCT). MDCT has many advantages over echocardiography and digital subtraction catheter angiography, because of its ability to demonstrate the fistula separate from surrounding cardiovascular structures along with any aneurysm or obstruction in its course. Thus, MDCT is emerging as the initial non-invasive imaging technique for comprehensive preoperative evaluation of these rare congenital anomalies for cardiovascular surgeons to achieve better operative assessability and outcome.

Keywords: Coronary artery, Coronary fistula, Coronary CT, Cardiac chamber

CASE REPORT

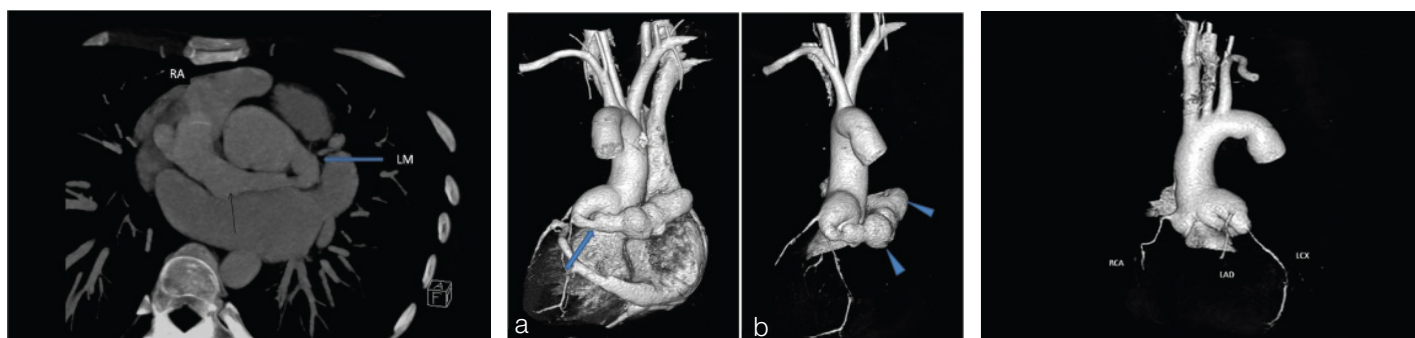
A 26-year-old lady came to cardiology department with history of palpitations, angina and dyspnoea on exertion (grade II). Patient had no history of diabetes or hypertension. Personal and family history was non-contributory. Patient was normotensive (118/84 mm Hg). On auscultation, end diastolic murmur was heard in left lower sternal border. Electrocardiography revealed left ventricular hypertrophy. A chest skiagram revealed mild cardiac enlargement. Two dimensional transthoracic echocardiography showed a cystic structure arising in relation to root of aorta communicating with the cardiac chamber and continuous flow on colour Doppler. CT coronary angiography was advised for further evaluation. Retrospective ECG-gated 256 slice, dual source MDCT (Somatom Definition Flash, Siemens) angiography was conducted for better delineation of coronary arteries. The heart rate was in normal range during study. Axial images were reconstructed and then processed (Syngo Via software) using standard algorithms. Axial images, 3D volume-rendered (VR), multiplanar reconstruction (MPR) and maximum intensity projection (MIP) images were correlated together. The left main coronary artery (normal origin) was dilated and tortuous. It was draining through a cistern (Retroaortic course) into the right atrium having a single entrance [Table/Fig-1]. Multiple saccular dilatations were noted along the course of fistula. A blind ending projection just before its entry into the right atrium was also noticed [Table/Fig-2a&b]. No significant narrowing was seen along

fistula. The right coronary, left anterior descending and left circumflex arteries were normal at origin with normal opacification [Table/Fig-3]. Patient was subsequently referred to the cardiothoracic surgeons for definitive surgery. Fistula closure and aneurysm repair was done and patient improved symptomatically.

DISCUSSION

A coronary cameral fistula is a connection between a coronary artery and any heart chamber [1]. Coronary cameral fistula is a rare entity with an incidence of 0.1% in patients undergoing coronary angiography [2,3]. Most of the patients are asymptomatic; however it can lead to symptoms of angina pectoris. Most commonly affected artery is right coronary however rare cases of fistulae involving the left coronary system are also reported. In majority of cases, drainage occurs into right ventricle or right atrium. Continuous flow in these shunts causes volume or pressure overload which leads to dilatation of coronary artery or cardiac compartment [4]. The termination sites of coronary cameral fistula in decreasing order of frequency are the right ventricle, right atrium and left ventricle. Most fistulae are congenital and have only rarely been reported as acquired. Coronary cameral fistula with associated aneurysm is very rare [5]. These patients present with symptoms of angina, dyspnoea on exertion and palpitations [6].

Symptoms are due to large volume flow through these shunts which can steal the blood from coronary artery and may lead



[Table/Fig-1]: Axial Maximum intensity projection (MIP) image showing coronary cameral fistula arising from left main coronary artery (LM-blue arrow) via a cistern (black arrow) and opening into right atrium (RA). **[Table/Fig-2a,b]:** Volume rendered images (VRT) showing coronary cameral fistula (arrow in a) and multiple small outpouchings (arrowheads in b) along fistulous course. **[Table/Fig-3]:** Volume rendered image (VRT) showing right coronary artery (RCA), left anterior descending (LAD) and left circumflex (LCX) from dilated left main coronary artery.

to cardiac ischemia [7]. Surgical management is affected by number of connections as multiple fistulae or entry points make surgery more difficult. Two dimensional echocardiography, conventional angiography and CT angiography are the various imaging modalities available for evaluation of these patients [8]. Two dimensional echocardiography is a non invasive technique, however limited in terms of required expertise and poor image quality in obese patients. CT angiography is a non-invasive modality with its capability of whole acquisition in single breath hold [9,10]. CT angiography has advantage in showing the course of fistula separate from other adjacent structures. It can also detect any thrombosis, abnormal dilatation or stenosis along the fistula. MDCT can provide accurate assessment of the size and location of aneurysm. It is also helpful in preoperative planning by showing relationships between the complex anatomy of the coronary artery fistula and great vessels [11]. We here present a rare case of a coronary cameral fistula and associated aneurysm, in which accurate diagnosis was made by CT angiography. It may be preferred as the initial non-invasive imaging technique in such cases.

Aneurysm repair, fistula closure or coronary artery bypass grafts are treatment options for coronary cameral fistula and associated aneurysm.

Teaching points/Take home message

- The coronary cameral fistula is a rare entity. CT angiography is modality of choice in demonstrating the entire fistulous course separate from other adjacent structures. It can also detect any thrombosis, abnormal dilatation or stenosis along the fistula.
- MDCT is non-invasive imaging technique for comprehensive pre operative evaluation of these rare congenital anomalies to achieve better operative assessibility and outcome.
- Various post processing techniques like volume rendering and maximum intensity projections are helpful in delineating the complete anatomy and course of fistula.

CONCLUSION

Coronary cameral fistula is a connection between coronary artery and any heart chamber. It is a rare entity with only few cases reported in literature. Various imaging modalities are available for its diagnostic evaluation. Multidetector ECG gated CT angiography is non invasive modality for diagnosis of fistula, associated aneurysm and relationship with adjacent structures. A careful scrutiny of images and a close index of suspicion are required for diagnosing this entity, which is extremely uncommon in clinical and radiological practice.

REFERENCES

- [1] Mutlu H, Serdar KM, Ozhan H, Kansız E, Oztürk S, Uner S. A case of coronary artery fistula draining into the pericardium causing hematoma. *Cardiovasc Surg.* 2001;9:201-03.
- [2] Fernandes ED, Kadivar H, Hallman GL, Reul GJ, Ott DA, Cooley DA. Congenital malformations of coronary arteries: the Texas Heart Institute experience. *Ann Thorac Surg.* 1992;54:732-40.
- [3] Kugelmass AD, Manning WJ, Piana RN, Weintraub RM, Baim DS, Grossman W. Coronary arteriovenous fistula presenting as congestive heart failure. *Cathet Cardiovasc Diagn.* 1992;26:19-25.
- [4] Manghat NE, Morgan HGJ, Marshall AJ, Roobottom CA. Multidetector row computed tomography: imaging congenital coronary artery anomalies in adults. *Heart.* 2005;91:1515-22.
- [5] Hirose H, Amano A, Yoshida S, Nagao T, Sunami H, Takahashi A, et al. Coronary artery aneurysm associated with fistula in adults: collective review and a case report. *Ann Thorac Cardiovasc Surg.* 1999;5:258-64.
- [6] Papadopoulos DP, Ekonomou CK, Margos P, Moysas L, Anagnostopoulos S, Benos I, et al. Coronary artery aneurysms and coronary artery fistula as a cause of angina pectoris. *Clin Anat.* 2005;18:77-78.
- [7] Jagia P, Goswami KC, Sharma S, Gulati GS. 16-MDCT in the evaluation of coronary cameral fistula. *AJR Am J Roentgenol.* 2006;187:W227-28.
- [8] Nair T, Joy MV, Subramanyan R, Venkitachalam CG, Balakrishnan KG. Two-dimensional and Doppler echocardiographic study of coronary arteriovenous fistulas. *Indian Heart J.* 1990;42:149-52.
- [9] Flohr TG, Schaller S, Stierstorfer K, Bruder H, Ohnesorge BM, Schoepf UJ. Multi-detector row CT systems and image-reconstruction techniques. *Radiology.* 2005;235:756-73.
- [10] Heuschmid M, Kuettner A, Schroeder S, et al. ECG gated 16-MDCT of the coronary arteries: assessment of image quality and accuracy in detecting stenoses. *AJR.* 2005;184:1413-19.
- [11] Tsang WK, Li A. Coronary Artery Aneurysm with Associated Fistula: a Rare Condition Detected by Computed Tomography Coronary Angiography. *Hong Kong J Radiol.* 2014;17:57-61.

PARTICULARS OF CONTRIBUTORS:

1. Senior Resident, Department of Radiodiagnosis, GIPMER, New Delhi, India.
2. Junior Resident, Department of Radiodiagnosis, GIPMER, New Delhi, India.
3. Senior Resident, Department of Radiodiagnosis, GIPMER, New Delhi, India.
4. Director Professor, Department of Radiodiagnosis, GIPMER, New Delhi, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Umesh Kumar Mittal,
Senior Resident, Department of Radiodiagnosis, G B Pant Hospital, New Delhi, India.
E-mail: dr.umeshmittal@yahoo.co.in

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Jan 05, 2016**
Date of Peer Review: **Feb 10, 2016**
Date of Acceptance: **Feb 12, 2016**
Date of Publishing: **May 01, 2016**