Original papers

Human heart-type fatty-acid-binding protein as a point-of-care test in the early diagnosis of acute myocardial infarction

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Summary

Background: At very early stages of acute myocardial infarction (AMI), highly sensitive biomarkers are still lacking.
Aim: To evaluate the utility of human heart-type fatty acid-binding protein (h-FABP) for early diagnosis of AMI.
Design: Prospective diagnostic study.
Methods: Consecutive patients presenting to the emergency department with chest pain or dyspnoea within 24 h of symptom onset were included. At presentation, the h-FABP test result was compared to the standard diagnostic work-up, including repeated ECG and troponin T measurements. Sensitivity analysis was performed for inconclusive tests.
Results: We enrolled 280 patients presenting to hospital with a median symptom onset of 3 h (IQR 2–6 h): 109 (39%) had AMI. At presentation, h-FABP had a sensitivity of 69% (95%CI 59–77) and specificity of 74% (95%CI 66–80); 45 tests were false-positive and 34 were false-negative. Omitting inconclusive tests increased sensitivity and specificity only slightly. AMI was identified significantly earlier by h-FABP than by troponin T (24 vs. 8 patients, p=0.005).
Discussion: Although h-FABP can help to detect myocardial damage at an early stage in patients with chest pain or dyspnoea, it appears unsuitable as a stand-alone test for ruling out AMI.

Introduction

Cardiac markers are an important tool in the diagnosis of acute myocardial infarction (AMI).1–3 The ideal marker should quickly identify high-risk patients for fast-track treatment, while excluding patients who are at low risk of life-threatening disease.4

Cardiac troponins fulfil these criteria to a large extent; their high sensitivity for minor myocardial injury and almost total specificity to the cardiac muscle have made it possible to redefine AMI in biochemical terms.5 They have thus become the preferred biochemical marker for acute coronary syndrome (ACS).6 However, due to their delayed appearance in serum, there is still a need for reliable early markers.

Recent research suggests that human heart-type fatty-acid-binding protein (h-FABP), a cytosolic
protein mainly expressed by myocytes, might have potential as an early cardiac marker. It appears in plasma 1–3 h after cardiac damage, and may be the earliest available plasma marker of acute myocardial injury.\textsuperscript{7,8} It may have better diagnostic accuracy than other cardiac markers in the early stages after symptom onset,\textsuperscript{9–12} although the clinical impact of this better diagnostic performance remains controversial.\textsuperscript{13,14}

Qualitative point-of-care tests (POCT) designed to detect h-FABP in whole blood samples and produce a result 15 min after blood application have recently been developed,\textsuperscript{15,16} and are now commercially available in Europe.

We aimed to evaluate, in a reasonably large consecutive group, whether a qualitative h-FABP POCT could reliably diagnose AMI in patients presenting to the emergency department with symptoms likely to be of coronary origin.

**Methods**

Our trial was designed as a prospective diagnostic study, according to the Declaration of Helsinki. We followed the criteria for reporting diagnostic accuracy published by the STARD group,\textsuperscript{17} and the study was approved by the local ethics committee.

![Figure 1. Flow diagram of study population.](https://academic.oup.com/qjmed/article-abstract/100/4/203/2258670/figure1)

**Participants**

The study took place at the non-trauma emergency department\textsuperscript{18} of the Medical University Hospital in Vienna, Austria. Patients presenting to the emergency department were consecutively screened for entry criteria: onset of acute chest pain and/or dyspnoea lasting for at least 20 min within the last 24 h, age >18 years. A total of 295 patients met these entry criteria, of whom 280 were included; the reasons for exclusion are listed in Figure 1.

**Sample and data collection**

Five investigators (2 final-year students, 3 junior-grade doctors) who were trained in performing and reading the test at the outset shared a full-shift rota 24 h a day. Their duties included patient screening, performing and interpreting the h-FABP test, and taking the patients’ presenting history. The reference standard was interpreted by two experienced senior-grade doctors.

Blood samples for the h-FABP test were taken from every patient at hospital presentation and 4 h later, together with routine blood sampling. The h-FABP test was performed immediately, and the physician responsible for the patient who made the reference diagnosis was blinded to the
result. To maintain blinding, h-FABP test processing was performed in a separate room at the emergency department. At presentation, current symptoms and past medical history were documented using a pre-defined protocol. Data for TIMI risk score assessment were collected and applied to patients finally diagnosed with ACS. Chronic renal failure (CRF) and pre-test physical exercise are known to cause elevated h-FABP blood levels; the presence of these conditions was also noted. Patients with no history of renal failure and serum creatinine level <1.3 mg/dl were defined as having normal renal function. Follow-up information regarding reference diagnosis and outcome was extracted from medical notes and discharge letters. The investigator performing the index test was blinded to standard diagnostic work-up, but was aware of patients’ present symptoms.

Data were entered in an electronic database twice independently, and compared for disparities. The database was checked for errors by a person who did not participate in data entry.

Test methods

h-FABP point-of-care test

We used a rapid chromatographic immunoassay designed for qualitative determination of h-FABP in whole blood samples at cut-off levels of 7 ng/ml (CardioDetect, Rennesens). The test kit was the size of a credit card and required 60–100 μl whole blood. The test had to be interpreted within 20 min after blood application. Tests were judged to be positive or negative; invalid tests without control bands were repeated immediately. When the investigator was in doubt about the diagnosis due to a blur change of the h-FABP color band, a test example for ‘weak’ positive and negative tests provided by the manufacturer assisted in reading the test. When a test was inconclusive after interpretation as described above, this was noted in addition to the test result.

Reference diagnosis

Standard diagnostic work-up for patients with acute chest pain was defined as the reference standard. Our standard protocol for chest pain includes 12-lead ECG and cardiac markers (CK, CKMB and troponin T), obtained from every patient, both at presentation and 4 h later. At the physician’s discretion, the observational period could be prolonged, and could include echocardiography, coronary angiography, CT, MRI, nuclear imaging or stress testing.

Diagnostic outcome was categorized into four groups: (i) ST-elevation myocardial infarction (STEMI); (ii) non-ST-elevation myocardial infarction (NSTEMI); (iii) unstable angina (UA); and (iv) no ACS. Diagnoses were by a senior cardiologist according to the Joint Guidelines of the European Society of Cardiology and American College of Cardiology Committee. Troponin T serum concentrations ≥0.04 ng/ml were considered to be positive in terms of myocyte damage. Alternative reasons for elevated troponin levels had to be excluded before judgement of the reference standard; the diagnosis was made after critical review of the clinical picture and all relevant information.

Our primary outcome parameter was AMI (STEMI or NSTEMI). The secondary outcome parameter was ACS (STEMI, NSTEMI or UA) to allow for the influence of potentially false-negative troponin T results.

Statistical methods

Sample size calculation was based on the precision of the sensitivity of h-FABP for diagnosing AMI. An interval of 5% around the proposed sensitivity, given a prevalence of 25%, required a sample of about 290 individuals.

Data are presented as means and 95% CIs or as medians and IQRs, as noted. Diagnostic test criteria included sensitivity, specificity, negative and positive predictive values, likelihood ratios and diagnostic odds ratio, and were calculated according to standard procedures. The respective 95% CIs are test-based. To allow for stratum effects, we calculated stratum-specific diagnostic test criteria. A sensitivity analysis was used to assess the influence of inconclusive test results on diagnostic criteria. To assess whether h-FABP or troponin T was positive earlier, we used the McNemar test. For data processing, we used MS Excel for Windows XP; for statistical analysis, we used Stata 8 (intercooled Stata 8.2 for Windows). A two-sided p value <0.05 was considered statistically significant.

Results

Participants

Between 4 April 2005 and 23 August 2005, a total of 280 patients were enrolled out of 295 patients meeting the entry criteria (Figure 1). Mean age was 58 years (95%CI 57–60), and 213 (76%) were male. Median time from symptom onset to first blood sample was 3 h (IQR 2–6). Patient characteristics are presented in Table 1. For the full distribution of coronary risk factors, see Supplement 1 in the online supplement at www.qjmed.oxfordjournals.org.
Fourteen patients (5%) had recently taken physical exercise, and 18 (6%) had chronic renal failure (CRF). In 75 (27%) patients, ACS was ruled out on an outpatient basis. The others were admitted to hospital for further diagnostic work-up: 140 (50%) underwent coronary angiography, and 110 (39%) had a coronary intervention. Four patients died during their hospital stay, secondary to massive pulmonary embolism following bypass grafting in one case, and acute heart failure secondary to AMI in three.

ACS was diagnosed in 140 (50%) individuals: 31 (11%) with UA, and 109 (39%) patients, of whom 73 (26%) had STEMI and 36 (13%) NSTEMI. The non-ACS group consisted of 140 patients with a final diagnosis of hypertension, stable angina, pulmonary embolism, atrial fibrillation, gastritis, pneumonia, myocarditis, aortic dissection or non-serious causes.

**Test results**

Table 2 shows the diagnostic performance of h-FABP at presentation. Sensitivity was highest (91.3%, 95%CI 72.0–98.9) in those who presented >6 h after symptom onset. Recent physical exercise and CRF did not interfere with diagnostic accuracy. In the h-FABP sample drawn 4 h after presentation, sensitivity and specificity were 89.9% (95%CI 82.5–94.8) and 76.0% (95%CI 68.8–82.3), respectively. Full stratified data for ACS are shown in Supplement 2 of the online supplement www.qjmed.oxfordjournals.org.

**Sensitivity analysis**

Thirty-nine tests were inconclusive: 18 in patients with AMI and 21 in patients without AMI. In the latter group, seven were diagnosed as ‘hypertensive episode’ and six as unstable angina with troponin serum levels below the cut-off value. Exclusion of inconclusive tests only slightly increased sensitivity and specificity (Table 3). Test results and diagnosis, including inconclusive tests at hospital presentation and 4h later, can be seen in Table 4, and for ACS, Supplement 3 of the online supplement www.qjmed.oxfordjournals.org.

**Comparison of h-FABP and troponin T**

Of the 98 patients in whom both h-FABP and troponin T were positive, h-FABP was positive earlier than troponin in 24, whereas troponin T was positive earlier than h-FABP in eight (p = 0.005; Figure 2).

**Discussion**

We aimed to evaluate the accuracy of h-FABP in a point-of-care setting for early detection of myocardial damage (or ruling out AMI) in patients presenting to the emergency department with chest pain or dyspnoea. In our patients, h-FABP could not by itself diagnose AMI with adequately high accuracy, but when positive, it was usually faster than troponin T.

**Endpoints: AMI vs. ACS**

The endpoint of AMI has its limitations, because the usual definition of AMI\(^1\) includes a positive biomarker, which in our case was troponin T. Hence false-negative troponin T results could potentially influence the apparent accuracy of h-FABP. To overcome this potential problem, we additionally calculated the diagnostic accuracy of h-FABP for the clinical diagnosis of Acute Coronary Syndrome (ACS), although h-FABP is a known marker of myocardial injury rather than myocyte

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**Table 1** Patient characteristics at presentation

<table>
<thead>
<tr>
<th>Total (n = 280)</th>
<th>STEMI (n = 73)</th>
<th>NSTEMI (n = 36)</th>
<th>UA (n = 31)</th>
<th>No ACS (n = 140)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>213 (76%)</td>
<td>57 (78%)</td>
<td>31 (86%)</td>
<td>28 (90%)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>58.2 (56.5–59.9)</td>
<td>58.3 (55.2–61.4)</td>
<td>60.8 (56.7–64.9)</td>
<td>64.7 (59.1–70.3)</td>
</tr>
<tr>
<td>BMI (kg/m(^2))</td>
<td>28.0 (27.4–28.5)</td>
<td>28.1 (27.0–29.3)</td>
<td>29.3 (27.1–31.5)</td>
<td>26.7 (25.6–27.8)</td>
</tr>
<tr>
<td>Risk stratification*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low risk</td>
<td>–</td>
<td>29 (40%)</td>
<td>4 (11%)</td>
<td>3 (10%)</td>
</tr>
<tr>
<td>Intermediate risk</td>
<td>–</td>
<td>32 (44%)</td>
<td>25 (69%)</td>
<td>16 (52%)</td>
</tr>
<tr>
<td>High risk</td>
<td>–</td>
<td>12 (16%)</td>
<td>7 (19%)</td>
<td>12 (39%)</td>
</tr>
</tbody>
</table>

Data are numbers (%) or means (95%CI), as appropriate. STEMI, ST-elevation myocardial infarction; NSTEMI, non-ST-elevation myocardial infarction; UA, unstable angina; ACS, acute coronary syndrome; BMI, body mass index.

*Risk stratification: the low risk group had a TIMI risk score of 0–2 (STEMI, NSTEMI/UA), the intermediate risk group a score of 3–5 (STEMI) and 3 or 4 (NSTEMI/UA) and the high risk group a score of 5–14 (STEMI) or 4–7 (NSTEMI/UA).
### Table 2  Diagnostic test characteristics of h-FABP at hospital presentation

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>AML prevalence (%)</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Likelihood ratio (+)</th>
<th>Likelihood ratio (−)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>280</td>
<td>39%</td>
<td>68.8 (59.2–77.3)</td>
<td>73.7 (66.4–80.1)</td>
<td>2.61 (1.97–2.46)</td>
<td>0.423 (0.316–0.567)</td>
</tr>
<tr>
<td>Time since symptom onset</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;2h</td>
<td>107</td>
<td>49%</td>
<td>65.4 (50.9–78.0)</td>
<td>78.2 (65.0–88.2)</td>
<td>3.00 (1.75–5.13)</td>
<td>0.443 (0.297–0.660)</td>
</tr>
<tr>
<td>2–6h</td>
<td>105</td>
<td>32%</td>
<td>58.8 (40.7–75.4)</td>
<td>70.4 (58.4–80.7)</td>
<td>1.99 (1.26–3.14)</td>
<td>0.585 (0.381–0.898)</td>
</tr>
<tr>
<td>&gt;6h</td>
<td>68</td>
<td>34%</td>
<td>91.3 (72.0–98.9)</td>
<td>73.3 (58.1–85.4)</td>
<td>3.42 (2.08–5.65)</td>
<td>0.119 (0.031–0.451)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥55 years</td>
<td>164</td>
<td>41%</td>
<td>77.9 (66.2–87.1)</td>
<td>61.5 (51.0–71.2)</td>
<td>2.02 (1.52–2.68)</td>
<td>0.359 (0.223–0.577)</td>
</tr>
<tr>
<td>&lt;55 years</td>
<td>116</td>
<td>35%</td>
<td>53.7 (37.4–69.3)</td>
<td>89.3 (80.1–95.3)</td>
<td>5.03 (2.46–10.3)</td>
<td>0.519 (0.370–0.728)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>67</td>
<td>31%</td>
<td>66.7 (43.0–85.4)</td>
<td>67.4 (52.0–80.5)</td>
<td>2.04 (1.22–3.42)</td>
<td>0.495 (0.261–0.936)</td>
</tr>
<tr>
<td>Male</td>
<td>213</td>
<td>41%</td>
<td>69.3 (58.6–78.7)</td>
<td>76.0 (67.5–83.2)</td>
<td>2.89 (2.05–4.06)</td>
<td>0.404 (0.290–0.561)</td>
</tr>
<tr>
<td>CRF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>254</td>
<td>40%</td>
<td>67.3 (57.3–76.3)</td>
<td>76.5 (68.9–82.9)</td>
<td>2.86 (2.09–3.93)</td>
<td>0.427 (0.319–0.573)</td>
</tr>
<tr>
<td>Yes</td>
<td>26</td>
<td>31%</td>
<td>87.5 (47.3–99.7)</td>
<td>50.0 (26.0–74.0)</td>
<td>1.75 (1.03–2.98)</td>
<td>0.250 (0.037–1.66)</td>
</tr>
<tr>
<td>Exercise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>262</td>
<td>38%</td>
<td>69.0 (59.0–77.9)</td>
<td>72.8 (65.3–79.5)</td>
<td>2.54 (1.91–3.38)</td>
<td>0.426 (0.313–0.579)</td>
</tr>
<tr>
<td>Yes</td>
<td>18</td>
<td>50%</td>
<td>66.7 (29.9–92.5)</td>
<td>88.9 (51.8–99.7)</td>
<td>6.00 (0.893–40.3)</td>
<td>0.375 (0.145–0.972)</td>
</tr>
<tr>
<td>Risk stratification*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;4 risk factors</td>
<td>200</td>
<td>43%</td>
<td>67.1 (56.0–76.9)</td>
<td>73.9 (64.9–81.7)</td>
<td>2.57 (1.83–3.62)</td>
<td>0.446 (0.323–0.615)</td>
</tr>
<tr>
<td>≥4 risk factors</td>
<td>80</td>
<td>30%</td>
<td>75.0 (53.3–90.2)</td>
<td>73.2 (59.7–84.2)</td>
<td>2.80 (1.71–4.57)</td>
<td>0.341 (0.168–0.695)</td>
</tr>
</tbody>
</table>

Data are numbers, percentages, or means (95%CI), as appropriate. AMI, acute myocardial infarction; CRF, chronic renal failure. *High risk group. Patients were considered to be at high risk when presenting with ≥4 out of the following risk factors: past medical history of CAD; family history of CAD; smoker; hypertension; diabetes; hypercholesterolaemia.

### Table 3  Sensitivity analysis

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>AML prevalence (%)</th>
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<th>Specificity</th>
<th>Likelihood ratio (+)</th>
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</thead>
<tbody>
<tr>
<td>Overall</td>
<td>280</td>
<td>39%</td>
<td>68.8 (59.2–77.3)</td>
<td>73.7 (66.4–80.1)</td>
<td>2.61 (1.97–2.46)</td>
<td>0.423 (0.316–0.567)</td>
</tr>
<tr>
<td>Conclusive only</td>
<td>241</td>
<td>38%</td>
<td>71.4 (61.0–80.4)</td>
<td>77.3 (69.8–83.8)</td>
<td>3.15 (2.28–4.35)</td>
<td>0.369 (0.264–0.517)</td>
</tr>
<tr>
<td>Inconclusive only</td>
<td>39</td>
<td>46%</td>
<td>55.6 (30.8–78.5)</td>
<td>47.6 (25.7–70.2)</td>
<td>1.06 (0.594–1.90)</td>
<td>0.933 (0.471–1.85)</td>
</tr>
</tbody>
</table>

Data are numbers, percentages, or means (95%CI), as appropriate. AMI, Acute myocardial infarction.

### Table 4  Cross table of h-FABP test results vs. diagnosis

<table>
<thead>
<tr>
<th></th>
<th>h-FABP (+)</th>
<th>h-FABP (−)</th>
<th>Inconclusive</th>
<th>Missing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>At presentation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMI present</td>
<td>65</td>
<td>26</td>
<td>18 (10+/8−)</td>
<td>0</td>
<td>109</td>
</tr>
<tr>
<td>AMI absent</td>
<td>34</td>
<td>116</td>
<td>21 (11+/10−)</td>
<td>0</td>
<td>171</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>142</td>
<td>39 (21+/18−)</td>
<td>0</td>
<td>280</td>
</tr>
</tbody>
</table>

|                |            |            |              |         |       |
| **Four hours after presentation** |            |            |              |         |       |
| AMI present    | 92         | 7          | 9 (4+/5−)    | 1       | 109   |
| AMI absent     | 30         | 113        | 24 (11+/13−) | 4       | 171   |
| Total          | 122        | 120        | 33 (15+/18−) | 5       | 280   |
ischaemia.\textsuperscript{25,26} This information provides a more complete picture from the clinical point of view,\textsuperscript{27} but the results were roughly similar for AMI and ACS. The results for ACS are available in the online supplement www.qjmed.oxfordjournals.org.

Stratum-specific values

Stratified analysis indicated better test performance in elderly patients and those at high risk. Compared to younger patients, sensitivity was higher in older patients, but the inverse was observed for specificity. In the high-risk stratum, sensitivity was as high as 75.0\% (53.5–90.2), but these effects are small and might be due to chance alone.

Patients with CRF and pre-test physical exercise are known to have increased serum levels of h-FABP,\textsuperscript{21,22} but these factors did not affect diagnostic performance in our patients.

As expected, there was a trend towards enhanced test performance with increasing time after symptom onset, with best performance in the group with symptom onset of >6h, although these differences did not reach statistical significance. This trend is also consistent with the better test characteristics for the h-FABP test set 4h after admission.

Time performance

H-FABP rises are detectable 1–3h after tissue injury,\textsuperscript{16} whereas troponin concentration increases later (4–10h).\textsuperscript{25} We were able to confirm these findings: in our patients, h-FABP was positive significantly earlier (\(p=0.005\)) than was troponin T. Half of all our patients presented to hospital within 3h after symptom onset, when h-FABP might already be detectable, but not troponin T. Nonetheless, troponin T was the earlier cardiac marker in 8\% of patients testing positive. Variability in reporting of time delay after symptom onset may contribute to this finding.

Sensitivity analysis

Interpretation of a simple coloured line as a positive test is not always straightforward; despite this being a substantial problem of such qualitative tests, we found little information about such metering difficulties in the literature.\textsuperscript{4} In our study, colour bands of definite positive tests became visible within 5–10 minutes, whereas in inconclusive tests, it took much longer for the colour band to appear, and sometimes the colour band remained blurred. One in eight test results was inconclusive. The two main diagnoses in patients with inconclusive tests who did not suffer an AMI were acute hypertension and unstable angina. It seems possible that these conditions may have caused h-FABP blood levels close to the lower cut-off value for the test, and therefore have been responsible for the ‘inconclusive’ test result. h-FABP can also be released by myocytes in patients with myocardial ischaemia.\textsuperscript{28,29} However, sensitivity analyses excluding vs. including inconclusive tests showed little change in diagnostic test characteristics, suggesting that the test is robust.

Previous result with h-FABP

Our findings are within the range of other trials, when considering the differences in symptom onset. Riesgo et al.\textsuperscript{30} analysed the same test panel in an emergency setting and showed an overall sensitivity of 47\%, but the average symptom duration was only 74 min, explaining the lower test values. Alansari and Croal\textsuperscript{14} found an overall area under ROC curve (AUC) of 0.636 (95\%CI 0.567–0.695) of h-FABP for time after symptom onset of 5h. Despite a shorter time after symptom onset, AUC was a little higher in our study (0.712, 95\%CI 0.658–0.767), but not significantly so.

Notably, Seino et al.\textsuperscript{31} found a sensitivity of 90.3\% (95\%CI 73–97) and a specificity of 77.5\% (95\%CI 68–85) in a small group of patients presenting to office cardiologists with chest pain. The difference may be explained by lower cut-off levels at 6.2 ng/ml, and by a markedly longer time after symptom onset of 6 to 12h. A recently published abstract by Ecollan et al.\textsuperscript{32} found that early qualitative assessment of h-FABP in a mobile ICU improves the diagnosis of ongoing AMI.
Other early markers

Comparing h-FABP to CK-MB and myoglobin, our findings suggest that on hospital presentation, h-FABP is more sensitive but less specific. A recent meta-analysis by Balk et al.\textsuperscript{23} examined the diagnostic accuracy of various cardiac markers in ACS and AMI at presentation to the emergency department. For AMI, the sensitivity of CK-MB was 44\% (95\%CI 35–53) and the sensitivity of myoglobin was 49\% (95\%CI 41–57). Specificity of both markers was >90\%. For ACS, the biomarkers had sensitivities of 16–19\%, and specificities of 96–100\%. The authors reported moderate heterogeneity among the studies; no clear correlation between time after symptom onset and sensitivity could be identified.

Importance

The point-of-care test with h-FABP is now available to patients on the European market, but its role in the diagnostic pathway has yet to be determined. In our patients, h-FABP alone was not safe for excluding AMI at presentation to the hospital. The earlier after symptom onset the test is applied, the lower test performance will be, and obviously, pre-hospital point-of-care testing will be even earlier than in our hospital-based study. The simplicity of the test enables laypersons to perform it at home, and inappropriate confidence in a negative test result might delay or even prevent them from seeking professional help.

Our findings do suggest that at the point-of-care, h-FABP tests may contribute to detecting AMI more rapidly, but need to be used with other measures. Further research is needed to elucidate the role of h-FABP in combination with other markers.\textsuperscript{1}

Limitations

Our study was university hospital-based and may not necessarily reflect results for the general population. It should be fairly representative of the emergency department setting, as we included patients consecutively and tried to avoid any selection bias within the emergency department population, but the results may not translate to others settings, such as self-testing of patients at home.

The prevalence of AMI (39\%) in our cohort appears high. Previous investigations at our emergency department\textsuperscript{23} showed an AMI prevalence <20\% of all patients presenting with chest pain, but our inclusion criteria regarding symptom duration of >20 min within the last 24 h were more selective. We sought to focus on patients who needed to be observed for a prolonged time for a safe exclusion of AMI, and for these patients we consider the AMI prevalence in our cohort to be representative.

To avoid information bias, all treating physicians were blinded to the test result, and the person performing the test was blinded to the reference standard. The only exception (for practical reasons) was awareness of test readers of the presenting symptoms of the patient. The test had to be performed immediately after blood drawing, and due to limited personnel resources, only one investigator was present at times. This may be a limitation, but in real-life usage, the person doing the test will often be in a similar situation.

Conclusions

h-FABP can help to detect myocardial damage early at presentation in patients with chest pain or dyspnoea, but to confirm diagnosis or exclusion of AMI, a combination with more accurate markers is necessary. Our findings do not support the use of h-FABP to rule out AMI. There were some difficulties with test interpretation, but these problems did not greatly affect test performance.

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