ECG-gated 16-MDCT of the coronary arteries: Assessment of image quality and accuracy in detecting stenoses

OBJECTIVE. The aim of this study was to investigate image quality and diagnostic accuracy in detecting coronary artery lesions using a 16-MDCT scanner. MATERIALS AND METHODS. Thirty-seven patients (28 men, nine women) underwent unenhanced helical CT and MDCT angiography of the coronary arteries. After patients received oral beta-blocker medication, CT scans were obtained during a single breath-hold with a 16-MDCT scanner using ECG-gating (0.75-mm collimation, 2.8-mm table feed/rotation, 0.42-sec rotation time). The image quality was assessed in terms of artifacts and segment visibility by two reviewers. Stenosis severity was compared with the results of conventional invasive coronary angiography. RESULTS. The data evaluation of the image quality was based on a total of 488 segments, of which 380 segments were considered to have diagnostic image quality. One hundred eight segments (22.1%) could not be sufficiently evaluated because of severe calcifications (35 segments) and motion artifacts (73 segments). The mean calcium score (Agatston score equivalent [ASE]) was 524.3 +/- 807.6. Twenty-eight (75.7%) of the 37 patients had an ASE of less than 1,000 (mean ASE, 90.8 +/- 152.3 [SD]), and nine (24.3%) patients had an ASE of 1,000 or greater (mean ASE, 1,761.0 +/- 637.6). For detecting...
lesions 50% or greater (without any exclusion criteria), the overall sensitivity, specificity, positive predictive value, and negative predictive value were 59%, 87%, 61 %, and 87%, respectively. When limiting the number of patients to those with a calcium score of less than 1,000 ASE, the threshold-corrected sensitivity for lesions 50% or greater was 93%; specificity, 94%; positive predictive value, 68%; and negative predictive value, 99%. CONCLUSION. In patients with no or moderate coronary calcification, MDCT of coronary arteries using 16-MDCT technology allows the reliable detection of coronary artery stenoses with high diagnostic accuracy. Obtaining an initial unenhanced scan was found to be mandatory to avoid performing useless examinations in patients with severe calcifications.