Clinical update no. 522
19 September 2018

What is the role of CT-coronary angiogram in the ED workup of chest pain, with initial normal serial ECG and hs-troponin?

Coronary CT angiography saves lives and money: 20,000-plus cases prove it

The hype has been around for some time – this registry database from 2007 might have predated more reliable evidence.

The follow up data from the SCOT-HEART study (from Scotland) has been published.

> Heart scans for patients with chest pains could save thousands of lives in the UK, research suggests.

Spoiler alert: there was no mortality reduction

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Coronary CT Angiography and 5-Year Risk of Myocardial Infarction

The SCOT-HEART Investigators*

ABSTRACT

BACKGROUND

Although coronary computed tomographic angiography (CTA) improves diagnostic certainty in the assessment of patients with stable chest pain, its effect on 5-year clinical outcomes is unknown.

N ENGL J MED 379;10 NEJM.ORG SEPTEMBER 6, 2018

The study randomly assigned 4146 patients with stable chest pain to standard care plus CTA or standard care alone. The primary end point was death from coronary heart disease or nonfatal myocardial infarction at 5 years.

Of note it is not an ED patient population.

PATIENT POPULATION AND RANDOMIZATION

Patients 18 - 75 years with stable chest pain referred to an outpatient cardiology clinic; exclusion criteria included renal failure and acute coronary syndrome within 3 months.

Table 2. Primary and Secondary End Points after a Median Follow-up of 4.8 Years.*

End Point	No./% patients: Standard Care (N=2073)	Standard Care plus CTA (N=2073)	Hazard Ratio (95% CI)†
Primary end point: death from CHD or nonfatal myocardial infarction‡	81 (3.9)	48 (2.3)	0.59 (0.41–0.84)§
Death			
From CHD‡	9 (0.4)	4 (0.2)	0.46 (0.14–1.48)
From any cause	43 (2.1)	43 (2.1)	1.02 (0.67–1.55)
Nonfatal myocardial infarction	73 (3.5)	44 (2.1)	0.60 (0.41–0.87)

It is a little hard to follow, as p values are not given, just a hazard ratio with fairly small numbers. As well, the diagnosis could be a little less than completely reliable, with the study noting "*There was no formal event adjudication, and end points were classified primarily on the basis of diagnostic codes*". Criteria to define MI, such as a troponin rise, are not defined in the study or appendix.

There was no mortality benefit.

From a total 4146 patients (2073 each group) there were 33 fewer infarcts in the CT-CA group, although MI was not defined in the study. The data gives an absolute risk reduction from 3.9 to 2.3%, i.e. 1.6%, with NNT of 100/1.6 = 62.

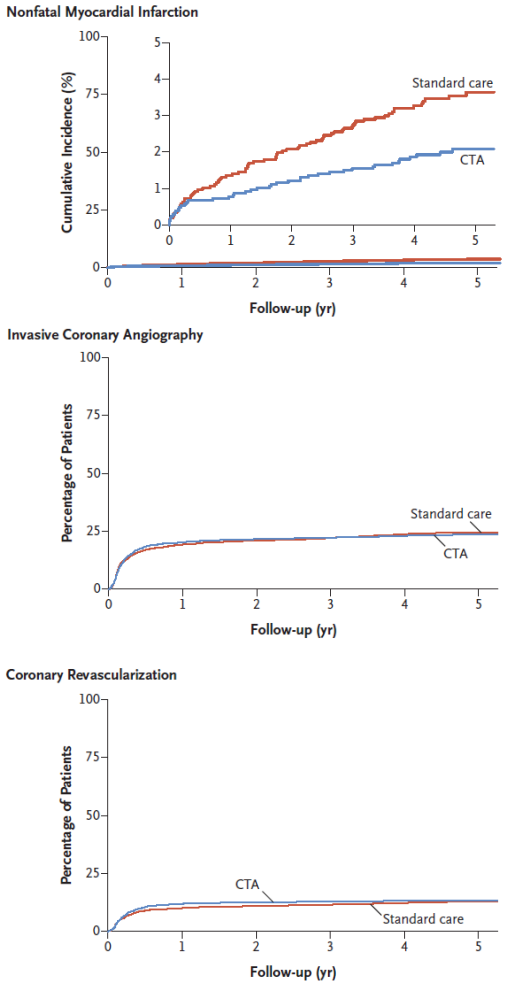


Figure 1. Percentage of Patients Who Underwent Invasive Coronary Angiography and Coronary Revascularization, According to Year of Follow-up.

How is it so? There was no difference in coronary angiography (24% in each group) or revascularisation (13%).

SUBSEQUENT MANAGEMENT

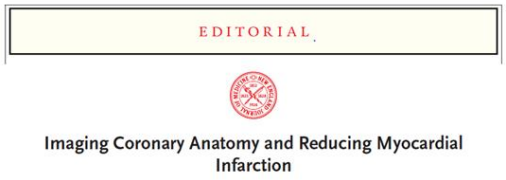
Patients assigned to CTA were more likely to have commenced preventive therapies (19.4% [402 patients] vs. 14.7% [305 patients]; odds ratio 1.40) and antianginal therapies (13.2% [273 patients] vs. 10.7% [221 patients]; odds ratio 1.27), with differences persisting over 5 years.

So, treating 97 more with preventive therapy (antiplatelets agents, statins, etc) and 52 more with antianginal therapy was suggested as resulting in 33 fewer infarcts with no mortality benefit over 5 years follow up. That is a NNT of about 3, which is vastly exxagerated to any known risk reduction from those interventions.

Clinical outcomes did not differ between patients who had possible angina and those who had nonanginal chest pain, as defined in the National Institute for Health and Care Excellence (NICE) guidelines

About a third of patient were classified as having non-anginal chest pain. Mortality reduction was the same for angina and non-anginal chest pain in those having CT-CA.

That means those intervention were essentially used as primary prevention in a third of patients. The just published ASPREE trial shows no benefit from aspirin as primary prevention (*NEJM* 16 September 2018), and statins have essentially no benefit either.


EDITORIAL

Imaging Coronary Anatomy and Reducing Myocardial Infarction

The editorial noted that differences in medical management between the groups were modest, <10% for either statins or aspirin, and unlikely to explain the outcome difference. The earlier PROMISE trial randomised to CTA or functional testing (mostly EST), with no outcome difference at 2-year follow-up.

Some further review of the data at:

https://www.medscape.com/viewarticle/901204?nlid=124637_545&src=WNL_mdplsfeat_180828_mscpedit_emed&uac=9338SR&spon=45&impID=1724161&faf=1

Preventive therapies are not that good

The generally accepted NNT for aspirin/statins is about 50, so that should give 2 fewer MIs, not 33 fewer. The NNT is not 3.

The study design assumed a 5-year-event rate of 13%, with 80% power to detect an ARR of 2.8%. The results were an event rate of 3.1% and ARR of 1.6%. That implies a different population group to anticipated, with likely limited external validity.

Lack of rigorous follow up mean that even a modest number of cases misclassified as MI would make the conclusion unreliable. The number lost to follow up compounds that.

Bias is inherent in what was an open-label trial with non-blinded event adjudication. So a small troponin leak might not be classified as MI when there is a bias to show benefit from CT-CA. MI was not formally defined.

The trial is inconsistent with the ROMICAT-II trial (*JAMA Intern Med.* 2018; 178:212-219) evaluating CT-CA as a first diagnostic test in patients with chest pain which showed that those who received clinical evaluation alone without any further provocative testing (EST, other) did not have higher rates of major adverse events than those who had CT-CA.

The editorial notes that "… *information provided by a diagnostic test can resonate therapeutically beyond making a correct diagnosis of CAD and that clinicians should aggressively pursue preventive measures to achieve the best outcomes possible* …". The same holds even for those with non-anginal chest pain. Really? Somehow I doubt it.