Diagnosis of Pulmonary Tuberculosis *

WITHIN the past few years there has come about a reversal in the relative difficulty in diagnosing and treating pulmonary tuberculosis. Formerly the diagnosis was considered difficult and the treatment certainly was simple, while now in the vast majority of cases the diagnosis is easy but the proper management and treatment has become extremely complicated.

A few factors in regard to tuberculosis should always be kept in mind. It must be remembered that any person, regardless of age, resistance, or general condition of health will have the disease if a sufficient number of tubercle bacilli enter the body. Therefore, the history of more than casual contact with an open case is of vital importance in leading one to suspect the presence of tuberculosis. Every person who has had intimate and prolonged contact should have a chest examination regardless of the presence or absence of symptoms, because they are usually slight and often entirely absent in early tuberculosis.

Also the diagnosis must be established or eliminated in those who have more or less chronic local symptoms referable to the respiratory tract. There are exceptions, but usually general symptoms do not occur in tuberculosis unless local ones are also present. The local symptoms most commonly encountered are cough, expectoration, hemoptysis, pleurisy, and laryngeal irritation; the general symptoms most often found are malaise, anorexia, loss of weight and strength, lack of endurance, indigestion, and fever. Of course, all of the foregoing are also symptoms of many other diseases and not all appear in every case of tuberculosis. Together with other data symptoms must be given considerable weight but no symptom or group of symptoms is pathognomonic. Dry pleurisies not accompanied by acute infections, must be looked upon with utmost suspicion as nearly all are tuberculous. The same is true of pleurisies with effusion and unless otherwise accounted for should be so regarded.

The physical signs that may be elicited are so well known that little need be said about them. By far the most important is the presence of moderately coarse post-tussive rales, and when found in the upper third of the lung are nearly always due to tuberculosis. If heard at the bases they may be of no pathologic significance. However, in minimal lesions rales, as well as all other signs, are often entirely absent.

The more frequent use of the x-ray has demonstrated beyond all doubt the futility of attempting to diagnose and define small tuberculous areas by means of decreased expansion, supraclavicular depressions, slight impairment of percussion note, prolonged expiration, granular breathing, and by palpation. These methods and signs are valuable in their places, but practically are useless in establishing a diagnosis of minimal tuberculosis, or in demonstrating the absence of minimal lesions. Physical signs are also most unreliable in revealing the exact extent and character of more advanced disease.

A number of factors have been responsible for the more satisfactory diagnosis of tuberculosis, but unquestionably the x-ray has been the most important. The number of minimal cases that can be diagnosed without its aid is almost negligible, and no other methods of examination will give so accurate a knowledge of more advanced disease. To be of value, thoracic roentgenograms must be technically satisfactory as attempts to interpret poor films will lead to many serious errors. The next essential is that one be thoroughly familiar with the shadow cast by normal structures. This cannot be

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DISEASES OF THE CHEST

emphasized too much since there is a wide variation in shadows produced by normal chests. This is especially true of the region in and near the hilum and of the descending trunks. The interpreter should be very sure of his ground when stating that these shadows are abnormal. Also because of the normal variations in linear markings, a diagnosis made on slight peribronchial infiltration alone is not justified. It is necessary also that one have a clear conception of the various types and characteristics of infiltrations caused by different pulmonary diseases.

Adult tuberculosis generally begins in the upper third of the lung and is seen on the roentgenogram as soft mottled shadows in the apex, or as a small dense area of infiltration below the clavicle. The moderately and far advanced lesions present such a variety of pathological shadows that a knowledge of the characteristics of all stages can be gained only by the examination of many films. Often on one x-ray of the chest may be seen the shadows of mottling, calcification, fibrosis, consolidation, and cavitation. Somewhat similar shadows are produced by diseases other than tuberculosis, but as a rule, if due consideration is given to the size, consistency, uniformity and distribution, certain essential characteristics will be found which will reveal the true nature of the process.

The laboratory furnishes the only pathognomonic sign of tuberculosis and that is a positive sputum. Because of the possibilities of error, acid-fast bacilli should be demonstrated more than once, and a negative sputum should be examined repeatedly. It should be remembered that patients who expectorate mucopurulent material which is repeatedly negative for tubercle bacilli must be suspected of having some non-tuberculous disease. Animal inoculation with the suspected material is advisable at times. It has been about 35 years since Koch discovered and proved that tubercle bacilli cause tuberculosis, but too often a sufficiently diligent search for the organisms is not made.

The tuberculin skin test has been found to be of much value in arriving at correct conclusions in regard to the exact nature of pulmonary pathology. It is indispensable in diagnosing childhood type tuberculosis and also very valuable in doubtful adult cases as a surprisingly large number will be found to be negative. This is especially true of the rural population and a negative skin test, when the few exceptions are remembered, places an almost insurmountable burden of proof for a positive diagnosis on the history, symptoms, signs, and x-ray.

The diagnosis of childhood or first infection type tuberculosis is so entirely different from that of the adult that separate consideration is necessary. In suspecting the disease in children the history of exposure is by far the most important factor. The state of nutrition and the general health are usually entirely normal. Frequently there are no symptoms whatever that would indicate the presence of tuberculosis. If such symptoms as chronic cough, expectoration, fever, loss of weight and strength are present it nearly always means that tuberculosis is not the causative factor. These symptoms occurring in a child may be the result of a hopelessly advanced adult type lesion but in the vast majority of instances are caused by bronchiectasis or lung abscess.

The most common errors made in interpreting roentgenograms of the chests of children result from attributing broad and blurred mediastinal shadows to tuberculosis; this is insufficient evidence and nearly always is due to cardiac motion; also by interpreting all densities in the hilum as calcification. Practically all chest films show small round or oval dense areas in the hilum, most of which are due to blood vessels struck axially by the rays and are entirely normal. However, a positive diagnosis of childhood type tuberculosis can be made with great assurance of correctness by a careful consideration of the history, by the elimination of other pulmonary conditions, and by obtaining a positive skin test and a characteristic roentgenogram. A diagnosis of childhood tuberculosis is not justified unless both a positive skin test and positive x-ray findings are present.
Time permits only a brief mention of a few of the many conditions that may simulate tuberculosis. Of these bronchiectasis is the most common and it often produces every sign and symptom of tuberculosis except a positive sputum. The onset of symptoms can generally be traced back to an attack of pneumonia, measles, whooping cough, scarlet fever or sinusitis. The bronchi of the lower portion of the lungs are most often involved. The disease can readily be differentiated from tuberculosis by the history, x-ray, negative sputum and the instillation of an opaque iodized oil.

Lung abscess also rarely presents difficulties in differentiation. Ordinarily there is a history of pneumonia, tonsillectomy, or an operation on some part of the upper respiratory tract a short time before the sudden severe pulmonary symptoms occur. Also the possibilities of foreign bodies should be considered.

Fungus infections of the lungs present a picture somewhat like that of tuberculosis and the diagnosis can be made only by finding the organisms in the sputum. It may be mentioned here that care should be exercised in making a diagnosis of bronchiectasis and fungus infections, as iodized oil and the administration of iodides are definitely dangerous in tuberculosis.

The prolonged inhalation of irritant dust produces x-ray evidence not unlike that of miliary tuberculosis, but the symptoms, and especially the occupational history, are significant.

Primary new growths of the lungs may be confusing, but serial x-ray films and bronchoscopic examination will reveal the non-tuberculous nature of the process.

Subacute non-tuberculous pulmonary conditions occur fairly frequently after "colds" and influenza. The pathology is generally in the region of the descending bronchi. Again, the history, location, sputum examination, skin test, and x-ray appearance will make the diagnosis clear.

In conclusion, emphasis should be placed on the following: In suspecting tuberculosis the opportunity for infection and symptoms are most important; the adult type of tuberculosis has a strong predilection for the apices, and moderately coarse rales in these areas are almost pathognomonic; thorough study of the sputum should never be neglected, and satisfactory roentgenograms are indispensable. The final diagnosis is made only after a correlation and proper appraisal of all possible findings.