



The Effectiveness of Calcium Scoring Alongside Coronary Computed Tomography Angiography in Patients with Low-Likelihood of Chest Pain

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Dear Editor in Chief

Acute chest pain is a challenging clinical problem, commonly encountered in emergency departments. Appropriate management and treatment of acute chest pain requires a careful assessment of patients to predict the probability of acute coronary syndrome (ACS) and initiate immediate treatment. Generally low-risk patients with negative serial electrocardiograms and cardiac injury markers have to undergo a confirmatory test so that the presence of underlying ischemia and also the need for hospitalization might be established (1). Non-invasive imaging studies are being increasingly used with such patients and Coronary Computed Tomography Angiography (CCTA) has been proven instrumental in assisting the physicians to decide about the likelihood of ACS. Hoffmann et al. (2009) explored the effectiveness of CCTA in patients with acute chest pain and normal electrocardiograms and cardiac biomarkers. In their sample, the patients who had no plaque on CCTA did not have ACS in the follow-up either, so that the negative results on CCTA had 100% negative predictive value for ACS (2). CT quantification of CAC (coronary artery calcification) was used to exclude ischemia (3). The results that the study yielded indicated that CAC scoring could be performed to assess the need for hospitalization in

low risk patients. Nonexistent or minimal CAC would make cardiac chest pain very unlikely in the patients with low to moderate probability of coronary chest pain. (3) CCTA together with CT CAC scoring is another protocol used to detect ACS, even though there is some evidence suggesting that combining these two methods might lead to no particular advantages (4, 5). CCTA could be more helpful than CAC scoring in predicting major cardiac adverse events in low risk patients in emergency departments, and that using both methods simultaneously might not increase the prognostic value of CCTA, when done alone (4). Chang et al. investigated the effect of adding CAC scoring to CCTA. The results suggested that elevated CAC score is linked with a higher likelihood of underlying coronary artery disease on CCTA, but it does not assist the CCTA in predicting 30-day adverse cardiovascular events (5). Drawing on the findings mentioned above, we studied the patients who shown up in our emergency department with acute chest pain in a one-year period. It was found that patients with low likelihood chest pain, 2088 patients had undergone coronary CCTA in addition to CT CAC scoring. With the cost of the addition of CAC scoring to CCTA being 133 dollars for each patient, and the annual

cost for all patients amounts to 277704 dollars. Furthermore, the increased health cost also means more exposure to radiation as a result of using both imaging studies simultaneously. Every CAC scoring involves 7.5 mGy (milligray) additional radiation exposures for each patient, which amounts to an annual extra radiation exposure of 15660 mGy for our patient population. The total radiation a patient is exposed to is an important issue to be considered. The extra radiation exposure can increase the likelihood of adverse health consequences including the susceptibility for (developing) malignancies. Obviously this takes its toll on the patients alone, and not on the diagnostic management, of course. Other factors that must be taken into account include the extra time consumed this way as well as equipment depreciation. So much time spent, with no parallel diagnostic values may seriously undermine the efficiency of the radiology department. Thus, CAC scoring increases the depreciation costs of equipment as well as servicing costs and as a result imposes unnecessary financial burdens on the health care system. Through applying CAC scoring reasonably, and the exclusion of CAC scoring from the routine CCTA, not only can the patients' unnecessary exposure be avoided, but the health care system expenses and service costs could also be reduced without any adverse consequences.

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