Chest radiographs and BNP levels provided complementary information beyond clinical findings for diagnosing heart failure


Clinical impact ratings GP/FP/Primary care ★★★★★☆ IM/Ambulatory care ★★★★★☆ Internal medicine ★★★★★★★ Respirology ★★★★★★ Cardiology ★★★★★★

Q In patients with acute dyspnoea, how do chest radiographic findings and circulating B type natriuretic peptide (BNP) levels compare for diagnosing heart failure (HF)?

METHODS

Design: blinded comparison of chest radiographs and BNP levels with confirmatory clinical diagnosis.

Setting: 5 teaching hospitals in the United States and 2 in Europe.

Patients: 880 patients (mean age 64 y, 55% men) presenting to the emergency department (ED) with a principal complaint of shortness of breath (either the sudden onset of dyspnoea with no history of chronic dyspnoea or an increase in the severity of chronic dyspnoea); and had complete information on BNP, historical, clinical, and electrocardiographic data, and chest radiographic findings. Patients with dyspnoea not caused by HF (eg, stabbing injuries, trauma, and pneumothorax) were excluded.

Description of tests: chest radiographs were obtained in the ED and the presence of cardiomegaly, cephalisation, interstitial oedema, alveolar oedema, pleural effusion, hyperinflated lungs, and pneumatic infiltrates, as interpreted by a radiologist, was recorded. During initial evaluation, BNP levels were measured using the Triage BNP test (Biosite Diagnostics, San Diego, CA, USA), a fluorescence immunoassay for the quantitative determination of BNP in whole blood and plasma specimens. BNP levels were analysed within 4 hours or were centrifuged, frozen, and analysed 1 to 2 days later.

Diagnostic standard: about 30 days after the ED visit, the results of electrocardiography, chest radiography, echocardiography, clinical test results, consultations, and medical record information were used by 2 independent cardiologists to categorise cases as caused by acute HF or having noncardiac causes.

Outcomes: sensitivity, specificity, and positive and negative likelihood ratios for the diagnosis of acute HF.

MAIN RESULTS

447 of 880 patients (51%) had a final diagnosis of acute HF. Of these, 90% had BNP levels ≥100 pg/ml. 576 of 880 patients (66%) fulfilled the Framingham criteria for HF. The table shows the results. In a multivariate analysis, additional information beyond the clinical predictors of acute HF was provided by BNP at a cutpoint of ≥100 pg/ml (odds ratio [OR] 12.3, 95% CI 7.4 to 20.4) and chest radiographic variables of cardiomegaly (OR 2.3, CI 1.4 to 3.7), cephalisation (OR 6.4, CI 3.3 to 12.5), and interstitial oedema (OR 7.0, CI 2.9 to 17).

CONCLUSION

In patients with acute dyspnoea, chest radiographic variables and circulating B type natriuretic peptide levels provided complementary diagnostic information beyond clinical predictors for diagnosing heart failure.

Abstract and commentary also appear in ACP Journal Club.

Diagnostic characteristics of chest radiographic findings and B type natriuretic peptide (BNP) levels for detecting heart failure*

<table>
<thead>
<tr>
<th>Tests</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (CI)</th>
<th>LR 1</th>
<th>LR 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiomegaly</td>
<td>79% (75 to 83)</td>
<td>80% (76 to 84)</td>
<td>3.98</td>
<td>0.26</td>
</tr>
<tr>
<td>Cephalisation</td>
<td>41% (37 to 46)</td>
<td>96% (93 to 97)</td>
<td>9.41</td>
<td>0.61</td>
</tr>
<tr>
<td>Interstitial oedema</td>
<td>27% (23 to 31)</td>
<td>98% (96 to 99)</td>
<td>12.67</td>
<td>0.72</td>
</tr>
<tr>
<td>BNP (pg/ml)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥100</td>
<td>90% (86 to 92)</td>
<td>75% (71 to 79)</td>
<td>3.66</td>
<td>0.14</td>
</tr>
<tr>
<td>≥200</td>
<td>80% (76 to 84)</td>
<td>87% (83 to 90)</td>
<td>6.08</td>
<td>0.23</td>
</tr>
<tr>
<td>≥300</td>
<td>71% (67 to 75)</td>
<td>90% (87 to 93)</td>
<td>7.18</td>
<td>0.32</td>
</tr>
</tbody>
</table>

*Diagnostic terms defined in glossary; LRs calculated from data in article; CIs provided by author.
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