Bronchiectasis in the Aged*

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Autopsies performed at the Long Island Hospital on patients in the eighth, ninth, and tenth decades of life revealed a high incidence of bronchiectasis.

From 1943 to 1953 inclusive, out of a total of 254 autopsies in this age group, advanced bronchiectasis was discovered in 33 cases (13 per cent).

Bronchiectasis is a disease which is characterized by the pathological enlargement of one or more bronchi or bronchioles. The dilatation itself, however, is not the most important factor. The dilatation being only the demonstrable effect of a pathological process which damages the tissues of the bronchi and lungs sufficiently to interfere with their function.

Examination of the diseased bronchi reveals the loss of normal columnar ciliated epithelium. This is replaced in some cases by purely cicatricial tissue, and in others by stratified squamous cell epithelium. The basement membrane of the mucosa is likewise destroyed or damaged with disappearance of the elastic tissue fibers. The submucosa becomes densely fibrotic and rigid. In the vicinity of the lung parenchyma there appears to be laid down additional fibrosis which adds to the thickness and rigidity of the bronchial wall.

In addition to bronchiectasis, one usually finds varying degrees of pulmonary atelectasis, pneumonitis and fibrosis.

The maintenance of the self-cleansing mechanism of the tracheo-bronchial tree is of vital importance to an organ constantly exposed to foreign agents such as irritating dusts, particulate matter and bacteria. The factors concerned in protection of the respiratory tract are integrated by reflex activity so that gas exchange so necessary to survival is not impeded. The vibrissae serve as a gross filter and provide the first line of defense. The factors include ciliary activity, mucus formation, phagocytosis, cough and the peristaltic contraction of bronchial musculature.

Coughing represents a complicated reflex mechanism generally initiated by irritation of the nerve endings in the bronchial and tracheal epithelium. The forceful expiration of air carries the offending material out of the bronchial passages. With the diminished muscle tone, decreased sensitivity to stimuli and slowing of reflex activity so common in the ageing process, the inability to produce effective cough may result in inadequate elimination of bronchial secretions in elderly people and so predispose of pathologic states.

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It is important to note that there are certain conditions present in ageing which affect normal ciliary activity. These are excessive drying and atrophy of the epithelium, chronic infection, and the lack of integrity of the tissue fluids and electrolyte balance. When the ciliary system mechanism fails, secretions may accumulate in such large quantity that death from asphyxia is possible.

The inhaled swollen particles which are not conveyed up by ciliary activity or by the peristaltic movements of the swollen bronchi are absorbed by the wandering phagocytes and make their way into the circulation and lymphatics of the lung. Once ciliated epithelium is destroyed, it is not replaced. The rigidity of the walls of bronchiectatic bronchi precludes any possibility of bronchial peristalsis taking place. Atelectasis, pneumonitis or fibrosis of the surrounding living parenchyma, prevents admission of air which could play an important part in the expulsion of mucus, pus or foreign material from the damaged bronchi through the medium of coughing.

As would be expected, bronchiectasis is a progressive disease. In an involved lobe the retention of infection produces further destruction and damage to the tissue of the normal bronchi and living parenchyma. With increasing fibrosis and rigidity of the bronchial walls and lung parenchyma, drainage by means of coughing is further impaired, resulting in spread of the infection.

Age deteriorations may be present in almost all of the intricate mechanisms concerned in tracheo-bronchial elimination with resulting impairment of self-cleansing properties of the lung.

Aside from the occasional fusiform bronchial dilatation observed, the two distinctive types most commonly seen are cylindrical and saccular forms. Cylindrical bronchiectasis is the most common variety, and is found almost always in the base of the lung. The saccular type is found usually in the upper portion of the lung.

Bronchiectasis may be divided into four main types, depending upon the predominating pathology and location: (1) Fibrotic bronchiectasis is characterized by an abundance of peribronchial fibrosis. This type tends to favor progressive bronchial dilatation in the presence of infection. (2) Stenotic bronchiectasis favors development of atelectasis which, by virtue of its interference with bronchial drainage, favors spread of infection. (3) Ulcerative bronchiectasis produces varying degrees of hemorrhage from blood streaks to amounts endangering life. (4) The dry hemorrhage type of bronchiectasis is characterized by the absence of cough and sputum but by recurrent hemorrhages.

It has been noted that the majority of bronchiectatic lesions are traceable to any of the following pre-existing conditions such as recurring bronchial infection, lobar or lobular pneumonia, acute and chronic lung abscesses, sinusitis, asthma, bronchial obstruction due to carcinoma, foreign body, and inflammatory cicatrix in the bronchial lumen caused by specific infection such as tuberculosis. To a lesser extent, bronchiectasis may be the sequel of chronic empyema or lesions causing slow compression
of a bronchus, leading to retention of secretion with subsequent infection.

Clinical manifestations in bronchiectasis depend upon the degree of pathology present. Mild cases are characterized by slight cough, scanty amounts of sputum and rarely hemorrhage. Abnormal findings, when present, consist of diminished resonance and rhonchi over affected lobes. The diagnosis usually made at this stage is that of chronic bronchitis.

In far advanced stages bronchiectasis can be diagnosed readily. The clinical picture is apt to be severe. Cough may be constant. Sputum is abundant and may be foul. Varying degrees of dyspnea may be present. Finger clubbing is more frequent. Hemorrhage may be a serious problem.

It is, therefore, important to establish a diagnosis in the early phases of the disease so as to prevent late complications such as bronchopneumonia, atelectasis, empyema or marked hemorrhages. It has been noted that bronchopneumonia and bronchiectasis are frequent concomitants, the former occurring as a complication of the latter.

Roentgen findings in bronchiectasis vary considerably and diagnosis based upon plain films may be difficult. Yet the disease should be suspected when the following are present: (1) prominent bronchial markings, (2) rounded areas of increased radiance, (3) lobar or lobular atelectasis and (4) areas of mottled densities.

Although bronchography is an important and reliable procedure in the diagnosis of bronchiectasis, we do not advise it for elderly patients because of their limited pulmonary reserve. In addition, oil is usually retained in the chest of patients with asthma and emphysema. This may confuse subsequent roentgenograms and diminish the function of the involved alveoli. If the patient is a fit subject for surgical intervention, then bronchograms are definitely indicated in order to outline the normal and abnormal bronchi. Bronchoscopy may be of diagnostic value in differentiating foreign body, neoplasm or endobronchial tuberculosis.

Treatment of bronchiectasis in the aged should be directed in controlling intercurrent infections, removal of secretions, maintaining maximum vital capacity, a nutritious diet and chemotherapy.

Sex distribution of the 33 patients in this study was 28 males and five females. The great preponderance of male over female cases is undoubtedly due to the fact that in our chronic disease hospital we have twice

<table>
<thead>
<tr>
<th>TABLE I</th>
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<tbody>
<tr>
<td>SEX AND AGE DISTRIBUTION</td>
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<table>
<thead>
<tr>
<th>Number of Autopsies</th>
<th>254</th>
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<tbody>
<tr>
<td>Bronchiectasis</td>
<td>33</td>
</tr>
<tr>
<td>Male</td>
<td>28</td>
</tr>
<tr>
<td>Female</td>
<td>5</td>
</tr>
<tr>
<td>Age Distribution—70-80</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>80-90</td>
</tr>
<tr>
<td></td>
<td>90 plus</td>
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TABLE II
ETIOLOGIC FACTORS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>12</td>
</tr>
<tr>
<td>Pleurisy</td>
<td>6</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>6</td>
</tr>
<tr>
<td>Bronchogenic Cancer</td>
<td>4</td>
</tr>
<tr>
<td>Asthma and Emphysema</td>
<td>3</td>
</tr>
<tr>
<td>Silicosis</td>
<td>2</td>
</tr>
</tbody>
</table>

as many male as female patients. The youngest in the group was 70 years old and the oldest 91. See Table I.

Etiologic factors encountered in this series are tabulated in Table II. The high incidence of pneumonia and pleurisy is certainly striking. It was impossible to determine in most cases whether pneumonia caused the bronchiectasis or occurred because of bronchiectasis. Tuberculosis and bronchogenic carcinoma also were found to be important etiological factors.

TABLE III
MAJOR SYMPTOMS

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough</td>
<td>31</td>
</tr>
<tr>
<td>Sputum</td>
<td>29</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>18</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>15</td>
</tr>
<tr>
<td>Chest Pain</td>
<td>13</td>
</tr>
</tbody>
</table>

The chief symptoms of bronchiectasis were cough, sputum, hemoptysis, dyspnea, and chest pain. Table III shows the occurrence of these symptoms in the series under study. Almost all had cough with sputum.

It is important to note that over half the patients had hemoptysis at some time during the course of the disease. There is no doubt that practically all persons with bronchiectasis expectorate blood at some time. The amount may vary from tiny streaks to massive hemorrhage. Dyspnea and chest pain were also frequent symptoms.

Most of the patients had physical signs in the chest, although these were sometimes minimal, such as transient basal rhonchi, impaired resonance or slight suppression of breath sounds over the affected lobe. Clubbing of the fingers, long considered a classical sign of bronchiectasis,

TABLE IV
PHYSICAL SIGNS

<table>
<thead>
<tr>
<th>Findings</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Chest Findings</td>
<td>29</td>
</tr>
<tr>
<td>Clubbing of Fingers</td>
<td>18</td>
</tr>
<tr>
<td>No Physical Findings</td>
<td>4</td>
</tr>
</tbody>
</table>
was present in 18. Its presence should always lead to consideration of the possibility of bronchiectasis but its absence obviously has no value in ruling out the disease. See Table IV.

Review of chest roentgenograms revealed that a high percentage were abnormal. Thirty of the 33 were abnormal in some respect and usually the proper diagnosis was at least suggestive. Bronchiectasis can be diagnosed accurately from such studies in most cases. Bronchograms may serve as a means of confirming the diagnosis and mapping out the diseased segments.

Case Reports

Case 1: M. B., a 75 year old white male was admitted with a 10 year history of cough, expectoration of two or three ounces of yellowish-green blood streaked sputum and dyspnea on exertion.

Physical examination revealed coarse rales at both bases. There was marked clubbing of the fingers. In the past 10 years he had four attacks of pneumonia. He succumbed to his fifth attack (Fig. 1).

Autopsy revealed widespread bronchopneumonia, most marked in the lower lobes. There were numerous old and recent fibrotic adhesions. There was marked congestion and pulmonary edema. Bronchiectatic cavities in large numbers were present in both lower lobes. There was an old primary pulmonary complex in the lower lobe of the left lung and a calcified plaque at the apex of the right upper lobe.

Case 2: D. M., is an 86 year old white male, with a history of pulmonary tuberculosis for the past 20 years. His chief complaints were cough, expectoration of yellowish-green sputum, occasional bouts of hemoptyis and dyspnea. Physical examination revealed dullness and coarse rales over the left upper lobe and right base. Sputum was positive for tubercle bacilli. He succumbed to bronchopneumonia (Fig. 2).

Autopsy revealed advanced pulmonary tuberculosis of both upper lobes, especially the left in which area there were also a number of small cavities. Marked bronchiectasis and bronchopneumonia were noted in both bases, particularly the right.

Figure 1 (Case 1): Marked thickening and coarse infiltration of both bases, especially the right, with emphysema. Figure 2 (Case 2): Thickened pleura over the left apex with coarse infiltration and multiple small cavities. Marked exaggeration of the right tracheo-bronchial tree with bilateral diaphragmatic adhesions. The heart and mediastinum is displaced to the left.
Case 3: W. W., a 74 year old white male, was admitted with a two months history of cough, sputum, chest pain and dyspnea. Physical examination revealed marked dullness over the lower half of the right lung. Fluid obtained from the right pleural cavity was bloody and was positive on Papanicolaou smear. He succumbed to bronchopneumonia (Fig. 3).

Autopsy revealed bronchogenic carcinoma involving the right main bronchus 3 cm. from its origin. In the right lung below the obstructed main bronchus, there was marked bronchiectasis and atelectasis. Both lungs showed confluent bronchopneumonia.

Case 4: J. D., an 82 year old white male, was admitted with a 10 year history of cough, sputum, occasional streaking, weakness and dyspnea on exertion. For the past 20 years, he had complained of asthma and chronic bronchitis. Physical examination revealed impaired resonance and coarse rales at both bases. There was marked clubbing of the fingers. He succumbed to bronchopneumonia (Fig. 4).

Autopsy revealed bilateral confluent bronchopneumonia. Advanced bronchiectasis was noted in both lower lobes, extending into the periphery of the lungs. In addition, the right middle lobe showed moderate fibrosis of the parenchyma.

CONCLUSIONS

Bronchiectasis in the aged is a common disease.

Autopsy findings on 254 patients, ranging from 70 to 91 years, revealed bronchiectasis in 33 (13 per cent).

Bronchial obstruction and infection are two of the most important causes of bronchiectasis.

In this series, the most common etiologic factors encountered were pneumonia, pleurisy, tuberculosis and bronchogenic carcinoma.

Symptoms were usually cough, sputum, hemoptysis and dyspnea. Physical findings in the chest and clubbing of the fingers were present in almost all of our cases.

Bronchiectasis can be diagnosed accurately in most cases by plain roentgenograms.

Figure 3 (Case 3): Marked density involving the lower half of the right lung, having the appearance of consolidation or fluid. Coarse infiltration extending out from hilar regions. Figure 4 (Case 4): Thickened pleura and a calcified area at the right apex with small calcified nodes in both lungs. thickening and coarse infiltration at both bases.
Instillation of iodized oil in this age group is contraindicated.

The treatment of bronchiectasis in the aged should be directed in controlling intercurrent infections, removal of secretions, nutritious diet and chemotherapy.

CONCLUSIONES

La bronquiektasie en los ancianos es una enfermedad común.
Los hallazgos de autopsia en 254 enfermos entre 70 y 91 años, revelaron bronquiektasie en 33 (13 por ciento).
La obstrucción bronquial y la infección, son dos de las causas más importantes de bronquiectasie.
En esta serie la etiología más común fue: neumonia, pleuresía, tuberculosis y carcinoma bronquiogénico.
Los síntomas habituales son: tos, esputos, hemoptisis y disnea.
Los hallazgos físicos en el tórax y lo dedos hipocráticos, se encontraron en casi todos los casos nuestros.
La bronquiektasie puede diagnosticarse exactamente en la mayoría de los casos por la radiografía simple.
La instilación de aceite yodado en el grupo de esta edad está contraindicada.
El tratamiento de la bronquiektasie en los ancianos debe dirigirse hacia el control de las infecciones intercurrentes, expulsión de las secreciones, dieta y quimioterapia.

RESUME

La bronchiectasie est une affection fréquente chez les individus âgés.
Les constatations d'autopsie chez 254 malades, allant de 70 à 91 ans, révélèrent l'existence de bronchiectasie chez 33 d'entre eux (13%).
L'obstruction bronchique et l'infection sont deux des causes les plus importantes des dilatations bronchiques.
Dans cette série de cas, les facteurs étiologiques le plus souvent rencontrés furent la pneumonie, la pleurésie, la tuberculose et le cancer bronchique.
La dilatation bronchique peut être diagnostiquée d'une façon courante par de simples radiographies dans la plupart des cas.
L'instillation d'huile iodées est contrindiquée dans ce groupe de malades âgés.
Le traitement de la bronchiectasie chez les personnes âgées devrait viser à juguler les infections intercurrentes, calmer les sécrétions et comprendre un régime nutritif et la chimiothérapie.

SCHLUSSFOLGERUNGEN

Die Bronchiektsasie bei betagten Menschen ist eine häufige Krankheit. Sektionsbefunde bei 254 Kranken im Alter zwischen 70 und 91 Jahren erbrachten eine Bronchiektsasie dei 33 Fällen = 13%. Ein Bronchialver-
schluss und eine Infektion sind 2 der wichtigsten Ursachen für Bronchiektasie.