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Letter to the Editor

Visualization of coronary arteries and coronary stents by low dose 320-slice multi-detector computed tomography in a patient with atrial fibrillation

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ABSTRACT

Cardiac multi-detector computed tomography (MDCT) is widely used in the diagnosis of coronary disease. However, the predictive value of this technique is limited in the presence of atrial fibrillation and coronary stents. Here we present a case showing the ability of the new 320-slice MDCT to assess coronary anatomy in a patient with atrial fibrillation and coronary stents.

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Cardiac multi-detector computed tomography (MDCT) is widely used in detecting coronary disease. However, despite technological advances, the predictive value of this technique remains limited in the presence of coronary stents due to significant artifacts [1]. Presence of irregular heartbeat, in particular of chronic atrial fibrillation, is also considered a limitation for use of MDCT [1,2]. As reported in current guidelines visualization of coronary lumen by MDCT remains challenging in these patients [1]. Another important limit of MDCT scan is the relatively large radiation exposure, with most scans requiring a dose of 5–20 mSv [1].

We have recently used a new 320-detector row computed tomography (Aquilion One, Toshiba Medical Systems), which has recently been introduced in clinical practice [3], to assess coronary disease in two patients with atrial fibrillation. The first patient was a 60 years old man (weight of 84 kg and height 172 cm) with previous coronary angioplasty (2 stents on left anterior descending and one on circumflex artery) and chronic atrial fibrillation with mean heart rate ≈65 b/min at the time of the scan (on beta-blocker therapy). The protocol used was an injection of 80 mL of iopamidol followed by 40 mL saline, tube current 120 kV, 400 mA, duration 237 ms, single beat retrospecitve scanning, and 16 cm craniocaudal coverage. The total exposure associated with this scan was only 1.387 mSv. The scan yielded excellent opacification of coronary arteries, including the stent area, allowing an accurate anatomical diagnosis, showing only minimal restenosis on the stent on proximal left anterior descending, no restenosis on the stent on mid left anterior descending and no restenosis on the stent on proximal circumflex (Fig. 1). These findings were confirmed in a coronary angiogram. MDCT also provided data on left ventricular function (EF = 33%, with end-diastolic volume 186 mL and end-systolic 124 mL) and on aortic valve (area 2.56 cm^2) and aortic root.

In this case we show that a detailed assessment of coronary anatomy can be performed in patients with atrial fibrillation using very low radiation exposures, even in a patient with multiple stents. The exposure obtained (<2 mSv in both cases) is among the lowest reported in the literature: for instance Wolak et al. reported a dose of 26 ± 8 mSv for patients with atrial fibrillation using a 64-slice MDCT (with analysis on multiple beats) [4].

Our findings show that new technologies applied to MDCT allow accurate diagnosis of coronary anatomy in the most challenging conditions (chronic atrial fibrillation and the presence of multiple stents) with a minimal radiation exposure.

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The authors of this manuscript have certified that they comply with the Principles of Ethical Publishing in the International Journal of Cardiology [5].

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Fig. 1. On the left coronary artery CT scan showing good opacification of coronary arteries, showing only minimal restenosis on the stent on proximal left anterior descending and no restenosis on the stent on proximal circumflex. On the right coronary angiogram confirming CT scan findings. On the boot the ECG recorded at the time of the CT scan showing atrial fibrillation.

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