Post-cardiac injury syndrome (PCIS) is an inflammatory process involving pleura and pericardium secondary to cardiac injury. Even though this clinical entity has been recognised for decades, diagnosis is difficult because of lack of a diagnostic test. Antimyocardial antibody titre in pleural fluid and serum has been proposed to have diagnostic value. However there are inherent difficulties in measuring and interpreting the role of antimyocardial antibody. A case of PCIS with low pleural fluid complement level is reported, which it is believed can be useful to support the diagnosis of PCIS.

The post-cardiac injury syndrome (PCIS) refers to pleuroperticarditis secondary to cardiac injury by various mechanisms. Diagnosis depends upon clinical suspicion and exclusion of other clinical conditions that may mimic this syndrome, such as pulmonary embolism, pneumonia, and congestive heart failure. The injury is believed to be immunological. Kim and Sahn reported immunological assessment of pleural fluid, including antimyocardial antibody testing, in a patient with PCIS. We report the results of immunological analysis of pleural fluid in a patient with PCIS. We think that a low complement level in pleural effusion may serve as a potential diagnostic tool.

CASE REPORT
A 60 year old man was admitted with pleuritic chest pain, fever, and shortness of breath of one days’ duration. He had undergone redo coronary artery bypass graft surgery six days previously. His past medical history was significant for PCIS 10 years previously after his first coronary artery bypass graft surgery, which required the use of corticosteroids. Physical examination showed low grade fever (37.4°C), decreased breath sounds at lung bases, pleural and pericardial friction rubs. Chest radiography showed moderate size bilateral pleural effusion. A ventilation-perfusion scan was of low diagnostic value. Moreover, titres below 1:40 may not be significant, and the development of PCIS. Although it is thought that the patients with high titres of antimyocardial antibody may develop PCIS, it is difficult to interpret these studies because of differences in assay techniques. In our patient the antimyocardial antibody titres in pleural fluid and serum were <1:40. The pleural fluid to serum antimyocardial antibody ratio could not be calculated, as we could not quantify titres below 1:40. Moreover, titres below 1:40 may not be significant, and the

Table 1  Results of pleural fluid analysis

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Pleural fluid</th>
<th>Serum</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose [mmol/l]</td>
<td>9.5</td>
<td>2.4</td>
<td></td>
</tr>
<tr>
<td>Protein [g/l]</td>
<td>31</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Lactate dehydrogenase [µkat/l]</td>
<td>21.41</td>
<td>3.84</td>
<td></td>
</tr>
<tr>
<td>Antimyocardial antibody titre</td>
<td>&lt;1:40</td>
<td>&lt;1:40</td>
<td></td>
</tr>
<tr>
<td>C3 [µmol/l]</td>
<td>3.3</td>
<td>9.8</td>
<td>C3 index† = 0.57</td>
</tr>
<tr>
<td>C4 [µmol/l]</td>
<td>0.55</td>
<td>1.50</td>
<td>C4 index‡ = 0.62</td>
</tr>
<tr>
<td>C1q binding</td>
<td>Present</td>
<td>Absent</td>
<td></td>
</tr>
</tbody>
</table>

Note: pleural fluid cultures were negative.

†C3 or C4 index = (pleural fluid complement/serum complement) × (pleural fluid total protein/serum total protein).
presence of antomyocardial antibodies could just be a non-specific finding. Because of these difficulties in interpreting the significance of antomyocardial antibodies we think that low complement level in the pleural fluid by itself may be used as a diagnostic test for PCIS in the appropriate clinical setting. Our patient had reduced C3 and C4 levels in pleural fluid, and had immune complexes as documented by the presence of C1q binding in pleural fluid. Low complement index, obtained after adjusting for total protein concentration, also indicates significant complement consumption in pleural space and suggests an immunological mechanism causing pleural effusion. These results are similar to the case report published by Kim and Sahn. These findings suggest that complement is being consumed in the pleural cavity probably secondary to a local immune reaction. To the best of the authors’ knowledge, in addition to the report by Kim and Sahn, there is only one other case report in a French language journal by Beynel et al, who reported a patient with PCIS presenting with exudative pleural effusion and low pleural fluid complement level. Kahl et al and Meri et al described patients with PCIS showing diminished serum complement levels during early postoperative period followed by an increase in serum complement levels. The increase in the complement level was considered to be an acute phase response. Similar pleural fluid complement pattern is also seen in systemic lupus erythematosus and rheumatoid arthritis. However, pleural fluid glucose level is usually extremely low in connective tissue disorders like rheumatoid arthritis. Pleural fluid glucose level was normal in our patient. Moreover, systemic lupus erythematosus and rheumatoid arthritis can be easily ruled out with simple serological tests if clinically suspected as a cause of low complement level in pleural fluid.

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Immunological analysis of pleural fluid in post-cardiac injury syndrome

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