Pulmonary Findings in Patients with Chagasic Megaesophagus*

Study of Autopsied Cases

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We studied retrospectively 69 cases of chagasic megaesophagus (group 1) and 207 cases of chronic chagasic myocardiopathy (CCM) without megaesophagus (group 2) by autopsy in the Pathology Department of the Federal University of Bahia, Brazil, from 1953 to 1975. It was shown that pulmonary tuberculosis was significantly more frequent in group 1 (21.7 percent) than in group 2 (3.4 percent). The patients of group 1, who had megaesophagus without associated cardiomyopathy (n = 36), had a much higher rate of pulmonary tuberculosis (36.1 percent) than those with associated CCM (6.0 percent), and they also had the most severe forms of the pulmonary disease. Other pulmonary complications of infectious origin occurred more frequently in group 1. The prevalence of pneumonia was 34.7 percent in group 1 and 10 percent in group 2. Six cases were considered to be aspiration pneumonia. Lung abscess occurred in two cases in each group. We suggest that megaesophagus should be carefully investigated for pulmonary complications, especially for tuberculosis in populations with a high rate of this infection.

Diseases of the esophagus, especially motility disturbances and obstructive lesions, can occur with pulmonary complications. Andersen and colleagues' reported an incidence of 10 percent of pulmonary symptoms in 601 cases of achalasia of the esophagus. Aspiration pneumonia is recognized as the most frequent complication of achalasia, but patients with this disease also suffer a high incidence of pulmonary abscesses, bronchiectasis, asthma, and pulmonary fibrosis.1,2 Mycobacteria are frequently isolated from the sputum of bronchial secretions of patients with achalasia and aspiration pneumonia.3 According to Olsen,4 achalasia and tuberculosis may coexist but the bacilli are usually atypical, and the majority are non-pathogenic.

In rural areas of Brazil, Chagas' disease is endemic, and esophageal involvement (megaesophagus) is a common clinical manifestation of this disease. The latter is caused by the protozoa Trypanosoma cruzi and it has been described in all countries of South and Central America. In its chronic stage, the disease may affect the heart, causing congestive myocardiopathy, the esophagus leading to megaesophagus, or a combination of both.5 In endemic areas, achalasia not associated with Chagas' disease is extremely rare.

We observed various pulmonary complications in patients with chagasic megaesophagus. This experience and our failure to find in the literature a more detailed study of the common pulmonary changes in this disease stimulated us to pursue the current study.

MATERIAL AND METHODS

We studied retrospectively 69 cases of chagasic megaesophagus (group 1) examined by autopsy in the pathology department from 1953 to 1975. Criteria for the diagnosis were the presence of a dilated esophagus with marked destruction of ganglionic cells in Auerbach's plexus and focal chronic inflammation along the plexus and in the muscular layers, in a subject with a positive complement fixation test for Chagas' disease. General information (sex, age, race, profession), cause of death, the principal illness as determined by the pathologist, and the macroscopic and microscopic alterations of the lungs all were carefully recorded. Tuberculosis was diagnosed in this study by gross lesions in the lungs which microscopically showed granulomatous inflammation with caseous necrosis plus epithelioid and multinucleated giant cells. Group 2 consisted of all patients with chronic chagasic myocardiopathy without megaesophagus who underwent postmortem examination between 1953 and 1975. The myocardiopathy was recognized at autopsy by the presence of chronic diffuse myocarditis, sometimes with T cruzi amastigotes within cardiac fibers, in a subject with a positive complement fixation test for Chagas' disease as previously described.6 The same data were recorded for the 207 patients of group 2. This group had characteristics quite similar to group 1 with regard to sex and age distribution, socioeconomic background, and level of health and sanitation, except for the absence of megaesophagus. For the statistical analysis we used the $\chi^2$ test.

RESULTS

Table 1 shows the age and sex distribution of the two groups. The mean age of group 1 (megaesophagus) was 44 years, with a range of 13 to 82 years; in group 2 the mean age was 38 years, with a variation of 11 to 74 years. There was a slight preponderance of males in both groups. The pulmonary alterations most frequently found in the two groups were pleural effusion, thromboembolism, pneumonia, and tuberculosis.
Pleural effusion (Table 2) occurred significantly more often in group 2 (117 of 207 cases) than in group 1 (25 of 69 cases; p<0.005). There was no difference in the type of pleural fluid found, with transudates predominating slightly in both groups. The high incidence of pulmonary thromboembolism (Tables 2 and 3) in CCM is well-known.\(^3\) In our study, thromboembolism with or without pulmonary infarct was detected at autopsy in 52.7 percent of the patients of group 2 (CCM without megaesophagus) and in 21.7 percent of group 1 (megaesophagus). On subdividing the latter group, patients with megaesophagus without associated cardiopathy (36 patients) had a pulmonary thromboembolism rate of 8.3 percent, while those with associated heart disease (33 patients) had a rate of 36.4 percent (p<0.005). Thus, patients with megaesophagus and associated cardiopathy had a greater prevalence of pulmonary thromboembolism than those with isolated megaesophagus, but less than those with isolated CCM.

**Pneumonia**

Pulmonary complications of infectious origin (Table 2) occurred in a total of 41 of the 69 patients of group 1 (megaesophagus) as opposed to 31 of the 207 patients without megaesophagus (group 2).

We observed a significantly greater prevalence of pneumonia in group 1 (24 of 69 patients) than in group 2 (22 of 207 patients; p<0.001). Six cases were considered by the pathologist to be aspiration pneumonia and three of these lipid pneumonia.

Lung abscess occurred in two cases in each group, or 2.9 percent in group 1 and 1.0 percent in group 2, a difference which was not statistically significant.

**Tuberculosis**

We found an elevated prevalence of pulmonary tuberculosis among the cases of megaesophagus (Tables 2 and 4). While in group 2 the rate of pulmonary tuberculosis was 3.4 percent, in patients with megaesophagus (group 1) it was 21.7 percent (p<0.001). To analyze the data in greater detail, we divided group 1 into two subgroups: (A) patients with megaesophagus without cardiopathy, and (B) patients with megaesophagus and associated cardiopathy. There were 36 patients in subgroup A and 33 patients in subgroup B. Thirteen of the 36 patients (36.1 percent) with megaesophagus without cardiopathy had pulmonary tuberculosis, and only two of the 33 patients (6.0 percent) of subgroup B had pulmonary tuberculosis (p<0.005). Moreover, the patients in subgroup A had a predominance of serious forms of pulmonary tuberculosis, while the two patients of subgroup B has mild forms

**Table 2—Pulmonary Findings in 69 Patients with Chagasic Megaesophagus (Group 1) and 207 Patients With Chronic Chagasic Myocardiopathy Without Megaesophagus (Group 2)**

<table>
<thead>
<tr>
<th>Pulmonary Findings</th>
<th>Group 1 (n = 69), No. (%)</th>
<th>Group 2 (n = 207), No. (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>24 (34.7)</td>
<td>22 (10.6)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>15 (21.7)</td>
<td>7 (3.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Infarction and/or</td>
<td>15 (21.7)</td>
<td>109 (52.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>embolism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>25 (36.2)</td>
<td>117 (56.5)</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Abscess</td>
<td>2 (2.9)</td>
<td>2 (1.0)</td>
<td>NS</td>
</tr>
<tr>
<td>Others*</td>
<td>37 (53.6)</td>
<td>131 (63.3)</td>
<td>NS</td>
</tr>
</tbody>
</table>

*Note: Atelectasis, emphysema, pulmonary congestion, pleural adhesion, schistosomal granuloma

**Table 3—Infarction and/or Pulmonary Embolism in Patients with Isolated Chagasic Megaesophagus, Megaesophagus Associated with Chronic Chagasic Myocardiopathy, and Isolated Myocardiopathy**

<table>
<thead>
<tr>
<th>No. of patients</th>
<th>Megaesophagus</th>
<th>Megaesophagus and Cardiopathy</th>
<th>Cardiopathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infarction and/or embolism</td>
<td>36</td>
<td>33</td>
<td>207</td>
</tr>
<tr>
<td>Percent</td>
<td>8.31</td>
<td>36.4</td>
<td>52.7</td>
</tr>
</tbody>
</table>
Table 4—Pulmonary Tuberculosis in Patients with Isolated Megaesophagus and Megaesophagus Associated with Chronic Chagasic Myocardiopathy

<table>
<thead>
<tr>
<th>Megasophagus</th>
<th>Megaesophagus and Myocardiopathy</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>36</td>
<td>33</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>Percent</td>
<td>36.1</td>
<td>6.06</td>
</tr>
</tbody>
</table>

(Fig 1).

Table 5 shows that pulmonary tuberculosis was considered the principal disease by the pathologist in ten of the 15 cases of group 1, while it was the principal diagnosis in only one of the seven cases with pulmonary tuberculosis in group 2.

Other pulmonary disorders, such as atelectasis, emphysema, pleural adhesion, schistosomal granuloma, and others, did not differ significantly between the two groups.

**DISCUSSION**

Our study shows a high rate of pulmonary disorders in cases of chagasic megaesophagus submitted to autopsy in the Hospital Prof. Edgard Santos (Salvador, Bahia, Brazil), between 1953 and 1975. Respiratory complications have been described previously in patients with esophageal diseases, notably the motility disturbances and the obstructive lesions. Aspiration pneumonia is recognized as the most common of these complications, but patients with esophageal disorders have a high incidence of pulmonary abscesses, bronchiectasis, emphysema, asthma, and pulmonary fibrosis. In our study pulmonary complications of infectious origin were the most common, occurring 41 times among 69 cases of megaesophagus.

Pneumonia was recorded in 34.7 percent of the cases of megaesophagus we studied, a rate significantly greater (p<0.001) than that observed in group 2. We identified six cases of aspiration pneumonia, three of which were labeled as lipoid pneumonia. There has been reported an incidence rate of 8.3 percent of lipoid pneumonia in patients with esophageal disease. Lipoid pneumonia originates from aspiration into the respiratory tree, occurring either during sleep or in debilitated, cachectic individuals, such as those we observed with chagasic megaesophagus. Patients with megaesophagus sometimes report that they wake up with cough or even asphyxia, due to regurgitation of food retained in the esophagus. In chagasic patients there have been described, pathologically and functionally, pulmonary changes. According to Körber, the lungs become stiff, the bronchi show dilation, with elastic and collagen fibers impregnated with hemosiderin; and the interalveolar septum is thick due to interstitial fibrosis. Spirometric studies performed on chronic chagasic patients without cardiac failure showed no changes in pulmonary volumes, but the FEV1 was lower than in nonchagasic patients. After methacholine administration, there was marked FEV1 reduction in the chagasic patients (average reduction 31 percent) compared with normal individuals (average reduction 10.9 percent).

According to Baldwin, isolation of Mycobacteria from the sputum or bronchial secretions of patients with achalasia and aspiration pneumonia is not uncommon. However, Olsen reports that the bacilli are usually atypical and nonpathogenic. Throughout a literature review, Burke and Ullian detected 16 reported cases of lung infection due to rapidly growing mycobacteria in patients and megaesophagus. M tuberculosis was deliberately excluded in all cases. These authors reported one case of functional megaesophagus due to left colon interposition esophagoplasty in which a respiratory infection was detected and Mycobacterium chelonei, subspecies abscessus, was identified. Nevertheless, in our study, the prevalence of pulmonary tuberculosis was high (21.7 percent) in patients with chagasic megaesophagus and six times greater than in the control group. In Chagas' disease, megaesophagus may occur in isolation or associated with cardiopathy. The prevalence of pulmo-
Pulmonary tuberculosis in the patients with isolated megaesophagus was much higher than in those with an associated cardiopathy. Additionally, the patients without an associated cardiopathy suffered the most grave forms of pulmonary tuberculosis (Fig 1). We were surprised to find that patients with megaesophagus and advanced pulmonary tuberculosis had few symptoms due to that disease. This fact emphasizes the importance of investigating the possibility of tuberculosis in every patient with megaesophagus, especially in populations with a high rate of the infection. This measure should be automatic in the management of these patients, since pulmonary tuberculosis was considered by the pathologist as the principal illness in 10 of the 15 cases (Table 5). Although the reason that patients with chagasic megaesophagus have a high rate of pulmonary tuberculosis is not completely understood, we believe that the state of nutrition plays an important role. Chagasic individuals are generally of low socioeconomic level, and when megaesophagus develops, they usually evolve a severe degree of malnutrition which progresses to cachexia. Moreover, Northeast Brazil (the origin of the patients in this study) has a higher index of tuberculosis than all the other regions of the country, according to the National Division of Respiratory Health, and Bahia has the highest rate of tuberculosis among the states of this region. In a survey made in 1966 in the Pathology Department of the Hospital Edgard Santos, a rate of tuberculosis of 9.3 percent was found in autopsy material. Therefore, it seems to us that the two factors, high prevalence of tuberculosis in the region and the severe impairment of nutritional status, can explain the frequent occurrence of this disease in patients with chagasic megaesophagus. Pulmonary thromboembolism is extremely common in CCM, principally when chronic congestive heart failure is present. We found 109 cases of embolism or pulmonary infarct among 207 patients with CCM (52.7 percent). The prevalence was also elevated in the group with megaesophagus (21.7 percent). Nevertheless, this latter rate was due mainly to the cases with associated cardiopathy, thus leaving an incidence of only 8.3 percent of embolism or pulmonary infarction for the patients with megaesophagus without CCM (Table 3).

These data concerning pulmonary tuberculosis and thromboembolism lead us to speculate that patients with megaesophagus associated with chagasic heart disease have complications related mainly to the heart disease and less to the esophageal disease.

The literature has reported pulmonary abscesses in 37.5 percent of patients with esophageal disease. We observed only two cases of lung abscess in 69 patients with chagasic megaesophagus (2.9 percent), all associated with bronchopneumonia.

The present study was of a selected sample of cases, those patients who died in a hospital, from which were excluded those with signs of pulmonary tuberculosis on screening chest x-ray film. Therefore, the actual prevalence of pulmonary complications among clinical cases might not be precisely reflected here. Nevertheless, it shows a high prevalence of pulmonary complications in patients with chagasic megaesophagus, especially pulmonary tuberculosis. These complications certainly contributed to the deaths of these patients, and therefore the physician should remain alert to diagnose and treat these complications in patients with chagasic megaesophagus.

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3 Baldwin ER. Non-pathogenic acid-fast bacilli. Am Rev Tuberc 1942; 45:756-761

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