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THE DIAGNOSIS OF MALIGNANT DISEASE IN THE CHEST.

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UNDER the heading of malignant disease in the chest two conditions are included, namely, primary carcinoma of the lung and new growths of the mediastinum. During the last few years much has been written on this subject, and the condition is one deserving of such attention, as most authorities are agreed that there is a definite increase in the incidence of this type of malignant

disease. Once a diagnosis has been made the prognosis is grave, but with the advances which are being made in thoracic surgery and the treatment of malignant disease in general by radium, better results may be looked for. Such results, however, can only be obtained if cases are diagnosed in their earliest stages, and before metastases have occurred.

The object of this article is to indicate the chief points in the diagnosis of: (a) Carcinoma of the lung, which usually arises in a bronchus; and (b) malignant growths arising in the mediastinum.

(1) HISTORY AND SYMPTOMS.

A detailed history of the case should always be taken, and well repays the time spent in obtaining it. The onset of symptoms is

usually gradual and, unfortunately, the patient may not seek advice until the condition is well established. The most common symptoms are described below. If these occur in a patient over 40 years of age previously free of symptoms—and the patient will often emphasize this fact—the case must be looked upon as possibly one of malignant disease in the chest.

(a) *Pain in the Chest.*—This symptom is almost constant, and is often the one for which the patient seeks advice. The type of pain varies considerably. It may be of a dull, aching type, felt more or less constantly in one part of the chest. In other cases the pain is more acute, made worse on coughing or deep breathing, and suggestive of pleurisy. The pain may be referred along the course of the intercostal nerves, when it is usually very acute. Severe pain in the back is present in some cases of mediastinal growth, due to erosion of the vertebræ.

(b) *Shortness of Breath.*—This, too, is nearly always present. At first the dyspnoea may be slight and only felt on exertion. Later it becomes more constant, and in some cases is very distressing. Occasionally the shortness of breath is paroxysmal in type and may suggest asthma. Some patients complain of a feeling of suffocation in the chest rather than of shortness of breath. In many cases the dyspnoea is quite out of proportion to the extent of the lung involved.

(c) *Cough and Expectoration.*—In common with diseases of the lungs in general, cough is a common symptom in malignant disease of the lung. It varies considerably in different cases. At first it is dry in type, with little or no expectoration. Later severe bouts of coughing are not uncommon, and after such a bout a little blood-stained mucus may be expectorated. A small hæmoptysis may be the initial symptom, but a copious one is not common. Repeated small hæmoptyses occur commonly in carcinoma of the bronchus. The amount of sputum varies considerably and depends, to a large extent,

upon changes occurring in the lungs secondary to the growth or to the breaking down and secondary infection of the growth itself. When such are present large amounts of foul-smelling sputum may be coughed up. Occasionally patients giving this history will date their symptoms from an attack of influenza, or even pneumonia, “after which they have never felt well.” Such a history is misleading, and the underlying cause, which may be a growth, is apt to be overlooked.

(d) *Weakness and Loss of Weight.*—Weakness is a common symptom, and in some cases it is the initial complaint. As the condition develops patients find that they are unable to carry out their employment, and the feeling of fatigue increases until they become bed-ridden. In common with malignant disease in other parts of the body, loss of weight and anorexia are present in carcinoma of the lung.

(2) PHYSICAL EXAMINATION OF THE PATIENT.

(a) *General Considerations.*—In the early stages the patient often has the appearance of good health, but later pallor or, more commonly, cyanosis develops. Marked cyanosis is common in the later stages of mediastinal growth.

A moderate degree of fever is usually present. In some cases, especially those with copious foul expectoration, a high, swinging type of temperature chart is common. Sweating and even rigors accompany this type. In younger patients the temperature chart may show periodic bouts of fever, and this feature may be the clue to a diagnosis of lymphadenoma.

(b) *Clinical Examination.*—In cases of mediastinal growth the signs of paralysis of the cervical sympathetic may be present. The larynx should always be examined and any abnormal movement of the cords noted. Clubbing of the fingers is not a common finding, but in cases with foul sputum it

may be present. Very rarely, hypertrophic pulmonary osteo-arthritis has been observed.

Physical Signs in the Chest.—The extent of abnormal signs in the chest varies greatly and depends upon the following factors :—

(a) The type of neoplasm present; (b) the extent of the neoplasm; in very early cases the examination of the lungs may prove completely negative. This applies particularly to early carcinoma of the bronchus before bronchial obstruction is present; (c) the presence of pleural effusion.

It is not proposed to describe the physical signs of each type of neoplasm separately, but rather to indicate the more general findings. The most common combination of physical signs is: (a) Poor movement; (b) marked dullness on percussion; and (c) weak or absent breath sounds over an ill-defined area of the lung. The commonest sites for these signs are the upper zone of the lung in front, and the lower zone of the lung behind. Dullness on percussion may be due to collapsed lung, to direct spread of the growth on to the surface, or to the presence of fluid.

The position of the apex beat of the heart varies. In cases where marked collapse of the lung is present the heart and mediastinum are displaced to the side of the growth. When there is a marked effusion present the heart is displaced to the opposite side, but the displacement is not usually considerable.

As the condition progresses, signs of mediastinal pressure develop. This applies to all types of growth, including carcinoma of the bronchus which, as it extends, does so not only directly into the lung substance but also into the mediastinum. The clinical picture then resembles that of a primary mediastinal growth. The commonest pressure signs are dilatation of veins in the chest and abdominal walls and oedema of the face or arm. In some cases, unfortunately, these signs are present when the patient first presents himself for examination, and in

these cases the prognosis is hopeless. Physical examination is not complete until search has been made for secondary deposits. Glands in the neck or axilla are commonly enlarged, and signs of secondary deposits in the liver, bones or brain may be present. Cases have been recorded in which the first indication of a growth in the lung was the sudden onset of a hemiplegia due to a cerebral metastasis.

(3) FURTHER INVESTIGATIONS.

(a) When the presence of fluid is suspected exploration of the chest should be carried out. If fluid is obtained it should be examined for cells, and predominance of endothelial cells is suggestive of neoplasm. Occasionally, cells of a neoplastic nature may be found in the pleural fluid. The appearance of the fluid varies and is generally slightly yellow in colour, resembling that of a tuberculous effusion. In other cases the fluid is hæmorrhagic, and if such is found the diagnosis of malignant disease in the chest is almost certain. Rarely is a hæmorrhagic effusion due to any cause other than growth. In other cases, although the physical signs present may suggest the presence of fluid, such is not found on exploration. These are cases in which the growth has reached the chest wall. Rarely, an empyema secondary to growth may be present.

(b) If enlarged glands are present in the supraclavicular fossa or axilla one may be removed for examination. This investigation is very useful when the diagnosis is in doubt, and should always be carried out if the case suggests lymphadenoma.

(c) *X-ray Examination.*—Whenever a case presents itself with the symptoms described above, an X-ray examination of the chest should always be carried out. Many of these cases, as has been observed previously, have no definite physical signs, and if an X-ray film is not taken until such signs have appeared, certain cases will not be diagnosed

in their earliest stages, and thus any special treatment advised will be delayed.

The X-ray appearances vary considerably in the different types of malignant disease in the chest and in their interpretation the clinician and radiologist should co-operate. The value of lipiodol injection and subsequent X-ray films cannot be over-estimated in the investigation of obscure cases. If a bronchus is pressed upon or obstructed by a neoplasm arising in its lumen, the lipiodol will not traverse the bronchus normally. In some cases a thin prolongation of the lipiodol will be seen—the so-called rat-tail appearance which is characteristic of bronchial stenosis. In other cases the lipiodol will pass down the main bronchus normally, but will not enter some part of the bronchial tree. This area of lung may be the site of a neoplasm.

An X-ray film may show other appearances, e.g., an opacity extending outwards from the root of the lung into its substance. In other cases the whole of one side of the chest is opaque, due to the presence of a large pleural effusion. Such an effusion will obscure detail in the lung, and if the effusion be aspirated and replaced by air, an underlying opacity suggesting neoplasm may become visible on taking another X-ray. Unfortunately, however, the value of this procedure is limited, but it is important to emphasize that a pleural effusion developing insidiously in an elderly patient should always suggest the possibility of growth being the primary cause.

Occasionally the induction of an artificial pneumothorax helps in the interpretation of some shadows in the lung. By collapsing the lung the shadow may become more sharply defined and its origin ascertained. Often, however, it is impossible to obtain a satisfactory collapse.

Whenever the nature of the opacity suggests neoplasm and the general examination of the patient does not suggest this diagnosis, a further X-ray should be taken after a short interval. Unfortunately increase of the

shadow will often have taken place, when the diagnosis of growth cannot be excluded.

(d) *Bronchoscopy*.—This method of investigation in the hands of the expert is of great value in the diagnosis of carcinoma of the bronchus. By this method a small portion of the growth may be removed and the nature of the growth determined microscopically. Occasionally innocent growths arise from a bronchus.

(4) DIFFERENTIAL DIAGNOSIS.

The following conditions have to be considered in the differential diagnosis of malignant disease in the chest:—

(a) *Tuberculosis*.—The commonest cause of cough, hæmoptysis and loss of weight is pulmonary tuberculosis, and this is the diagnosis first suggested in patients with these symptoms. Pain in the chest is more constant in malignant disease. It is, however, only when repeated examinations of the sputum fail to show the presence of the tubercle bacillus that the possibility of growth arises. An X-ray film will usually decide definitely between these two conditions, and this should be taken as soon as possible. Occasionally post-mortem examination will show the presence of both tuberculosis and growth in the same lung. The tuberculosis in these cases is not usually of the "open" type, and very rarely can the tubercle bacillus be found in the sputum.

(b) *Chronic Suppuration in the Lung*.—This includes bronchiectasis, and more especially chronic abscess of the lung. The history in these cases may be suggestive. Cachexia is not so marked as in cases of growth. The X-ray appearances associated with chronic abscess of the lung may closely resemble that of growth. Lipiodol injection should always be carried out. By so doing a definite diagnosis of bronchiectasis can be made and the presence of any bronchial obstruction can be excluded.

A high leucocyte count suggests lung abscess, but a white count of 15,000 is not

uncommon in growth when marked secondary infection is present.

Whenever the cause of suppuration in the chest is obscure, growth should always be considered. Evarts Graham, in a recent paper on "Pulmonary Suppuration" (excluding empyema and tuberculosis) found that of 330 cases 10 per cent. were due to carcinoma of the lung.

(c) *Innocent Tumours in the Chest.*—Occasionally cases of fibroma or teratoma of the mediastinum are met with. The presence of such is usually suggested by the X-ray picture. The opacity is more sharply defined than that of a malignant growth. Pressure signs do not occur commonly and the patient's general condition is usually good. These cases should be kept under observation and the question of surgical removal considered.

A retro-sternal enlargement of the thyroid should be kept in mind if the opacity in the mediastinum is situated centrally.

(d) *Aneurysm of the Aorta.*—Aneurysm of the aorta simulates closely a mediastinal growth, both in physical signs and symptoms and in the X-ray appearances. Examination under the X-ray screen should always be carried out and is usually of much help in distinguishing between the two conditions. The presence of a positive Wassermann reaction in the blood is almost invariably present in cases of aneurysm, but this does not exclude growth.

Under observation a patient with mediastinal growth usually goes down hill rapidly and marked signs of mediastinal pressure soon become evident.

(e) *Lymphadenoma.*—Some cases of mediastinal lymphadenoma closely simulate growth, and much difficulty arises if there is no enlargement of the superficial glands. The presence of periodic rises in the temperature is a help in diagnosis, and later a superficial gland can be removed and the diagnosis settled by microscopical examination.

(f) *Hydatid Cyst of the Lung.*—This con-

dition is uncommon in this country. The question of hydatid disease usually arises after an X-ray of the chest has been taken. The opacity is sharply outlined lying in the substance of the lung. Occasionally two or more cysts may be present. The presence of a positive complement-fixation test and a positive Casoni intradermic reaction strongly suggests the diagnosis of hydatid disease.

(g) *Syphilis of the Lung.*—This also is a rare condition, but gumma may give rise to difficulty in diagnosis. The presence of a positive Wassermann reaction and the response to anti-syphilitic treatment are important points in the diagnosis.

Before concluding the differential diagnosis, mention must be made of secondary deposits of carcinoma in the lung and also of carcinomatosis of the lungs. Secondary deposits in the lung, as shown by X-ray examination, are often multiple. The clinical picture of carcinomatosis and the X-ray appearances may closely resemble that of tuberculosis, but the absence of the tubercle bacillus in the sputum and the rapid course of the condition decide the diagnosis.

CONCLUSION.

Malignant disease in the chest is not an uncommon condition. It should be thought of in every patient over 40 who complains for the first time of the symptoms above described. The onset of cancer of the lung thus resembles the onset of cancer of the stomach in a patient previously free of gastric symptoms. An X-ray of the chest should be taken as soon as possible and, if indefinite, repeated after a short interval. Lipiodol injection is of much value in diagnosis.