CASE REPORT

Coronary artery anomalies: A diagnostic challenge

Ahmed Fathala a,*, Walid Hassan b

a Medical Imaging Service, King Faisal Specialist Hospital and Research Center, Riyadh, Saudi Arabia
b King Faisal Heart Institute, King Faisal Specialist Hospital and Research Center, Riyadh, Saudi Arabia

Received 11 May 2010; revised 24 June 2010; accepted 13 July 2010
Available online 21 September 2010

1. Introduction

Coronary Angiography (AC) has traditionally been indicated to detail the coronary vasculature before intervention and has maintained the reference standard imaging modality (Scanlon et al. 1999). Owing to the potentially complex three-dimensional natures of these anomalies, CA cannot show reliably the relationship of aberrant vessels with the underlying cardiac structures. These limitations can be overcome by using a non-invasive diagnostic modality that acquires full three-dimensional (3D) data from both the heart cavities and the coronary arteries. Mutidetector CT (MDCT) CA allows rapid acquisition of the entire 3D cardiac volume of data in a Single scan with excellent spatial resolution (Schmitt et al, 2005). MDCT CA is considered to be appropriate indication for patient with suspicious CAA c (Kramer et al. 2007).

To date, the main diagnostic method for the detection of coronary anomalies has been selective CA. CA is invasive associated with risk of ionizing radiation and iodinated contrast. Furthermore, CA cannot delineate the spatial relation between anomalies coronary artery and cardiac structures. Although, MDCT CA is emerging as the best non-invasive test for the diagnosis of CAAs, it has several limitations such as ionizing...
radiation, iodinated contrast, and significant inferior spatial resolution compared to conventional CA. We report two cases referred for evaluation for suspected CAAs, these two cases will demonstrate the importance of high spatial resolution obtained by CA and 3D cardiac volume data obtained by MDCT CA.

1.1. Case number 1

A 32-year-old male with history of chest pain, mildly impaired left ventricular function. CA revealed mild irregularities of the left main (LMN), Abnormal Left anterior descending artery (LAD) demonstrating ectasia and abnormal network like and sinusoidal appearance of proximal to mid LAD (no luminal continuation to allow wire for intravascular ultrasound-IVUS) with normal caliber distally (Fig. 1A). Owing to very high resolution of CA, fine details of intrinsic lumen of LAD was clearly visualized; we categorized these anomalies as intrinsic coronary artery anomalies. To the best of our knowledge this is first reported case in literature.

An elective MDCT CA was performed to define the complete anatomy and the morphology of LAD but fails to show fine details of LAD due to inferior spatial resolution compared to CA. The maximum intensity projection (MIP) and Volume rendering (VR) images showed mild non-obstructive plaque in proximal LAD, severe luminal irregularities and positive remodeling of large segment of LAD (Fig. 2B and C).

1.2. Case number 2

A 44-year-old male with history of hypertension and atypical chest pain underwent nuclear myocardial perfusion imaging (MPI), but was equivocal owing to significant extra cardiac activity adjacent to the inferior wall interfering with perfusion assessment in most of the inferior and inferolateral wall. Subsequently, he was referred to CA. CA revealed the total anomalies of coronary system, and all coronary artery originate from right sinus of Valsalva (CA images not shown). To delineate the coronary artery system course and the relation with cardiac structures MDCT CA was performed. MDCT CA shows that all coronary artery originate from the right sinus of Valsalva and show the entire coronary course in relation to other cardiac structures (Fig. 2A and B).

![Figure 1](image-url) A 32-year-old man with history of chest pain. (A) Coronary angiogram demonstrating ectasia and abnormal network and sinusoidal like appearance of proximal to mid left anterior descending artery (LAD). (B) Maximum intensity projection (MIP) multidetector CT image shows luminal irregularities and noncalcified plaques in corresponding segment of LAD. (C) Three-dimensional volume-rendered (VR) image demonstrating luminal irregularities, but both MIP and VR failed to show the fine details of LAD lesion owing to inferior spatial resolution.
2. Conclusion

CAAs are a major diagnostic challenge and currently there is no single diagnostic test that could evaluate all anomalies. Although, CA is the most commonly utilized test in patients with suspect CAAs it cannot show reliably the relationship of aberrant vessels with the underlying cardiac structures. ECG-gated MDCT is a non-invasive 3D-imaging technique that provides an excellent overview of the CAAs and complex vascular anatomy in three-dimensional view. We believe that MDCT CA should be the preferred initial diagnostic test for CAAs and CA may be needed in subgroups of patients with suspected intrinsic and luminal abnormalities.

References


