Pitfalls and bugs of nuclear and CT cardiac scans in an extremely obese patient: reasons for using conventional coronary angiography as first-line test

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DESCRIPTION

In October 2012, an asymptomatic 54-year-old man, with a body mass index (BMI) of 50 kg/m², smoking habits, hypertension, dyslipidaemia and family history of coronary artery disease (CAD) presented to us for a clinical work out. Since these conditions indicate high risk of CAD,¹ he underwent exercise/rest sestamibi gated single-photon-emission cardiac tomography (G-SPECT). This procedure documented submaximal exercise test and inconclusive anterior wall perfusion defect. A reduced exercise capacity and tissue attenuation characterise obesity and determine doubtful SPECT results (figure 1). A 64-slice cardiac tomography (CT) detected calcium deposits over the anterior descending (LAD) and first diagonal (D1) coronary arteries and lack of visualisation of the distal right coronary artery (RCA), (figure 2). Coronary calcifications can hide the arterial lumen leading to incorrect estimation of stenosis severity.² Obesity may lead to decreased image quality, owing to 'noisy image'³ (figures 3 and 4). Moreover, conventional coronary angiography documented two significant LAD

Figure 2 CT maximum intensity projection reconstruction—Spider view: calcium deposits over the anterior descending and first diagonal coronary arteries and visualisation of the only proximal right coronary artery that seems to be hypoplastic. CT images are inconclusive for detection of coronary artery stenosis.

Figure 1 Low increase of heart rate and double product on exercise test. The scan shows inconclusive anterior perfusion defect (white arrows). The polar map is unable to quantify the defect (green arrow). The first-pass images note the presence of normal left ventricular ejection fraction. Single-photon-emission cardiac tomography images are uncertain for the presence of exercise-induced ischaemia.

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Figure 3 Three-dimensional volume rendering reconstruction—right anterior oblique view shows degraded rendered-image due to high-noise related with the high-body mass index. CT scan reveals missed lesions on the anterior descending and first diagonal coronary arteries.

Figure 4 Three-dimensional volume rendering reconstruction—left anterior oblique view shows decreased image quality with two left anterior descending missed lesions. Left main coronary artery is barely visible.

stenoses and occlusion of the RCA. LAD lesions were then treated with placement of two drug-eluting stents. Despite advances in scanners to improve both spatial and temporal resolution, obesity and coronary calcifications continue to limit the diagnostic accuracy of cardiac CT.⁴ In such cases, the current gold standard, conventional angiography could be considered as the first-line test procedure. This report stresses the importance of avoiding unnecessary ionising radiation exposure in extremely obese patients with elevated risk for CAD.

Learning points

- Obesity with two or more metabolic abnormalities indicate elevated risk for coronary artery disease (CAD) and may lead to inconclusive exercise testing owing to insufficient exercise capacity.
- Tissue attenuation which characterises obese patients decreases single-photon-emission cardiac tomography image quality and thus diagnostic accuracy.
- Obesity and high coronary calcium burden limit the diagnostic value of cardiac CT.
- In middle aged or older patients with a body mass index greater than 40 kg/m² and risk factors for CAD, conventional coronary angiography could be thus considered as first-line diagnostic procedure.

Contributors GPC wrote the paper, PS and ED performed CT imaging and revised the manuscript

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