

IV. TUBERCULOUS PLEURISY.

This has already been considered. Here it is sufficient to say that it occurs as: (a) An acute affection, accompanied by abundant sero-fibrinous fluid. In this category come certainly a proportion of the cases regarded as acute pleurisy from cold. (b) As a subacute affection, latent in its origin and insidious in its course, frequently preceding the development of or coming on concurrently with pulmonary tuberculosis. (c) As an acute pleurisy, the result of direct extension from the lung in cases of well-marked phthisis, and in which the fluid may be either sero-fibrinous or purulent. (d) Chronic adhesive tuberculous pleurisy, which may be unilateral or bilateral, unaccompanied by exudation and characterized by great thickening of the pleural membranes, in which are tubercles and caseous masses of varying sizes.

The symptoms and physical signs of tuberculous pleurisy with exudation do not require any description other than that already given in connection with the sero-fibrinous and purulent forms.

V. OTHER VARIETIES OF PLEURISY.

Hæmorrhagic Pleurisy.—A bloody effusion is met with under the following conditions: (a) In the pleurisy of asthenic states, such as cancer, Bright's disease, and occasionally in the malignant fevers. It is interesting to note the frequency with which hæmorrhagic pleurisy is found in cirrhosis of the liver. It occurred in the very patient in whom Laennec first accurately described this disease. While this may be a simple hæmorrhagic pleurisy, in a majority of the cases which I have seen it has been tuberculous. (b) Tuberculous pleurisy, in which the bloody effusion may result from the rupture of newly formed vessels in the soft exudate accompanying the eruption of miliary tubercles, or it may come from more slowly formed tubercles in a pleurisy secondary to extensive pulmonary disease. (c) Cancerous pleurisy, whether primary or secondary, is frequently hæmorrhagic. (d) Occasionally hæmorrhagic exudation is met with in perfectly healthy individuals, in whom there is not the slightest suspicion of tuberculosis or cancer. In one such case, a large, able-bodied man, the patient was to my knowledge healthy and strong eight years afterward. And, lastly, it must be remembered that during aspiration the lung may be wounded and blood in this way get mixed with the sero-fibrinous exudate. The condition of hæmorrhagic pleurisy is to be distinguished from hæmothorax, due to the rupture of aneurism or the pressure of a tumor on the thoracic veins.

Diaphragmatic Pleurisy.—The inflammation may be limited partly or chiefly to the diaphragmatic surface. This is often a dry pleurisy, but there may be effusion, either sero-fibrinous or purulent, which is circumscribed on the diaphragmatic surface. In these cases the pain is low in

the zone of the diaphragm and, as Guéneau de Mussy pointed out, may be intensified by pressure at the point of insertion of the diaphragm at the tenth rib. The diaphragm is fixed and the respiration is thoracic and short. Andral noted in certain cases severe dyspnœa and attacks simulating angina. As mentioned, the effusion is usually plastic, not serous. Serous or purulent effusions of any size limited to the diaphragmatic surface are extremely rare.

Encysted Pleurisy.—The effusion may be circumscribed by adhesions or separated into two or more pockets or loculi, which communicate with each other. This is most common in empyema. In these cases there have usually been, at different parts of the pleura, multiple adhesions by which the fluid is limited. In other instances the recent false membranes may encapsulate the exudation on the diaphragmatic surface, for example, or the part of the pleura posterior to the mid-axillary line. The condition may be very puzzling during life, and present special difficulties in diagnosis. In some cases the tactile fremitus is retained along certain lines of adhesion. The exploratory needle should be freely used when there is any doubt.

Interlobar Pleurisy forms an interesting and not uncommon variety. In nearly every instance of acute pleurisy the interlobular serous surfaces are also involved and closely agglutinated together, and sometimes the fluid is encysted between them. In a recent case of this kind following pneumonia, there was between the lower and upper and middle lobes of the right side an enormous purulent collection, which looked at first like a large abscess of the lung. These collections may perforate the bronchi, and the cases present special difficulties in diagnosis.

Diagnosis of Pleurisy.—Acute plastic pleurisy is readily recognized. In the diagnosis of pleuritic effusion the first question is, Does a fluid exudate exist? the second, What is its nature? In large effusions the increase in the size of the affected side, the immobility, the absence of tactile fremitus, together with the displacement of organs, give infallible indications of the presence of fluid. The chief difficulty arises in effusions of moderate extent, when the dulness, the presence of bronchophony, and, perhaps, tubular breathing may simulate pneumonia. The chief points to be borne in mind are: (a) Differences in the onset and in the general characters of the two affections, more particularly the initial chill, the higher fever, more urgent dyspnœa, and the rusty expectoration, which characterize pneumonia. (b) Certain physical signs—the more wooden character of the dulness, the greater resistance, and the marked diminution or the absence of tactile fremitus in pleurisy. The auscultatory signs may be deceptive. It is usually, indeed, the persistence of tubular breathing, particularly the high-pitched, even amphoric expiration, heard in some cases of pleurisy, which has raised the doubt. The intercostal spaces are more commonly obliterated in pleuritic effusion than in pneumonia. As already mentioned, the displacement of organs is a very valuable sign.

Nowadays with the hypodermic needle the question is easily settled. A separate small syringe with a capacity of two drachms should be reserved for exploratory purposes, and the needle should be longer and firmer than in the ordinary hypodermic instrument. With careful preliminary disinfection the instrument can be used with impunity, and in cases of doubt the exploratory puncture should be made without hesitation. I have never seen the slightest ill effects follow its use. Cases are reported of pneumothorax resulting from it, but they are extremely rare. The hypodermic needle is especially useful in those cases in which there are pseudo-cavernous signs at the base. In cases, too, of massive pneumonia, in which the bronchi are plugged with fibrin, if the patient has not been seen from the outset, the diagnosis may be impossible without it.

On the left side it may be difficult to differentiate a very large pericardial from a pleural effusion. The retention of resonance at the base, the presence of Skoda's resonance toward the axilla, the absence of dislocation of the heart-beat to the right of the sternum, the feebleness of the pulse and of the heart-sounds, and the urgency of the dyspnea, out of all proportion to the extent of the effusion, are the chief points to be considered. Unilateral hydrothorax, which is not at all uncommon in heart-disease, presents signs identical with those of sero-fibrinous effusion. Certain tumors within the chest may simulate pleural effusion. It should be remembered that many intrathoracic growths are accompanied by exudation. Malignant disease of the lung and of the pleura and hydatids of the pleura produce extensive dulness, with suppression of the breath-sounds, simulating closely effusion.

On the right side abscess of the liver and hydatid cysts may rise high into the pleura and produce dulness and enfeebled breathing. Often in these cases there is a friction sound, which should excite suspicion, and the upper outline of the dulness is sometimes plainly convex. In all these instances the exploratory puncture should be made.

The second question, as to the nature of the fluid, is quickly decided by the use of the needle. The persistent fever, the occurrence of sweats, and the increase in the pallor suggest the presence of pus. In children the complexion is often sallow and earthy. The unexpected, however, often happens, and repeatedly, in protracted cases, even in children, when the general symptoms and the appearance of the patient has been most strongly suggestive of pus, the syringe has withdrawn clear fluid. On the other hand, effusions of short duration may be purulent, even when the general symptoms do not suggest it. The following statement may be made with reference to the prognostic import of the bacteriological examination of the aspirated fluid: The presence of the pneumococcus is of favorable significance, as such cases usually get well rapidly, even with a single aspiration. The pus organisms—staphylococci and streptococci—are more common in empyema of septic origin, and such cases are notori-

ously less hopeful than others. A sterile fluid indicates in a majority of instances a tuberculous origin.

Treatment.—At the onset the severe pain may demand leeches, which usually give relief, but a hypodermic of morphia is more effective. The Paquelin cautery may be lightly but freely applied. It is well to administer a mercurial or saline purge. Fixing the side by careful strapping with long strips of adhesive plaster, which should pass well over the middle line, drawn tightly and evenly, gives great relief, and I can corroborate the statement of F. T. Roberts as to its efficacy. Cupping, wet or dry, is now seldom employed. Blisters are of no special service in the acute stages, although they relieve the pain. The ice-bag may be used as in pneumonia. The general treatment of the early stage should be rest in bed and a liquid diet. Medicines are rarely required. A Dover's powder may be given at night. Mercurials are not indicated.

When the effusion has taken place, mustard plasters or iodine, producing slight counter-irritation, appear useful, particularly in the later stages. The following rational plan is successful in some cases. It is based upon the idea that if the blood serum is depleted or if it is kept concentrated, the liquid will be absorbed from the lymph spaces, of which the pleura is one, to equalize the loss. To do this the patient should have the daily amount of liquid food greatly restricted. If there is no fever, a meat diet, with an egg and dry bread and eight to ten ounces of liquid in the form of milk or water, should be given. Salt articles of food may be used, but I do not think it necessary to give, as some do, doses of salt. The second element in the treatment is the active depletion of blood serum, which is effected in the way introduced by Matthew Hay. Every morning, if the patient is robust, otherwise every second morning, from half an ounce to an ounce and a half of Epsom salts is given an hour before breakfast, in as concentrated a form as is possible. This produces copious liquid discharges. I have seen large exudations disappear rapidly when this plan was followed. By acting upon the skin and kidneys, the same end may be obtained, but with much less certainty. The vapor or hot bath may be used and an occasional dose of pilocarpin. Diuretics, such as digitalis, squills, and acetate of potash, may sometimes be required. I rarely resort, however, to diuretics or diaphoretics in the treatment of pleurisy with effusion. Iodide of potassium is of doubtful benefit.

Aspiration of the fluid is the most thorough and satisfactory method and should be resorted to whenever the effusion becomes large or if it resists the ordinary methods of treatment. The credit of introducing aspiration in pleuritic effusions is due to Morrill Wyman, of Cambridge, Mass., and Henry I. Bowditch, of Boston. Years prior to Dieulafoy's work, aspiration was in constant use at the Massachusetts General Hospital and was advocated repeatedly by Bowditch. As the question is one of some historical interest, I give the author's conclusions concerning aspiration, expressed more than forty years ago, and which practically represent

the opinion of clinical physicians to-day: "(1) The operation is perfectly simple, but slightly painful, and can be done with ease upon any patient in however advanced a stage of the disease. (2) It should be performed forthwith in *all* cases in which there is complete filling up of one side of the chest. (3) He had determined to use it in *any* case of even *moderate* effusion lasting more than a few weeks and in which there should seem to be an indisposition to resist ordinary modes of treatment. (4) He urged this practice upon the profession as a very important measure in practical medicine; believing that by this method death may frequently be prevented from ensuing either by sudden attack of dyspnoea or subsequent phthisis, and, finally, from the gradual wearing out of the powers of life or inability to absorb the fluid. (5) He believed that this operation would sometimes prevent the occurrence of those tedious cases of spontaneous evacuation of purulent fluid and those great contractions of the chest which occur after long-continued effusion and the subsequent discharge or absorption of a fluid."

There is scarcely anything to be added to-day to these observations. When the fluid reaches to the clavicle the indication for aspiration is imperative, even though the patient be comfortable and present no signs of pulmonary distress. The presence of fever is not a contra-indication; indeed, sometimes with serous exudates the temperature falls after aspiration.

The operation is extremely simple and is practically without risk. The spot selected for puncture should be either in the seventh interspace in the mid-axilla or at the outer angle of the scapula in the eighth interspace. The arm of the patient should be brought forward with the hand on the opposite shoulder, so as to widen the interspaces. The needle should be thrust in close to the upper margin of the rib, so as to avoid the intercostal artery, the wounding of which, however, is an excessively rare accident. The fluid should be withdrawn slowly. The amount will depend on the size of the exudate. If the fluid reaches to the clavicle a litre or more may be withdrawn with safety.

During aspiration if the patient feels faint it is best to interrupt the operation, for sudden death has occasionally happened during the withdrawal. It is, however, a much less common accident than sudden death in cases of full pleura without operation. Cough is a symptom which frequently develops toward the close of aspiration. Though very painful it need not excite alarm. French writers have described cases of albuminous expectoration, associated with dyspnoea, which may come on after the tapping and prove rapidly fatal. It must be an excessively rare complication. The conversion of a sero-fibrinous into a purulent fluid is a danger which need not be considered. I have never met with an instance of the kind.

Empyema is really a surgical affection, and I shall make only a few general remarks upon its treatment. When it has been determined by

exploratory puncture that the fluid is purulent, aspiration should not be performed, except as preliminary to operation or as a temporary measure. Perhaps it is better not to have an exception to this rule, although the empyemas of children and the pneumonic empyema occasionally get well rapidly after a single tapping. It is sad to think of the number of lives which are sacrificed annually by the failure to recognize that empyema should be treated as an ordinary abscess, by free incision. The operation dates from the time of Hippocrates and is by no means serious. A majority of the cases get well, providing that free drainage is obtained, and it makes no difference practically what measures are followed so long as this indication is met. The good results in any method depend upon the thoroughness with which the cavity is drained. Irrigation of the cavity is rarely necessary unless the contents are fetid. Sudden collapse has happened during irrigation and a remarkable accident is the occurrence of convulsions. In the subsequent treatment a point of great importance in facilitating the closure of the cavity is the distention of the lung on the affected side. This may be accomplished by the method advised by Walter James, which has been practised with great success in the surgical wards of the Johns Hopkins Hospital. The patient daily, for a certain length of time, increasing gradually with the increase of his strength, transfers by air-pressure water from one bottle to another. The bottles should be large, holding at least a gallon each, and by the arrangement of tubes, as in the Wolff's bottle, an expiratory effort of the patient forces the water from one bottle into the other. In this way expansion of the compressed lung is systematically practised. The abscess cavity is gradually closed, partly by the falling in of the chest wall and partly by the expansion of the lung. In some instances it is necessary to resect portions of one or more ribs.

The physician is often asked, in cases of empyema with emaciation, hectic and feeble rapid pulse, whether the patient could stand the operation. Even in the most desperate cases the surgeon should never hesitate to make a free incision.

II. CHRONIC PLEURISY.

This affection occurs in two forms: (1) *Chronic pleurisy with effusion*, in which the disease may set in insidiously or may follow an acute sero-fibrinous pleurisy. There are cases in which the liquid persists for months without undergoing any special alteration and without becoming purulent. Such cases have the characters which we have described under pleurisy with effusion. (2) *Chronic dry pleurisy*. The cases are met with (a) as a sequence of ordinary pleural effusion. When the exudate is absorbed and the layers of the pleura come together there is left between them a variable amount of fibrinous material which gradually undergoes organi-

zation, and is converted into a layer of firm connective tissue. This process goes on at the base, and is represented clinically by a slight grade of flattening, deficient expansion, defective resonance on percussion, and enfeebled breathing. After recovery from empyema the flattening and retraction may be still more marked. In both cases it is a condition which can be greatly benefited by pulmonary gymnastics. In these firm, fibrous membranes calcification may occur, particularly after empyema. It is not very uncommon to find between the false membranes a small pocket of fluid forming a sort of pleural cyst. In the great majority of these cases the condition is one which need not cause anxiety. There may be an occasional dragging pain at the base of the lung or a stitch in the side, but patients may remain in perfectly good health for years. The most advanced grade of this secondary dry pleurisy is seen in those cases of empyema which have been left to themselves and have perforated and ultimately healed by a gradual absorption or discharge of the pus, with retraction of the side of the chest and permanent carnification of the lung. Traumatic lesions, such as gunshot wounds, may be followed by an identical condition. Post mortem, it is quite impossible to separate the layers of the pleura, which are greatly thickened, particularly at the base, and surround a compressed, airless, fibroid lung.

(b) *Primitive dry pleurisy.* This condition may directly follow the acute plastic pleurisy already described; but it may set in without any acute symptoms whatever, and the patient's attention may be called to it by feeling the pleural friction. A constant effect of this primitive dry pleurisy is the adhesion of the layers. This is probably an invariable result, whether the pleurisy is primary or secondary. The organization of the thin layer of exudation in a pneumonia will unite the two surfaces by delicate bands. Pleural adhesions are extremely common, and it is rare to examine a body entirely free from them. They may be limited in extent or universal. Thin fibrous adhesions do not produce any alteration in the percussion characters, and, if limited, there is no special change heard on auscultation. When, however, there is general synechia on both sides the expansile movement of the lung is considerably impaired. We should naturally think that universal adhesions would interfere materially with the function of the lungs, but practically we see many instances in which there has not been the slightest disturbance. The physical signs of total adhesion are by no means constant. It has been stated that there is a marked disproportion between the degree of expansion of the chest walls and the intensity of the vesicular murmur, but the latter is a very variable factor, and under perfectly normal conditions the breath-sounds, with very full chest expansion, may be extremely feeble.

Is there a primitive dry pleurisy which gradually leads to great thickening of the membranes, and which ultimately may invade the lung and induce cirrhotic change? Upon this question neither pathologists nor clinicians agree. I think that Sir Andrew Clark, in his Lumleian lectures

at the Royal College of Physicians (1885), has made good his claim that such a disease does exist. At the outset in these cases there is a dry pleurisy, usually at one base, indicated by the usual signs; and this persists in spite of all treatment. There is no evidence of fluid; the general health may not be much impaired, or there may be slight fever and disturbed digestion. The cases give great anxiety, owing to the natural suspicion that tuberculosis exists. In time the evidence of dulness is found at the base. There are feeble breathing and creaking, leathery friction sounds. There may be commencing retraction of the side. Clinically these cases are of great interest, and should, I think, be separated, on the one hand, from the condition which follows a healed empyema or old pleurisy with effusion, and, on the other, from the rare instances of primitive cirrhosis of the lung. However, in all three states there may ultimately be an almost identical clinical picture. Anatomically in these pleuritic cases the pleura, particularly that surrounding the lower lobe, sometimes the entire membrane, is thickened, the two layers are intimately united, and fibrinous bands passing from the pleura traverse the lung tissue, sometimes dividing it in a remarkable way into sections. The bronchi may present marked dilatations, though this is not always the case, and the lung tissue is more or less sclerosed. The cases belong to the group of chronic pneumonias called by Charcot pleurogenous. In many instances there can be no question as to their non-tuberculous nature. There are cases, however, in which, with chronic pleurogenous pneumonia in the lower lobe, there are cavity formations at the apex and tuberculous lesions in other parts. Such may, of course, be tuberculous from the outset.

Lastly, there is a primitive dry pleurisy of tuberculous origin. In it both parietal and costal layers are greatly thickened—perhaps from two to three millimetres each—and present firm fibroid, caseous masses and small tubercles, while uniting these two greatly thickened layers is a reddish-gray fibroid tissue, sometimes infiltrated with serum. This may be a local process confined to one pleura, or it may be in both. I have seen two typical instances of it—one in a young, well-nourished Irish girl, who died of malignant scarlet fever, in whom one pleura was in the condition above described, and there were no other tuberculous lesions. The other was in a young man who died of typhoid fever, in whom both pleuræ were uniformly thickened and tuberculous without any fluid exudate. These cases are sometimes associated with a similar condition of the pericardium and peritonæum.

Occasionally remarkable vaso-motor phenomena occur in chronic pleurisy, whether simple or in connection with tuberculosis of an apex. Flushing or sweating of one cheek or dilatation of the pupil are the common manifestations. They appear to be due to involvement of the first thoracic ganglion at the top of the pleural cavity.