

Letters to the Editor

Cardiologist Point of View on the Exercise Echocardiography and Multidetector Computed Tomography for the Evaluation of Acute Chest Pain



La perspectiva del cardiólogo sobre la evaluación del dolor torácico agudo mediante ecocardiografía de ejercicio y tomografía computarizada multidetectores

To the Editor,

Having carefully read the response¹ of the authors of the article entitled “Exercise Echocardiography and Multidetector Computed Tomography for the Evaluation of Acute Chest Pain”,² I would like to clarify a number of points.

The technological advances in multidetector computed tomography (MDCT) most widely applied in the clinical setting are those that enable the study of myocardial perfusion and the assessment of the functional impact of stenosis with techniques to estimate the fractional flow reserve (approved by the United States Food and Drug Administration since November of 2014). These advances are still too recent to have been included in clinical practice guidelines. However, in the technical setting, other well-established features such as prospective acquisition, the use of 100 kV, dual source and dual energy X-ray tubes, increased gantry rotation speed, iterative reconstruction, etc, have unquestionably improved the acquisition, interpretation, and diagnostic accuracy of cardiovascular MDCT. However, the system employed for this study represents technology dating back to 2004 and is not equipped with these technical improvements, which may have limited the results of MDCT.

The cornerstones of any interpretation, whether “fortunate” or “unfortunate”, are patient preparation and image acquisition and reconstruction. Inadequate patient preparation or poor acquisition can irreparably invalidate the interpretation of studies. The situation is like an echocardiogram acquired by someone else, who selects the protocol, the planes, and the parameters, in which a suboptimal view or an inappropriate Nyquist limit can inevitably lead us to an erroneous quantification and diagnosis. Moreover, although I commend the efforts of Dr. Ortiz-Pérez and Dr. Bosch¹ to justify their choice of reconstruction parameters—a decision that, in Spain, is usually made by radiologists—their arguments do not support their choice. A slower gantry speed implies the need for a longer acquisition time. That is, it affects image quality insofar as it determines the temporal resolution and, thus, the possibility of mainly motion artifacts. Modifiable variables that can be used to mitigate this lower temporal resolution include the establishment of an optimal heart rate, proper synchronization of patient breath-holding, and the electrocardiogram, as well as multisegment reconstruction. However, the optimization of these variables does not dispense with the need to improve the spatial resolution, attempting in the reconstruction to acquire an isotropic voxel, with a cutoff thickness similar to the detector width (0.6 mm) and collimation for image acquisition, and a modification of the overlap already employed by multiple authors.^{3,4} Moreover, a slower acquisition speed does not impede the optimization of image

quality by improving intraluminal contrast if the voltage is reduced to 100 kV in patients whose body mass index is less than 30, as the signal-to-noise ratio has been shown to be good and the reduction in the radiation dose is exponential, that is, quadratic.⁵

Clinical cardiologists should begin to demand for their patients the standards of quality established by the Society of Cardiovascular Computed Tomography. The radiation dose is an “immediate” marker of the technical quality of the study, since it tells us if “a sledgehammer has been used to crack a nut” and whether this biological cost, “provided” by the team (professionals and MDCT), is compensated for by the verisimilitude of the information it yields. Many scientific journals now reject studies not using the currently recommended radiation dose (< 12 mSv, and soon to be further reduced) or those not supplying this information, as is the case in this article. Clinical cardiologists should try to find teams of cardiologists and radiologists that have accredited know-how in this technique and invest in technological training and updating to improve diagnostic accuracy and reduce the radiation dose.

The association of a calcium score > 400 with significant stenosis undoubtedly encumbers the specificity of MDCT with a “false positive” rate of 20%, as shown in the study by Von Ziegler et al, cited by me in a previous letter, and by the authors of the article discussed here,² in which 1 of 5 patients (20%) had a score > 400 but did not have significant stenosis. Moreover, this calcium score threshold of > 400 has not been corroborated by other studies.⁶

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