Editorial Comment

Atherosclerotic plaque burdens in type 2 diabetes

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In this issue of the Journal of Geriatric Cardiology, Huang et al. have reported the detection of coronary artery disease with electron-beam computed tomography (EBCT), utilizing non-contrast and contrast imaging techniques (EBCTA) in several subgroups including type 2 diabetes mellitus (DM), impaired glucose tolerance (IGT), coronary heart disease, and normal subjects. Interestingly, non-contrast imaging by measurement of the coronary artery calcium score (CAC) did not show any differences among the groups. However, the presence of coronary calcification and/or coronary stenotic lesions detected by contrast coronary angiography with EBCTA was found more frequently in type 2 DM, IGT, and coronary artery disease patients than in healthy subjects. The authors concluded that combined information on either CAC or luminal assessment with EBCTA should be considered for assessment of atherosclerosis in type 2 DM patients.1

It has been shown that type 2 DM shows evidence of increased atherosclerotic plaque burdens measured by CAC as compared to healthy subjects.2,3 The reasons that we did not see this difference in the Huang et al. studies was due to the small sample size and possibly the effects of ethnic differences as suggested by the Multi-Ethnic Study of Subclinical Atherosclerosis.4 Another reason for a confounding factor was that male patients were the majority of the study population, and it has been demonstrated that males had a higher likelihood of developing coronary atherosclerosis or calcification than did females.5

Huang et al. demonstrated the utilities of the information of noncalcified plaques or stenotic lesions from EBCTA and/or CAC improved detection of coronary artery disease in their population. This was consistent with the recent study using multi-slice computed tomography (MSCT) coronary angiography to detect atherosclerotic changes in type 2 DM; up to 40% of the coronary artery plaques visualized were noncalcified plaques.6 Importantly, CAC < 100 did not exclude coronary artery disease in those patients. Therefore, noninvasive coronary angiography has been shown to be an excellent method to detect atherosclerotic changes of the coronary artery in type 2 DM patients, probably even before the significant stenotic lesions developed.

The concept of using combined CAC and coronary CT angiography information is attractive and feasible for comprehensive assessment of luminal narrowing and coronary artery plaque visualization, but there are several questions and concerns in this approach especially if it is considered as a screening tool. Those are iodinated-contrast and radiation exposure, prognostic information, how to treat these patients according to the obtained findings, and comparison data to conventional risk stratification methods including stress echocardiography or stress myocardial perfusion. Lastly, which technology should we use, comparing EBCT and MSCT? Although the accuracy of coronary artery images from both techniques was comparable, MSCT has shown to be superior in image quality, less non-assessable segments, and better contrast to noise ratio and spatial resolution. The disadvantages were that in MDCT technique, patients were exposed to more radiation and needed to have a heart rate less than 70 beats per minute for the best image quality.7

The study by Huang et al. suggested that EBCT can assess calcified and non-calcified plaques and coronary artery stenosis; perhaps it may lead to improvement in the detection of coronary artery disease. Whether this approach can be practically utilized will need further investigation and to overcome the above limitations. Further advancement in assessing coronary artery disease would be to characterize the plaques and to predict vulnerable plaques. Currently, MSCT is inferior to intravascular ultrasound for characterizing the plaques because of the current resolution and overlapping attenuation values of different types of plaques.8 Various imaging modalities including computer tomography, magnetic resonance imaging, nuclear imaging, and optical coherence, have been utilized in researching plaque characterization.9 We are now moving beyond the detection of coronary stenosis where the paradigm is shifted to an early detection of coronary atherosclerosis, and to try to identify high-risk patients who need aggressive risk factor modifications to prevent future fatal cardiovascular events.
References


