Hypersensitivity pneumonitis due to cotton dust in Indian children

A. Chetty, D.A.B.P. and A.N. Malviya, M.D.*

Hypersensitivity pneumonitis is a disease of peripheral gas exchanging part of the lung resulting from sensitisation to wide variety of materials. Eight children were diagnosed to have hypersensitivity pneumonitis in a group of 107 children who have been referred as bronchial asthmatics. Diagnosis was established by clinical criteria, skin testing, X-ray chest, presence of precipitins in the serum, pulmonary function studies and open lung biopsy.

Key words: Hypersensitivity pneumonitis (HP), interstitial lung disease, Immuno floresence, lung biopsy.

Hypersensitivity pneumonitis (HP) or Extrinsic allergic alveolitis is a clinical syndrome caused by a wide variety of organic materials especially fungal products and animal derived proteins.

Frequency and intensity of exposure to the antigen and immunologic response of the individual determine the clinical picture both atopic and non atopic individuals are affected and atopics respond by demonstrating bronchospasm and late type III reaction after exposure.

Failure to recognise this entity may lead to the erroneous diagnosis of pulmonary tuberculosis or recurrent attacks of broncho pneumonia. Very few cases of Extrinsic allergic alveolitis have been reported in children.¹

The criteria for the diagnosis of HP are recurrent attacks of respiratory distress, persistence of crepitations on auscultation of chest on several occasion, positive immediate and delayed reaction to a specific antigen on skin testing and presence of precipitins in the serum. In addition to these criteria children can have diffusion abnormalities.

Pulmonary function studies will be within normal limits in the asymptomatic period. Reduction in VC gas transfer and compliance will be noted 4-6 h after exposure or during acute attacks.

Some patients may exhibit obstructive lung disease with disease with decrease in forced vital capacity in 1 second. Chest X-Ray may show fine nodular densities and interstitial infiltrations. In the acute stage X-Ray chest at times can be perfectly normal. Avoidance of exposure at this stage may completely reverse the whole picture. Intermittent exposure may lead to permanent pulmonary function and radiographic abnormalities.

Material and Methods

In pediatrics chest clinic of All India Institute of Medical Sciences, New Delhi, India 107 children were seen with recurrent attacks of difficulty in breathing between the
period of 1980-82. Majority of these children had obstructive lung disease as manifested by rhonchi on the chest on several occasions. Two children had no adventitious sounds. Respiratory rate was 40 to 60 per min. Cyanosis and finger clubbing were noted in three patients.

No cardiovascular abnormalities were detected. Liver and spleen were not palpable.

Routine investigations for pulmonary tuberculosis were carried out. Mantoux test was done with 1 TU and 5 TU in all these children. They were negative in these eight patients, six out of these eight children were between the ages of 8-12. The remaining two were 2 to 4 yr of age. Skin testing was done in all these patients with fungal and dust antigens using 0.01 ml 1.500 antigen supplied by Curewel Laboratory, India. Reading was done after 15 min and 4 h. Immediate skin test reading was done using Shivpuri’s modified criteria. All one plus readings were eliminated to avoid false positivity.

Precipitins were done by Ouchterlonys double gel diffusion technique.

Results

All the 8 children who were diagnosed to have HP fulfilled 4 or more than four criteria. The details of the results are given in Table.

<table>
<thead>
<tr>
<th>No. of patients</th>
<th>Persistent crepitation</th>
<th>Silent chest with tachypnoea</th>
<th>Clubbing</th>
<th>Immediate skin reactivity to cotton dust</th>
<th>Delayed reaction to CD</th>
<th>Pulmonary function abnormalities*</th>
<th>Presence of precipitins</th>
<th>Interstitial lung diseases as seen in X-ray chest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistent crepitation</td>
<td>6</td>
<td>Silent chest with tachypnoea</td>
<td>Clubbing</td>
<td>Immediate skin reactivity to cotton dust</td>
<td>Delayed reaction to CD</td>
<td>Pulmonary function abnormalities*</td>
<td>Presence of precipitins</td>
<td>Interstitial lung diseases as seen in X-ray chest</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>3</td>
<td>8</td>
<td></td>
<td>5</td>
<td>3</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

*Done only in 3 patients

All the children had ill defined opacities in both lung fields and increased interstitial markings. Open lung biopsy was done in two children.

Interalveolar infiltration with lymphocytes and plasma cells were noted (Figs. 1, 2). Immunoflourescence was weakly positive. Pulmonary function studies could be done only in few patients since the younger children did not cooperate for the study. This study revealed diminished, vital capacity with reduction in carbon monoxide transfer factor (Table II).

Discussion

Clinical features of HP are determined by

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age</th>
<th>Ht in cms</th>
<th>V.C. Litres</th>
<th>M.M.E.F.R. litre/Sec.</th>
<th>FEVI</th>
<th>DLCO/m/mms of Hg. Predicted</th>
<th>FEVI</th>
<th>DLCO/m/mms of Hg. Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>8</td>
<td>100</td>
<td>0.55</td>
<td>0.27</td>
<td>52</td>
<td>10</td>
<td>3.9</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>10</td>
<td>115</td>
<td>1.08</td>
<td>0.22</td>
<td>65</td>
<td>13</td>
<td>8.02</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>11</td>
<td>131</td>
<td>0.66</td>
<td>0.22</td>
<td>62</td>
<td>14.5</td>
<td>2.87</td>
<td></td>
</tr>
</tbody>
</table>