readily indicate the presence of glycosuria in youth. There is no wasting, no abnormal appetite, or thirst and dryness of the mucous or cutaneous surfaces. There are also no symptoms to point to the presence of cirrhosis of the kidney, and I especially desire to note this, since the presence of glycosuria in some cases of renal cirrhosis has long been recognised. He is, however, passing daily very large quantities of glycuronic acid in a urine which is not increased in quantity or density.

It must not, however, be concluded from these results that the presence of this substance is so extremely rare, for my observations were made upon individuals who were believed to be free from diabetes mellitus, and, since it causes no apparently inconvenient symptoms, its presence may be more frequent than one might be led to suppose. Further, by having shunned all cases of acknowledged diabetes, I may have unconsciously rejected instances of glycuronic acid in the urine as being supposed to be glucose. It is not unlikely, also, that some cases of true glycosuria may have been present also in the urine glycuronic acid, in which case they will mask each other.

The difficulties to be met with and overcome in order to demonstrate the presence of both substances in the same urine are extremely great; and I may also add here that the usual solutions of lead or baryta which are recommended to be added to urine for the purposes of classification before using the polariscope to estimate the quantity of sugar present are not sufficient to eliminate all chances of fallacy in the event of glycuronic acid being present as well as glucose.

LECTURES ON THE SURGICAL ASPECT OF HEPATIC ABSCESS.

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

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LECTURE III.

CONTINUING our account of the directions in which an abscess of the liver may rupture, we come next to the following:

4. Hepatic abscess opening into the pelvis of the right kidney is merely mentioned as a pathological curiosity. The fact is recorded by Annesley.¹

5. For a hepatic abscess to burst into the lung it is necessary that it shall have perforated the diaphragm. This probably, though not of necessity, indicates the presence of peritoneal adhesions, and certainly of pleural adhesions. Such abscesses are situated in the right lobe of the liver, at its upper, and I believe most often at its posterior, part, I think it is most usual for an abscess which is about to, or has already, burst into the lung, to cause an upward increase of dullness, but show little or no appearance of enlargement downwards. The abscess most commonly, if not invariably, perforates the base of the lung and induces, and is often preceded by the signs of, pneumonia in this situation, but not of great extent. If the abscess do not become cured, the prolonged expectoration of its contents will almost certainly give rise to chronic fibrosis and dilatation of bronchi, or extensive disorganisation of the lung. Not infrequently, however, a cure may be thus effected but, as far as I can learn, this is not the most common termination. The rupture probably takes place quite suddenly, and does not give rise to any special premonitory symptoms. The expectoration is at first perhaps pure blood, then either light-coloured or chocolate-coloured pus. Afterwards, according to my experience, it may assume very different characters, either being constantly pus mixed with dark blood, almost entirely bright blood mixed with a little pus, or muco-pus tinged with bile. It is said occasionally to consist almost entirely of bile. The amount of blood daily secreted by a liver abscess is sometimes a source of danger to the patient, and it is remarkable to observe how rapidly this diminishes when an external opening is made; no doubt because of the rest given to the abscess by the subsidence of the cough.

An abscess which is being expectorated, but which does not give any local signs of its whereabouts, offers one of the most puzzling problems to the surgeon, for he has to weigh the chances of spontaneous cure against, first, the danger to the lung and to life, if nothing be done; and, secondly, the risks of exploring the liver for an altogether unlocalisable collection of pus. I will give a case in point.

CASE XVII.—Lieut. S., aged 30, was a patient of Sir J. Fayrer, who asked me to see him in August, 1889. He went to India in 1881, and whilst there and in Burmah had dysentery and numerous attacks of fever.

On April 8th, 1888, he had the first symptoms of hepatic abscess. On May 12th, slight hæmoptysis, and on May 21st he expectorated matter. He believes that at this time there was dullness front and back to the level of the armpits, with absence of breath sounds. By June 24th the back had cleared up, and breath sounds began to appear in front. By January 30th he was much collapsed, and was bringing up 30 ounces of blood and pus a day. From that time he began to mend, and he got about and spent the winter in the South of France. While there he was pretty regularly without expectoration for a fortnight at a time, and in perfect health, each period being followed by a relapse. By April he was in bed again, but again he picked up and got about. By the end of June the expectoration had stopped, but in July it recommenced.

When I saw him he was in very fair health, but was constantly expectorating from 6 to 8 ounces a day of bright red blood mixed with some mucus and a little pus, and was of course always

Fig. 2.

coughing. There was dullness in front almost to the nipple, and no breath sound below this line. Vocal fremitus and vocal resonance were abolished below a curved line (see Fig. 2) reaching a little above the nipple, and behind there was dullness and no breath sound below the tenth rib, though vocal resonance could be traced a little lower. The breathing whenever heard was quite normal. The heart's apex was not displaced, and there was no increase of liver dullness downwards, nor was there anything in the way of pain or tenderness by which to localise the abscess.

Under these circumstances, and especially as he had been several times so nearly cured, we advised him to try almost complete rest for the present. I did not see him again, and was much disappointed to see a notice of his death a few days before the delivery of this lecture. His father writes to me that he gradually became worse after I saw him, expectorating at last as much as 37 ounces a day. An attempt was made in Birmingham to reach the abscess, and it appears that the needle passed right through it into the liver, but none was evacuated. At the *post-mortem* examination it was found that the whole of the right lung was hollowed out into an enormous abscess, containing three or four pints of pus, the lower part of which was almost cheesy. There was a layer, one inch in thickness, of vesicular lung at the back. The bronchus opened directly into it, about one inch below its first division. There was a small abscess in the upper part of the right lobe of the liver. The heart was altogether to the left of

¹ *Sketches of the Most Prevalent Diseases of India*. By James Annesley. Second Edition. London, 1831; p. 485.

the middle line. The left lung was quite healthy, and there was no trace of tubercle in the body.

As the case has turned out, I cannot but regret that an attempt was not made to reach the matter at first, but it is more than possible that it would have proved an unsuccessful search.

Quite different was the following case, which, though it has been previously reported,² I must here briefly refer to.

CASE XVIII.—The patient was at University College, under the care of my colleague, Dr. Roberts. He was a fine strong soldier, who had been in India, but was extremely anæmic, and, in fact, I thought in a moribund condition on account of the large amount of blood-stained mucus daily expectorated. The liver was slightly tender, and could just be detected below the margin of the ribs. In the right back there was dulness, not well defined, one inch and a half above the angle of the scapula, and over this area the breathing was weak, vocal resonance and fremitus were abolished, and coarse *râles* could be heard. There was no tenderness over the lower ribs. Thinking that there was probably an empyema, the dull area was selected for operation, and after ascertaining, as the result of several punctures, the presence of deep-seated matter, the needle was retained as a guide, and the incision was made in the ninth interspace behind. After removal of a piece of the ninth rib, however, it was found that the pleura was healthy, and a pneumothorax was necessarily set up. Being very desirous (for the man's sake) of completing the operation at one sitting, I

Fig. 3.—Diagrammatic representation of the method of opening the abscess in Case xviii. *a*. Cavity of the pleura; a portion is also shown below the sutures. *b*. Ribs and intercostal muscles. *c*. Diaphragm adherent to liver. *d*. Double row of stitches uniting diaphragm to chest walls. The small vertical arrow indicates the opening from the abscess through the lung. The large horizontal arrow shows the direction of the opening made at the operation, and the position occupied by the tube.

stitched up with great care and some difficulty the diaphragm to the costal pleura; and, when I was certain that it was airtight, I opened the abscess through the diaphragm and inserted a large tube. The method of procedure will be made clear by looking at Fig. 3. The patient made an excellent recovery, the expectoration gradually diminishing and the abscess behaving in the best possible manner.

Had a correct diagnosis been arrived at, probably the opening might have been made at a lower level and the pleura avoided. The case, therefore, teaches two lessons: (1) that it will not do to assume the presence of an empyema or even of adhesions when the dulness is much increased upwards, and (2) that if by chance the pleura be opened, the operation may with care be safely concluded without endangering the pleura or the patient's life.

An abscess of the liver bursting into the lung may easily simulate a pulmonary abscess.

CASE XIX.—In the spring of 1885 I was asked by my colleague, Dr. C. T. Williams, to see a man, aged about 30, who had been in India, and who was supposed to be suffering from an abscess in the base of the right lung in front, the peculiarity of the case being the curious brown expectoration, which was very copious, as a result of which the patient was much exhausted, the illness being one of long standing. In the lower part of the front of the right chest were all the physical signs of a pulmonary cavity, and there was a tender spot about the sixth interspace below the nipple. An incision was made at this spot, and passed through pleural adhesions, then through the diaphragm into an obvious liver abscess in the right lobe. The expectoration at once stopped, and the abscess quickly closed without any untoward symptoms.

I shall have to return to this subject when speaking of abscesses caused by hydatids.

6. Frerichs says, in speaking of rupture into the pleura, that it usually causes no remarkable disturbance; a dull pain and slight dyspnoea, together with the physical signs of pleuritic effusion, being the sole indications of its occurrence. The abscess may burst either into the lung, or externally, if it be not treated as an ordinary empyema. My experience of this condition is confined to one case only, but it must be owned that the symptoms at the time of rupture were more marked than those described by Frerichs.

CASE XX.—The case was that of a man, aged 34, who had served as a soldier in India for five years, and had suffered from ague. He was admitted under the care of Dr. Roberts into University College Hospital on November 18th, 1885. He had returned to England in 1884, and had remained well till October 28th, 1885, following an occupation in which he was exposed to great variations of temperature; he was then seized with hepatic pains and vomiting, which forced him to keep his bed, and continued with greater or less severity till the time of his admission.

On admission he looked fairly well and was not jaundiced; he complained of constant throbbing pain in the hepatic region, especially at the lower margin of the thorax and the posterior part of the right axilla, over which area there was also tenderness. The appetite was bad and there was diarrhoea, the stools being dark brown and semi-solid. There was very slight enlargement of the liver upwards, none downwards. The spleen could not be felt. The temperature was 102°.

On December 28th he was suddenly seized with very marked signs of right pleurisy, and it was soon obvious that a large amount of fluid had collected in the right pleura, there being dulness in front as high as the clavicle and behind to the level of the angle of the scapula; and the heart's apex being displaced outwards so as to be just outside the left nipple. An aspirator drew off some chocolate-coloured pus. In the meantime blood had on several occasions appeared in the motions.

On December 30th I saw him, and opened the pleura in the seventh intercostal space, just in front of the posterior axillary fold. The finger was introduced with some difficulty between the ribs and felt the diaphragm covered apparently by soft granulations; but no opening through it could be discovered. The fluid consisted of dark brown serum mixed with curdy pus. I used in this case a valved tube (which I was then in the habit of employing, and have described in a previous course of lectures, but have since discarded), and thus no air was admitted into the pleura. The wound was dressed with carbolic acid gauze.

The empyema behaved well enough, but it was impossible to check the now typically dysenteric diarrhoea, and on January 2nd, 1886, the man died. The temperature up to the time of rupture into the pleura had been of a hectic type, usually varying from 99° to 102°; but after that event it was usually normal or sub-normal, reaching only on one occasion, the day following, 100°, and on the next day 99°.

At the *post-mortem* examination the liver was not found to be much enlarged, but presented one large excavation of the size of the palm of the hand, and half an inch deep in the centre and lessening towards the circumference, the rupture of which had given rise to the empyema. The rest of both lobes was studded with innumerable minute points of suppuration. There was ulceration throughout the length of the colon.

CASE XXI.—In this connection I am able to mention, owing to the kindness of Mr. Roughton, who asked me to see the case with him, the case of a strong young American of most temperate habits, who was travelling round the world and was taken suddenly ill whilst in Ceylon with an acute tropical abscess. The reference to this case will be very brief, as it will

shortly be published by Mr. Roughton. It was opened close to the costal margin, 3 inches from the middle line, and was apparently on the point of healing, when sudden right pleural effusion occurred. This was aspirated several times and had become purulent before Mr. Roughton saw him. He opened the empyema after removing a piece of the sixth rib, just in front of the posterior axillary fold. The cavity did not drain well, and at last there was expectoration of fetid pus, and an evident bagging of similar material in the deep part of the wound, but the position of the cavity could not be ascertained.

When I saw him he was not losing ground, but had marked clubbing of the fingers. The liver was not apparently enlarged either upwards or downwards, but I suspected some collection of matter in the lower part of the pleural cavity because the right back was almost completely dull, though weak breath sounds could be heard as far as the ninth rib.

I was present at Mr. Roughton's operation on January 12th, which was an endeavour to find the cavity from which the discharge came, in which, after prolonged efforts, we were, apparently, not successful. A trocar, passed through the lower part of the dull area behind, no doubt entered the liver, for, as we afterwards discovered, there was no lung in this situation. Then the original opening was enlarged by removing more rib, and, after cutting through the dense pleura, several tracks were followed up but without success, causing a good deal of hæmorrhage; and it was quite impossible to be certain how far we were working above the diaphragm and how far below it. The case, I think, is a very important one as indicating the great difficulties that arise when an abscess is situated partly above and partly below the diaphragm. The surgeon may expect to meet with very similar trouble in dealing with caries or necrosis of the lower rib cartilages. It has occurred to me more than once. There can be no doubt that ultimately this abscess communicated with the lung as well as the pleura, though whether it burst into the former or the latter first is purely a matter of surmise. This patient, after undergoing an attack of pneumonia and acute albuminuria, is, I am informed, convalescent, and it appeared from the subsequent progress of the case that, in the operation described, Mr. Roughton did really reach the position of the retained pus.

7. Rupture into the pericardium has been mentioned by various observers. The physical signs are sufficiently obvious. The result has always been fatal; but the condition should hardly be beyond the limits of modern surgery.

8. Rupture into the cavity of the peritoneum is one of the least common terminations, for the obvious reason that as the abscess approaches the surface of the liver adhesions are almost certain to be formed. This is quite consistent with our experience of the course of other intra-abdominal abscesses; the amount of surrounding inflammation no doubt distinguishing these cases from those of chronic ulcer of the stomach or intestine, in which, as is well known, rupture is often followed by acute general peritonitis.

CASE XXII.—I have not myself met with such a case, but I may mention, as one somewhat of this nature, that of Mr. H., aged about 30, a resident in Calcutta, whom I saw with Sir J. Fayer in the summer of 1888. He presented typically the signs and symptoms of a large hepatic abscess, the liver extending far down, below the umbilicus, and the dulness being raised very considerably both in front and in the axilla; and marked tenderness being present in the latter situation. An exploring trocar having been introduced through one of the lower intercostal spaces determined the presence of pus, and, on making an opening in this situation, exit was given to 60 ounces of matter which lay between the upper surface of the liver and the diaphragm. It was, in fact, a subdiaphragmatic abscess.

Now a subdiaphragmatic abscess is a rare condition. It may arise from local peritonitis, from perforation of the stomach, or from abscess of the liver, or from suppurative about the kidneys, possibly also from the downward bursting of an empyema, or from the upward travelling of abscesses that originate lower down, say, in connection with the cæcum, or from caries of the costal cartilages. It may easily be confused with a supra-diaphragmatic empyema—another rare condition.

A careful search was made in Mr. H.'s case for the opening into the liver, but it could not be found, so a very large drainage tube was inserted and a carbolic acid gauze dressing was applied. The liver at once came up, and it was evident that it was very little, if at all, enlarged; and the abscess followed a perfectly typical aseptic course. The patient rapidly put on flesh and regained his ap-

petite, and beyond the fact that he had for a long time a pulse of 120 or more the case presented no peculiarities.

A few words must now be said about suppurating hydatids of the liver; for if the cyst be situated in the upper or posterior part of the gland the characteristic symptoms of hydatid may be absent, and until the matter is evacuated there may be nothing to distinguish such a case from one of hepatic abscess.

CASE XXIII.—The first case I will describe occurred ten years ago (admitted February 26th, 1880) at University College Hospital, under the care of my colleague, Dr. Ringer. It was that of a young woman, aged 20, with a phthisical history, who had lived eleven years in America, but, for the eighteen months previous to admission, in England. There were signs of right empyema, namely, retraction and immobility of the side, the dulness being below the third rib in front, the fifth in the axilla and the angle of the scapula behind. There was a high temperature, 101° to 104°, and marked clubbing of the fingers; no note was made of the liver. There was copious muco-purulent expectoration, which, in March, was noticed to be yellow.

The patient continued much in the same state till July 10th, but gradually became weaker. I was then asked to see her, and made an incision in the back through an intercostal space below the angle of the scapula, giving exit to a large amount of pus mixed with hydatid cysts. An ordinary tracheotomy tube was inserted. The drainage was evidently imperfect, for the expectoration again became yellow. Owing to the closing of the hospital, we now lost sight of the patient; but she returned on October 1st in a moribund condition, and at the *post-mortem* examination we found the right lung full of disseminated tubercle. The liver was of normal size, and contained three hydatid cysts: one close to the junction of the posterior and upper surfaces as large as a walnut, shrunk and calcified, and communicating through the diaphragm with the lung; a second, of the size of a Maltese orange, opening into the common bile duct; and a third apparently still active. The spleen and kidneys were albuminoid. No doubt the opening here should have been much more free, but the case was evidently a most unpromising one for treatment. I would particularly direct attention to the tubercles in the right lung only in connection with the fact that this lung had been constantly irritated for eight months, *à propos* of the question of leaving alone abscesses that are being expectorated.

The last case I will inflict upon you is one of especial interest in connection with thoracic surgery, because it had been diagnosed as an empyema and opened as such; and, to make a full confession, I looked upon it as one myself at first, though I think there were data at hand which should have enabled us to come to a correct diagnosis.

CASE XXIV was that of a lady, Miss R., aged 30, whom I saw with Dr. Slater, of Barnbury, on May 17th, 1889. Her illness began six months before whilst she was staying at Cambridge, which is said to be developing an evil notoriety for hydatid disease. First she was said to have become abnormally stout, and then an abscess formed below the angle of the right scapula. This was punctured and then freely opened by Drs. Ellis and Batten, of Gloucester, and a drainage tube was passed between the ribs. They report that early in January she had pain at the epigastrium and over the region of the liver; that at the time of the operation there was dulness and absence of breath sounds to midway between the angle and the spine of the scapula, and the heart was much displaced outwards, but there was no apparent enlargement of the liver. They clearly recognised some peculiarity about the case, however, because the matter did not flow freely at first, its escape being no doubt prevented by the hydatid cysts; and also because a distinct hepatic enlargement was manifest soon afterwards. It was assumed therefore that there was a second abscess lower down, and that it was probably an empyema depending upon some subdiaphragmatic suppurative.

Before she came to London some burrowing of matter had taken place in the soft tissues of the back, and the tube had slipped out from between the ribs. When I saw her she was thin and very much emaciated; the fingers were clubbed, and the extremities blue. The liver extended two inches below the umbilicus, and was very hard, but it was not easily felt, because the whole abdomen was tense, suggesting from its shape and hardness a football when it was manipulated. Dulness extended up to the third rib in front, and was sharply defined (Fig. 4); behind it faded off gradually halfway up the scapula (Fig. 5). The level of dulness passed across the apex of the axilla. Breath sounds, vocal resonance, and vocal fremitus were abolished over the dull area, except close to the spine.

The heart's apex was in the sixth interspace, one inch outside the nipple. The temperature varied from 101° to 103°. The appetite was capricious. There was no expectoration and no albuminuria. There was an opening discharging pus opposite the ninth rib, outside the angle of the scapula.

Fig. 4.

Fig. 5.

I enlarged the cutaneous opening, and, at the outer part of the subcutaneous abscess, discovered a small track passing into a cavity within the ribs. This gave exit to a large quantity of pus and hydatid membranes, and then it was found that the cavity was situated altogether beneath the diaphragm, which had been pushed up to this enormous height by the gigantic hydatid cyst.

I would here raise the questions, without venturing to answer them, Whether an enlargement of the liver often or always pushes the heart over more or less than a collection of fluid in the pleura. In this case the dislocation was very considerable. The cavity was washed out with solution of chloride of zinc (40 grs. to 3j), and the wound was dressed with boracic lint and salicylic wool. The liver rose one inch.

The case progressed favourably, though at one time she was in some danger of sinking from exhaustion, and she became still more extremely emaciated. Whether or not this depended upon the fact that there occurred an enormous flow of pure bile from the wound, half a pint to three-quarters of a pint *per diem* for some time, I will not pretend to say. The result was, however, that bedsores formed over the angles of the scapulae and the most prominent rib angles. In the course of time, however, this diminished and finally stopped. She began to put on flesh. The motions, previously pale, assumed their natural colour, and by the end of September (four months) the abscess had completely closed.

She is now well nourished, and in good spirits, but there remains a rounded swelling at the epigastrium, freely movable, and connected with the liver. Whether it is another cyst or a distended gall bladder I cannot say, but whatever it is, it appears to be diminishing in size, as may be seen by comparing Fig. 6 with Fig. 7.

Fig. 6, September 24th.

Fig. 7, November 29th.

The subject of these lectures has been so diffusely treated, that it will be perhaps convenient to summarise what has been said with regard to treatment, which is intended to be its essential part.

1. Pyæmic abscesses do not call for surgical interference, or, if in rare cases one should point, it is only opened to relieve symptoms, but without hope of doing permanent good.

2. The same observations apply to abscesses resulting from suppurative phlebitis of the portal vein.

3. Multiple abscesses associated with dysentery or ulceration of the bowels are very unfavourable for surgical treatment. They must however, be opened and treated on the same lines as the single or tropical abscess, because they cannot be certainly diagnosed.

4. Single abscess of the liver, whether tropical or not, must, if it approach the surface, be opened, the following precautions being adopted:

(a) If it present at the epigastrium, the presence of adhesions must be ascertained before incising the liver.

(b) If through the chest wall, a spot must be chosen below the normal limit of the pleura; but, if by chance either pleura or peritoneum be opened, the opening must be closed with a double row of stitches before incising the liver.

(c) Strict antiseptic precautions must be throughout adopted, either carbolic acid or some slightly soluble salt of mercury being employed for the dressings.

(d) The tube must be of large size at first, and a tube of some sort must be kept in until the discharge is reduced to a very minute quantity.

If the abscess have burst into the lung, pleura, pericardium, peritoneum, or kidney, and the position of the abscess can be clearly determined, it must be opened without delay. If the position of an abscess be only suspected and the patient be losing ground, it is right to puncture the liver in the most likely situations, bearing in mind that, though usually quite harmless, a slight amount of risk accompanies this very trivial operation. This rule applies to cases in which the abscess has ruptured into any of the cavities enumerated above. If, on the other hand, whether the abscess have ruptured or not, there are no means of diagnosing the whereabouts of the matter, and the patient be not losing or even gaining ground, the surgeon should hold his hand for a time.

5. Hydatids of the upper and back part of the liver are to be treated upon the same lines; but in cases of this sort, and in those of subdiaphragmatic abscess, it must be remembered that the diaphragm may be pushed up to a very great height, thus closely simulating intrapleural suppuration.

6. Empyema, pericarditis, and peritonitis caused by rupture of a hepatic abscess or hydatid must be promptly dealt with on general principles.

ON THE CENTRAL MOTOR INNERVATION OF THE LARYNX.

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AND

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THE communication, under the above title, by Professor Krause, of Berlin, published in the JOURNAL of January 18th, forcibly illustrates the truth of the old adage, that "it seems a pity to take offence where none is meant." Professor Krause evidently appears to think that the terms "investigation" and "discovery" are identical. It seems hardly necessary to point out that this is not so. Inasmuch as he himself found it necessary to controvert only last year, in a special communication, at the meeting of German naturalists at Heidelberg the opinion given out by François Frank—namely, that there was no cortical representation of the larynx¹, it was surely legitimate for us in 1886 to "investigate" the whole question of the motor innervation of the larynx.

As to the question of priority, Professor Krause, in his present communication, says in reference to his own work on the subject: "These results of mine the authors (namely, Semon and Horsley) have, on a former occasion (1886) recognised as the first investigations on the subject."

¹ See *Internationales Centralblatt für Laryngologie*, etc., January, 1890, p. 381.