Bronchiectasis: Practical Consideration of Cure, Treatment and Prognosis

BEATTY H. RAMSAY, M.D., F.C.C.P.
Los Angeles, California

It is the purpose of this paper to point out that symptomatic bronchiectasis results in death from infection, hemorrhage and pulmonary insufficiency; and that in approximately one-half of the cases, cure is possible and desirable by segmental resection of the diseased areas.

Anatomy

The lungs are formed of units known as bronchopulmonary segments. Each is a cone of tissue with its own bronchus and blood supply. Two or more may be grouped together as a lobe, but individual segments of any lobe may be diseased without involvement of the others, and individual segments may be removed without damage to other segments of a lobe. This concept is of particular importance in the consideration of bronchiectasis, because this disease characteristically affects some segments of several lobes.

Pulmonary Function

We do not have unlimited pulmonary function. Physical activity of the young is curtailed by limitations in respiratory and cardiac function. As the degenerations of age occur, the impairment of cardiac and pulmonary function are additive and mutually embarrassing. A damaged heart might sputter along if the lungs are normal—but fail completely should there be pulmonary limitation as well.

Pathologic Physiology

The air we breathe contains great quantities of dust, bacteria, and foreign material. Were there no mechanism for removal of this, the bronchi would, in time, become completely filled. Fortunately, the bronchial wall forms mucus to dissolve some of the foreign matter, has a ciliary brushing mechanism to move the mucus proximally, and in addition, the bronchial cough explodes larger particles upward and out of the bronchial tree.

The bronchiectatic change results in a thickened wall, destruction of some of the mucus glands, and of the cilia. Other factors which interfere with drainage are pleural thickening, enlarged hilar nodes, deformation of the chest wall, or immobilization of the diaphragm by pregnancy. In the upper lobes, the force of gravity is usually effective in facilitating bronchial drainage, but in the dependent segments, gravity acts unfavorably and stagnation occurs. Inhaled bacteria are not promptly eliminated, but grow in the accumulated secretion and infection results. The quantity of purulent material may become great, so that the usual ineffective cough
of the bronchiectatic cannot expel it at one time. Coughing is paroxysmal and mixed with deep inspirations which suck pus and bacteria into normal pulmonary segments.

By this means, severe clinical attacks of pneumonitis in otherwise normal lung tissue may be produced, but far more often, the degree of pneumonitis and/or atelectasis is so slight that early fatigue, lassitude and malaise may be the only symptoms. Each such process results in some scar, and after 20 or 30 years have passed, it is frequent to find widespread secondary pulmonary fibrosis and emphysema and markedly limited respiratory function. In this state of borderline pulmonary capacity, any thoracic disease, such as pneumonia, fractured ribs, cardiac decompensation, etc., may result in death.

**Diagnosis**

A diagnosis of bronchiectasis can only be proved or disproven by a complete bronchogram; i.e., one with filling of all 18 segmental bronchi.

**Significance of Demonstrated Bronchiectasis**

The extent and degree of bronchiectatic change are less significant than the presence or absence of symptoms. A patient with widespread bronchiectasis may be relatively asymptomatic; whereas one single bronchiectatic segment which is not well-drained may result in recurrent pneumonia, hemorrhage, empyema, or even brain abscess.

**Complications**

Infection. Prior to the development of modern chemotherapy, infection was the usual direct cause of death in bronchiectasis.

Perry and King, in 1940, published a follow-up study on 400 patients with bronchiectasis. Sixty-nine per cent developed symptoms in the first two decades of life. Of 96 nonsurgical cases who developed bronchiectasis before the 10th year, 62 were dead in less than 20 years from the onset. Only 9 (9.4 per cent) lived 30 or more years. The mortality was almost identical in those with commencement in the second decade. When one realizes the early beginning of the disease in most patients and that most die in less than 20 years, it becomes apparent that those with symptomatic, untreated bronchiectasis usually are dead before they are 40.

Bradshaw and Clerf, in 1941, reviewed 171 patients with untreated bronchiectasis seen originally between 1925-35. Fifty-nine (34.5 per cent) died from bronchiectasis or its complications up to the time of report. The average duration of life in those who died was 13½ years.

With present day antibiotics, infections occur but are generally easily controlled. Empyema and brain abscess are much more uncommon than formerly. They still occur, however, and brain abscess especially may result from subclinical infection.

Arthritis is common, and even minor arthritic symptoms should be viewed as an indication that smoldering infection is present.
Hemorrhage

Scannell in 1950 reported a 10 year follow-up on bronchiectatic patients who, at the Massachusetts General Hospital, had indications for surgical resection, but surgery was not performed. He found that 11 were well, but that four had died from massive pulmonary hemorrhage and one from "general decay." It is important to realize that fatal pulmonary hemorrhage is a common termination in bronchiectasis.

Pulmonary insufficiency. Although, with chemotherapy and antibiotics, even severe infections can be controlled and far less often result directly in death, the scarring which results eventually leads to crippling and premature demise from pulmonary insufficiency.

In this respect, it is interesting to compare diabetes mellitus and bronchiectasis. Joslin states, "Total absence of vascular disease occurred infrequently after 20 years of diabetes. . . ." When diabetic control is not perfect, the occurrence of atherosclerotic change is early and severe. The usual cause of death in diabetes mellitus of long duration is vascular change in the brain, heart or kidney. In diabetes too, because of antibiotics, infection is no longer the customary cause of death. If there were a surgical operation which would cure diabetes mellitus, would that not be greatly preferable from standpoints of daily well-being, economics, and ultimate prognosis than the present day management with substitution insulin? So too in symptomatic bronchiectasis of limited extent, surgical cure is more economical, offers a longer prognosis, and provides a healthy, symptom-free daily life. Present day surgical mortality is 0.4 per cent.²

Approximately 50 per cent of bronchiectasis cases are not surgical. Symptomatic cases where nearly all segments are involved are beyond surgical cure for obvious reasons. Infrequent mild hemoptyses, without other symptoms, require nothing more than reassurance. Anatomical bronchiectasis in a segment or segments which are well-drained and thus do not become infected, or in which infections are mild and infrequent, and where the intervals are completely free from evidence of infection, does not require more than symptomatic therapy. But should there be fatigue, chronic cough, increased sputum production, arthritis, or general malaise in the interim, low-grade chronic infection is present, and in such a situation, surgery is indicated.

SUMMARY

Surgical bronchiectasis is symptomatic disease significantly affecting less than 12 bronchopulmonary segments, where the remaining segments have adequate functional capacity. This emphasizes the factor of time. In surgical bronchiectasis, cure can be obtained by surgical removal, if done before secondary changes are produced in nonbronchiectatic segments. So-called conservative treatment, in such cases, may result in partial control of symptoms and infections, but, nevertheless recurrent minor inflammations over the years finally produce secondary fibrosis and emphysema and early death from pulmonary insufficiency.
La bronquiectasia quirúrgica, es una enfermedad que afecta significativamente menos de 12 segmentos, en tanto que los segmentos restantes, tienen adecuada capacidad funcional. Esto acentúa la importancia del factor tiempo.

En la bronquiectasia de tipo quirúrgico, la curación puede obtenerse por la excisión quirúrgica si se lleva a cabo antes de que aparezcan cambios secundarios en los segmentos no bronquiectásicos. El llamado tratamiento conservador en tales casos, puede obtener un control parcial de los síntomas y de la infección pero sin embargo, las inflamaciones de menor cuantía, pero recurrentes por años, producen fibrosis secundaria y enfisema y muerte temprana o por insuficiencia pulmonar.

REFERENCES