Review: the accuracy of troponin T and I tests in acute myocardial infarction depends on timing after onset of symptoms


QUESTION: Are troponin T and troponin I tests accurate for detecting acute myocardial infarction (MI) at varying times from onset of symptoms or presentation to the emergency department (ED)?

Data sources
Studies were identified by searching Medline to December 1999 with terms and phrases related to troponin, diagnosis, and diagnostic use.

Study selection
English, German, French, and Spanish language studies were selected if troponin tests were used in the assessment of adults with acute chest pain, the study design included prospective data collection, assessment of acute MI was made by clinicians blinded to the results of the troponin tests, MI was diagnosed using the World Health Organisation or similar criteria, and sensitivity and specificity data were reported for > 1 time point from the onset of pain or presentation to the ED.

Data extraction
Data were extracted on settings, consecutive or non-consecutive patient enrolment, patient characteristics, test manufacturer, cut point values for abnormal levels, and timing of the test from onset of pain or presentation to the ED. Study quality was classified as level I if patients were enrolled consecutively and the rest were classified as level II. Data on sensitivity, specificity, and likelihood ratios were extracted or calculated and combined in meta-analyses.

Main results
19 studies met the inclusion criteria. Of the 11 level-I studies (3736 patients), 7 increased troponin T and 4 increased troponin I. Of the 8 level-II studies (1998 patients), 6 increased troponin T, 1 increased troponin I, and 1 increased both. The sensitivity of both tests increased from the time of onset of symptoms, whereas specificity stayed the same or decreased slightly. Serum troponin T and I tests are often used to help to diagnose acute MI. The diagnostic performance of the tests varies greatly, however, depending on the cut point used to define abnormal levels and the timing of the test from onset of symptoms. The review by Ebell et al highlights the difficulties in using troponin tests for the diagnosis of MI and provides summary sensitivity and specificity data for specific cut point values and times from symptom onset. These values are derived by using data from studies of varying quality and from a wide spectrum of patients, including patients presenting to the ED with symptoms suggestive of MI and those admitted to coronary care units because of high suspicion of MI. The reported test sensitivities may be inflated by the inclusion of patients with a high likelihood of MI. The summary diagnostic performance values are “best fit” estimates from data from several studies and are not derived by statistically rigorous methods.

The only conclusions that should be drawn from this review are that a positive troponin T test result can be useful for ruling in MI when blood is drawn > 6 hours after symptom onset and a negative troponin test result can effectively rule out MI when blood is drawn > 8 hours after symptom onset. The review fails to mention the difficulty in using these tests to diagnose patients with unstable angina; a negative test result that rules out MI should not necessarily be used to send patients home from the ED. Furthermore, the diagnostic performance of the tests is greatly affected by changing the cut points for abnormal values: a lower cutoff (0.1 ng/ml) increases sensitivity but decreases specificity.

Catherine Milch, MD
Tufts University School of Medicine
New England Medical Center
Boston, Massachusetts, USA

COMMENTARY

Test characteristics for troponin T and I for detecting acute myocardial infarction*

<table>
<thead>
<tr>
<th>Test and cut point for abnormal levels</th>
<th>Time in hours from onset of symptoms</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>+LR</th>
<th>−LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Troponin T &gt;0.1 ng/ml</td>
<td>1</td>
<td>47%</td>
<td>87%</td>
<td>3.7</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>74%</td>
<td>83%</td>
<td>4.4</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>84%</td>
<td>81%</td>
<td>4.5</td>
<td>0.2</td>
</tr>
<tr>
<td>Troponin T &gt;0.2 ng/ml</td>
<td>1</td>
<td>14%</td>
<td>87%</td>
<td>1.1</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>86%</td>
<td>83%</td>
<td>5.1</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>96%</td>
<td>81%</td>
<td>5.2</td>
<td>0.05</td>
</tr>
<tr>
<td>Troponin I &gt;0.1 ng/ml (based on only 1 study)</td>
<td>1</td>
<td>13%</td>
<td>95%</td>
<td>2.7</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>67%</td>
<td>95%</td>
<td>13</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>90%</td>
<td>95%</td>
<td>18</td>
<td>0.1</td>
</tr>
</tbody>
</table>

*LRs defined in glossary.
Review: the accuracy of troponin T and I tests in acute myocardial infarction depends on timing after onset of symptoms

Evid Based Med 2001 6: 25
doi: 10.1136/ebm.6.1.25

Updated information and services can be found at:
http://ebm.bmj.com/content/6/1/25

These include:

References
This article cites 1 articles, 0 of which you can access for free at:
http://ebm.bmj.com/content/6/1/25#BIBL

Email alerting service
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections
Articles on similar topics can be found in the following collections

- Drugs: cardiovascular system (754)
- Ischaemic heart disease (419)
- Pain (neurology) (413)
- EBM Diagnosis (148)

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/