Triage of Chest Pain Patients in the Emergency Department

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When patients are seen in the emergency department with chest pain, the emergency department (ED) physician must decide whether or not the symptoms are due to myocardial ischemia or something else. The concern is that the patient may be evolving an acute coronary syndrome.

Introduction

An acute coronary syndrome can be considered likely in patients with the following clinical presentations:

- a) New onset of an unstable chest pain syndrome;
- b) Recurrent (crescendo) angina with no prior PCI or CABG;
- c) Recurrent crescendo angina with prior PCI or CABG.

Patients (b) and (c) are usually treated with anti-angina and antiplatelet therapy and patient (a) may not be on any cardiac medications. The clinical presentation must be considered in the context of other factors, eg age, gender, hypertension, dyslipidemias, positive family history of premature coronary artery disease, diabetes, chronic kidney disease, cigarette smoking, and use of drugs such as cocaine.

Chest Pain Units in Emergency Departments

Many are now advocating a designated unit in the emergency department to evaluate patients presenting with stable chest pain. The purpose of these units is to triage patients with chest pain safely to home or admit them to the hospital. Indications for admission to the hospital are many, but the following are generally acceptable reasons for admission because of a chest pain history, suggesting an unstable cardiac etiology, ie an acute coronary syndrome or some other acute cardiac problem:

- 1) Known coronary disease plus or minus a revascularization procedure;
- 2) Ischemia changes on the electrocardiogram or a positive Troponin T;
- 3) Possible pericarditis, eg pericardial rub, ECG changes;
- 4) Possible aortic dissection, eg in a severely hypertensive patient;

- 5) Multiple cardiac risk factors, untreated or out of control, eg hypertension, diabetes;
- 6) Family history of premature coronary artery disease.

ED Use of CT Coronary Angiography and Myocardial Perfusion Imaging to Evaluate Chest Pain Patients and Predict Future Myocardial Infarction

Currently, there is a great deal of interest in performing computed tomographic coronary angiography in the ED to evaluate patients with chest pain who have an “intermediate” risk of a cardiac event. The issue here is to define intermediate risk. If this is based on the Framingham Risk Score, it should not apply to these patients since the score relates to events that may occur in the next ten years, not the next ten days. Perhaps a simpler method is to identify those stable patients whose symptoms and ECG/troponin are unequivocal (high probability) for myocardial ischemia and those whose symptoms and ECG/troponin suggest (high probability) non-cardiac chest pain. All other patients can be considered as chest pain of uncertain etiology, ie “intermediate risk.”

CT coronary angiography is a wonderful imaging technique that provides fantastic anatomic information, but it may not be appropriate in the ED to triage “intermediate risk” chest pain patients. For example, if the CT angio is normal or shows only minimal irregularities, statistically, the prognosis of populations of these patients over the long term is good.

In the individual patient, no one can predict who will have an infarction in the near future and who will not. My concern is, even if there are no high-grade stenoses present, minimal irregularities with thin caps over lipid pools can be present which may rupture and result in a coronary occlusion and subsequent myocardial infarction later on. I will readily admit that this is a small number, but it is not zero.

When directed to the individual patient, the same is true for myocardial perfusion imaging. Myocardial perfusion

imaging tells us whether or not there is a transient perfusion defect in the myocardium during stress. These defects generally relate to high-grade coronary artery stenoses. If no perfusion defect is present, the presence of minimal coronary irregularities is not eliminated. In the future, these irregularities can be responsible for plaque rupture which can occlude a coronary artery and result in a myocardial infarction or sudden cardiac death.

Simpler Triage Tests in the ED to Assess Chest Pain Patients

It seems to me that the key tests done in the ED to help with decision making are the ECG and the troponin T. The ECG and troponins are important diagnostic tests but must be interpreted in the context of the clinical presentation and other things such as risk factors, age, gender, etc. If either ECG or Troponin T is positive, the patient should be admitted for observation and subsequent in patient evaluation with, in my opinion, a catheter-based coronary angiogram.

If the electrocardiogram is positive for ischemia, regardless of whether the troponin T is positive or negative, most of these patients should be admitted to hospital and referred for a catheter-based coronary angiography. If the ECG is negative for ischemia, the troponin T is negative, and the patient is stable (hemodynamically and electrically), this is the type of patient that can be discharged from the hospital and followed up by a physician. On follow-up a nuclear or echo stress test can be performed, and if it is negative, a high-grade coronary artery stenoses is unlikely but does not rule out a non-obstructive plaque that may be prone to rupture. If the stress test is positive,

generally this patient has a high-grade coronary artery stenosis and should be admitted to hospital and referred for a catheter-based coronary angiography. If the decision is made by the physician on follow-up to do CT-based coronary angiography, a normal coronary angiogram makes a high grade stenosis unlikely but does not rule out small plaques that are prone to rupture in near future. In contrast, if the CT-based coronary angiography is positive, the patient should probably undergo a nuclear or echo stress test; and if a nuclear stress test is positive, catheter-based coronary angiography is warranted. In the latter instance, the patient will be exposed to three sources of radiation and two sources of radio-opaque contrast material.

Summary

In summary, there is no test of which I am aware that guarantees the patient will not have a myocardial infarction in the near or distant future. However, prognosis is not a snapshot but is a continuing variable related to what happens to the patient in the future, eg diabetes, hypertension etc. Prognostication for the individual still requires judgment. Decisions related to triage (home or hospital) should be based on the ECG and troponin T as well as multiple factors such as clinical presentation, (stable or unstable,) age, gender, family history, and a number of risk factors such as hypertension, diabetes, known dyslipidemia, smoking, obesity, chronic kidney disease and sedentary life style.

Reference

1. Conti CR. Acute chest pain evaluated by CT coronary angiography. *Clin Cardiol* 2009;32(10):541–542.