A CLINICAL LECTURE ON PULMONARY ABSCESS.

Delivered at the Hospital for Consumption and Diseases of the Chest, Brompton,

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CAUSES OF PULMONARY ABSCESS.

It is not exactly easy to say what is meant by *abscess* of the lung. In other parts of the body we do not meet with the same difficulty. "A circumscribed collection of pus" answers well enough as a definition. It will include all possible conditions except the very chronic and very rare "lymph abscess" in which the contents are not purulent, but a clear fluid. But in the lung it may be said to be either too inclusive or not inclusive enough; it hardly includes bronchiectasis, which, from the surgical point of view, merits, at all events, discussion in this connection, and it certainly does include some tuberculous cavities which, from the medical point of view, should scarcely be included in the category.

Dr. J. Kingston Fowler, in a work I ought perhaps hardly to refer to, says that an abscess may be met in connection with:

1. Pneumonia followed by necrosis and softening of a considerable area of the consolidated lung.
2. Pulmonary tuberculosis, when a large carious area undergoes rapid disintegration.
3. Chronic non-tuberculous cavities.
4. Bronchiectasis, either with or without ulcerative changes in the bronchial walls and surrounding tissues.
5. Suppuration of a hydatid cyst.
6. Softening of a pyæmic infarction.
7. Pulmonary embolism followed by softening.
8. Perforation of the lung by a malignant growth in the œsophagus.
9. Suppuration of bronchial glands extending into the lung.
10. Empyema rupturing into the lung.
11. Perforation of the lung by a mediastinal abscess.
12. Perforation by an abscess extending through the diaphragm.
13. Injuries of the lung.

DIAGNOSIS.

It is obviously not my business, even if I were able to do so, to say anything about the physical diagnosis of an abscess in the lung. Theoretically of course, if of considerable size, it should give the signs of a cavity—that is, if there be a communication with a bronchus of sufficient size to allow of the entrance and egress of air; but even this latter condition is by no means always present, and, if it be present, it is in many cases so frequently plugged with the discharge that abnormal sounds are only occasionally produced in the cavity. Sometimes no doubt it is possible to be pretty sure not only that an abscess exists, but to point with confidence to its situation. But physicians of the widest experience will tell you that more often, possibly because of its deep situation, possibly because of its small size, and possibly because of the condition I have just referred to, the localisation is a matter of absolute impossibility, and the diagnosis depends partly upon the history of the case and partly upon the character of the expectoration.

But even though the history be known and the expectoration be obviously from a cavity, it is often out of the question to say whether the cavity is in the lung or outside it. An abscess of the liver which has opened almost directly into a large bronchus, an abscess connected with caries of the spine, or a mediastinal gland, or a pyopericardium, a diaphragmatic empyema, or one between the lobes of the lung or between the lung and the pericardium, and numerous other conditions that might be named may supply all or nearly all the signs of, and be easily mistaken for, abscess of the lung. It is obvious therefore that if the surgeon be asked to interfere in a doubtful case he must keep a very open mind and go very cautiously to work. It is wise for him before he begins his investigations to consider the possibility of the matter coming from any one of the regions from which an abscess has been known to burst into the lung.

LOCALISATION OF THE ABSCESS BY EXPLORATORY PUNCTURE.

What he will be first called upon to do is to puncture the lung in order to see if he can hit the suspected abscess. The choice of an instrument for this purpose is a matter of great

importance. It is not justifiable to use a simple exploring trocar, because it is not possible in any case to be sure of the presence of pleural adhesions, and, if these be not present, it is probable that, either in entering it or withdrawing it, some air will be allowed to enter the pleural cavity. This has at least three disadvantages:

1. It modifies the physical signs.
2. It allows the lung to fall away from the chest wall, and therefore renders any further immediate operation difficult and dangerous.
3. If the abscess has been reached by the cannula, and the contents be septic, the chance of infection of the pleura is very great indeed.

The hypodermic syringe is clearly a most unsatisfactory instrument for this purpose, and even the large forms of simple syringe are, in my opinion, very unsuitable; the needle is very apt to become plugged, and a negative result is therefore never conclusive.

Far the best instrument is the bottle aspirator, the puncture being made by a cannula and trocar attached to it—not by a simple pointed needle. The cannula should not be too large, and should have a second opening at the side near the point. It must not be forgotten that, in puncturing the lung, it is almost certain that the trocar will pass through vessels of considerable size, and very probable that it will perforate a bronchus either directly before or immediately after the passage through the vessel. It does not follow that this will produce hæmoptysis, but it is not at all unlikely that it may do so. Fortunately this is seldom serious from the amount of blood lost; but if the patient be very deeply anaesthetised even a small amount may put him into a condition of great peril, which is one of the reasons why, in operating on this class of cases, the chloroform (I say chloroform advisedly) should always be administered very sparingly, the other being that a fit of coughing may lead to the escape of a large amount of pus into the trachea and larynx.

VARIETIES OF EXPECTORATION.

Before proceeding to tap the chest the surgeon is not only justified in examining the expectoration, but is bound to try to form an opinion for himself as to its probable source. It may well be that he is more intimately acquainted with the varieties of pus met with in different abscesses than his medical colleague, and thus be enabled in this way to throw new light upon the case.

It may, therefore, be worth while to pause for a few moments to consider the varieties of expectoration that may be met with.

It must in the first place be observed that the material that is expelled from the mouth is never quite the same as that which leaves the cavity in which it has been formed. It always receives some addition from the air tubes and the mouth, and occasionally also from the stomach. I have, for example, had sent to me for observation the sputum from a case of a recently ruptured empyema, which consisted in large part of vomited matters, and had the characteristic smell of the contents of the stomach, though the naked-eye appearance was that of pus. The amount of addition which the expectoration receives *in transitu* depends partly upon the state of the mucous membrane of the air passages, but chiefly upon the amount of effort involved in the act of coughing, and in the amount of saliva secreted by the patient. If the cough is easy and the secretion from the abscess large, the only change that is effected is that the pus is arranged into more or less distinct pellets coated with mucus, which possibly may contain bubbles of air. But if there be much difficulty in bringing it up, the greater part of that which leaves the mouth may be more or less aerated mucus or saliva. I have seen a patient with a single bronchiectatic cavity, that only held an ounce or two, expectorate a good deal more than a pint regularly every twenty-four hours. Indeed the amount of the expectoration is no guide in estimating the magnitude or smallness of the cavity.

LESS COMMON VARIETIES OF EXPECTORATION.

There are certain special forms of expectoration from cases in which the suspicion of pulmonary abscess is likely to arise that we may deal with first.

1. *Bile-stained*.—Unless the patient is jaundiced this must

necessarily come from the liver, and suggests either hepatic abscess or hydatid of the liver. It is not, in my experience, common, but I have seen it in both the conditions named. The yellow or green expectoration met with in some cases of pneumonia is hardly likely to be confused with it.

2. *Hydatid Cysts*.—Fragments of hydatid cyst mixed with the pus will explain, of course, a part of the pathology of the case, but will not necessarily help to localise the disease. It is important to remember that hydatids are often multiple, and that it does not follow that the cyst you can localise (say in the liver) is the source of the expectoration, which may be situated in the lung or elsewhere.

3. *Actinomyces*.—The small yellow bodies met with in this disease may occur in large quantities in the expectoration, and yet escape detection simply because they are not looked for. We have accumulating evidence that the clinical and naked-eye appearance of this disease may very closely simulate not only empyema and pulmonary abscess, but pulmonary tuberculosis. I would therefore urge the minute inspection of the sputa in all doubtful cases. If once the small bodies said to look like grains of iodoform are seen, and placed under the microscope, the diagnosis is cleared up and the patient most likely saved from a useless operation.

4. *Chocolate-coloured Expectoration*.—This consists of pellets of pus more or less darkly stained with blood, and often containing a good deal of mucus either intimately mixed with the pus or in streaks. The blood is generally uniformly diffused through the pus. Sometimes, however, it is in bright red streaks, and often the individual pellets vary much in the amount of staining, some being almost free from, others consisting almost entirely of, blood. This expectoration in nine cases out of ten, in my experience, comes from the liver; but it must not be forgotten that my experience only includes cases of real or suspected pulmonary abscess. It is generally derived from a hepatic abscess, but it may come from a hydatid. It may also, however, come from the abscess of lung which so often follows hepatic abscess, and from the abscess which is caused by the breaking down of a hydatid of the lung. Presumably, therefore, it may be met with in some other condition, but I have myself only seen it in those I have referred to. Chocolate-coloured pus should be examined while warm for the amoeba coli. If this be discovered, the probability of the presence of a hepatic abscess is very great.

5. *Dark brown and very offensive expectoration* which does not bear any resemblance to pus is met with in some cases of gangrene occurring in the course of acute pneumonia. I am obliged to mention it here because in such cases the surgeon may have to open the cavity, which can hardly be called an abscess, resulting from the gangrenous process.

6. *Hairs and Epidermic Fragments*.—If patients say they have expectorated hairs the story should not be received with incredulity. There are mediastinal dermoids that may rupture into the lung or pleura and cause pulmonary abscess or empyema.

7. *Expectoration from the Mouth and Nasopharynx*.—In patients with chronic inflammation of the gums a highly offensive expectoration may be produced which separates into an upper clear or bloodstained layer and an opaque white or yellow layer looking exactly like pus, but under the microscope showing only squamous epithelium. Pus may also come from the antrum or frontal sinus or from diseased or dead bone in the nose or jaws, or at the base of the skull, and if pulmonary signs be also present much confusion may result. The possibility of the presence of oesophageal pouches must not be forgotten.

8. *Other Uncommon Conditions*.—This does not exhaust the list of the peculiar materials that may be thrown up from pulmonary abscesses, but the cases are too few to require headings to themselves.

Portions of bone and other foreign bodies that have "gone the wrong way"; sequestra from ribs or vertebrae; calcareous plates from tuberculous empyemata or glands; or food which has escaped through an opening in the oesophagus, are the sort of things to which I am referring. In a case to which reference will be subsequently made, large black masses having a most offensive odour came from an apex cavity of doubtful origin. They were made up almost completely of huge apparently non-pathogenic, bacteria. When it is recol-

lected that any abscess below the diaphragm may burst through it, and subsequently open into the lung, it is obvious that many other unexpected materials (the contents of the intestine, for example), may conceivably be found in the expectorated matters. The possibility of the patient being a malingeringer must also be borne in mind.

MORE COMMON VARIETIES OF EXPECTORATION.

We come finally to the more common products of pulmonary abscess where the essential thing is pus. The pus is arranged in more or less distinct nummular pellets which sometimes remain distinct when they are placed together in a cup, and sometimes run together. They are themselves non-aërated, but are enclosed in or mixed up with a variable amount of more or less aërated mucus and saliva. The pus varies much in colour, consistence, and smell. It is often yellow or green, occasionally almost white, and while there is sometimes no smell or only a sickly odour, it may be in the highest degree offensive.

Unfortunately sputa which would answer to this rather inclusive description may be met with in almost any form of abscess of the lung, and also—to add to the confusion—in cases in which there is a general breaking down of a portion of lung without any large resulting cavity.

But there are certain distinctions that may be drawn which will aid in the diagnosis.

A. *Separation into Layers*.—If the expectoration separates into three or two layers it suggests (but does not prove) the existence of bronchiectasis. Dr. Fowler says:

After standing for about twenty-four hours it settles into either two or more, often three, well defined strata—an upper thin, brownish, frothy mucoid layer; a middle layer of greenish fluid, either clear or containing hanging threads; and a thick lower layer of purulent material which forms a grey opaque mass. Where only two layers are present, the upper is more or less stringy, or it may be clear, the solid matters sinking to the bottom.

B. *The Presence of Blood*.—I must again remind you that I am only speaking of pulmonary abscess, or what may be confused with it. I have already referred to the appearance of the blood in pus that comes from the liver. If there be pretty constant—or at all events frequent—streaking of the sputa with blood, the question of tubercle must be entertained. But the possibility of a new growth being at the bottom of the case must be borne in mind. In cases of bronchiectasis there are often as the disease advances occasional and severe hæmoptyses. In cases of empyema the story often is that hæmorrhage occurred once when the matter first burst into the lung, or, if the hæmoptysis was repeated, it only happened when the opening into the lung was re-established after a temporary closure. Prune-juice expectoration sometimes occurs in cases of tumour. Lastly, it must be remembered that both mediastinal abscesses and aneurysms may be confused with pulmonary abscesses, and that either of them may give rise to sudden and fatal arterial hæmorrhage from a large artery.

C. *Smell*.—It requires practice to recognise the characteristic smell of the expectoration in gangrene of the lung, bronchiectasis, etc., and I doubt if anybody ever acquires enough knowledge to make an opinion derived from the sense of smell of much value. But there are certain points worth remembering. Gangrene of the lung gives at first a very foul, earthy sort of stink, and it becomes more and more offensive as the case progresses. In bronchiectasis the expectoration is at first odourless, or at most has a faint sickly smell. The length of time that elapses before it begins to stink varies much in different cases. It then usually becomes very foul, and has a peculiar sickly character. The chocolate-coloured pus from liver abscesses, etc., seldom has more than a faint disagreeable smell. That from tuberculous cavities is as a rule still less offensive. The breaking down of a pneumonic patch of lung sometimes causes offensive expectoration, sometimes not.

D. *Microscopic examination* will, of course, not be neglected. I need not dwell upon the importance of the discovery of elastic tissue, liver cells, tubercle, and other micro-organisms or of animal or vegetable parasites.

NATURE AND POSITION OF ABSCESS.

Now let us consider the varieties in shape and position the abscess may present, and, adopting the same course as in dealing with the last subject, let us first clear out of the way some of the more peculiar conditions.

1. *Bronchiectasis*, in whatever way it may arise, consists essentially of a dilatation of the bronchial tubes, which results in a collection of fusiform or saccular cavities of greater or less size, occupying a part or parts of the lung which are approached by one or more bronchi, and communicating by means of the parent stem with one another. If the process have gone no further this completes the description, if it be added that they are lined with mucous membrane. If, however, as sometimes happens, ulceration has occurred, lateral communications may have been formed between contiguous cavities, and the interior is no longer quite smooth but is formed by the lung tissue itself, more or less modified by inflammatory processes. It need not be said that these cavities offer a most unpromising field for surgery, because unless the part of the lung affected be very localised, it is extremely unlikely that any cavity, which by good luck, may be reached will do more than drain a fraction of the complicated system of dilated bronchi. If the finger enters one of these cavities, the sensation imparted to it is very characteristic; it is like passing it into the finger of a very smooth glove.

2. *Disintegration of a Pneumonic Lobe whether Tuberculous or Non-Tuberculous*.—Here there is probably no cavity of large size, but the whole affected portion of the lung is riddled with small cavities, quite sufficiently large, however, to give rise to suggestive physical signs and to yield characteristic expectoration. I am far from saying that these cases may not be benefited by operation, though at the time the result is apt to be disappointing. On exploration, a small but distinct quantity of pus, probably having an offensive smell, is drawn into the syringe; but, on incising the lung, the operator is disgusted to find that he has opened only a minute cavity, or perhaps more than one, and that his finger appears to pass only into unusually friable pulmonary tissue. He should not, however, despair but insert his tube, and, as the process of disintegration goes on, he will very likely be rewarded by a more copious discharge from the tube and a gradually diminishing expectoration.

3. *Pyæmic Abscesses*.—These are hardly interesting to the surgeon. They seldom attain a large size, and are almost always multiple. They affect various parts of the lung, but are commonly met with on the surface. They arise from septic emboli, and in their earliest state consist of conical patches of pulmonary apoplexy, which afterwards become surrounded by local pneumonia, and are usually indicated, on the surface of the lung, by a raised round spot covered by recent lymph. When suppuration has occurred, the centre is occupied by a small quantity of pus lying in a round smooth-walled cavity. Although surgery can seldom do anything for these, and although the prognosis, if they be present, is extremely bad, there is reason to believe that their contents may occasionally be coughed up, and that the patient may recover.

4. *Hydatids*.—A suppurating hydatid stands upon a somewhat different footing from one that has not suppurated. In the latter case there is a tense cyst impinging directly upon the normal lung tissue, and often also upon the normal pleura. In the former there is probably, but not always, a distinct ectocyst formed by the inflammatory processes that have been going on, and the contents are usually purulent, mixed with the *débris* of the mother and daughter cysts. Sometimes, however, as has been said above, there is no ectocyst, and the wall of the cavity is then formed of disintegrating pulmonary tissue. In such a case the contents are very likely chocolate-coloured pus, in which hooklets and other hydatid *débris* are to be found. It is remarkable for what a long period this sort of material may continue to be expectorated. There is in these cases not the same fear of causing "death by drowning" from the escape of the contents into the air passages that is present in dealing with a living hydatid. They are to be opened exactly in the same way as any other operable pulmonary abscess. They most frequently occur at the lower part of the right lung. The surgeon must not be surprised if he should meet with a localised collection of serum or pus in the pleura superficial to the suppurating hydatid.

5. *Actinomycosis and other fungoid diseases* will probably puzzle the operator when he first meets with a case. He will most likely have made his diagnosis of abscess apparently secure by drawing off some pus with the aspirator. On enter-

ing the lung, however, the finger will pass into a soft homogeneous mass from which very free hæmorrhage will occur, but very little pus will escape. It will very likely be necessary to plug the wound, and then an examination of the pus should clear up the difficulty. When it is remembered how often actinomycosis occurs in the liver, and how greatly this viscus enlarges both upwards and downwards in consequence, it will not surprise you to hear that more than once I have opened an actinomycotic liver, thinking it was the lung; when the abscesses were pointing or had already discharged through one of the lower intercostal spaces in the axilla.

Common Type of Pulmonary Abscess.—Turning now to the more ordinary cases of pulmonary abscess, it may be said that the cavities vary enormously in shape and size, but are perhaps more often rounded than irregular. The surrounding tissue is always more or less altered, and the lining of the cavity varies accordingly. In most cases, however, the wall is not smooth, but either presents strands passing across from side to side formed by the comparatively slowly disintegrating bronchial tubes, or small tubercles representing the truncated extremities of these when they have given way. When the process is acute, the finger passes easily into the pulmonary tissue; when it is more chronic the walls are firmer; sometimes, indeed, they are quite dense and hard.

Acute Pneumonia.—If it have passed into a state of gangrene, the part of the lung affected is widely disintegrated, and is probably at first occupied by a number of cavities containing brown stinking material. Later a distinct abscess may be formed, and sometimes this occurs without the intervention of the gangrenous process. Such abscesses are embedded in a wide area of consolidation, which makes the process of opening somewhat simple because the lung does not tend to collapse after the chest is incised. They are, of course, most frequently met with at the base of the lung but occasionally at the apex.

Gangrene.—The gangrenous cases are very unfavourable for any treatment, but sometimes the only possible chance for the patient seems to consist in making a free opening. It must be added that I have seen cases where this attempt has failed and yet the patient has recovered after weeks of agony, during which he has been a burden to himself and his friends on account of the constant expectoration of most filthy material. The localised pneumonic abscess is, on the other hand, one of the most favourable forms for surgical interference.

Chronic non-tuberculous abscesses are, however, the most favourable cases of all. They sometimes develop without any assignable cause, and may then be met with in any part of the lung. More often, however, they depend upon the rupture into the lung of an abscess originating elsewhere, such as a hepatic abscess or an empyema. Hepatic abscess is frequently followed by the formation of an abscess in the base of the right lung. This is often situated in front, and may then lie behind the third, fourth, and fifth ribs and inter-spaces; it also not infrequently occurs posteriorly. The surrounding lung tissue suffers very little, and if you have a chance of seeing the necropsy of a patient in whom one of these abscesses has healed, you will probably doubt the history you have been supplied with. Free opening and drainage is all that these abscesses require. They often, however, take a long time to close. I have seen them continue to discharge for more than a year before finally healing. When a hepatic abscess opens into the lung it does not by any means always result in a second abscess. It may merely form a sinus through the lung, and, I need not add, those cases often recover without operation.

Tuberculous Abscesses.—This is not the place to describe the ordinary tuberculous vomica, lest we should appear to be encroaching too much on the domain of medicine; and I would only say in passing that the surgeons have for many years been engaged in devising plans for the treatment of these cavities by operation, and hint that there must be cases that could be drained with advantage; some have gone so far as to excise the apices of affected lungs, whilst the tuberculous affection is limited in extent; but to enter on this question now would lead me far beyond the limits of my subject. The tuberculous abscesses that come into my theme are those occasionally met with at the base of the lung. They are surrounded by tissue infiltrated with tubercle, and their walls

are mostly pretty firm. They require surgical treatment, and this does not present any special difficulty.

Tuberculous Disintegration.—I have already referred to the rapid disintegration of a portion of tuberculous lung, and the sort of sponge riddled with small cavities which may result.

Traumatic Abscess.—Lastly, I must refer to the subject of injuries, but will not dwell upon it. Foreign bodies in the bronchi produce either acute or chronic bronchiectasis. Perforations from without may be followed by abscess, but there is nothing very special to be said about them.

THE OPERATION FOR PULMONARY ABSCESS.

I will conclude by giving a very brief account of the operation required for opening a pulmonary abscess, and then add a few illustrative cases.

It is supposed that the presence of pus has been ascertained. The first essential is to harden your heart against giving credence to the assertion that "adhesions must be present." No one is able to be certain about it, and it is your duty to assume that there are none. A free incision should therefore be made, free enough to enable you to remove portions 3 inches long of two, or if necessary more, ribs. The ribs should then be removed without, if it can be avoided, inflicting any injury to the pleura—and it must not be forgotten that, if the pleura be healthy, this is by no means an easy procedure, and demands care and deliberation.

The next step is to pass fully-curved needles—Hagedorn's are excellent for the purpose—to the depth of $\frac{3}{4}$ or 1 inch into the substance of the lung through the pleura. Six or eight such stitches are placed in a ring round an area sufficiently large to enable you, when you open the lung, to insert a large drainage tube; the opening should, indeed, be large enough if possible to admit the finger. When this is done, the pleura and the lung are incised with a knife, or the deeper part may be done with dressing forceps. Some surgeons recommend that this part of the process should be left for another occasion, and that the actual cautery should be used for the purpose. The latter is a troublesome process, but, if the skin be protected, no anæsthetic is required for this second operation. The charring of the tissues is very confusing, and, if the cautery be too hot, bleeding may occur, so I am not much in favour of the plan. Quinke has, however, described cases of bronchiectasis treated in this way, in which a very free incision into the lung has been made by repeating the process on several occasions, and in some of them good results seem to have followed. For my own part, however, I prefer, if the operation is put off to another day, to make the opening either with the knife or dressing or sinus forceps. If the hæmorrhage be severe the wound may be plugged. This will be sure to arrest it, and the drainage tube may be inserted the next day. I have, however, seen one case where a very large vessel was opened and the plugging had to be continued for a long time, as the withdrawal of the plug was always followed by very copious bleeding and hæmoptysis.

When the abscess is opened a large tube must be inserted well into the abscess, and must be retained in position as long as there is any considerable quantity of discharge. The tube is very apt to be expelled from an abscess in the lung, and special means such as stitches through the skin, or strapping over the deep part of the dressing, must often be resorted to for a long time.

These abscesses are so often septic that elaborate and extensive antiseptic dressings are seldom required. Boric lint or a small piece of cyanide gauze, surrounded by a mass of wood-wool, are very useful applications.

The fact of the tube being well in the cavity is often proved by the characteristic whiffing sound as the air is expelled in the act of breathing or coughing. The entry of air is sometimes so free that the patient can breathe through the opening when the mouth and nose are closed. I have under such circumstances heard a respiratory murmur in the opposite lung.

CHARACTERISTIC CASES.

Pneumonia.—A. Followed by Gangrene.

CASE I.—A small boy at University College Hospital, under the care of Dr. Poore, with double apex pneumonia. I exposed the apex of the left lung and opened a gangrenous cavity. He continued to expectorate brown stinking material, and *post mortem* we found a similar cavity at the right apex.

CASE II.—A middle-aged man, under the care of Dr. Thin and Dr. Carson Smith, had gangrene of the right base. I punctured the lung in

many places, but failed to hit the pus. He continued extremely ill for a long time, expectorating for many weeks as much as 15 ounces of most filthy stuff, but then improved, the expectoration lost its smell, and he appeared to have completely recovered. I am informed, however, that quite recently he has had one attack of hæmoptysis—about a teacupful of bright arterial blood. He appears now to be in the best of health.

B. Followed by Abscess.

CASE III.—A girl of 19 years had a large abscess in the lower part of the left lung following pneumonia. It was opened in the left axilla, and she made a good recovery in nine weeks from the time of operation.¹

I could, however, add cases where the patients did not recover, and also others in which I failed to find the cavities.

Pulmonary Tuberculosis.

CASE IV.—I once operated on a small basic cavity in a tuberculous patient, a middle-aged man, under the care of Dr. Bastian.² He made a good recovery, but died a long time afterwards of pulmonary tuberculosis.

CASE V.—A woman, aged 30, under the care of Dr. Ringer at University College Hospital, had in 1895 complained of pain in the left side for three years and had had cough for three months. She was the subject of syphilis and tuberculosis; she had a high temperature and rigors. I opened an abscess of moderate size at the left base in October, 1895. She improved greatly but left the hospital wearing the tube. If it was removed, cough and expectoration and fever returned. She came back on several occasions to have the tube replaced, and when last seen, though gradually losing ground, the most troublesome symptoms were kept in abeyance as long as the tube remained in the abscess.

CASE VI.—I have under observation now a lady, aged about 35, who comes of a very tuberculous family but who herself has enjoyed good health until a few weeks ago, when a slight cough set in. While a tooth was being extracted under gas, she either inspired some blood into the trachea, or it is suggested that she had an attack of hæmoptysis. This was followed by increased cough and fever, with fetid expectoration and signs of consolidation at the right base. An exploratory puncture drew off fetid pus. I stitched the lung to the chest wall and incised it, entering a cavity of very small size in the consolidated lung. The patient was only slightly relieved at first, and the wound, as is usual in such cases, became very septic. Soon, however, the expectoration diminished, while the discharge from the tube increased, and now she appears to be in a fair way to recovery.

We have at present only presumptive evidence that this case is tuberculosis.

Chronic Non-tuberculous Cavities.

CASE VII.—A strong man, a retired prize fighter, under the care of Dr. Barlow at University College Hospital, had signs of a cavity at the right apex, and of mischief—it was thought disintegration of the lung—at the right base. He had been suddenly seized with violent pain in the right breast eighteen months before. He had gone to a Chest Hospital, and had been discharged as cured, but had had subsequent attacks of hæmoptysis, with increasing cough and expectoration. He had had no previous illness. The expectoration—muco-purulent, stained with blood, and brick-red—was so foul that he was a nuisance to the whole ward. He complained of pain at the lower part of the chest on the right side. He could not lie down, and the administration of the anæsthetic was very difficult and dangerous. I incised the apex of the right lung in April, 1898, in the second intercostal space in front, entering a small cavity containing stinking pus. I then removed a piece of the eighth rib in the posterior axillary line, and stitched the lung to the pleura. On subsequent occasions I incised the lung in this situation with Paquelin's cautery, but never found any pus there. In the meantime he gradually improved, but had considerable œdema of the legs. This, however, in time disappeared, and both incisions closed. He is now apparently well. It was thought that he most likely had some malignant disease, or possibly tubercle, but the result of the case appears to show that we were mistaken.

CASE VIII.—A medical man, aged 49, from the northern provinces of India, very robust, and with no history of previous illness, developed without apparent cause a small cavity at the right apex. The expectoration was very foul, and contained black lumps, which consisted almost entirely of fetid masses of very long, straight, motionless bacteria, said by the pathologists not to correspond to any known pathogenic type. The cough was very troublesome and the temperature high. I incised the abscess in the second intercostal space in front, and entered a tough irregular cavity. Progress was slow but continuous: the black masses gradually disappeared, the cough and discharge ceased. He put on flesh, and in the course of a few months completely recovered, and has now returned to India.

I could give many cases of pulmonary abscess following liver abscess. The following will suffice:

CASE IX.—A young man now in the Brompton Hospital with a tropical abscess had all along a good deal of dullness at the right base. There was always a difficulty in getting the liver abscess to drain, and at last he began to expectorate large quantities of chocolate-coloured pus. The week before last I explored the back, and found a large abscess in the base of the right lung. The temperature at once fell, and he is now apparently recovering. He has now two sinuses, one passing into the liver and the other into the lung, the external openings being not far from one another.³

CASE X.—A young lady returned from India with a large hepatic abscess which she was expectorating. I opened it through one of the lower intercostal spaces in the axilla, and she improved, but continued to expectorate. There remained some dullness in front, with signs of a cavity behind the third, fourth, and fifth rib cartilages. This pulmonary abscess was opened through an intercostal space, and after many months she made a complete recovery. During the later stages of this case she used to expectorate a few pellets of blood-stained pus during the night, and discharge a similar quantity through the tube during the day, but there was no expectoration by day and no discharge from the wound at night.

Bronchiectasis.

I have described so many of these cases in different publications that I will not burden you with any of them here. Some have been the result of old pleurisy; some have occurred apparently spontaneously, others have followed the inspiration of foreign bodies. In one only¹ has a completely good result followed operation. Some have been allowed to close; some have worn a drainage tube permanently; in a few cases the patients have appeared to have been actually worse for the operation.

Hydatid.

CASES X and XI.—We have had several cases of suppurating hydatid in the lung at the Brompton Hospital. Two have occurred during the last year, both in young women, both in the lower part of the right lung. One was for a long time mistaken for an empyema, and in the other the diagnosis was very doubtful until some cysts were expectorated. Both healed after incision, but both have now unfortunately developed tuberculosis—a possible sequence of this disease that should be borne in mind during the treatment of the case. In the case which was supposed to be an empyema I was proceeding very cautiously, because there was such a small space over which the physical signs seemed to warrant an incision. After removing the rib I could see the unadherent lung slipping backwards and forwards beneath the healthy pleura; so I at once introduced the stitches in the usual way and found on incision of the lung the suppurating hydatid quite close to the surface.

In concluding this somewhat desultory lecture I would again refer to the well-known fact that cases of pulmonary abscess (like those of empyema) are not infrequently followed by cerebral abscess. The treatment of these abscesses has so far been very disappointing. Not that they are always difficult to open, but they are often multiple, and the other results of embolic pyæmia are not seldom present.

REFERENCES AND NOTE.

¹ *Lancet*, 1887, vol. i, p. 513. ² *Ibid.*, 1887, vol. i, p. 512. ³ Since the lecture was delivered this patient has died of a cerebral abscess. ⁴ *Med.-Chir. Trans.*, 1886, vol. lxi.

ON LATERAL CURVATURE OF THE SPINE: ITS PREVENTION AND TREATMENT.

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I.

IN 1897 appeared in the *JOURNAL* two papers by me¹ on Lateral Curvature, dealing largely with a sideways divergence of the pelvis and lower limbs, which, until I mentioned the subject in 1895 in my work on scoliosis, was unsuspected, and had altogether escaped recognition. I named this condition "amesial pelvis." It is of necessity followed by lateral curvature of the spine in such wise that pelvic deviation to the right produces lumbar or total curvature to the left, and *vice versa*. Both these forms, but more especially the latter, are very apt to develop into the double or S-curve. I would wish now to complete my survey of pelvic aberrations, because they are most important factors in the production, their correction essential to the prevention and treatment of lateral curvature. Besides amesiality there are two conditions to be noticed: namely, version and obliquity.

The former of these has hitherto escaped observation; the term is intended to designate a twist or rotation of the pelvis on a vertical axis, so that one side of the bone lies further back than the other, the defective posture being named according to that side of the pelvis which lies most backward. The direction of this backward twist is usually left, and is followed by a left convex lumbar or total curve; while when the right innominate bone is thrown back the resultant spinal curvature is right convex. Version is independent of, though frequently combined with, amesiality, but as far as the deviation is concerned in contrary sense: thus when both deviations coexist left version coincides with right amesiality, and *vice versa*. A mere inspection of the back, while the patient stands in drill posture in front of the surgeon, hardly reveals with any certainty this deviation, especially in its slighter or incipient stages, while when merely the back and loins are uncovered—a too frequent practice—the condition is of course entirely hidden. A good photograph taken under such conditions as I described last August, as ensuring by triangulation an absolutely correct position of the camera vertically behind the patient, will always reveal the defect, because that lateral half of the pelvis which is thrown backwards presents a broad side view, while that which is projected forward only affords

a narrow foreshortened image of the gluteal region. Fig. 3 was thus taken: it shows a child, aged 12, with double curvature (dorsal to right, lumbar to left), with both amesiality and version of pelvis. If, to apply this test, we measure with compasses the distances from the rima narium to the side outlines of the pelvis, we find the left one to measure $\frac{1}{8}$ inch, the right $\frac{3}{8}$ of an inch, which, as the girl is 4 ft. 8 in. tall, implies a real divergence of two inches.

It must not however be supposed that this malposture is only present during standing; on the contrary it is also present while the patient is sitting. Indeed, the origin of version is in the large majority of, if not in all, cases, due to a faulty habit of sitting, chiefly acquired while the child is learning to write. This is at that early age a very difficult business, which in order to leave the hand free and also under complete control, requires fixity of the shoulder girdle, and this again, perfect steadiness of the spine. The muscles securing this latter condition soon tire, more especially in the dorso-lumbar region; therefore, to ease them without losing stability or changing the position of chest and shoulders, such a twist is given to the pelvis, and with it of the lower vertebræ, as shall relieve the muscles and throw the work on the ligaments. The twist, be it remarked, must be of the pelvis, for if while this were steady the spine were turned, the chest and shoulders would turn with it; their posture necessary for writing would be lost. This twist or version of the pelvis, including of course the sacrum (part of the vertebral column) is in the same direction as the subsequent or simultaneous torsion of the resultant lateral curvature, which when it has been for some time maintained becomes habitual, not merely while writing, but in all sedentary postures; subsequently also in standing. The ligaments and muscles then rapidly contracture and adapt themselves to the posture and to the curve.

Fig. 1.—Permanent Obliquity.

Fig. 2.—Habitual Obliquity.

Though a good deal of the space at my disposal has been occupied by the description of this malposture, I must, on account of its importance, recur to it; but it will be better previously to cast a glance at the whole series of pelvic deviations, for they lie at the root and origin of very many curvatures. If, therefore, they can be detected while still quite recent, a large percentage of spinal deformities may be altogether prevented. Endeavours in a later phase to straighten a