

the case on the present occasion, as I am only too conscious how sketchy my paper has been.

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An Address

ON THE

DIAGNOSIS AND TREATMENT OF MORBID CONDITIONS OF THE PLEURA.

DELIVERED AT A JOINT MEETING OF THE BURNLEY DIVISION OF THE BRITISH MEDICAL ASSOCIATION AND THE BURNLEY MEDICO-ETHICAL SOCIETY.

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It is impossible in the time at my disposal to discuss adequately the morbid conditions of the pleura, and rather than touch lightly on them all I will pass over some in silence, so as to be able to deal more fully with the others.

INDICATIONS FOR PARACENTESIS IN PLEURAL EFFUSION.

If I were asked to state in a sentence the indications for paracentesis in pleural effusion, I should say that every effusion that was big enough to diagnose was big enough to tap. This would be with the obvious reservation that effusions apparently small and unattended by any special local or constitutional disturbance should be left for a reasonable time in the hope that they may undergo spontaneous absorption. When the physical signs point to a large effusion, or when the symptoms, such as dyspnoea, indicate serious embarrassment of the heart or lungs, the operation should be performed without delay. But the persistence of signs of a small effusion is no less an indication for paracentesis, as may be seen from various considerations. In the first place, the extent of the physical signs is not always proportionate to the size of the effusion, which may be much greater than it appears to be. In the second place, until we see some of the fluid, we can never be certain as to its nature, whether serous, purulent, or hydatid; and thirdly, the prolonged presence of a small collection of serous effusion in the pleura is not to be looked on with indifference. Apart from the mechanical compression which it exerts on the lung, if we accept the teaching of Sir A. E. Wright and his school, we must believe that a tuberculous effusion having a lower tuberculo-opsonic index than the other fluids of the body favours the existence of the bacilli in the parts which it bathes, and so ought to be got rid of as speedily as possible.

THE PERFORMANCE OF PARACENTESIS.

Having decided that paracentesis is to be performed, we should select a trocar and cannula of sufficient calibre to allow pus to flow through it. I employ the medium sized cannula supplied with Potain's pneumatic aspirator. I find Potain's pneumatic aspirator the most convenient for general use, but good results may be had with a simple tube acting as a siphon. The practice of making a preliminary exploration with a syringe and a fine needle is superfluous and undesirable. If fluid is found, the practitioner proceeds to employ the aspirator, and so two punctures are inflicted where one would have sufficed. If the result is negative the operator is in doubt whether the small needle was not blocked. The accidental puncture of the lung with a clean needle is not followed by any serious consequences. Certain points need to be especially attended to. The apparatus must be tested with water each time it is employed. The trocar and cannula must be introduced far enough to

make it certain that the pleura has been reached, the flow must be slow, and not more than 50 oz. should be withdrawn at the first operation. The remainder will probably undergo absorption; if it does not, it is not a serious matter to repeat the operation. It is well to tell the patient or his friends that you have not taken it all away.

MALIGNANT DISEASE.

The presence of blood in such amount as to give a red colour to the fluid is not uncommon, and is of no special significance, but a brownish or chocolate colour due to altered blood suggests the possibility of the existence of malignant disease. Sometimes the character of the cellular elements may also suggest the same condition. Malignant disease of the pleura or of the lung in such a position as to cause signs associated with the pleura is, however, such a rare event in the experience of any one individual practitioner that it is difficult to construct a clinical type for the disease. In general I should say that we ought to suspect the possibility of malignant disease in any case of pleurisy which, as regards its signs, symptoms, and progress, does not conform to the types with which we are familiar. Signs of pressure on structures not usually involved in pleural effusion, or of pressure not relieved by the removal of the fluid, strongly suggest a new growth. In one case there was oedema in the mammary region, enlarged axillary glands, distension of one jugular vein, and a slightly brassy cough. The trocar was felt to enter a hard mass. In another case there was paralysis of one vocal cord. In a woman lately under my care one of the earliest circumstances to arouse suspicion was finding that the effusion was of the colour of strong tea, and it was found to contain epithelial cells. Hard glands were present in the neck and axilla, and there was distension of the jugular veins on both sides. In another case there was nothing to suggest malignant disease until the pleura was opened for what seemed to be an ordinary empyema. It was then found that the pus lay in a cavity in a conical mass of new growth which extended for a considerable distance into the lung. In some cases one remains in doubt up to the very last whether one is dealing with malignant disease or tubercle, and even at the *post-mortem* examination a skilled pathologist may be unable to distinguish between them until a careful microscopic examination has been made. This actually happened in the following case:

A medical practitioner, aged 57, had pneumonia of the right lung in 1902, and made a good recovery. On June 8th, 1904, he consulted me with a large pleural effusion on the left side, the dullness reaching up to the clavicle, and the heart being pushed over to the right side. During the following three and a half months he was aspirated eight or nine times. Latterly the effusion was blood-stained, and its removal made little or no difference in the physical signs, and there was evidently a solid mass in the lung or pleura. During this time he was almost constantly in bed, complained of pain in the stomach, often severe, and got thin and weak. Tubercle bacilli were looked for in the sputum, but none were found. The temperature was moderately raised. The liver was enlarged. Towards the close there was dysphagia and severe dyspnoea, and a pericardial rub was heard. I could not make up my mind between a diagnosis of tubercle and of malignant disease, though I inclined to the former. He sank gradually, and died of asthenia on September 24th.

At the necropsy the naked-eye appearances led to the belief that the case was one of malignant disease. The right lung was normal, but the left lung was collapsed, the pleura being from $\frac{1}{2}$ to $\frac{3}{4}$ in. thick. The mediastinal glands contained yellowish masses, and there were nodules in the pericardium. Microscopically bacilli were found in the left pleura and in one of the glands, and miliary tubercles in the collapsed lung.

HAEMORRHAGIC EFFUSION.

A remarkable condition, of which I have seen two instances during the last eighteen months, is the presence in the pleura, without any obvious cause, of an effusion consisting of almost pure blood. I am inclined to think this may be dependent on some constitutional condition, allied to the haemorrhagic diathesis or the purpuric state, as seems to have been the case in the following instance:

A railway inspector, aged 57, fell against a fender and fractured one or two ribs on March 8th, 1908, and was treated as an out-patient at the Royal Infirmary. I did not see him at that time, but I was informed that no effusion was suspected until about March 18th, when extensive dullness was observed and a needle inserted. No fluid, however, was found. On March 27th—three weeks after the accident—exploration was again

performed, and 27 oz. of nearly pure blood were removed. This was repeated three times during the succeeding seventeen days, 107 oz. of practically pure blood being withdrawn altogether. It might be said that this was simply a case of haemorrhage from a ruptured intercostal vessel, but the assistant physician, who first saw the case in my absence, is positive that there was no effusion of any kind there at that time. Further, it was evident that fresh blood was poured out after the earlierappings. Now, there are two points—one in the past history, the other in the subsequent development of the case—which I think throw light on the cause of the haemorrhagic effusion. The first is that seven years before he brought up a large quantity of blood, and was told he had broken a blood-vessel; the other is that on June 15th last year he was again admitted to the infirmary, this time with painful anasarca in the lower extremities accompanied by a persistent recurring purpuric eruption.

To my mind it is reasonable to conclude that the bleeding seven years before, the haemorrhagic effusion, and the purpuric eruption shortly after it had all a common origin. In the other case, a gentleman wintering in Egypt, the most probable cause was thought to be the rupture of some pleural adhesions.

EMPHYEMA.

Passing to the consideration of purulent effusion into the pleura (empyema), I maintain that there are no signs or symptoms by which we can with any approach to confidence distinguish it from serous effusion until some of the fluid has been removed for inspection. Hectic fever is common enough in cases of serous effusion, as might be expected from the frequent co-existence of tubercle, and cases of empyema are generally attended by only a moderate rise of temperature, rarely above 102°, and generally less. No doubt a leucocytosis, if proved by a competent observer to be present, will be a point in favour of suppuration, but it is seldom of practical application for diagnosis except in hospital. The diagnosis of

empyema being, then, only established on finding pus flow into the aspirator, we have to consider how we shall deal with the case, first at the moment, and secondly with a view to permanent recovery. Many of these cases are suffering from urgent distress from dyspnoea and toxaemia, and are in need of immediate relief, and my practice is to continue the extraction and remove a considerable quantity of pus, perhaps a pint. By this means the urgent symptoms are at once relieved for a time, the temperature becomes normal, and the patient will probably have a good night. We thus gain time to make our arrangements for performing the greater operation under the most favourable conditions, and to get the consent of the patient or his friends. After many years' consideration of the subject, I have come to the conclusion that there is only one line of treatment to be adopted in every case of empyema, and that is the establishing free drainage by incising the pleura and introducing a good size drainage tube. I know that authorities allege that cases of empyema in which the only organism present is the pneumococcus may recover after a simple aspiration, and a few cases are recorded in various works in which such recovery has taken place. At one time it was my ambition to try to get cases of empyema well by aspiration alone, but I never succeeded; they all had to come to a free incision; and when one saw the great masses of lymph which sometimes presented in the wound it was not surprising that the attempt to evacuate the pleura through a cannula had failed.

Finally, the results of free incision on the condition of the lung and the general health of the individual are so excellent, that I doubt whether a cure by aspiration would be worth aiming at even if there were any reasonable probability of its being attained.

The dread of a free incision into the pleura was largely the outcome of theoretical considerations. It was supposed that as soon as air was admitted freely to the surface of the lung there would be nothing to counteract the elastic contractility of the organ, which would remain ever after in a state of collapse. I confess that it is not altogether easy to understand the full expansion commonly met with after the operation for empyema, amounting in some cases apparently to a *restitutio ad integrum*, but there is one important consideration that is apt to be overlooked—namely, that at every forcible expiratory effort, whether coughing or singing, or loud speaking, the collapsed lung is fully inflated by air driven out of the sound lung.

The belief that permanent collapse of the lung, more or less complete, is to be expected to follow the free admission of air into the pleura has led to the expenditure of no small amount of ingenuity in the vain and pernicious attempt to drain an empyema in such a manner as to allow the pus to escape, while preventing or restricting the entrance of the air. The usual result-

of such proceedings is that the drainage is not free, that septic organisms gain entrance to the pleura, that the discharge becomes offensive, and that after much useless suffering and delay resort has to be had to a free incision. Many of you may think that at this time of day it is like flogging a dead horse to labour this point; but unfortunately I have good reason to believe that the old fear of a free opening is by no means extinct, and that futile attempts to limit the access of air by valvular

openings or other pernicious contrivances are still being made, with the most undesirable results.

Feeling as I do that these practices can only be due to a want of appreciation of the good results that follow the establishment of a free opening into the pleura I have tried to trace a number of cases of empyema which have been operated on for me during the last few years at the Royal Infirmary. I have written to thirteen and have got in touch with eight. Of these only one is what one might call a complete failure. The left lung appears mostly solid and collapsed, with falling in of the ribs and curvature of the spine. But I do not think we can attribute this to the operation, since it is stated in the notes that at the time of admission the left side of the chest was considerably deformed. Two pints of pus were removed. A second case is that of a tall strongly-built girl operated on in August, 1907, at the age of 17. At present the left (affected) side measures 1 in. less than the right, and the shoulder has dropped somewhat. The movement of both sides of the chest is poor and she evidently takes no trouble to expand it.

The third case, operated on December, 1904, I have not seen, but I hear he has been "all over the world" since, and for a time joined the navy of a South American republic as a cornet player. The other 5 cases have made a recovery so complete that I think that if it were not for the scar it would be impossible to recognize that anything had ever been wrong with the pleura or lung.

R. D., a painter, aged 37, was admitted on October 29th, 1903. By aspiration 20 oz. of pus were removed, and next day a free

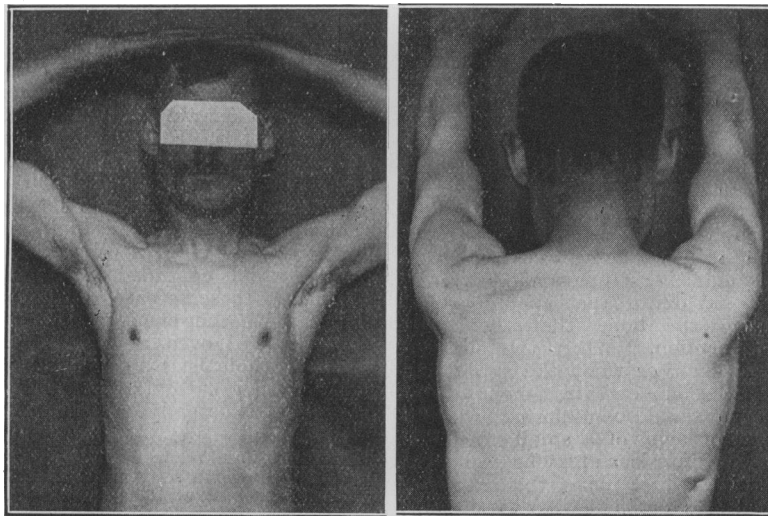


Fig. 1.—R. D. Five years ago a pint of pus removed from right pleura by aspiration, and next day a free incision, with removal of piece of rib, made into the pleura. Complete expansion of lung.

incision was made. I saw him this month, after five years. The chest expands well and equally (Fig. 1); the breath sounds are heard well all over; there is no dullness on percussion. His general health is excellent.

W. W., a boy aged 2½. Admitted March 20th, 1904, about three weeks after an attack of pneumonia. Left side of chest was distended, and about 2 pints of pus were removed through a free incision. I saw him again this month, nearly five years later. He goes to school, and is in good health. The left side shows slight flattening in front, but measures only ¼ in. less than the right. The movements are approximately equal on both sides and there is good expansion, and the breath sounds are normal. The lung seemed to descend a little during inspiration.

Joseph McE., aged 9. Admitted on October 7th last year with signs of a large pleural effusion. The usual operation was performed under eucaïne, and 4 pints of foul-smelling pus was removed. I saw him a few days ago. He looks well, feels well, and goes to school. The chest looks symmetrical; by measurement both sides are equal and expand equally, the total difference between inspiration and expiration being 2 in. Percussion and auscultation normal. The heart is not displaced. By percussion I determined that the lung border descends as it normally does during inspiration.

George K., aged 4, was admitted on August 31st, 1908, with signs of effusion in the left pleura. He had been treated elsewhere for pneumonia several weeks before. Pus was found, and a free incision was made, a piece of rib being removed. He made a satisfactory recovery, but shortly after being sent to a convalescent home he developed scarlatina, so I have not been able to obtain exact particulars of the condition of his lungs.*

The other case I will relate presently, but I will briefly refer here to one which I have met with in private.

A gentleman whose case I knew well had empyema at the age of 40. He was first treated by a tube on the siphon method, the discharge became septic, and two free incisions were made and a tube passed through from one to the other. Some twelve years later I examined him for insurance. Not only was there no falling in of the chest, and the movement of the side was good, but I determined by percussion that there was an actual descent of the lung during inspiration.

This observation, by no means an isolated one, seems, if correct, to imply that the pleural cavity may be actually restored after the closing of an empyema. I have never had an opportunity of investigating this point *post mortem*, but it does not seem to be beyond the bounds of possibility when we remember that surgeons who have

* He was brought to see me on March 16th, when the photograph (Fig. 2) was taken. His appearance was that of robust health. He stood quite straight; the shoulders were level and not rounded. There was no sensible falling in of either side of the chest. The right side at the nipple measured 11½ in., the left 10½ in. Movement was equal on both sides, the percussion resonance and the breath sounds were normal. Except for the presence of the cicatrix it would be impossible to tell that anything had been wrong with the chest.

operated on a case of appendicitis or other condition attended by extensive peritoneal adhesions have found no trace of these when they have had to open the abdomen at some subsequent date.

I do not bring forward these few cases as proving that the prognosis in empyema is exceptionally good. In some cases the lung is permanently crippled, though I believe in these the damage has been done before the operation or results from causes, such as cirrhosis, unresolved pneumonia, or tuberculosis, which are independent of it. My cases are enough to prove that a free opening into the pleura need not be followed by permanent collapse of the lung, nor by any serious interference whatever with its functions.

OPERATION.

The operation now generally performed at the Liverpool Royal Infirmary is the removal of a piece of rib by the subperiosteal method and the insertion of a wide tube with a broad flange. By the local

injection of eucaïne or novocain the incisions are made almost painless, and the risk of giving a general anaesthetic is in most cases avoided.

SPONTANEOUS EVACUATION OF AN EMPYEMA.

An empyema overlooked and left alone will, like an abscess elsewhere, make a way out for itself. At the present day an empyema is hardly likely to be allowed to burst externally; the only instance I remember seeing was when I was house-physician twenty-six years ago.

But it is not so very uncommon for an empyema to discharge itself through the air passages. I have notes of 5 cases in my wards during the last eight years in which this accident seems to have occurred. The usual history is that after some acute illness the patient has coughed up a large quantity of matter, perhaps highly offensive to the smell, and the expectoration has continued. No doubt patients sometimes die asphyxiated before we can be called to them. When we find a patient with a his-

tory such as I have sketched and expectorating pus, we try to localize the suppurating cavity, and if we find dullness or other indications of pleural effusion or thickening, we make one or more explorations with the aspirator. If we find pus, a free incision should be made, a tube inserted, and the case treated as one of ordinary empyema. When this is done, the prognosis is no worse than in other cases of the disease, as is illustrated by the following:

P. H., aged 47, a railway worker, was admitted on April 6th last year. About six weeks earlier he had had a rigor, followed

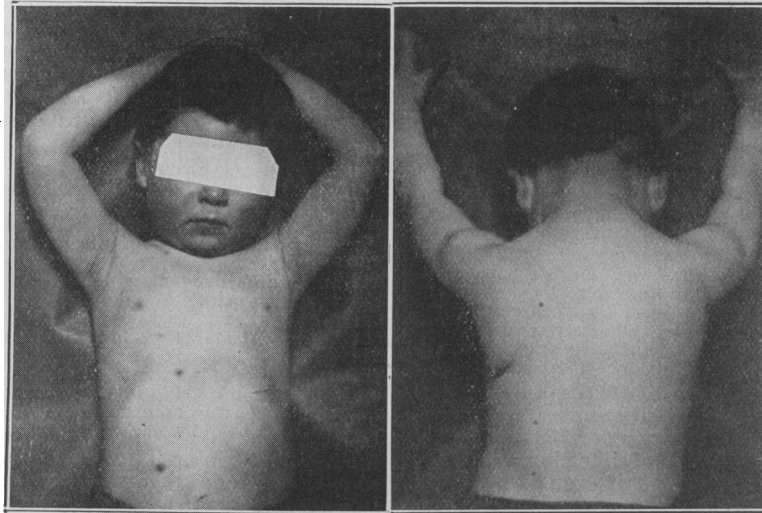


Fig. 2.—George K. Empyema. Evacuated by free incision with removal of piece of rib early in September, 1908. Complete expansion of lung.

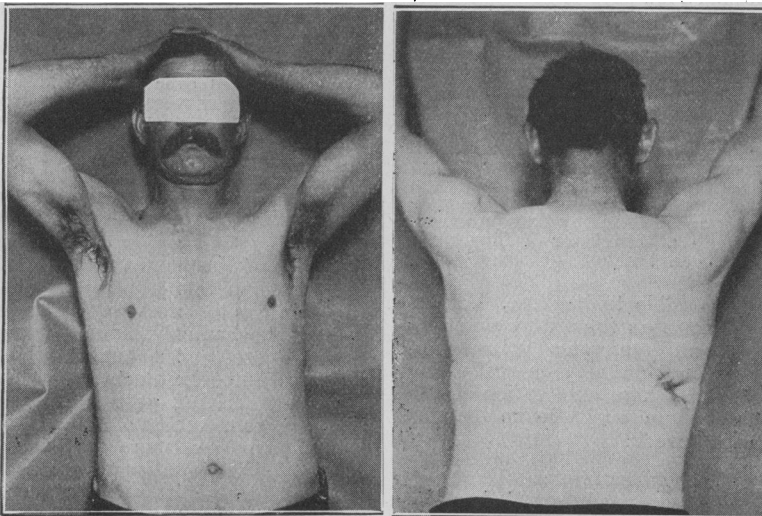


Fig. 3.—P. H. Empyema discharged through air passages. Intense fetor. Free incision into pleura, with removal of a piece of rib in April, 1908. Complete expansion of lung.

by cough (probably pneumonia), and after about three weeks copious very offensive expectoration came on. When admitted he was in great distress, coughing incessantly and bringing up purulent fluid. The fever was intense. There was dullness over the right side of the chest, and succussion splashing was heard. I at once removed nearly half a pint of stinking pus mixed with air from the right pleura, which at once relieved his urgent distress, and later in the day my colleague, Mr. Lidler Jones, performed the usual operation for empyema. The patient made a good recovery, except that a small piece of rib necrosed and had to be removed at a subsequent operation. When he came to report himself a few days ago he was in good health and at his work. The two sides of the chest appeared equal in measurement and in movement (Fig. 3). There was no dullness on percussion, and, except for the presence of a scar, it would have been impossible to say that anything had been wrong with the chest.

Unfortunately, however, it is not always possible to locate the suppurating cavity. Apparently, after the abscess has burst into the air passages, it may contract into a mere sinus, which continues to pour out offensive matter indefinitely, but eludes the attempt to find it by exploration. How easily this may happen is illustrated by a case I saw in consultation several years ago:

A lady was expectorating offensive matter, and had signs pointing to an empyema at the right base. I made an exploratory puncture, being guided as to the spot by some very localized moist sounds, and found pus. Mr. Bickersteth was called in, and made a free incision and drained the cavity successfully. The cavity was found to be no bigger than a walnut, showing how easily it might have been missed.

It is well known since the time of Hippocrates that patients may recover without operation after evacuation of an empyema through the air passages, but it is only after much suffering and the risk of infecting the other lung, and they sometimes die; and if ever I meet again with such a case, and fail to find the matter by exploration with the aspirator, I shall feel it my duty to advise the making of a free opening and a thorough examination of the pleura and the surface of the lung.

DIFFICULTIES IN DIAGNOSIS.

I will now refer to some cases which serve to illustrate the peculiar difficulties which we may meet with in the diagnosis and treatment of cases with signs suggestive of effusion at the lower part of the pleura.

Suppurative Pericarditis.

Benjamin P., aged 7, was admitted to my ward after a week's illness. The left lung was in a state of pneumonic consolidation. The crisis took place the day after admission, but after the temperature had been normal a few days it became hectic. Dullness persisted, and the heart seemed to be pushed over towards the right. I suspected that an empyema had formed, and made an exploratory puncture over the left lung, and found some pus. The usual incision was made, but little or no matter was found and none came through the tube. Two days later I punctured the pericardium and found a little blood-stained serum containing pneumococci. At the autopsy we found carnification of the left lung. The pericardium was greatly thickened and the heart was adherent to the chest wall. At the back and towards the left of the heart there was a collection of pus, about 6 oz., lodged between the two layers of the pericardium. This I had evidently reached in my first puncture, which must have gone through a thin layer of lung. On operation it could only have been reached by turning the lung aside.

Such a case is probably impossible to diagnose. At the same time it serves to illustrate an important practical point—namely, that signs and symptoms pointing to empyema consequent on pneumonia may be really due to pus in the pericardium, and where exploration of the pleura is negative pyopericardium ought to be thought of. I had such a case only last week.

SUBDIAPHRAGMATIC INFLAMMATIONS.

Inflammatory or other diseased conditions below the diaphragm are likely to give rise to signs pointing to disease of the pleura, and these may for a time quite overshadow the primary disorder. Thus I have known the pleura to be opened for an empyema, and hydatids to be found in the pus, and on further exploration the hydatids were found to be merely a colony connected with a much larger mass growing in the liver.

The large single abscess of the liver may, if it points upwards, suggest effusion or suppuration above the diaphragm, and if it is actually attended with a serous effusion in the right pleura, as happened in the following case, the true nature of the case may be overlooked even on the operating table.

A Chinaman, aged 36, was admitted on June 8th, 1904, with signs and symptoms pointing to effusion into the right pleura.

I only saw him just at the end of my visit; his symptoms were urgent and I aspirated him at once and found a considerable quantity of pus. I directed that one of the surgical staff who was in the building should be requested to perform the usual operation for empyema. On my next visit I was informed that this had been done, but that only a serous effusion and not an empyema had been found. On seeing the patient again I found that the liver was enlarged downwards while the diaphragm was pushed upwards and lay against the operation wound in the chest.

I saw at once what had happened in this case. The needle I had plunged into the chest had traversed the lower part of the pleura, missing the effusion, and piercing the diaphragm had tapped an abscess in the liver. The surgeon, however, advancing by successive stages, had laid open the pleura, and finding there a copious effusion of some kind, thought he had done all that was required by evacuating it.

In another case a young woman aged 20, who had never been out of Liverpool, had an irregular temperature, with night sweats, for several weeks, and I suspected she was tuberculous. The only physical signs obtainable were some dullness on percussion and impairment of the breath sounds on the right side of the back as high as the angle of the scapula, and I made a puncture in this region, with a negative result. Two months later she returned to the infirmary with an oedematous swelling over the dull area. I was now confident of the existence of pus, and I explored, and on pushing the cannula deeply in, I drew off 2 oz. of fetid pus, looking like anchovy sauce, which had evidently come from the liver. Here all the indications pointed to empyema, and considering that the patient had never been abroad I do not think a correct diagnosis was possible before it was made. She did well after operation.

Dr. Samuel West alludes to the occurrence of fetid empyema in connexion with ulcer of the stomach, though I do not find any instance of its occurrence in his book. If the fundus of the stomach were a frequent seat of ulcer the association might be fairly common, but in point of fact it must be extremely rare. Only last week, however, I saw in consultation a case in which I believe the empyema had arisen from an extension through the diaphragm of infection and inflammation starting from a gastric ulcer.

Miss B., aged 24, had had gastric trouble for a considerable time, and a year ago was attended for what was thought to be gastric ulcer. At that time she had severe pain coming on directly after food; she had vomiting, though there was no hæmatemesis. She got better, but towards the end of November the symptoms returned. On the morning of December 26th, possibly not unconnected with the season's festivities, she had severe vomiting and pain referred particularly to the back of the left shoulder. Ten days later a practitioner was called in and found signs of left pleural effusion. The temperature became hectic and there were rigors, and oedema appeared over the left lower ribs. On January 14th 25 oz. of fetid pus were withdrawn and a free incision made. In the absence of pneumonia or other lung trouble, and of tubercle, with the history suggestive of gastric ulcer and with the knowledge that effusion came on at a time when the gastric symptoms were severe, I feel justified in concluding that the empyema in this instance was due to extension of infective inflammation from an ulcer in the stomach.*

In closing this review of the clinical aspects of morbid conditions of the pleura two considerations are especially brought home to me. One is the extent to which the physician has to resort to the surgeon or to the employment of mechanical means for the successful treatment of these cases. But behind all this lies the other and still more important consideration—the means which we possess of arriving at a correct diagnosis. For many years we, as members of a learned and progressive profession, have been more and more attracted to the new and fascinating studies of bacteriology, hæmatology, and pathological chemistry, and we are not without grounds for believing that if we are ever to arrive at a knowledge of the ultimate processes which underlie the phenomena of health and disease, it will be by pursuing investigations on these lines. But, though I should be among the last to belittle the value of the incubator, the microscope, and the test tube as means for extending our knowledge, I am convinced that in the daily routine of our work as medical practitioners they are of very limited application. Such practical results as they do yield are only of value when obtained by those who are constantly engaged in that kind of investigation, and in the case of the inexperienced they are likely to be absolutely misleading. It is on the physical examination and the careful study of the patient

* I am informed that this patient has made a good recovery. May 11th.

at the bedside, not on work in the laboratory, that we have in the main to rely in the diagnosis and prognosis of our cases; and we will all do well to beware lest, in our eagerness to employ the more recondite proceedings which are continually being offered for our aid, we neglect the first principles of clinical investigation—the training of the eye, the hand, and the ear.

A Clinical Lecture

ON A

CASE OF BACILLUS PYOCYANEUS PYAEMIA SUCCESSFULLY TREATED BY VACCINE.

DELIVERED AT THE BRISTOL GENERAL HOSPITAL.

BY ERNEST HEY GROVES, M.S., F.R.C.S.,
ASSISTANT SURGEON.

GENTLEMEN,—The boy you see before you to-day, with bright eyes and fat cheeks, is so different from the wretched spectre whom some of you saw with me last autumn, that it may be difficult for you to believe that it is the same patient. But although he has emerged victorious from the struggle with disease, he has been left with lifelong scars of the strife, which afford a ready means of identification.

History.

There seem to be no facts in his past or family history which have any bearing on the case until November, 1907, when at the age of 8 years he developed two abscesses, one over the right Poupert's ligament, and the other on the inner side of the left thigh. He remained in bed for this condition and the right abscess quickly healed, but the left much more slowly; when it had healed he still remained with a painful stiff left hip-joint.

He first came under my care, at the age of 10, in August, 1908, for lameness, due to fixation of the left hip-joint. He had marked adduction of the thigh, which necessitated the pelvis being tilted up on the left side, so as to cause much apparent shortening of the limb. There was also about 1 in. real shortening—that is to say, that whilst the left heel was 3 in. off the ground when the boy stood upright, two-thirds of this was due to the tilting of the pelvis, and only one-third to loss of length in the hip. The left hip-joint was the seat of firm fibrous ankylosis, upon which weight extension had no appreciable effect. A skiagram showed thickening of the neck of the left femur, irregularity of the surface of the head, with a partial upward dislocation. The acetabulum was enlarged upwards—no doubt by a process of caries affecting its superior margin.

Operation.

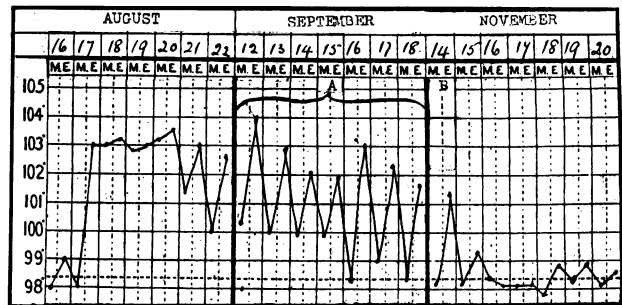
On August 17th, 1908, the left hip-joint was exposed through an anterior incision and the capsule opened. The head of the femur had not left the acetabulum, but the latter cavity had extended upwards and backwards. The head of the femur and the surface of the hip-socket were carious and divested of cartilage. The diseased bone was thoroughly scraped away and the adducted position of the leg corrected forcibly after tenotomy of the tendons of the adductor muscles. There was much oozing from bone and muscles, and a drainage tube was left in the wound. The aseptic method was used throughout the operation, the skin having been prepared with 1 in 500 spirit and biniodide lotion, and dry swabs, with sterilized water for flushing were employed for cleaning the wound. The limb was put up in extreme abduction and with weight extension.

After-history—Pyaemia.

The next day, in the evening, the temperature rose to 103° F., and it remained near this point for five days, after which it underwent those daily fluctuations characteristic of a hectic fever. The wound was opened up, but the discharge was scanty and more sanious than puriform. I need hardly remind you that this scantiness of purulent discharge from the primary focus of septic infection is always of ominous import, and indicates that the vital powers of resistance and reaction are overwhelmed and that the sepsis is spreading further. A urethral discharge often ceases when acute epididymitis occurs, and the stinking matter from the middle ear dries up when the mastoid or lateral sinus are affected.

The boy became noisy, delirious, and extremely ill, so that he had to be moved to the isolation ward. It was very difficult to get him to take even liquid food, and he became very rapidly emaciated. On August 21st he developed an inflamed swelling of the right thumb. This was opened and found to contain thick gelatinous pus in the last joint. Unfortunately, owing to the pathologist being away on his holiday, the swab taken from this abscess was not examined. During September and October other abscesses developed, and these were chiefly in the region of the pelvis, one very large one being over the right hip-joint. These occurred very rapidly and attained a great size in a very short time. He was treated with injections of various polyvalent antistreptococcus serums without any effect.

Very foolishly I imagined that it was a condition of mixed infection, and I thought, therefore, that vaccines or serums could not be expected to do much good. However, fortunately for the boy, this unwarranted assumption was not allowed to go unchallenged, and on October 25th I asked the pathologist, Dr. Dunkley, to see him. He took swabs from the original wound over the left hip, and from this, to my great surprise, obtained a pure culture of the *Bacillus pyocyaneus*. Now this is a germ which we are too apt to treat lightly. It is true that when it causes blue pus on the surface of an exposed wound it may do but little harm, but this is also the case with other pyogenic organisms—for example, streptococci or staphylococci—but when it exists in pure culture in the depths of the tissues it causes a most deadly septic infection. This has been demonstrated in the case of the peritoneum, for example, by Dudgeon and Sergeant.



A. This represents the actual temperature on the dates given, but it almost exactly represents the course of the temperature for twelve weeks—namely, from August 22nd to November 14th. B. Second injection of vaccine.

Dr. Dunkley prepared an emulsion of the very bacilli grown from the patient's wound, and this, having been heated to 60° C. for an hour, was used as a vaccine. On November 6th 40 millions of the dead bacilli were injected, but there was no appreciable result. On November 14th a further dose of 60 millions was administered, and the next day the temperature remained normal and has remained so ever since. On November 24th, December 8th, January 1st and 16th the injections were repeated, 100 million bacilli being used each time. From the date of the second injection the boy's whole condition has rapidly improved. He has slept quietly, taken his food well, become plump and well nourished, and all the abscesses and sinuses have healed except a small one on the inner side of the left thigh which is quite superficial.

A more striking example of the potency of vaccine-therapy could hardly be imagined.

One further point remains to be told. When his general condition had ameliorated and he could bear to be touched, it was found that the right hip was deformed and displaced. It was much shortened and adducted, and the head of the femur was felt in the buttock. Undoubtedly the joint had been the seat of a pyaemic abscess which by a distension of the capsule with pus had led to a dislocation of the joint. Curiously enough this one patient has exhibited three different varieties of pathological dislocation of his joints: They are:

1. Dislocation by destruction of bony surfaces; illustrated by the tuberculous left hip.
2. Dislocation by destruction of ligaments and the traction of muscles; illustrated by the right thumb.
3. Dislocation by distension of the capsule; illustrated by the right hip.