Letters

Correspondance

Cardiac markers for acute myocardial infarction: When should we test?

I read with keen interest the article by Eugene Dagnone and colleagues.[1] As the director of a typically overcrowded Canadian emergency department I am constantly searching for clinical tools to avoid admitting patients to hospital and facilitate their safe and expeditious discharge. Patients presenting with chest pain represent a large group who require cautious and time-sensitive evaluation before discharge.

I was disappointed by the methodology used in this study, specifically with regard to the use of the cardiac troponin I (cTnI) enzyme test. The authors stated that "the time profile of cTnI parallels that of the CK MB [creatine kinase and its MB isoenzyme] fraction." From Table 1 in the article it is evident that 73% of patients enrolled in the intervention group had cTnI evaluated at less than 6 hours after onset of chest pain and 88% at less than 12 hours. It is likely that clinical decision-making would not have been enhanced by results obtained at a time when the sensitivity of the cTnI assay was less than optimal.

Had the study mandated cTnI evaluation at no less than 10 hours after the onset of chest pain, the emergency physician would more reliably have been able to incorporate this test into his or her decision process for admission. I suggest that this modification would very possibly have significantly altered the outcome of the study.

I would encourage the authors or others to undertake further studies utilizing cardiac markers in a time-sensitive manner to evaluate their utility in safely avoiding admissions of patients presenting with chest pain.

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Reference

1. Dagnone E, Collier C, Pickett W, Ali N, Miller M, Tod D, et al. Chest pain with nondiagnostic electrocardiogram in the emergency department: a randomized controlled trial of two cardiac marker regimens. *CMAJ* 2000;162(11):1561-6.

[Two of the authors respond:]

A firmly held tenet of cardiac investigations is that serial testing is imperative.[1] Serial testing is especially relevant for patients with nondiagnostic or negative electrocardiograms.[2]

Stylized time profile graphs are often used to depict the benefit of early markers. Earlier peaks and apparently faster rises in the first couple of hours in a time profile that often extends over 72 hours are purported to indicate the superiority of early markers. Histological and electron microscopic studies have demonstrated that irreversible damage occurs after only 20 minutes of occlusion. When most patients present, on average 3 or more hours later, the distinction between small and slightly larger molecules (17 000 v. 86 000 daltons) is probably a moot point. We postulate that when ischemic damage is severe and prolonged, cellular location and concentration and intravascular metabolism are more important in determining release kinetics from the myocardium than molecular size.

Howard Dyan observed that 25–30% of our patients presented within 2 hours of the onset of chest pain whereas 30–40% presented within 2–6 hours. As a result, serial cardiac marker testing occurred at 2–4 hours for the early presenters and 2–8 hours for the latter group. Although not directly reported in our article owing to space limitations, discharged patients were also sampled at 24–48 hours for cTnI and CK MB whereas admitted patients were sampled at 8 hours for CK MB and at 16 hours for CK MB and cTnI. More than 80% of our patients with acute myocardial infarction had a positive cTnI test at 16 hours after admission.

This first report on the study focused only on the data that were available to physicians in the emergency department, as this is where the main triage decision on admission or discharge is made. The decision to test early rather than at an optimal theoretical point was a deliberate strategy to attempt to test the value of troponin measurements under real-life emergency department conditions. Positive cTnI results at 16 hours had no influence on our admission decision.

Our current emergency department investigation thus recommends serial sampling of CK at 0 and 3 hours, with a subsequent sample at 6 hours if the results and the patient's condition are inconclusive. Emergency physicians order either a CK MB or a cTnI test on one of these samples (usually the first sample). If the CK level does not change or decreases on subsequent sampling, then the CK MB – cTnI results on the first sample are valid. If the CK increases over time and the initial CK MB or

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