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hs-Troponin I Followed by CT Angiography Improves Acute Coronary Syndrome Risk Stratification Accuracy and Work-Up in Acute Chest Pain Patients

Results From ROMICAT II Trial

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ABSTRACT

OBJECTIVES This study compared diagnostic accuracy of conventional troponin/traditional coronary artery disease (CAD) assessment and highly sensitive troponin (hsTn) I/advanced CAD assessment for acute coronary syndrome (ACS) during the index hospitalization.

BACKGROUND hsTnI and advanced assessment of CAD using coronary computed tomography angiography (CTA) are promising candidates to improve the accuracy of emergency department evaluation of patients with suspected ACS.

METHODS We performed an observational cohort study in patients with suspected ACS enrolled in the ROMICAT II (Rule Out Myocardial Infarction/Ischemia using Computer Assisted Tomography) trial and randomized to coronary CTA who also had hsTnI measurement at the time of the emergency department presentation. We assessed coronary CTA for traditional (no CAD, nonobstructive CAD, ≥50% stenosis) and advanced features of CAD (≥50% stenosis, high-risk plaque features: positive remodeling, low <30-Hounsfield units plaque, napkin-ring sign, spotty calcium).

RESULTS Of 160 patients (mean age: 53 ± 8 years, 40% women) 10.6% were diagnosed with ACS. The ACS rate in patients with hsTnI below the limit of detection (n = 9, 5.6%), intermediate (n = 139, 86.9%), and above the 99th percentile (n = 12, 7.5%) was 0%, 8.6%, and 58.3%, respectively. Absence of ≥50% stenosis and high-risk plaque ruled out ACS in patients with intermediate hsTnI (n = 87, 54.4%; ACS rate 0%), whereas patients with both ≥50% stenosis and high-risk plaque were at high risk (n = 13, 8.1%; ACS rate 69.2%) and patients with either ≥50% stenosis or high-risk plaque were at intermediate risk for ACS (n = 39, 24.4%; ACS rate 7.7%). hsTnI/advanced coronary CTA assessment significantly improved the diagnostic accuracy for ACS as compared to conventional troponin/traditional coronary CTA (area under the curve 0.84, 95% confidence interval [CI]: 0.80 to .88 vs. 0.74, 95% CI: 0.70 to 0.78; p < 0.001).

CONCLUSIONS hsTnI at the time of presentation followed by early advanced coronary CTA assessment improves the risk stratification and diagnostic accuracy for ACS as compared to conventional troponin and traditional coronary CTA assessment. (Multicenter Study to Rule Out Myocardial Infarction/Ischemia by Cardiac Computed Tomography [ROMICAT-II]; NCT01084239) (J Am Coll Cardiol Img 2015;8:1272–81) © 2015 by the American College of Cardiology Foundation.

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Highly sensitive troponin (hsTn) assays and coronary computed tomography angiography (CTA) are promising candidates to improve diagnostic accuracy in patients undergoing evaluation for suspected acute coronary syndrome (ACS) in the emergency department (ED) (1–7). Multiple studies have shown that hsTn assays have increased sensitivity for the detection of ACS and decreased time to assay positivity compared to conventional troponin (1–4). These assay characteristics suggest a potential for faster and more efficient evaluation of patients presenting to the ED with symptoms suggestive of ACS. Several recent studies suggested that even a single very low measurement of hsTn at the time of ED presentation can rule out myocardial infarction (MI) safely (8–10). Further, increasing levels of hsTn are associated with coronary artery disease (CAD) and myocardial perfusion defects, and have prognostic value beyond the acute care episode (11,12).

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Three large randomized trials have shown that coronary CTA as compared to standard of care, including serial conventional troponin and functional testing to provoke myocardial ischemia, decreased the time to diagnosis and allowed for earlier discharge from the ED (5–7). Recent data suggest that detection of high-risk coronary plaque features (defined as positive remodeling, low <30 Hounsfield units [HU] plaque, napkin-ring sign, or spotty calcium) is independent and incremental to significant coronary stenosis for diagnosis of ACS (13). The exclusion of high-risk plaque may help to decrease downstream testing (e.g., additional stress testing and invasive coronary angiography). The increase in downstream testing was observed in studies using the traditional assessment of coronary CTA for stenosis (14–16).

Hence, there are expectations that a combination of advanced coronary CTA with hsTn may increase accuracy in the management of patients presenting to the ED with suspected ACS. We designed an observational cohort study nested in the ROMICAT II (Rule Out Myocardial Infarction/Ischemia using Computer Assisted Tomography) trial. We determined whether combined assessment of hsTnI and advanced coronary CTA for high-risk plaque improves accuracy of ACS risk classification as compared to conventional troponins and traditional coronary CTA assessment for stenosis.

ABBREVIATIONS AND ACRONYMS

ACS = acute coronary syndrome

AUC = area under the receiver operating characteristics curve

CAD = coronary artery disease

CI = confidence interval

CTA = computed tomography angiography

ED = emergency department

hsTn = highly sensitive troponin

HU = Hounsfield units

LOD = limit of detection

NPV = negative predictive value

PPV = positive predictive value

METHODS

PATIENT POPULATION. The ROMICAT II trial randomized patients presenting to the ED with suggestive ACS but without ischemic electrocardiographic changes and with negative conventional troponins (see Online Table 1 for the conventional troponin assays used in the study) (7). This ancillary study was designed as a nested observational cohort study in patients who were randomized to coronary CTA and consented to blood sampling for hsTnI at the time of ED presentation (**Figure 1**). All study participants provided written consent for participation in ROMICAT II. The local institutional review boards approved the study. A detailed description of the

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