Female patient, 68, hypertensive and dyslipidemic with atypical chest pain. Calcium score: zero. Due to the symptoms, investigation was conducted using myocardial perfusion scintigraphy (MPS). Moderate ischemia on the anterior, septal and apical left ventricular walls was found to be associated with other indirect markers of severity and abnormal exercise electrocardiography. Coronary computed tomography angiography (CCTA) revealed anterior descending artery with significant obstructive lesion confirmed by coronary angiography. Percutaneous revascularization provided improvement of symptoms, normalization of MPS and exercise electrocardiography. This report emphasizes the importance of assessing the pretest probability of coronary artery disease for the correct indication of the imaging methods.

Introduction

Evaluation of coronary artery disease (CAD) using non-invasive methods is a common initial approach in the management of symptomatic patients with suspected CAD. The main methods used are: exercise testing, stress echocardiography, myocardial perfusion scintigraphy (MPS) and, more recently, coronary angiography (computed tomography angiography) with coronary calcium score (CCS). CCS has an excellent negative predictive value, which makes it a very attractive method; however, it must be interpreted with caution in cases of symptomatic patients. The objective of this report was to demonstrate that actual perfusion abnormalities in MPS may occur in patients with CCS = zero.

Case report

Female patient, 68 years old, hypertensive and dyslipidemic with atypical chest pain. CCS study with absolute zero value. Due to the symptoms, despite the absence of detectable coronary atherosclerosis, MPS was conducted in a private clinic in Rio de Janeiro, which showed an area of moderate ischemia on the anterior, septal and apical left ventricular (LV) walls with ejection fraction during exercise (Figure 1A).

Exercise electrocardiography performed for the scintigraphic study showed an exclusively electrocardiographic criterion for myocardial ischemia with descending ST segment depression in leads DII, DIII, AVF, V3 to V6 and aVR elevation (Figure 1B).

Coronary computed tomography angiography showed anterior descending artery with significant obstructive lesion (suboccluded) in the proximal third (Figure 2A), subsequently confirmed by coronary angiography (Figure 2B). Image fusion was performed using the MPS software with coronary computed tomography angiography confirming perfusion defect area irrigated by the sick anterior descending coronary artery (Figure 2C).

The patient underwent percutaneous revascularization, presenting improvement of symptoms and normalization of MPS (Figure 1C) and exercise electrocardiography (Figure 1D).

Discussion

Many literature data demonstrate that the lack of calcium in the coronary arteries means low risk for future cardiac events and CCS provides incremental prognostic value to the clinical parameters in diverse populations of asymptomatic patients. In diabetic patients, who are known to present higher risk for future cardiac events,
Figure 1
In A: Myocardial perfusion scintigraphy showing low uptake of the radiotracer in the anterior, septal and apical walls of the left ventricle in the exercise phase.
In B: Electrocardiogram (exercise phase) showing descending ST segment depression (leads DII, DIII, aVF, V3, V4, V5 and V6), and aVR elevation.
In C: Myocardial perfusion scintigraphy showing normalization of the ischemia areas previously described after the therapy.
In D: Normalization of electrocardiographic parameters (of exercise) after percutaneous revascularization.

those with CCS = zero have five-year survival rate similar to non-diabetic patients without calcifications. However, the prognostic implications of CCS = zero in symptomatic patients are less reliable and coronary artery disease cannot be ruled out in a significant percentage of cases. A recent substudy from the multicenter trial CORE 64 investigated the correlation between CCS = zero and the absence of coronary stenosis > 50% in a population of 291 patients referred for invasive angiography. It was observed that 14 (19%) of 72 patients with CCS = zero had at least one ≥ 50% stenosis. In a meta-analysis with a total of 3924 patients and 42-months follow-up, Sarwar et al. showed that the chance of future cardiac events in patients without calcium in the coronary arteries was significantly higher in symptomatic patients. In this context, it should be considered that significant coronary artery stenosis may occur in the absence of detectable calcifications in CCS and this association may be more pronounced in symptomatic patients at higher risk.

On the other hand, for more than two decades now, MPS has been widely accepted as a powerful tool for risk stratification of patients with suspected or known diagnosis of CAD. Scintigraphic images allow evaluating hemodynamic abnormalities at all stages of coronary artery disease, including initial endothelial dysfunction, microcirculation disease and moderate to sharp stenosis of the major coronary arteries. An extensive literature points out that the absence of perfusion defects in MPS implies a good prognosis, with a chance of events of approximately 1% per year,7,8 thus avoiding other expensive and/or invasive diagnostic techniques. In patients with significant perfusion abnormalities, the risk increases with the severity of the perfusion defect. Scintigraphy is wisely used not only to diagnose but also to direct the best treatment for each patient.7
This case report emphasizes the importance of considering the CAD pretest probability for recommending specific tests. Symptomatic patients with moderate to high pretest probability of CAD are likely to benefit more from functional tests, such as MPS in the stratification of their coronary risk.

**Author contributions**

Conception and design of the research: Pedras FV. Acquisition of data: Pedras FV, Pedras BV. Analysis and interpretation of the data: Pedras FV, Pedras BV, Lopes FPPL. Writing of the manuscript: Pedras FV, Polonia MVP, Pedras DV, Lopes FPPL. Critical revision of the manuscript for intellectual content: Pedras FV, Lopes FPPL.

**Potential Conflicts of Interest**

This study has no relevant conflicts of interest.

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**References**


