

CASE REPORT

An unusual case of false-positive coronary artery calcium score

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Abstract

False-negative results of coronary artery calcium score (CACS) are common due to small calcified lesions being missed using a 3-mm slice thickness, a threshold of 130 Hounsfield units (HU) and a minimum area of 1 mm² for defining a calcified plaque. In contrast, false-positive results of CACS, as verified by a lack of coronary artery calcifications in computed tomography coronary angiogram (CTCA), are extremely uncommon. We present a patient with a false-positive coronary calcium score who had normal coronary arteries in CTCA.

INTRODUCTION

Coronary artery calcium score (CACS) is useful in the diagnosis of stable coronary artery in patients with a low to intermediate pre-test probability [1]. CACS is well known for its high negative predictive value and false-positive results of CACS are extremely uncommon [1]. Nevertheless, they can happen and this case report illustrates a false-positive CACS compared with a computed tomography coronary angiogram (CTCA).

CASE REPORT

A 74-year-old woman with a low to intermediate likelihood of significant coronary artery disease (CAD) presented with atypical chest pain.

The main differential diagnoses were angina secondary to flow-limiting CAD, musculoskeletal chest pain and gastroesophageal reflux disease.

The ECG and routine blood analysis, including troponin levels, did not show any significant changes.

A CT was then requested (NICE guidelines on stable chest pain [2] recommend CACS for these patients—however, she was referred for both CACS and CTCA).

The patient underwent a coronary calcium score and an adaptive sequential CTCA. Curved multiplanar reconstructions were used to assess the coronary arteries. The calcium (Agatston) score was 22 in total (Fig. 1a and b): 2 for the left anterior descending (LAD) artery and 20 for the right coronary artery (RCA), placing the patient in the 25th–50th percentile for gender and age [3].

A subsequent CTCA showed a single, isolated, non-obstructive, non-calcified plaque in the mid-LAD. The left circumflex artery was normal. Despite the apparent coronary calcification demonstrated in the coronary calcium score (Fig. 1b, white arrow), no atheroma was seen in the RCA and more specifically, no proximal coronary calcification was seen on any phase of the CTCA (Fig. 1c–e).

The quality of the study was considered acceptable, although there were minor step artefacts due to motion. However, these affected coronary artery segments did not seem to contribute to the positive coronary calcium score.

On the basis of CTCA, the patient was reassured; however, if a CACS alone had been performed she might have been managed as having established CAD.

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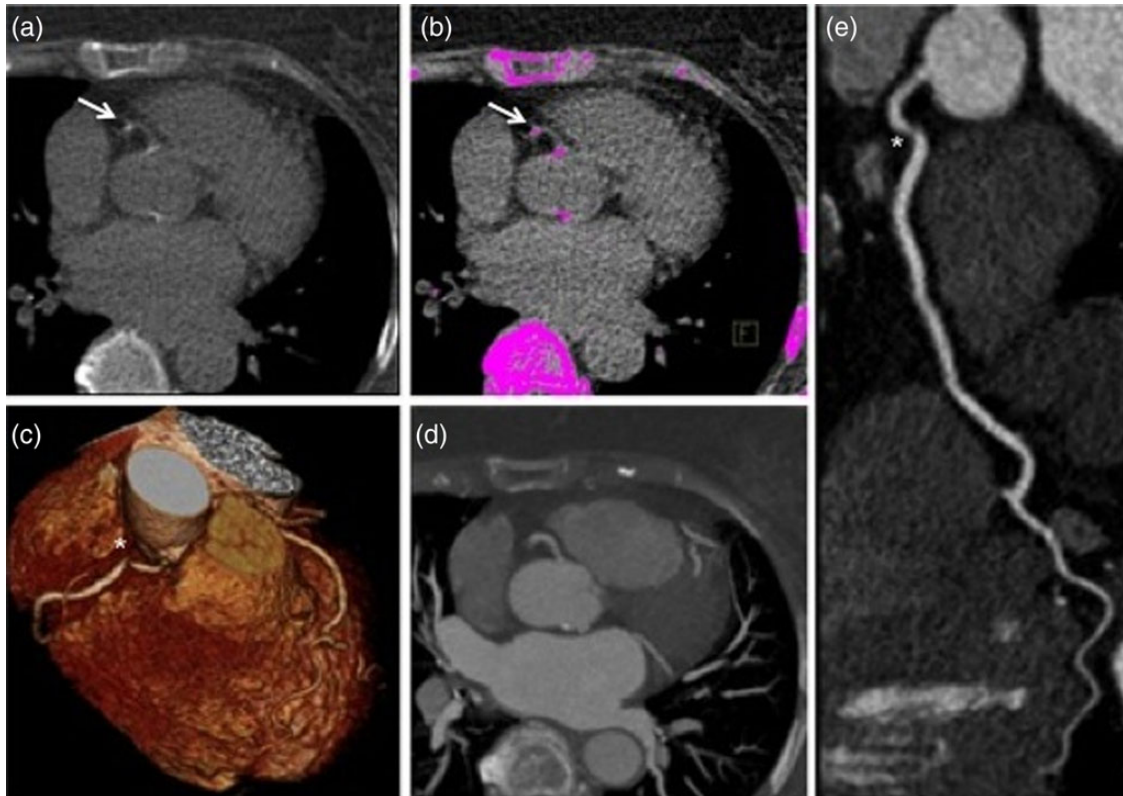


Figure 1: (a and b) Representative images of the patient's calcium score (white arrow pointing to the calcium detected in the proximal RCA). (c) Volume rendered (VR) model of the patient's heart. (d) Maximum intensity projection of the proximal RCA. (e) Curved multiplanar reformatting (cMPR) image of the RCA. The asterisk marks a significant kink in the proximal RCA (seen clearly in the VR image in c), where the vessel goes somewhat out of plane (hence, the appearance on the cMPR in e).

DISCUSSION

Calcification detected on a CACS may represent a pure calcified plaque or a calcified component of a mixed plaque. At a population level, the calcium burden represents approximately one-fifth of the atheroma burden and so, additional soft plaque disease may well be detected on the CTCA (that is not detected using a calcium score).

The reason for the false-positive CACS and negative CTCA, as seen in our patient, is unknown. However, persistent artefacts related to respiratory or patient motion are possible.

Any motion artefact could remove part of the dataset in a CTCA (i.e. an area of the coronary artery) making correlation inaccurate. This is most likely to give the impression of a false-negative CTCA.

Theoretically, the motion artefact could also result in an area of the coronary artery being overlaid with another part, potentially increasing the CT number and HU, resulting in it being >130 HU and therefore detected as calcium on the calcium score.

Our case highlights the importance of CTCA in complementing the assessment of calcium scores.

CONFLICT OF INTEREST STATEMENT

None declared.

FUNDING

The authors received no funding regarding this article.

ETHICAL APPROVAL

No ethical problems raised since this is just the description of a clinical case and no experiments or trials were done related to this study.

CONSENT

Informed consent was obtained.

GUARANTOR

E.N. is a guarantor of this study.

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