Primary Carcinoma of the Lung

IN A RECENT PAPER C. I. Allen (1) states that approximately one hundred and fifty papers dealing with primary carcinoma of the lung have appeared in the literature within the past three years. A fair number of these papers have dealt with the clinical features; whereas only a short time ago most of the writers were concerned with the pathologic picture. This increased clinical interest is very evident. Reports of patients treated during the past few years have demonstrated that in some instances primary tumors of the lung are operable. There is no doubt but that the number of patients diagnosed as suffering from primary malignant disease of the lung has rapidly increased.

Graham and Singer (2) quote Jungheins in stating that primary carcinoma of the lung, which always arises in a bronchus, constitutes between 5 and 10% of all carcinomas. Obviously these figures indicate that considerable study should be devoted to this disease in order to make an early diagnosis and to determine suitable treatment. Unfortunately, the onset in many cases is insidious, and in some cases it appears to arise in the lungs of individuals who have for many years been the victims of such chronic pulmonary diseases as bronchitis and tuberculosis. However, in others the condition arises in individuals who have a history peculiarly free from illness in any form. Furthermore, the enormous improvement in thoracic surgery justifies the hope that in the near future many patients now doomed when the diagnosis is made may be enabled to recover completely or at any rate look forward to a distinct prolongation of life.

Very little can be said in regard to etiology. Primary carcinoma of the lung is much more common in men than in women. Edwards (3) reports a series of 73 cases, 53 of whom were men and 20 women. In Edwards' (3) series the oldest patient was 69 and the youngest was 26 years of age. The average age was approximately 49 years. Jackson and Konzelman (4) report a series of 32 cases, 7 males and 25 females. The average age of the men was 52.3 years and of the women 34.1 years. In the cases I have seen the average age has been low. Two females have been under 21 years of age and two men have been under 40 and none have been more than 60 years of age. The lesion was on the right side in 33 of the cases reported by Edwards and on the left side in 40 cases. In Jackson's series 23 were right and 9 left. These tumors occur more frequently in the lower lobes than in the upper lobes according to the case reports. As far as can be determined at present, occupation does not appear to be of great importance.

Edwards (3) reports that cough was present in all of the 73 cases except one. All of Jackson's and Konzelman's (4) 32 cases had cough as a predominant symptom except five. Rabin and Neuhofer (5) do not report their 250 cases in detail, but state that cough and hemoptysis is caused by ulceration of tumors into the larger bronchi. Hemoptysis is reported to occur in a large proportion of all cases. Edwards (3) reports hemoptysis in 87.7% of his series. Hemoptysis, therefore, occurs in a greater percentage of cases of pulmonary malignancy than of pulmonary tuberculosis.

Sixty-four per cent of Edwards' (3) cases had a mucoid frothy sputum. If necrosis and infection has occurred the sputum may be purulent and resemble that seen in pulmonary abscess or bronchectasis.

Dyspnea was present in 74% of Edwards' (3) cases and he does not believe that it depends upon the amount of lung involved. He thinks it may be due to involvement of the bronchus or of the vagus. Dyspnea in the cases I have seen
has been fairly well in proportion to the amount of lung put out of action. Rabin and Neuhof (5) state that pain is the most common signal symptom of the tumors of the smaller bronchi while Edwards (3) reports pain as being present in only 60% of his cases. The pain is usually caused by the growth extending to the pleura or extrapleural structures.

Physical signs vary according to the location of the growth. When it is in a main bronchus to a lobe the signs will usually be those of bronchial obstruction causing atelectasis of the involved lobe. In the later stages there may be evidence of a secondary pleural effusion. The effusions are often serous early, but usually are blood stained or contain a great amount of blood. Physical signs may be absent when the growth is located in the peripheral portions of the lung or consist of slight localized dullness. In the later stages the growth infiltrates the chest wall and produces a very flat, solid percussion note—slightly different from the note over fluid; also the dullness may extend over beyond mid line, although the heart is not displaced. Clubbing of the fingers may be present.

In those carcinomas blocking the main bronchi or the commencement of the secondary bronchi the x-ray picture is dependent on the presence or absence of bronchostenosis. Infiltrations most dense at the lung root and extending in fine streaks and nodules to the periphery may be seen. Enlarged mediastinal lymph glands may be present. Growths arising outside the main bronchi may produce a well circumscribed shadow. The non-circumscribed tumors of the smaller bronchi usually present the appearance seen in unresolved pneumonia. When the growth extends to the periphery careful inspection may show more or less destruction of a rib.

Bronchography is mentioned by all authorities as being essential in the diagnosis of bronchial neoplasms. (Radiographic examination after introduction of lipiodol). It will give positive evidence of obstruction of bronchi. It will also show partial obstruction caused by a narrowing of the bronchial lumen from either within or without.

Those who are interested primarily in the medical or surgical aspects of chest diseases seem to be as enthusiastic as the bronchoscopist as to the value of bronchoscopic examination in bronchial carcinoma. The cardinal indication for bronchoscopic examinations is clinical or roentgenologic evidence of bronchial obstruction (a wheeze or an area of obstructive atelectasis or obstructive emphysema), and in no connection is it more valuable than in the early diagnosis of bronchial carcinoma (4). Several important observations can be made by this method: 1. A definite nodular growth may be seen from which a specimen can be removed for microscopic examination. 2. Narrowing due to submucous infiltration by growth or that due to pressure by a tumor outside the bronchus may likewise be determined and 3, broadening of the carina due to enlarged mediastinal lymph glands can be visualized. Edwards (3) thinks that bronchoscopy should be performed on the majority of patients who have had hemoptysis and from whom tubercle bacilli cannot be found in the sputum, especially if they are middle aged. The same view is held by other authorities.

The introduction of air into the pleural space may help to distinguish tumors of the inner chest wall and pleura from those arising in the pulmonary tissue and, therefore, may be of considerable value if the question of operation is being considered. Thorascopy may give evidence of secondary involvement of the pleura, a condition which would contraindicate any attempt at radical operation. Pleural effusion, when present, may be examined by Mandelbaum’s method and enable a positive diagnosis to be made. This method comprises separation of the cellular content of the pleural fluid by centrifugalization and hardening the deposit by formalin after which it is prepared for microscopic examination. This
method can also be used for sputum examination.

Exploratory thoracotomy may be used if all other methods do not enable a diagnosis to be made.

Much difficulty is being experienced in arriving at a practical classification of carcinoma of the lung. Formerly the classification was based on the cellular structure of the tumor. All are agreed that practically all pulmonary carcinomas originate in a bronchus and many believe that all types are derived from the same cell, namely the undifferentiated basal cell of the bronchial mucosa. All seem to believe that the location of the tumors is of great importance when treatment is considered, either radium or surgery, and therefore should be considered in classification. Tuttle and Womack (6) think their investigations show that tumors located in the large bronchi are less malignant and offer a better chance for cure by removal than those arising from the smaller bronchi. On the other hand Rabin and Neuhof (5) think their research has shown that peripherally located tumors are more likely to be circumscribed and that regional lymph nodular involvement occurs late and is limited. They, therefore, believe that the peripherally located tumors offer the best chance for surgical cure. Edwards (3) states that it is almost invariably impossible to perform a lobectomy on any patient in whom the growth can be seen with the bronchoscope; and in these cases the only radical operation that can be considered is total removal of the affected lung.

There are many pulmonary diseases which cause symptoms and objective findings similar to those of cancer of the lung. Lung abscess is often difficult to differentiate. The growth causes bronchial obstruction and infection occurs in the obstructed portion of the lung producing an abscess or gangrene. For this reason, the cause of lung abscess should always be determined if possible. Pulmonary tuberculosis is often diagnosed when a bronchial malignancy is present.

Differentiation depends on the sputum findings and if sputum is negative for acid fast organisms, a careful consideration of all subjective and objective findings is in order. As the growth may cause about the same symptoms and findings as a foreign body in a bronchus, the presence of a foreign body should always be ruled out. The acute symptoms that occur at the onset of necrosis and infection of the growth may stimulate pneumonia. A chronic bronchitis manifested chiefly by cough, especially a cough with a tendency toward spasmodic attacks may be caused by a carcinoma in a large bronchus without obstruction. The likelihood of a new growth is increased if hemoptysis is present. Positive diagnosis must necessarily depend on biopsy of a specimen obtained by the bronchoscope, biopsy of a regional lymph gland or on the operative or autopsy findings.

During the past 4 years Edwards (3) has been implanting radon seeds in bronchial tumors. The holders of radon seeds remain in place for seven days, the growth receiving an amount of gamma radiations equivalent to 1,795 milligram hours of radium. In general he states the end results as regards cure are poor owing to the late stage in which the treatment is instituted. In a large proportion of cases the local growth disappears. He thinks there is as definite a hope of curing them by irradiation as there is in early carcinoma of the tongue. He reports one patient treated by this method in 1931 who was well in May, 1934, there being a white scar on the bronchial wall where the growth was formerly located. Several patients are alive from periods of 2 months to over a year. He also inserts the radon seeds by thoracotomy in some cases when the growth is not visible through the bronchoscope.

Many cases of pulmonary malignancy have been treated by surgical removal of the affected lobe or lobes during the past few years. Edwards (3) reports 14 such removals. Rabin and Neuhof (5) report 5 cases, one of whom was living at the (Continued to page 38)
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time of the report. Numerous other reports are given, but the frequency of recurrence of the growth is discouraging. Total removal of a lung because of carcinoma of the bronchus was done first by Graham (2) April 5, 1933. In addition to removal of the lung and many mediastinal lymph glands, the 3rd to 9th ribs inclusive were removed. This was a left lung. Recent reports indicate the patient continues to do nicely. Rienhoff (7) has given a report of the successful removal of the left lung for tumor in two cases. His report also appeared in 1933.

Overholt (8) reports the successful removal of the right lung for carcinoma which is the first successful right pneumonectomy for cancer to be reported. His operation was done November 13, 1933. Overholt (9) has recently reported a series of 8 pneumonectomies, six of which were for carcinoma of the lung. Three of these survived the operation. A follow up of the first patient operated on found her to be in good health.

It seems logical that the prognosis may be better after successful total pneumonectomy than it has proven to be in the cases of lobectomy which have been followed for a longer period of time. In doing a lobectomy, it is not possible to so completely remove the regional lymph glands, and often the tumor mass extends up into the primary bronchus so that it cannot be completely removed. Edwards (3) has been quoted in this regard and C. I. Allen (1) reports a case where lobectomy was performed and there was a recurrence in the bronchial stub. Radium was implanted and growth of the tumor has been arrested but the tumor persists. The operation was performed in June, 1930. The report is made four years after the operation and clinically the patient is free from symptoms. Allen's case demonstrates the value of combined radium and surgical treatment of carcinoma of the lung.

Conclusions

1. More interest is being shown in the clinical features of carcinoma of the lung.
2. The number of cases of cancer of the lung diagnosed has greatly increased.
3. Carcinoma of the lung has often been confused with pulmonary tuberculosis and lung abscess; at times it is confused with other acute or chronic chest disease.
4. There have recently been reports of successful treatment of carcinoma of the lung by surgery and radium.

REFERENCES