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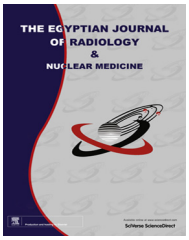

ORIGINAL ARTICLE

# Role of 320-slice multislice computed tomography coronary angiography in the assessment of coronary artery stenosis

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**KEYWORDS**

MSCT;
Coronary angiography;
Coronary artery disease

**Abstract** *Objective:* To evaluate the effectiveness of the multislice CT coronary angiography, as a non-invasive imaging tool in assessment of coronary artery stenosis.
*Patients and methods:* The study included 50 patients who were referred for MSCT coronary angiography followed by catheter coronary angiography. Patients with previous coronary bypass grafts and those with coronary stents were excluded. History of contrast allergy, renal impairment and severe chest conditions were exclusion criteria. The coronary angiographic CT studies were performed using a 320 CT scanner. The catheter coronary angiographic studies were performed via femoral arterial puncture. The results of CT angiography were compared with the gold standard catheter angiography.
*Results:* The positive predictive value and negative predictive value of MSCT coronary angiography in detection of coronary artery stenosis were 94% and 100%, respectively.
*Conclusion:* In conclusion, MSCT coronary angiography is a very helpful and rapid non-invasive coronary imaging modality that was able to detect and grade coronary artery stenosis better than other noninvasive examinations used to detect CAD, such as exercise stress testing. Due to its very high negative predictive value, it may eliminate the need for invasive coronary procedures in the presence of normal coronary imaging.


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## 1. Introduction

Conventional X-ray coronary angiography is the standard reference for the assessment of coronary artery disease. It is an invasive and potentially harmful procedure with a small risk of serious events (arrhythmia, stroke, coronary artery dissection, and

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death). Furthermore, the catheterization procedure involves admission to hospital and discomfort for the patient (1).

Non invasive imaging of the coronary arteries is faced with great difficulties. Most obviously coronary vessels have small dimensions, which require high spatial resolution. Also, they are subjected to rapid motion because of cardiac contraction. Sufficient temporal resolution is thus necessary to avoid artifacts (2).

During the past decade, considerable progress has been achieved in the field of noninvasive coronary imaging with MRI, electron beam computed tomography (EBCT), and, most recently, multislice computed tomography (MSCT) (3–5).

Contrast-enhanced MDCT is a promising non-invasive technique for the detection, visualization and characterization of stenotic artery disease. It could act as a gatekeeper prior to cardiac catheterization and finally replace conventional diagnostic modalities (6).

Recent generations of multi-slice CT machines with higher and developing spatial and temporal resolution allow a noninvasive approach to accurately delineate coronary artery anatomic structures, with increasingly more detector rows and higher gantry speeds, allowing for better visualization of the coronary arteries (7).

The aim of this study was to evaluate the effectiveness of the multislice CT coronary angiography, as a non-invasive imaging tool in the assessment of coronary artery stenosis.

## 2. Patients and methods

Between August 2012 and September 2013, 50 patients (35 males and 15 females, age range, 40–80 years; mean age, 62.0 years ± 2.8[SD]), were selected on the basis of clinical picture suggesting the presence of coronary artery disease. The patients were referred to the radiodiagnosis and imaging department of Nasser institute hospital from their cardiology departments and Tanta university hospitals for MSCT examination. Exclusion criteria included (1) previous bypass surgery or coronary artery stent placement, (2) pregnancy, and (3) patients with chronic renal impairment (high serum creatinine) or previous allergy to the contrast media. This study was approved by the ethics committee of our institution; an informed consent was obtained from all patients after full explanation of the benefits and risks of the procedure.

All patients were subjected to the following:

(I) Full history taking.

(II) Clinical examination.

(III) Evaluation of previous investigations and management.

- ECG and echocardiography if present.
- Drugs taken as antiarrhythmic drugs, vasodilators, diuretics and antihypertensive drugs.
- Serum creatinine in all patients.

(IV) Multislice computed tomography of the coronary arteries.

It was done for all cases in radiodiagnosis and imaging department of the Nasser institute hospital, using a 320 detector row machine.

*Patient preparation:*

- No food for 3–4 h before examination.
- Patient should be well hydrated for renal protection and for ease of establishing venous access.
- No caffeine products for 12 h before examination, this includes coffee, tea, energy drinks, energy pills, diet pills and most soda.
- Take all regular medications on the day of examination, especially blood pressure medication.
- Take pre-medications for contrast allergy as diphenhydramine 50 mg by mouth 1 h before contrast exposure.
- The patients were instructed to remove all metallic objects and wear hospital gowns, then the procedure was explained to the patient for reassurance and the patients were informed about the length of examination and the value of remaining motionless.
- In all patients a 20-gauge intravenous catheter may be sufficient in normal or small patients, but an 18-gauge intravenous catheter may be necessary for more rapid infusion rates.

*Patient positioning:*

- No food for 3–4 h before examination.
- Patient should be well hydrated for renal protection and for ease of establishing venous access.
- No caffeine products for 12 h before examination, this includes coffee, tea, energy drinks, energy pills, diet pills and most soda.
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*Technique:*

The imaging protocol was used (40 patients with prospective and 10 patients with retrospective ECG gating). The study was done first without contrast then the images obtained were used for evaluation and quantification of coronary artery calcification using Agatston score. Then all the patients underwent enhanced study for evaluation of stenotic lesions after injection of 50–60 cc of high iodine concentration non-ionic contrast media iopamidol (Scanlux, 370 mg I/mL, Sanochemia, Austria) to achieve good contrast, injected at rate of 4–7 ml/s.

*Parameters of CT protocol:*

The protocol used in the current study is known as Vitrea Fx, where kV = 120, mA = 500, mAs = 111 and slice thickness 1 mm.

*Image reconstruction:*

- Axial images

During data acquisition in coronary, the console automatically displays axial images of the slices of the anatomic area under investigation, usually at 1-mm intervals.

- Multiplanar reformatting