Does a negative D-dimer test rule out aortic dissection?

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Background

Early and accurate diagnosis is crucial for the management of patients with acute aortic dissection (AD). Recent studies [1-6] claimed that the D-dimer test may be a valuable addition to the diagnostic work-up in patients with suspicion of the disease.

Methods

The objective was to assess the value of the D-dimer test to rule out AD (sensitivity) using a generally accepted cut-off value of <500 mg/l. We performed a retrospective analysis of all patients with AD at the University Hospital in Basel between January 2000 and October 2005, who had a D-dimer immunoassay (LiaT est®) available [11]. Diagnosis was confirmed by TEE, angiography, CT-scanning or histopathological findings.

The sensitivity of the D-dimer test was calculated and a potential association of time from symptom onset until collection of the D-dimer blood sample was assessed.

Results

Twenty-five cases with confirmed AD and a D-dimer test were identified. The baseline characteristics are shown in table 1. Twenty-two patients had a true-positive and three patients had a false-negative D-dimer test result (cut-off <500 mg/l), resulting in a sensitivity of 88.0% (70.0% to 95.8%). There was no association between the level of the D-dimer reading and time of symptom onset or the extent of dissection (figure 1).

We observed no particular characteristics in the three patients with a negative D-dimer test concerning age, gender, extent of dissection, outcome or histological features compared to the remaining cases.

Discussion

In contrast to earlier studies reporting an excellent sensitivity of the D-dimer test in patients with AD (table 2), we found a substantial number of false negative test readings in our retrospective case-series. Twelve percent false-negative test readings using a <500 mg/l cut-off puts the usefulness of the D-dimer test to rule out AD in question. Until the results of large studies including consecutive series of patients with suspicion of AD and a rationale for an optimal cut-off value become available, we believe that D-dimer tests are not safe enough to rule out AD.

Table 1

<table>
<thead>
<tr>
<th>Study</th>
<th>Number of patients</th>
<th>D-dimer neg.</th>
<th>Sensitivity</th>
<th>Cut-off (µg/l)</th>
<th>Mean (µg/l)</th>
<th>D-dimer assay</th>
<th>Mortality</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weber et al. 2003 (1)</td>
<td>24</td>
<td>0</td>
<td>100%</td>
<td>500</td>
<td>9400</td>
<td>Tina-quant assay (Roche)</td>
<td>42%</td>
<td>pro- and retrospective</td>
</tr>
<tr>
<td>Perez et al. 2004 (2)</td>
<td>7</td>
<td>0</td>
<td>100%</td>
<td>500</td>
<td>n.a.</td>
<td>Semiquantitative latex agglutination assay</td>
<td>n.a.</td>
<td>retrospective case series</td>
</tr>
<tr>
<td>Eggbrecht et al. 2004 (3)</td>
<td>16</td>
<td>0</td>
<td>100%</td>
<td>500</td>
<td>2238</td>
<td>Quantitative assay D-Dimer Plus, (Dade Behring)</td>
<td>50%</td>
<td>pro- and retrospective</td>
</tr>
<tr>
<td>Hazui et al. 2005 (4)</td>
<td>29</td>
<td>2</td>
<td>93%</td>
<td>800</td>
<td>n.a.</td>
<td>Latex agglutination, n.a.</td>
<td>n.a.</td>
<td>pro- and retrospective</td>
</tr>
<tr>
<td>Akanu et al. 2005 (5)</td>
<td>30</td>
<td>0</td>
<td>100%</td>
<td>500</td>
<td>1800</td>
<td>Rapid bedside assay Cardiac reader (Roche)</td>
<td>13%</td>
<td>prospective case control</td>
</tr>
<tr>
<td>Ohlman et al. 2006 (6)</td>
<td>94</td>
<td>1</td>
<td>99%</td>
<td>400</td>
<td>8610</td>
<td>Immunoassay (Sta-LiaT)</td>
<td>23%</td>
<td>retrospective case series</td>
</tr>
<tr>
<td>Wiegand et al. 2007</td>
<td>25</td>
<td>3</td>
<td>88%</td>
<td>500</td>
<td>4420</td>
<td>Immunoassay (LiaT est®)</td>
<td>32%</td>
<td>retrospective case series</td>
</tr>
</tbody>
</table>

References


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Figure 1
Scatter plot with locally weighted regression line of time from symptom onset and level of D-dimer reading.

Table 1
Baseline characteristics of 25 patients with AD.

<table>
<thead>
<tr>
<th>Sex (male/female)</th>
<th>Age (yr)</th>
<th>Arterial Hypertension</th>
<th>Smoking</th>
<th>Diabetes mellitus</th>
<th>Hypercholesterolaemia</th>
<th>Marfan’s Syndrome</th>
<th>Deaths (in-hospital)</th>
<th>Median time from symptom onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/3 (88/12%)</td>
<td>62.7 (±15.4)</td>
<td>18 (72%)</td>
<td>11 (44%)</td>
<td>4 (16%)</td>
<td>7 (28%)</td>
<td>2 (8%)</td>
<td>8 (32%)</td>
<td>2 hours (0.5–120h)</td>
</tr>
</tbody>
</table>

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