

Optimal Calcium Score Threshold for 256-slice Coronary CT Angiography

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Introduction: Coronary CT angiography (CCTA) is an accurate non-invasive modality for the diagnosis of coronary artery disease (CAD). However, the diagnostic performance of CCTA is limited in patients with high coronary calcium score (CAC score). Coronary calcium results in an increased number of false positive scans, decreased specificity and limited positive predictive value. Therefore, it has been recommended that above a total CAC score value of 400, coronary CTA should be deferred. However, this recommendation is based on scanners with 16-64 detector. Therefore, our aim was to establish the optimal threshold of CAC score for state-of-the-art scanner to perform or defer coronary CTA.

Methods: Consecutive patients with suspected CAD who were referred to CCTA were included into our retrospective study. The patients were divided onto two groups based on the presence or absence of severe coronary artery stenosis on CCTA. Total and vessel-based CAC score values were compared between the two groups. We considered 95% specificity as a clinically acceptable threshold for CAC score to identify patients by whom the CCTA shows severe stenosis or it is not possible to rule out severe stenosis due to heavy calcium and therefore, CCTA should be deferred.

Results: In total, we have studied 4865 patients. The CCTA showed or could not rule out severe coronary artery stenosis in 563 cases. Cardiovascular risk factors such as age, sex, BMI, smoking, hypertension, diabetes mellitus and dyslipidemia differed significantly between the two groups ($p < 0.001$). A CAC score threshold of 700 had a specificity of 95.3% to identify patients with severe stenosis or non-diagnostic CCTA. The vessel-based CAC score threshold values to achieve 95% specificity in case of the left anterior descending (LAD) coronary artery was 320, in the left circumflex (LCx) coronary artery it was 100 and in the right coronary artery (RCA) it was 200.

Conclusion: Our results suggest that above a total CAC score of 700, LAD score of 320, LCx score of 100, and RCA score of 200, performing a CCTA after the CAC score scan has a limited value as the vast majority of patients will have severe stenosis or non-diagnostic CCTA.