Endobronchial Tuberculosis Revisited*

W. K. Lam, M.B.B.S., F.C.C.P; and C. K. Mok, M.B.B.S.

Analysis was made of 20 patients with endobronchial tuberculosis proven by fiberoptic bronchoscopy and bronchial biopsy. Unlike prechemotherapy reports, the disease affects the older age group and more men. Only one half of the patients had fever, and the characteristic localized wheeze was found in 15 percent of cases. Chest roentgenogram showed typical collapse-consolidation in most cases; however, it was clear in 20 percent of patients. Sputum/smear was negative for AFB in 85 percent of patients. When the gelatinous granulation tissue was not found during bronchoscopy, a diagnosis of bronchogenic carcinoma was made incorrectly in 30 percent of patients. At a mean period of 27 months postchemotherapy, all 12 patients recalled for study developed bronchostenosis proven by bronchoscopy/bronchography except one. Noninvasive methods such as chest roentgenogram and flow-volume loops were insensitive for detection of stenosis. Steroid therapy probably did not influence outcome of tuberculous endobronchitis.

Involvement of the trachea and major bronchi by tuberculosis was first described by Morton in 1698.1 The condition is not uncommon. In our recent study of 65 patients with sputum/smear negative pulmonary tuberculosis, 12 patients (18 percent) were found to have endobronchial involvement by tuberculosis on examination with fiberoptic bronchoscopy; the rest had the usual parenchymal disease.2 However, there is no data on clinical manifestations of endobronchial tuberculosis and results of treatment after the introduction of modern antituberculosis chemotherapy, apart from some isolated case reports.3,4 This has prompted us to review our recent experience with endobronchial tuberculosis in Hong Kong.

MATERIALS AND METHODS

Twenty patients were diagnosed as having endobronchial tuberculosis from October 1978 to March 1985 in our hospital. These patients were subjected to fiberoptic bronchoscopy because of clinical suspicion of proximal airway obstruction, or there was unexplained chronic cough. The diagnosis of endobronchial involvement was based on the finding of visible lesion during fiberoptic bronchoscopic examination, with histologic proof and stainable acid-fast bacilli on bronchial biopsy. Sputum or bronchial aspirate should also yield acid-fast bacilli on culture.

Only 12 out of 20 patients could be recalled for assessment after antituberculosis chemotherapy (combination of isoniazid, rifampicin, pyrazinamide, streptomycin and/or ethambutol for six months)5 with or without initial steroid cover (prednisolone, 30 mg daily for two to four weeks) to prevent fibrosis. Reassessment was designed to detect bronchial stenosis with fiberoptic bronchoscopy and/or bronchography.

RESULTS

Clinical Features (Table 1)

The age range was 16 to 93 years with a mean of 41 years, and the male to female ratio, 2:1. Ten percent of patients had diabetes mellitus and 25 percent had historic and/or roentgenographic evidence of previous pulmonary tuberculosis.

Duration of symptoms ranged from one week to one year with a mean of 11 weeks. All had cough. The amount of sputum was variable. One actually presented with bronchorrhea.4 Sputum was usually mucoid in appearance. Hemoptysis was present in only 25 percent of patients and it was seldom copious. The characteristic localized wheeze suggestive of endobronchial obstruction was seldom heard over the chest. In those with dyspnea, there was significant collapse of lungs. Chest pain was usually ill-defined in nature. Hoarseness was due to co-existent tuberculous laryngitis. One patient presented with subcutaneous emphysema due to severe coughing. Systemic symptoms were not remarkable. Only half the patients had fever, and 30 percent had weight loss.

Roentgenographic Appearance

Seven out of 20 patients (35 percent) had consolidation, and another seven had collapse of lungs (Fig 1). One patient had a cavitating lesion and another had miliary motting. Interestingly, four patients (20 percent) had a clear lung field. Of these four, one had evidence of air-trapping on expiratory film,4 one had subcutaneous emphysema, and another one had marginal enlargement of the left hilum.

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Manuscript received October 2; revision accepted December 17.
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Table 1—Clinical Features of Endobronchial Tuberculosis

<table>
<thead>
<tr>
<th>Symptoms</th>
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<tbody>
<tr>
<td>Cough</td>
<td>20/20 (100%)</td>
</tr>
<tr>
<td>Sputum: none</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Scanty</td>
<td>12 (60%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>6 (30%)</td>
</tr>
<tr>
<td>Copious</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>5 (25%)</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>7 (35%)</td>
</tr>
<tr>
<td>Chest pain</td>
<td>3 (15%)</td>
</tr>
<tr>
<td>Localized wheeze</td>
<td>3 (15%)</td>
</tr>
<tr>
<td>Hoarseness</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>Subcutaneous emphysema</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Fever</td>
<td>10 (50%)</td>
</tr>
<tr>
<td>Weight loss</td>
<td>6 (30%)</td>
</tr>
</tbody>
</table>

Sputum Examination

Only three patients were sputum smear positive for acid-fast bacilli with rhodamine-auramine stain, the rest (85 percent) were sputum/smear negative. Sputum examination, therefore, was surprisingly not helpful in diagnosis. The three patients with positive sputum smear were still subjected to fiberoptic bronchoscopy examination for fear of co-existent bronchogenic carcinoma.

Bronchoscopic Findings

The typical bronchoscopic finding was the presence of white gelatinous granulation tissue. It might be very bulky, blocking the lumen of airways and proving difficult to be removed by suction. Mucosa were nodular, red, vascular, and sometimes ulcerated. The appearance might simulate that of bronchogenic carcinoma. In fact, a diagnosis of neoplasm was suggested by the bronchoscopist in six out of 20 patients (30 percent).

Four patients (20 percent) had involvement of trachea; in one, tuberculosis had spread to involve the right main bronchus as well. The left bronchial tree was affected in eight patients and the right in nine patients. Interestingly, six patients had involvement of upper lobes, whereas nine patients had involvement of middle or lower lobes.

Bronchial aspirate during bronchoscopy was smear-positive for acid-fast bacilli in 17 out of 20 patients. The other three patients were smear-negative because they had received antituberculosis chemotherapy before bronchoscopy.

None of the patients had flare-up of tuberculosis after bronchoscopy.

Residual Bronchial Stenosis

Twelve patients were recalled for study eight to 49 months (mean 27 months) after completion of antituberculosis chemotherapy. Eight were asymptomatic, including one with pin-hole stenosis of the left main bronchus. Of the remaining four, one had scanty cough with mucoid sputum, and three had exertional dyspnea due to severe bronchial stenosis.

Physical examination showed features of lung collapse in four patients and localized wheeze in two.

Chest roentgenogram (inspiratory and expiratory films) showed no evidence of air-trapping in all 12 patients. There was evidence of lung collapse in four, tuberculoma in two, and fibrosis in one. The rest had completely normal chest roentgenogram.

Forced inspiratory and expiratory flow volume loops were obtained in all patients. Only one patient had evidence of upper airway obstruction.

Fiberoptic bronchoscopy was performed in 11 patients. Four patients had severe, pin-hole stenosis of either trachea or main bronchus (Fig 2); six patients...
bronchus opposite the opening of the airway draining the tuberculous cavity or focus.\(^1\) Another cause of endobronchial tuberculosis is direct infiltration by adjacent mediastinal lymph nodes. However, this is more common in children. Lymphatic and hematogenous spread is much less common. It is not known why some patients are more likely to develop endobronchial involvement. Salkin et al\(^5\) found endobronchitis was more common in those with advanced cavitating forms of tuberculosis. However, a tuberculous cavity was found in only one of our patients. Whether this change is real or not deserves more observation.

Classically, endobronchial tuberculosis was a disease of young females.\(^1\) Our study showed that males were affected twice as often as females, and it was no longer a disease of the young. Systemic symptoms of infection, such as fever, was present in only 50 percent of patients. This would make it difficult to differentiate endobronchial tuberculosis from bronchogenic carcinoma. Respiratory symptoms of tuberculous endobronchitis were nonspecific. The characteristic localized wheeze was found in only 15 percent of patients, and its absence, therefore, does not exclude endobronchial involvement.

Chest roentgenographic appearance in endobronchial tuberculosis is expected to show consolidation/collapse. Obstructive emphysema or tension cavity was not found in our patients. It should be noted that four patients had clear chest roentgenograms, and only one showed air-trapping on full inspiratory film. A clear chest roentgenogram, therefore, does not exclude endobronchial pathology, especially when there is a discrepancy between symptoms and roentgenographic findings.

With endobronchial involvement, one can expect to find sputum smear-positive for acid-fast bacilli.\(^1\) Unexpectedly, the majority of our patients had either no sputum or were smear-negative. The reason is not clear. It is possible that expectoration of sputum is difficult because of entrapment of mucus by proximal endobronchial granulation tissue, or that ulceration of involved mucosa is necessary for a positive AFB smear result. Nevertheless, the message is clear—a negative smear for AFB does not exclude endobronchial tuberculosis.

The bronchoscopic finding usually gives the clue to diagnosis. However, we even made the wrong bronchoscopic diagnosis of bronchogenic carcinoma in 30 percent of cases, especially when the typical granulation tissue was not present. This has prompted us to exclude tuberculosis in all cases of suspected bronchogenic carcinoma. Interestingly, the lower or middle lobes were affected slightly more often than the upper lobes of lungs. This would seem to favor the direct implantation theory of etiology of endobronchial tuberculosis by virtue of gravity.
Residual bronchostenosis was found in all patients except one. This is quite different from the initial optimistic report on the use of streptomycin alone in the treatment of endobronchial tuberculosis, which showed a 68 percent healing rate with no residual stenosis assessed four to six months later. It is possible that a longer duration of follow-up, as in our case, may detect more stenosis.

In the assessment of bronchostenosis, symptoms as well as noninvasive investigations such as chest roentgenogram and flow-volume loops are insensitive. Bronchoscopy and bronchography are the methods of choice. For ill patients, conventional tomography or computed tomography of the thorax may help.

Whether steroid therapy would help to prevent bronchostenosis or not is not clear. Only three patients received steroid therapy in our series, but all developed bronchostenosis. Nemir et al. found steroid therapy did not reduce the incidence of residual fibrosis in a double-blind study in children.

In conclusion, endobronchial tuberculosis is not rare. Clinically, it resembles bronchogenic carcinoma. Bronchoscopy should be done whenever suspicion arises, even though chest roentgenogram is clear and sputum examination is negative. Close follow-up is advisable as stenosis may develop later despite modern antituberculosis chemotherapy with/without steroid prophylaxis.

ACKNOWLEDGMENT: We thank Ms. Monica Chan for secretarial assistance.

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Fourth International Symposium, Ultrasound in Israel

This Fourth International Symposium, as well as the Fourth Barry B. Goldberg Lecture, will be held in Jerusalem, Israel, June 23. For information, contact Ruth Shilo, M.D., Tel-Aviv Medical Center, Ichilov Hospital, 6 Weizmann Street, Tel-Aviv, Israel.

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