

Bronchoscopic Aspects of Early Bronchiectasis

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DURING the past three decades peroral endoscopy has advanced from an occasional, spectacular method of foreign body extraction to a commonly employed diagnostic and therapeutic procedure. This is readily evinced by the fact that at present foreign body extraction comprises only 2 per cent of the cases in which bronchoscopy and esophagoscopy are performed¹. The universal interest and development of the procedure have been due undoubtedly to the obvious advantages of direct visualization of lesions of the esophagus and tracheobronchial tree. Whereas formerly in a number of diseases of these organs the probable diagnosis was based indirectly upon the clinical manifestations and roentgenographic characteristics, at present the diagnosis can frequently be established directly by peroral endoscopy. Thus, establishing a diagnosis, which previously was, at best, difficult and often made too late to permit the institution of adequate therapy, can now be done in an increasing number of cases at a stage sufficiently early to allow the most effective therapy. However, the value of bronchoscopy as a diagnostic procedure in these conditions is perhaps no greater than its efficacy as a therapeutic adjunct. The deserving preeminence of bronchoscopic aspiration and medication in chronic suppurative pulmonary lesions, atelectasis, bronchial ulceration and stenosis, and certain forms of tuberculosis is now generally recognized, and is readily illustrated by its conspicuous prominence in the recent literature of bronchiectasis²⁻⁵.

The term bronchiectasis, derived from the Greek word meaning "bronchial dilatation," refers to the clinical entity first described by Laennec⁶ in 1819. It is characterized by a chronic cough associated with a foul, purulent

expectoration. The exact incidence of this condition has not been accurately determined and in the past the impression has been left that its occurrence is relatively rare. However, within recent years those who have made a more thorough study of the disease are firmly convinced that it occurs far more frequently than is commonly supposed. Indeed, some observers have expressed the opinion that of the chronic pulmonary affections bronchiectasis ranks second in frequency to pulmonary tuberculosis, if not surpassing it⁷⁻⁹. Undoubtedly, many cases of non-tuberculous bronchiectasis are frequently labeled "pulmonary tuberculosis" and even treated as such.

Although the acquired type of bronchiectasis is commonly considered a disease of middle age, more extensive experience has shown that its insidious development frequently begins in early childhood. This has been definitely demonstrated statistically by Hedblom⁷, who found that in a series of 134 cases the onset of symptoms began before the fifteenth year of age in 43.2 per cent. This is further corroborated by the observations of Hutinel¹⁰, Wiese¹¹, Brauer¹², Thorpe¹³, Lemon¹⁴, Findlay and Graham¹⁵, Duken¹⁶, and others. The significance of this fact cannot be emphasized too strongly, because only by its recognition in this early formative stage can the progressive development of bronchiectasis be adequately controlled and possibly arrested.

Clinically, the condition varies considerably depending upon the type, duration and extent of the lesion, and the degree of infection. Even in the same individual there may be periodic remissions and exacerbations. Moreover, contrary to the characteristic textbook description, the expectoration of profuse fetid sputum occurs as a rule only in the more advanced cases. In fact, too, some patients representing the "dry bronchiectasis" of Bezancon¹⁷ have little or no sputum and others have a cough with only a slight amount of sputum usually present in association with

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an acute respiratory infection. Hemoptysis is frequently encountered, although seldom severe, and is manifested usually as a slight tingeing of the sputum with blood. Clubbing of the fingers occurs in the advanced cases. The patients frequently complain of slight lassitude, loss of energy, and rather vague, indefinite symptoms. The physical findings vary considerably and in early cases, during periods of remission, they may be entirely absent. However, one of the most characteristic features of the disease is its inevitable progression in the absence of therapeutic intervention. The symptoms of cough and expectoration gradually become more severe and over a period of months or years the recurrent paroxysmal attacks occur more frequently until the patient is daily coughing "mouthfuls" of foul, putrid sputum. He develops into a miserable chronic invalid—socially ostracized, and usually stamped as a consumptive. Too frequently he has been futilely treated with medicaments of all sorts until he is so weakened and discouraged that death would be a welcome relief. These are the well-known characteristics of the far-advanced stage, which obviously should never be permitted to develop.

The bewildering pathogenesis of bronchiectasis forms one of the most active research problems today. Whereas a detailed review of the causation is considered beyond the scope of this presentation, certain factors are of utmost etiologic significance, particularly as regards the bronchoscopic aspects of the early stage of the disease.

One of the fundamental pathogenic factors in the production of acquired bronchiectasis is mechanical; namely, bronchial obstruction. Numerous conditions may be responsible for the occurrence of such an obstruction. A study of a series of cases of bronchial obstruction demonstrates that it may result from an inflammatory bronchial stenosis associated with upper respiratory infections, from inspissated pus, from an intra—or extrabronchial tumor, from a stricture following tuberculous or other ulcerations, from the long sojourn of a foreign body, or from a kinked bronchus due to extrinsic pressure produced by tumors, empyema, etc.

It is difficult or impossible to discover the nature of the actual obstructing element in

each case of bronchiectasis in which a mechanical factor may be held to have a direct causal relationship. Occasionally, as in cases of overlooked foreign bodies present in the lung over long periods of time, the obstruction is dramatically demonstrated roentgenographically when the foreign body is found at the apex of a bronchiectatic triangle. However, a far more common type of bronchial obstruction appears to be an inflammatory bronchial stenosis associated with upper respiratory infections. Such stenoses are common in childhood and manifest themselves by repeated "attacks of pneumonia" which do not follow a course typical of true pneumonia. The child becomes acutely ill; dulness, bronchial breathing, and bronchophony are found over one lobe, usually the lower, but the heart shifts toward the involved side, demonstrating that the process is one of *atelectasis* rather than pneumonia. The symptoms subside as soon as the cough becomes productive of the obstructing secretions, and the temperature returns to normal within a few days. Thus, with these acute symptoms so closely simulating pneumonia, the element of bronchial obstruction may be overlooked.

Whereas the majority of these patients recover spontaneously, or possibly after the use of expectorants, some continue with a persistent cough and a low-grade fever. The continuation of these apparently insignificant manifestations is due to the persistence of the atelectasis, and the roentgenogram reveals a triangular density at the base of the lung. This, too, generally clears spontaneously after several weeks, but has a tendency to recur, remaining present for increasingly long periods of time after each attack of "pneumonia." In a correlation of these progressive clinical and roentgenographic manifestations with the correspondingly changing endoscopic characteristics, it has been definitely demonstrated that this is actually a pre-bronchiectatic stage^{18, 19}. Therefore, the clinical recognition of this stage is of decisive importance because unless successful re-aeration of the lung is obtained, retention of pus will eventually lead to destruction of the bronchial wall and fibrosis of the interstitial tissue. As a general rule, the time interval which exists between the actual onset of such an obstruction and the eventual well-established

bronchiectasis is so great that the importance of the pulmonary infections of childhood is overlooked. Such lesions occur with relative frequency in childhood, and major attention must be directed toward them in discussing the bronchoscopic aspects of early bronchiectasis.

Whereas most of these cases recover spontaneously or after the use of expectorants, some necessitate more extensive therapy. Postural drainage is of definite value, and should be used in conjunction with the other methods of therapy, but not as the sole method. If this type of drainage is inadequate, endobronchial drainage should be instituted. The bronchoscopic picture of the disease during this stage demonstrates the need of active bronchial dilatation and frequent aspiration of obstructing secretions by means of a strong suction pump.

The bronchoscopic picture in this pre-bronchiectatic stage is of extreme interest. The entire tracheobronchial tree usually is found to contain a considerable quantity of rather tenacious muco-pus, which upon aspiration reveals an underlying mucosa somewhat thickened and reddened. However, the most significant finding is an area of intense inflammation around the orifice of a branch bronchus sufficient to produce occlusion. Occasionally, as the patient coughs, thick pus is seen to ooze through the stenotic orifice. The failure of this secretion to bubble out of the bronchus is definite evidence that the lung tissues beyond is airless. By shrinking the mucous membrane around this inflamed orifice with cocaine, by dilating it with forceps, and then by passing an aspirator directly into it, the thick, obstructing pus can be readily released. Prompt relief of symptoms and disappearance of the atelectasis characteristically follow bronchoscopic aspiration, if performed early in these cases.

In the cases of atelectasis of longer duration, an attempt should be made bronchoscopically to open the airway and permit better drainage of pus. In our experience it has been observed that, after repeated bronchoscopic aspiration, re-aeration may be accomplished in some cases. Frequent re-examination is necessary, however, to be certain that the atelectasis does not recur following subsequent upper respiratory infections.

In the more advanced cases, with characteristic roentgenographic triangular atelectatic areas which have been present for more than a year, there are definite bronchiectatic cavities with marked lung destruction and bronchial dilatation. Bronchoscopic aspiration is of palliative benefit to these patients and reduces the inflammatory reaction, but cannot produce return of normal function. However, such cases no longer have a hopeless prognosis. Because of the recent advances in thoracic surgery, lobectomy can be performed with reasonable safety to remove the diseased portion of the lung.

In conclusion, it may be stated that the bronchoscopic aspects of early bronchiectasis may be divided into a diagnostic, a prophylactic, and a therapeutic phase. Diagnostically, the bronchoscope aids in establishing the early differential diagnosis of a bronchial obstruction and the identity of the secondary invading organisms. Prophylactically, the early recognition and removal of foreign bodies, the dilatation of bronchial stenoses, the bronchoscopic aspiration of areas of pulmonary suppuration and suppurative bronchitis are invaluable in preventing the development of this disease. The active treatment should be directed toward establishing and maintaining adequate bronchial drainage. Whereas this can be done by postural drainage in some cases, in others the evacuation of secretions can be accomplished far more satisfactorily by bronchoscopic aspiration. In the advanced case, this is particularly indicated as a palliative procedure and as a valuable means of preparing the patient for surgical intervention. Finally, vaccines prepared from bronchoscopically-obtained secretions are found to be of considerable benefit in some cases.

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