Combining electrocardiography and necrosis biomarkers improved detection of acute myocardial infarction in patients with LBBB


QUESTION
In patients with left bundle-branch block (LBBB) on initial electrocardiography (ECG), what are the diagnostic properties of clinical evaluation, ECG, and biochemical markers of necrosis for detection of acute myocardial infarction (AMI)?

DESIGN
Blinded comparison of clinical evaluation, ECG criteria for acute myocardial infarction, and biochemical markers of necrosis with creatine kinase-MB (CK-MB) as the diagnostic standard.

SETTING
Emergency department of the Medical College of Virginia Hospital, USA.

PATIENTS
182 patients (mean age 66 y, 70% women) from an unselected population who presented with LBBB on initial ECG and who were evaluated for possible myocardial ischemia.

DESCRIPTION OF TESTS AND DIAGNOSTIC STANDARD
On presentation, patients received clinical and initial ECG evaluation. After admission to the coronary care unit, patients had serial sampling of total CK and CK-MB. A CK relative index was calculated using a formula (CK-MB × 100/total CK). All ECGs were read by 2 cardiologists unaware of the clinical variables and patient outcome. Diagnosis of AMI was confirmed by an elevation of CK-MB to 8.0 ng/mL with a relative index of 4.0 in association with a characteristic increase and decrease in markers.

MAIN OUTCOME MEASURES
Sensitivity, specificity, and positive and negative likelihood ratios (calculated from data in the article) of the 3 tests.

MAIN RESULTS
13% of the patients with LBBB had AMI. Diagnostic properties of the 3 tests alone and in combination are shown in the Table.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (CI)</th>
<th>+LR</th>
<th>−LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrocardiographic (ECG) changes</td>
<td>46% (28 to 65)</td>
<td>93% (88 to 96)</td>
<td>6.57</td>
<td>0.58</td>
</tr>
<tr>
<td>New LBBB</td>
<td>42% (24 to 62)</td>
<td>65% (57 to 72)</td>
<td>1.20</td>
<td>0.89</td>
</tr>
<tr>
<td>New or indeterminate-age LBBB</td>
<td>83% (64 to 93)</td>
<td>41% (34 to 49)</td>
<td>1.41</td>
<td>0.41</td>
</tr>
<tr>
<td>Clinical impression (high risk)</td>
<td>25% (12 to 45)</td>
<td>98% (94 to 99)</td>
<td>12.50</td>
<td>0.77</td>
</tr>
<tr>
<td>Initial CK-MB/RI elevation</td>
<td>42% (24 to 62)</td>
<td>99% (95 to 100)</td>
<td>42.00</td>
<td>0.59</td>
</tr>
<tr>
<td>Initial myoglobin elevation</td>
<td>67% (43 to 84)</td>
<td>85% (77 to 90)</td>
<td>4.47</td>
<td>0.37</td>
</tr>
<tr>
<td>Initial CK-MB/RI elevation or ECG finding of concordant ST-segment elevation or depression</td>
<td>63% (42 to 79)</td>
<td>99% (95 to 100)</td>
<td>63.00</td>
<td>0.37</td>
</tr>
<tr>
<td>IMCECG</td>
<td>83% (60 to 94)</td>
<td>85% (77 to 90)</td>
<td>5.53</td>
<td>0.20</td>
</tr>
</tbody>
</table>

*CK-MB/RI = creatine kinase-MB/relative index; IMCECG = elevation of initial myoglobin or CK-MB/RI or ECG finding of concordant ST-segment elevation or depression. Diagnostic terms defined in Glossary; LR’s calculated from data in article.

CONCLUSION
Combining electrocardiography and biomarkers of necrosis increased both the sensitivity and specificity of testing for acute myocardial infarction in patients with left bundle-branch block.

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COMMENTARY
Patients with LBBB and AMI are at high risk with much to gain from thrombolysis (1). However, these patients remain undertreated. With the common goal of distinguishing truly lytic-eligible patients from thrombolysis (1). However, these patients remain undertreated. With the common goal of distinguishing truly lytic-eligible patients from thrombolysis in the absence of contraindications (1). When faced with a patient who has signs and symptoms of AMI and an ECG showing LBBB, any time spent studying the subtleties of the ECG is wasted time. If the clinical evidence is inconclusive, the decision is subject to greater uncertainty. But we suggest that precious time be used to further assess the patient, not the ECG.

Reference