

Computed Tomography Coronary Angiography for Faster Evaluation of Chest Pain Syndrome

Hollander JE, Litt HI, Chase M, et al. Computed tomography coronary angiography for rapid disposition of low-risk emergency department patients with chest pain syndromes. *Acad Emerg Med* 2007;14:112–6.

Study Overview

Objective. To evaluate 30-day risk of cardiac death and acute myocardial infarction (AMI) in low-risk chest pain patients evaluated with computed tomography coronary angiography (CTCA).

Design. Prospective observational case series.

Setting and participants. The study was performed at an urban, mid-sized academic emergency department (ED) over a 6-month period (January–June 2005) and included patients aged > 30 years who presented to the ED with a primary complaint of chest pain, received an electrocardiogram (ECG), and underwent CTCA. The protocol for CTCA in the ED included patients with a Thrombolysis In Myocardial Infarction (TIMI) [1] risk score of 0 to 2 (< 8.3% cardiac event rate), negative cardiac marker enzymes (troponin I and creatinine kinase-myocardial band [CK-MB] isoenzyme) on initial testing, and a serum creatinine level < 1.5 mg/dL. Patients with heart rate > 70 bpm received oral metoprolol to reduce heart rate and improve CTCA imaging quality. Patients who were pregnant, had active asthma, were allergic to contrast dye, or had a heart rate > 70 bpm and contraindication to β blockers were excluded. CTCA was only available on weekdays between 8:00 AM and 4:00 PM.

Main outcome measures. The primary outcome was a composite of cardiac death and AMI at 30 days determined by telephone follow-up and record review. AMI was defined as either positive cardiac markers (troponin I or CK-MB) or diagnostic ECG changes [2].

Main results. 54 patients received CTCA, and none had an adverse cardiac event by 30-day follow-up. 46 (85%) were discharged home from the ED. All discharged patients had coronary stenosis < 50% as identified by CTCA and calcium scores < 400. Of the 8 admitted patients, 1 had stenosis > 70%, 5 had stenosis between 50% and 69%, and 2 had stenosis between 0% and 49%; 3 of the admitted patients had stress testing, and of these, 2 had reversible ischemia, with cardiac catheterization confirming CTCA findings without additional interventions.

Conclusion. CTCA may provide rapid evaluation of low-risk patients with chest pain in the ED and allow for safe discharge of patients with negative studies.

Commentary

In the United States, more than 6 million patients present to the ED complaining of chest pain [3]. Although in a majority (> 55%) of these patients the source of pain is not cardiac, the rate of missed AMI is 2% to 3% [4]. This missed diagnosis is associated with adverse clinical outcomes and costly malpractice suits [5]. For this reason, many patients seen in the ED are admitted to the hospital or a chest pain observation unit for extensive cardiac evaluation to rule out the risk of AMI. If a rapid, effective, and safe method of evaluating chest pain patients can be developed, perhaps low-risk patients with acute coronary syndromes can be safely discharged from the ED for appropriate follow-up, which in turn may prevent unnecessary inpatient bed shortages, ED crowding, and excessive health care utilization/costs.

This study by Hollander et al found that 54 adult patients with low-risk chest pain were quickly and safely evaluated using multislice CTCA in the ED setting. None of these patients reported any adverse cardiac events during the 30-day follow-up period. Eighty-five percent had negative CTCA findings and were discharged from the ED. The remaining patients who had coronary stenosis identified by CTCA were admitted and stenoses were confirmed by stress testing or cardiac catheterization; none of these patients required additional interventions (ie, percutaneous coronary intervention).

The findings of this study are limited to a single academic ED with a 64-slice computed tomography (CT) scanner and cardiovascular radiologists trained in the interpretation of CTCA. Results may not be generalizable to ED or hospital settings that do not have access to advanced-level CT scanners or have staff with experience with this modality. Multicenter randomized controlled trials of CTCA versus usual care, safety and cost-effectiveness analyses, and evaluation of more in-depth clinical outcomes—including missed or silent AMI—are needed to confirm this study's findings.

Applications for Clinical Practice

The results of this study show promise for the use of CTCA

in rapid evaluation and disposition of patients with low-risk chest pain in the ED setting. Because this study occurred in an academic ED with a top-of-the-line 64-slice CT scanner and trained cardiovascular radiologists, the findings may not be applicable to most hospitals or EDs. As more investigations validate the use of CTCA as a quick diagnostic study for safely assessing atypical chest pain, a more efficacious means of caring for a common and costly ED presentation may become available.

—*Review by Ulla Hwang, MD, MPH*

References

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