Thymoma: Clinical and Additional Radiologic Signs*

Talma Rosenthal, M.D.;** Marjorie Hertz, M.D.;†
Yeheskiel Samra, M.D.;** and Nazim Shahin, M.D.†

Clinical and radiologic features have been described in 29 patients with thymoma. Although most clinical findings were consistent with those reported in the literature, a characteristic shape of tumor on plain chest film as well as its shrinkage on deep inspiration are described as new radiologic signs.

Thymoma is a tumor in which detection is a challenge to both the internist and radiologist. Because of its location in the anterior part of the mediastinum, it is sometimes difficult to distinguish radiologically from an aortic aneurysm,1-3 a prominent left pulmonary artery,1-3 an enlarged right atrium,1,3 enlarged hilar lymph glands, or a pericardial effusion.4 We have lately observed apparently characteristic features distinguishing thymoma on the plain chest x-ray film and on fluoroscopy, although these are not present in every case. It is the purpose of this report to describe these features as additional radiologic signs which may be helpful in the diagnosis of thymoma, as well as to give a short review of some interesting clinical features of patients with thymoma.

MATERIALS AND METHODS

All patients with thymoma as well as those with myasthenia gravis who had been hospitalized in the Chaim Sheba Medical Center were reviewed. Special attention was paid to the radiologic examinations of the chest and correlation with the findings on x-ray film and during operation or at autopsy. Twenty-nine cases were discovered in 14 males and 15 females, ranging in age from 4 to 65 years. The patients represented the whole clinical spectrum described in thymoma, from chance discovery on a routine chest x-ray film to symptomatic growth.

Table 1 summarizes the clinical and laboratory findings of the 29 patients, and Table 2 reports the radiologic findings on plain chest x-ray films and on fluoroscopy. Five of our patients were noted to have a tumor of the anterior mediastinum, which became smaller on deep inspiration. In addition, the shape of the tumor on the chest x-ray film resembled a beak-shaped "Semitic" nose, that is, a straight upper border and a curved lower contour of the mass (Fig 1).

The former radiologic signs are illustrated in the following case report.

CASE REPORT

A 54-year-old man was admitted to the hospital because of dryness of the mouth and weakness of the facial muscles. He had noticed a change in his way of speaking, with words becoming increasingly difficult to pronounce the more he talked. These symptoms had persisted for a year.

Physical examination revealed weakness of the facial muscles on both sides, most marked in the orbicular muscles of the mouth and eye. The sense of taste was absent in the anterior two-thirds of the tongue. On the chest x-ray film a pericardial shadow was found on the right, the size of an egg, which seemed to adhere to the pericardium. During fluoroscopy on deep inspiration, the shadow appeared to shrink and diminish in size (Fig 2). A tentative diagnosis of tumor of the thymus was made. Only then was it realized that the clinical picture was consistent with that of myasthenia gravis. A neostigmine (Prostigmin) test was definitely positive, and the patient was referred for surgical removal of the thymoma.

DISCUSSION

Thymic tumors are not rare, and large series have been reported.5,6 Clinically, thymoma may be accompanied by such serious disorders as myasthenia gravis,1,7 pure red cell anemia,8 and hypogammaglobulinemia causing severe infections.9,10

Table 1—Clinical and Laboratory Findings in 29 Patients

<table>
<thead>
<tr>
<th>Clinical and Laboratory Symptoms</th>
<th>Accompanying Thymoma in 29 Patients</th>
<th>No.</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myasthenia gravis</td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Agammaglobulinemia and</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>hypoagammaglobulinemia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superior vena cava syndrome</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Feeling of choking on bending forward</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Disturbing cough</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Coughing and production of phlegm plus pain</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>in upper back</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Metastases</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chance roentgen finding</td>
<td></td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Table 2—Radiologic Findings in 29 Cases of Thymoma

<table>
<thead>
<tr>
<th>Location</th>
<th>No. Cases*</th>
<th>Pulsatation Change in Size</th>
<th>During Respiration</th>
<th>Metastases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left upper</td>
<td>15</td>
<td>3</td>
<td>3**</td>
<td>1</td>
</tr>
<tr>
<td>Right upper</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Central mediastinum</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower mediastinum</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Two patients had negative x-ray film findings; thymoma was found on autopsy.
** One false negative.

*From the Chaim Sheba Medical Center-Tel Hashomer Hospital and the Tel Aviv University Sackler School of Medicine, Tel Aviv, Israel.
**Department of Internal Medicine.
†Department of Roentgenology.

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The incidence of myasthenia in thymoma ranges in different reports from 50 percent to more than 75 percent. The incidence of thymoma in patients with myasthenia gravis ranges between 8-15 percent. In our series myasthenia was found in 27.6 percent of patients with thymic tumors, a comparatively low number. In 21 patients with myasthenia gravis, the incidence was 9 percent with thymoma. It should be remembered that the relationship is so close that every patient with myasthenia gravis should be investigated for the possibility of thymoma. This is important from a practical point of view, as a regression may be achieved after removal of the tumor.

The most frequent pathologic blood picture mentioned in thymoma is that of pure red cell anemia. Pancytopenia, thrombocytopenia and pernicious anemia have also been mentioned. Improvement and even cure of the hematologic disease following removal of the thymoma has been reported. Hence, the great importance of correct diagnosis of thymic tumors.

In our series, however, only one patient showed red cell aplasia, and she died. A decrease of $\gamma$-globulin was found in four additional patients, two of whom also suffered from persistent Candida infection. This phenomenon need not be related exclusively to the decrease in $\gamma$-globulins, as three patients have been reported suffering from thymoma and Candida infection without any abnormality of globulins. It may well be as Montes mentioned that thymoma should be added to the list of abnormal conditions predisposing to Candida infection.

Radiologically, two types of tumor may be encountered. The first type is an oval or lobulated shape and may show calcification. The second type, which is more difficult to detect, is plaquelike and closely attached to the pericardium and large blood vessels. The plain chest x-ray film may show a widening of the upper part of the mediastinal shadow on the right or left margin.

The tumor may, however, be as far down as the diaphragm and at the level of the ninth dorsal vertebra. On the lateral film, the mass seems to lie in...
the anterior mediastinum. The lateral film is especially important for the demonstration of the plaque-like tumor, as it may be overlooked on the film in the frontal projection. Further investigation of the mass includes x-ray films in oblique projection, which show the tumor more prominently. In looking at the plain chest x-ray film in frontal and oblique projections, we were struck by the peculiar shape of the tumor: a slightly curved oblique upper border ending in a more marked hooked lower contour (Fig 1, 2).

Fluoroscopy with image intensification has proved useful in observing the change in size during inspiration and expiration. In several cases in our series the tumor was noted to shrink in size during deep inspiration, a phenomenon not always observed on the chest x-ray film but very clear on fluoroscopy. The explanation for this observation may be the change in pressure during deep inspiration which causes the whole mediastinum to become elongated and smaller in size. We have not observed this phenomenon in other tumors of the anterior part of the mediastinum. Some authors emphasize the use of laminography, especially in cases of a small thymoma and in patients with abnormal body contours and obesity, where other investigations are contraindicated. Anterior pneumomediastinography has proved of value as well. Nevertheless, Ellis and Gregg were not impressed by this method, and Kreef points out the difficulties of pneumomediastinography in patients with myasthenia gravis in whom respiratory complications often occur. Contraindications to this investigation include absence of the cough reflex and upper respiratory tract infection. Thymic venography has been observed by Kreef as an additional method for demonstrating thymic tumors.

In our opinion, these various complicated tests can be eliminated and the patient saved from great discomfort by attention to the radiologic signs described here indicating a diagnosis of thymoma; that is, the shape of the mass resembles a beaked "Semitic" nose on plain chest x-ray films, and the tumor shows diminution in size on deep inspiration during fluoroscopy.

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