Coexistent Bronchogenic Carcinoma and Active Pulmonary Tuberculosis*

A Report of Five Cases with Autopsy Findings

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There is a divergence of opinion as to the frequency of active pulmonary tuberculosis and primary carcinoma of the lung. Until recently the occurrence of the two diseases in the same patient was considered rare. Earlier observers were of the opinion that carcinoma and tuberculosis were incompatible, and that an element of antagonism existed between them.1,2 Others have pointed out that tuberculosis, like any other chronic inflammation or irritation, predisposed to the development of carcinoma as a result of cellular metaplasia of the bronchial and alveolar epithelium.3,4

In the past four years, in the Veterans Administration tuberculosis hospital at Castle Point, New York, there have been five instances among 203 autopsies in which active pulmonary tuberculosis was found in association with bronchogenic carcinoma. The patients were white males, World War I veterans ranging in age from 48 to 61 years. In three, the carcinoma was diagnosed during life; in the other two it was discovered at autopsy.

The following are the summaries of the five case histories, with the pertinent autopsy findings:

Case 1: F.W., 52 years old, was admitted to the hospital because of "burning sensation" in the right side of the chest and recurrent hemoptyses. Tuberculosis had been diagnosed 19 years previously. Since then he had frequent episodes of blood streaked sputum followed by brief periods of hospitalization at various institutions. Chest x-ray films taken one year prior to present entry, showed evidence of cavitation in the right upper lobe with slight dissemination to the right lower (Figure 1a). The chest x-ray film at the time of the final admission to the Veterans Administration hospital, Castle Point, revealed a marked increase in size of the cavity in the right upper lobe with a fluid level. New infiltrations were present below this area (Figure 1b). The sputum contained acid fast bacilli on repeated examinations. His temperature fluctuated between 99 and 101 degrees F. An x-ray film taken two months later

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184
showed extension of the disease to the right lower lobe. The condition became progressively worse and five months after admission he had a massive hemoptysis and died.

At autopsy the right main bronchus was markedly narrowed by a firm gray-yellow mass which extended into the cavity in the right upper lobe and into the surrounding peribronchial lymph nodes. On histologic examination the bronchial wall was almost completely replaced by many irregular sheets of epithelial cells with some pearl formation. In one area, the tumor cells (squamous cell carcinoma) extended directly into the right upper lobe.

The right upper lobe contained several large interlocking cavities with bronchi opening into these cavities. The horizontal branch of the left upper lobe bronchus was completely stenosed by firm bands of tuberculous scar tissue. Caseous and fibro-caseous foci were present throughout the entire left lung and right upper lobe. Millary tubercles were found in the kidney, spleen, liver and adrenals.

Case 2: J.W., 48 years old, was admitted because of cough, weakness, right side of chest pain, fever and weight loss. Three months prior to entry, he had “grabbing” pain on the right side not affected by respiration. He appeared emaciated and ill. The sputum contained numerous acid fast bacilli. The chest x-ray film (Figure 2) revealed evidence of extensive caseous pneumonic consolidation of the right upper lobe with multiple cavities. During hospitalization his fever ranged from 99 to 102.8 degrees F. He complained of severe cough and dyspnea. On the 15th hospital day, streaked sputum was noted for the first time. The following day he had a massive pulmonary hemorrhage and died.

At autopsy there was a tumor mass (5 cms. in diameter) on the right lateral aspect of the trachea (4 cms. above the carina) which narrowed the lumen. It involved both trachea and right main bronchus. Some of the tumor tissue had extended into and eroded the roof of the tuberculous cavity wall in the right upper lobe. A branch of the pulmonary
FIGURE 2
Case 2: Cavitary lesion of right upper lobe with multiple cavities, spread to left lower lobe. Illustrates circular density in right mid-lung field, atypical for cavitary pneumonia or tuberculous spread. Diagnosis: cavitary carcinoma, right lower lobe.

FIGURE 3a
Case 2: Cavitary lesion of right upper lobe with multiple cavities, spread to left lower lobe. Illustrates circular density in right mid-lung field, atypical for cavitary pneumonia or tuberculous spread. Diagnosis: cavitary carcinoma, right lower lobe.

FIGURE 3b
Case 2: Cavitary lesion of right upper lobe with multiple cavities, spread to left lower lobe. Illustrates circular density in right mid-lung field, atypical for cavitary pneumonia or tuberculous spread. Diagnosis: cavitary carcinoma, right lower lobe.
artery to the right upper lobe had become eroded by the carcinoma causing the fatal hemorrhage.

On histologic examination of the tissues the tracheal wall was found completely replaced by typical squamous cells which extended irregularly into the lumen. Gelatinous pneumonia (tuberculous) was found in the lower lobe of the left lung.

Case 3: J.A.M., 61 years old, was admitted to the hospital because of weakness, poor appetite and shortness of breath. Tuberculosis was first diagnosed seven years previously. Two years after the onset of illness he entered the Veterans Administration hospital at Castle Point because of disease in the upper lobes. The sputum contained acid fast organisms. After several weeks he left the hospital against medical advice. During the next four years there followed alternate periods of work and hospitalization at various institutions (Figure 3a). At the time of the second admission he complained of severe shortness of breath, intermittent localized sharp pain behind the sternum, cough and expectoration of a quarter of a cup of sputum daily. The chest x-ray film at the time of the final admission (Figure 3b) showed evidence of multiple cavities in the upper two thirds of the left lung and scattered foci in the right upper lobe. In the right mid-lung field, there was seen for the first time a circumscribed circular density. Tumor was suspected and inasmuch as he was too ill for bronchoscopy, the sputum was examined repeatedly for malignant cells (Papanicolaou stain) but none were found. His condition became progressively worse and he died three months after admission and seven years after the onset of pulmonary tuberculosis.

Autopsy revealed a large fairly circumscribed tumor mass in the right lower lobe just below the interlobar fissure in the postero-lateral aspect. It was solid white and pink in color. The cut surface presented areas of softening and hemorrhage. In the anterior aspect of this lobe and independent of the tumor mass, there were present many caseous and fibro-caseous foci. In the right upper and middle lobe, were also scattered caseous foci. The left upper lobe, and to a lesser extent the left lower

Figure 4a, Case 4: September 29, 1943. Bilateral upper lobe pulmonary tuberculosis.—Figure 4b, Case 4: June 6, 1949. Dense solid lesion upper third left lung atypical for progressive pulmonary tuberculosis; diagnosis pulmonary neoplasm.
TABLE I
SUMMARY OF PERTINENT AUTOPSY FINDINGS

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Duration</th>
<th>Tuberculosis</th>
<th>Carcinoma</th>
<th>Location</th>
<th>Type Carcinoma</th>
<th>Metastasis</th>
<th>Cause of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1 (FW)</td>
<td>52</td>
<td>19 years</td>
<td>?</td>
<td>Cavity RUL, LUL, Caseous and Acino-Nodule Foci, RUL, LUL, LLL, Acute Miliary: RLL, LLL, liver spleen, kidney, adrenal</td>
<td>Right Main Bronchus</td>
<td>Squamous</td>
<td>Cavity RUL, Rt. Pleura, Rt. Peri-bronchial nodes</td>
<td>Carcinoma and Massive hemoptysis</td>
</tr>
<tr>
<td>Case 2 (JW)</td>
<td>48</td>
<td>4 months?</td>
<td>4 months?</td>
<td>Cavities RUL, Tbc. Pneumonia LLL</td>
<td>Trachea and Right Stem Main Bronchus</td>
<td>Squamous</td>
<td>Rt. Superior Tracheo-Bronchial Lymph Nodes Rt. Upper Lobe Adrenals</td>
<td>Carcinoma and Massive hemoptysis</td>
</tr>
<tr>
<td>Case 3 (JAM)</td>
<td>61</td>
<td>7 years</td>
<td>3 years?</td>
<td>Cavity RUL, LUL, LLL, Caseous Foci all lobes</td>
<td>Right lower lobe</td>
<td>Undifferented (anaplastic)</td>
<td>Rt. Inferior Tracheo-Bronchial Lymph Nodes</td>
<td>Carcinoma and Pul. Tbc.</td>
</tr>
<tr>
<td>Case 4 (JT)</td>
<td>54</td>
<td>10 years</td>
<td>1 year?</td>
<td>Cavity RUL, RLL, Caseous Foci Rt. lung LLL</td>
<td>LUL</td>
<td>Adeno-Carcinoma</td>
<td>Pleura, Left Peri-Bronchial Lymph Node, Erosion left 3rd rib</td>
<td>Carcinoma (Cachexia)</td>
</tr>
<tr>
<td>Case 5 (HPB)</td>
<td>50</td>
<td>17 months?</td>
<td>17 months?</td>
<td>Cavity, RUL, LUL, LLL, Caseous Foci all lobes</td>
<td>Right Main Bronchus</td>
<td>Squamous</td>
<td>Regional Lymph Nodes Right lower lobe</td>
<td>Carcinoma and Massive hemoptysis</td>
</tr>
</tbody>
</table>
lobe, contained multiple tuberculous cavities and scattered caseous foci.

On histological examination the tumor revealed considerable anaplasia of the cells, the latter being arranged in masses and sheets surrounded by thin fibrous stroma.

*Case* 4: J.T., 54 years old, became ill three years prior to admission to the hospital. The initial x-ray film revealed evidence of bilateral upper lobe cavitation. The sputum was persistently positive for acid fast bacilli. No definitive treatment was administered. The disease remained stationary (Figure 4a) for six years. Then he began to complain of persistent dull aching pain in the left upper chest. On x-ray film inspection (Figure 4b) evidence of a dense solid lesion was seen in the upper third of the left lung. A Bucky film revealed erosion and thinning of the 3rd left
posterior rib. Because tumor was suspected, material was obtained by needle biopsy as well as from bronchoscopic aspiration. No tumor cells were found by the Papanicolaou method. He died eight months later.

At autopsy a firm hard yellowish white tumor mass 9 x 7 cm. was present in the postero-apical aspect of the left upper lobe. Strands of white tumor tissue extended into the lung parenchyma of this lobe and several small abscesses were found in this area. There were several interlocking cavities in the right upper lobe and a cavity was present in the apex of the left lower lobe. Small caseous and fibro-caseous foci were diffusely scattered throughout the entire right lung as well as in the left lower lobe.

On histological preparation, the tumor in the left upper lobe was found to be a well differentiated adenocarcinoma.

Case 5: H.P.B., 50 years old, was admitted because of increasing fatigue and general ill-health of about three months duration. The admission x-ray film showed a lesion in the right upper lobe. The sputum contained acid fast bacilli. A chest x-ray film three months later revealed evidence of two cavities in the right upper lobe (Figure 5a). He left the hospital but was readmitted eight months later because of chest pain, hoarseness, asthmatic seizures, intermittent hemorrhages and weight loss of 15 pounds. X-ray film inspection then showed an increase in size of the cavities in right upper lobe, a small cavity in left apex and a new density in the upper right mediastinum (Figure 5b). One month after readmission, and 17 months after the clinical onset of his tuberculosis, the patient had a massive pulmonary hemorrhage and died.

At autopsy, the wall of the right main bronchus was thickened and infiltrated with tumor tissue, causing partial stenosis. The right lower lobe, in its postero-lateral aspect had many sharply circumscribed yellowish white tumor nodules and a small cavity was present at the base.

In the right upper lobe, there was a large cavity (7 cms. in diameter) in its postero-lateral aspect. Anteriorly, there were many smaller cavities which communicated with an open bronchus. The left lung had many

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**FIGURE 5a**

*Figure 5a, Case 5*: June 26, 1947. Pulmonary tuberculosis, two cavities, right upper lobe.

**FIGURE 5b**

*Figure 5b, Case 5*: March 28, 1948. Giant cavity and new shadow right upper mediastinum suggestive of associated neoplasm.
scattered caseous foci in both lobes, a small cavity but no evidence of malignancy.

Histological examination of the right main bronchus revealed marked infiltration with tumor cells of the squamous type.

Discussion

There are many difficulties associated with the diagnosis of primary lung cancer in patients with active pulmonary tuberculosis. The tuberculous process usually dominates the clinical picture for a number of years so that the development of malignant growth is easily overlooked. Furthermore, the two diseases may closely resemble each other. A localized unilateral wheeze may be attributed to tuberculous bronchial obstruction. Upper lobe tuberculous cavities with enlarged hilar nodes frequently mask roentgenological hilar or parenchymal shadows. Lower lobe infiltrates of recent development may be mistaken for recent bronchogenic spread of disease or caseous pneumonia. Furthermore, a carcinomatous abscess may easily be mistaken roentgenologically for a tuberculous cavity. However certain definite clinical features should alert the physician to the possible presence of an associated neoplasm. Carcinoma should be suspected when there is persistent dull pain in the chest in the absence of pleural complications. Likewise atypical changes appearing in serial chest films should direct attention to the possible presence of neoplasm. A profuse sudden hemoptysis occurring in a patient with limited tuberculosis is particularly apt to be caused by complicating carcinoma. Changes in the character of expectoration, progressive weight loss or marked anemia are of little help in diagnosis.

The coexistence of pulmonary tuberculosis and carcinoma of the lung may be expected to occur more frequently in the years to come as a result of frequent discovery of pulmonary tuberculosis in older people and increased incidence of primary pulmonary neoplasms. This should prompt physicians treating tuberculosis in older age groups to be more alert to the possible occurrence of the two diseases in the same patient.

As to the relationship of pulmonary tuberculosis and bronchogenic carcinoma, it is of interest to note that in this series of cases, the two diseases arose in different areas of the respiratory tract although they were found at autopsy to exist adjacent. Some writers are of the opinion that tuberculosis plays a small role, if any, in the production of primary carcinoma of the lung.

SUMMARY

1) Five cases are reported in which active pulmonary tuberculosis was found in association with bronchogenic carcinoma.
2) The diagnosis of bronchogenic carcinoma in tuberculous patients is often difficult because the two diseases have many features in common.

3) The following clinical features have been helpful in the diagnosis of the coexistence of the two diseases: (a) Chest pain in the absence of pleurisy or other obvious cause. (b) Profuse, recurring hemoptysis which often occurs as a terminal event. (c) The appearance of an atypical shadow or shadows in serial chest films not in keeping with progressive tuberculosis.

4) Whenever atypical findings are present in a tuberculous patient of the middle or older age group, bronchoscopy and cytological studies of sputum and bronchial aspirated secretions are indicated to rule out complicating carcinoma.

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RESUMEN

1) Se relatan cinco casos en los que se encontró la asociación de tuberculosis y carcinoma bronquigénico.

2) El diagnóstico de carcinoma bronquigénico en los tuberculosos es a menudo difícil, porque las dos enfermedades tienen muchas características comunes.

3) Los siguientes datos clínicos han sido útiles para el diagnóstico de esa coexistencia: (a) Dolor torácico en ausencia de pleuritis o de otra causa justificada. (b) Hemoptisis recurrente que a menudo es el accidente terminal. (c) La aparición de una sombra atípica o en series de películas sin relación con la marcha del proceso tuberculoso.

4) Cuando hay hallazgos atípicos en un tuberculoso en edad madura o avanzada, la broncoscopia y los estudios citológicos del esputo y de las secreciones aspiradas, están indicados para descartar el carcinoma complicante.

RESUME

1) Les auteurs rapportent cinq cas dans lesquels s'associaient une tuberculose pulmonaire active et un cancer bronchique.

2) Le diagnostic de cancer chez les tuberculeux est souvent difficile à cause des nombreux éléments communs à ces deux affections.

3) Les constations cliniques suivantes furent d'un grand secours dans le diagnostic de la coexistence de ces deux affections: (a) Douleurs thoraciques en l'absence de pleurésie ou d'autre cause.
(b) Hémoptysie profuse et récidivante, que apparaît souvent comme incident terminal. (c) Apparition sur les radiographies faites en série d'ombres atypiques qui ne paraissaient pas en rapport avec l'évolution tuberculeuse.

4) Chaque fois que des constatations atypiques sont faites chez un tuberculeux d'un âgé moyen, ou franchement âgé, on doit faire la bronchoscopie, l'examen cytologique des crachats, et des produits d'aspiration bronchique afin de déceler l'existence d'un cancer surajouté.

REFERENCES