Studies examine use of newer blood test to help identify or rule-out heart attack

June 1 2016

Two studies published online by *JAMA Cardiology* examine the usefulness of a high-sensitivity cardiac troponin I assay to help identify or exclude the diagnosis of a heart attack for patients reporting to an emergency department with chest pain.

Patients with suspected cardiac chest pain account for more than 6 million emergency department visits annually across the United States. Current American Heart Association guidelines recommend serial measurements of cardiac troponin at presentation and 3 to 6 hours after symptom onset. As a result, most patients require prolonged assessment prior to safe discharge. This diagnostic approach leads to a large number of costly, potentially avoidable hospital admissions. Strategies that could safely identify a large proportion of patients suitable for discharge after a single sample of blood is taken on arrival in the ED would have major benefits to health care systems.

In one study, Edward Carlton, Ph.D., of the North Bristol National Health Service Trust, Bristol, England and colleagues determined the diagnostic performance of low concentrations of high-sensitivity cardiac troponin I in patients with suspected cardiac chest pain and an electrocardiogram showing no ischemia as an indicator of acute myocardial infarction (AMI; heart attack). The researchers analyzed 5 international (Australia, New Zealand, and England) observational cohort studies with outcome assessment and 30-day follow-up. A total of 3,155 patients presenting with symptoms suggestive of cardiac ischemia were included in the analysis. Eligible patients had a nonischemic

electrocardiogram determined and high-sensitivity troponin I measured at presentation. The lower limit of detection (1.2-ng/L) as well as rounded cutoff concentrations for a high-sensitivity troponin I assay were used in the analysis.

Acute myocardial infarction developed in 291 individuals (9.2 percent). High-sensitivity troponin I concentrations that were below the limit of detection identified 19 percent of patients as being potentially suitable for immediate discharge, with a high diagnostic performance in excluding AMI.

"To place these results in the context of absolute numbers of presenting patients, a number-needed-to-diagnose approach shows that, for the 1.2-ng/L cutoff level, for every 10,630 patients assessed, 1,990 would be correctly reassured that they are not having an AMI, 10 would be falsely reassured, and 8,630 would undergo further investigation, of whom 990 would ultimately receive a diagnosis of AMI. We also demonstrate that cutoff values above the lower limit of detection may not have the required diagnostic performance for clinical implementation," the authors write.

In another study, Dirk Westermann, M.D., of University Hospital Hamburg-Eppendorf, Hamburg, Germany and colleagues aimed to develop an algorithm for accurate and rapid exclusion and diagnosis of AMI after 1 hour. Current European Society of Cardiology guidelines recommend the use of high-sensitivity troponin assays on admission and after 3 hours. Recent studies suggest that AMI can be diagnosed earlier than 3 hours, when values below the 99th percentile are used as cutoff values.

This study investigated the application of the troponin I assay for the diagnosis of AMI in 1,040 patients presenting to the emergency department with acute chest pain. Results were validated in 2

independent cohorts of 4,009 patients.

The researchers found that with application of a low troponin I cutoff value of 6 ng/L, the rule-out algorithm showed a high negative predictive value of 99.8 percent after 1 hour for AMI, allowing for accurate and rapid exclusion of AMI. The l and 3-hour approaches yielded results that were not statistically different. Similarly, a rule-in algorithm based on troponin I levels provided a high positive predictive value with 83%. Application of the cutoff of 6 ng/L resulted in lower follow-up mortality (1 percent) compared with the routinely used 99th percentile (3.7 percent) for this assay.

"This cutoff [6 ng/L] enables a rapid triage that excludes AMI and a faster initiation of evidence-based treatment for patients diagnosed as having AMI," the authors write.

More information: *JAMA Cardiology*. Published online June 1, 2016; DOI: 10.1001/jamacardio.2016.1309
JAMA Cardiology. Published online June 1, 2016; DOI: 10.1001/jamacardio.2016.0695

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