fluid were vomited, and subsequently everything taken by mouth was vomited. Saline solution, given per rectum, caused the tetany to disappear, and reduced the pulse from 120 to 90, and the temperature from 102° to 98°.

Operation.

Ether was administered by the open method. The stomach, dilated to double its usual size, with walls of double the normal thickness was firmly adherent to the diaphragm and ribs. In the pylorus was a hard mass the size of a walnut. In the gastro-colic omentum was a globular, mobile tumour, the size of two golf balls. Posterior gastro-jejunostomy was performed.

After-History.

On recovery from the anaesthetic, right hemiplegia, with partial aphasia, was present. Coma supervened and death occurred thirty-six hours after operation. During these thirty-six hours liquids were swallowed and retained and left the stomach, which was found empty on passing a tube.

CASE III.—Carcinoma of Pylorus causing Obstruction.

A woman, aged 64, for fifteen years had passed much flatulency by mouth and rectum. At no time had there been any pain. For four months there had been intermittent vomiting, latterly as much as a quart at a time. There was a mass the size of a Tangerine orange 1 in. above and to the right of the umbilicus. In the forty-eight hours preceding operation 8 pints of saline solution were absorbed per rectum, producing a good volumed pulse of 80. The stomach, which contained foul liquid, was washed out two days before, and half an hour before operation.

Operation.

The anaesthetic used was almost entirely ether by the open method. Occupying the pylorus was a growth 3 in. by 2 in.; it extended 3 in. along the lesser curvature. In both omenta were large masses of growth. Posterior gastro-jejunostomy was performed.

After-History.

The patient, who had stood the operation well, became drowsy, with breath smelling strongly of acetone, and died comatose forty hours after operation.

These cases, which occurred within a period of three years; illustrate deaths from (1) septic pneumonia, (2) cerebral haemorrhage (or thrombosis), (3) acetonæmia.

The features common to all three cases were:

1. Operation was performed with the object of preventing death from starvation the result of pyloric obstruction.
2. The anaesthetic was ether.
3. On being returned to bed after operation the patient was at once placed, and nursed throughout, in the Fowler position, saline solution being administered per rectum.
4. The gastro-jejunostomy was that of the Mayo clinic, that is, posterior, no loop, antiperistaltic, with an opening of 2½ to 3 in.
5. During the time which elapsed between operation and death, the anastomosis acted perfectly.

In Case I the cause of the pneumonia was inhalation of septic material from the stinking mouth. Possibly the anaesthetic was an accessory cause. The patient was so emaciated, and so rapidly losing ground in spite of rectal feeding, that it was obvious that her only chance lay in operation.

In Case II, when first seen, the gastric tetany was marked and accompanied by pyrexia and a rapid pulse. As soon as these symptoms had been relieved by saline solution, given per rectum, it was felt that operation was the only rational treatment. In the absence of a necropsy it is impossible to be certain that the cerebral lesion was not a thrombosis, but haemorrhage appears the more probable. To some the fact that ether was the anaesthetic may account for the cerebral catastrophe, but that cerebral haemorrhage may take place during chloroform anaesthesia is proved by the following case, reported by Fairlie:¹

The patient, a labouring man aged 23, had been anaesthetized with chloroform three weeks previously, and artificial respiration for one minute had been necessary. On the next occasion, skin-grafting being the operation contemplated, chloroform was again administered; there was some struggling during the first stage, and death took place prior to operation. The *post-mortem* report read as follows: "Heart, normal; lungs, some engorgement at base, no oedema; brain, fresh haemorrhage extending over both cerebral hemispheres downwards towards the base, more extensive on the left side. There was no hypertrophy of lymphatic tissues."

The tendency of starved patients to develop acetonæmia is well known. Post-anaesthetic acetonæmia is far more common with chloroform than with ether. In Case III it was hoped that the gallon of saline solution absorbed per rectum in the forty-eight hours preceding operation might have obviated this risk. The acetonæmia was

treated with sodium bicarbonate, both by mouth and rectum, and by inhalation of oxygen, but without effect. The urine prior to operation contained neither sugar nor albumen. A specimen taken from the bladder immediately after death was examined by the Clinical Research Association, which reported:

This urine reduces Fehling's solution to the equivalent of 5 parts per 1,000, or 2.2 grains per ounce of glucose, but the reducing substance is not glucose, since it does not yield the characteristic glucosazone crystals. Acetone, aceto-acetic acid, and beta-oxybutyric acid are not detected.

The reducing substance was probably one of the acetone series. The acetone odour of the breath was marked and unmistakable. In a future case sodium bicarbonate and glucose might be administered per rectum prior to operation; it could do no harm, and might be of service.

Disappointing as such results must always be, it is hardly to be expected that operations for obstruction of the pylorus can escape the mortality which attends operations for obstruction in other portions of the intestinal tract, the mortality being highest in those cases in which the obstruction is complete and has existed for some time. As pointed out by the late Greig Smith, operations performed on desperate cases spoil statistics but save lives. In failing to save such a case the surgeon is in the position of a man who, seeing a runaway trap carrying its occupants towards a precipice, has made an effort to divert its course. The effort fails and the runaway dashes over the cliff. The fact that, in the event of the attempt at rescue failing, the horse moves a little faster, or the patient goes downhill a little more quickly, is not a valid excuse for shirking an obvious duty.

REFERENCE.

¹ Fairlie, *Lancet*, November 12th, 1910, p. 1415.

REMARKS ON THE PATHOLOGY AND TREATMENT OF FISTULAE.

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FISTULAE come under a branch of surgery which in a general hospital is apt to be neglected. Such cases are not, as a rule, of striking interest, and are frequently relegated to the end of the operation list, with the result that the operative treatment is not always efficient, whilst the patient is only too frequently sent out of the hospital to make room for more urgent cases before the cure is complete. Thus the post-operative treatment is not fully carried out, and the patient once more becomes the subject of chronic suppuration; for if there is one thing more than another that is essential to the healing of fistulae, it is the careful dressing and attendance after the operation.

These few notes on the pathology and treatment of fistulae are based upon observations made at St. Mark's Hospital, where the opportunity of watching the results of treatment is unique. I wish first to draw attention to a type of fistula that is commonly met with in the out-patient department of the hospital. I refer to the class known as "horseshoe fistulae." These cases present themselves with the history of having suffered from chronic discharge and attacks of pain on and off for a long period, in some instances of ten years, and have, as a rule, undergone many operations. Wearied with long attendance at hospitals, they finally meet with some one who, disappointed with the results of treatment, informs them that their case is tuberculous and incurable—an opinion that is in both directions nearly always erroneous.

The truth is that these cases have become chronic and intractable because their exact pathological conditions have not been recognized. The late Mr. Goodsall pointed out that in fistulae the internal and the external openings usually bear a definite relation to one another, and I may briefly refer to his observations, with figures to illustrate the condition of matters. His statement is that all fistulae with their external openings behind a line drawn transversely through the centre of the anus have their internal

openings in the middle line behind (see Fig. 1); and that in cases in which the external aperture is anterior to this line, the inner opening is directly opposite the external one (see Fig. 2).

It must, of course, be recognized that in both cases there are frequently outlying tracks which must be dealt with;

Fig. 1.

Fig. 2.

A, External openings. B, Internal openings. C, Internal sphincter. D, External sphincter. E, Line through centre of anus.

but it is all-important to find and trace the chief fistulous tracks, for complete fistula can only be treated with success when the internal opening has been found and laid open, and attention to Goodsall's rule will be found most helpful. I had this point well impressed upon my mind by two chronic cases of apparently complete fistulae with multiple external openings that were operated upon in which no internal opening was found. After many careful dressings they left the hospital nearly healed, but only to return several weeks later with discharging sinuses, and on further investigation the internal openings were found at the usual sites and were laid open with very satisfactory results.

On going into St. Mark's Hospital records over the last two years I found that complete posterior horseshoe fistulae occurred much more frequently than the anterior variety, the proportion being six to one.

It is common in old-standing cases to meet with as many as five or six external openings, which may be scattered far and wide; but the internal opening is usually single, though I have found two, one above the other, both in the anal canal (see Fig. 3). Double fistulae hardly ever occur, and where there are two openings, one on each side of the anus, the case is nearly always one of the horseshoe variety. Thus during the last two years, for example, only one such case was operated upon in the hospital.

Fig. 3.

As in the more simple, so also in the case of the horseshoe form of fistula, the internal opening is never above the anal canal. The common situation is between the two sphincters, and it seldom involves the upper or internal one; but owing to the great amount of chronic induration the position of the aperture gives one the impression that the anal canal is lengthened, and that the track cannot be laid open without damaging the whole of its musculature. This apparent lengthening of the canal is due to thickened and oedematous skin from chronic inflammation.

It must also be borne in mind that the internal openings of some fistulae, and even when extensive and with multiple external openings, may be found to be below the external sphincter, in which case the latter muscle will escape injury when the track is laid open (see Fig. 4). On laying open the external tracks sinuses may be found to run up the side of the bowel, and unless there happens to be a stricture of the rectum these are blind passages, and may be cured by free drainage from below with careful attention to the after-dressing (Fig. 5). Not infrequently tracks run up to the coccyx, and on the passage of a probe with a little force it is easy to imagine that the coccyx is the seat of disease, a mistake that may lead to its removal. Although involvement of the bone is a rare complication, the following case is an example where there was, in addition to definite destruction of the coccyx, extensive disease in the lower portions of the sacrum:

The patient, a labourer who suffered from almost continual discharge for twelve years, was admitted under the care of

Mr. Swinford Edwards. On examination the skin on both sides of the anus was extremely oedematous, and showed five external openings scattered around, in addition to multiple scars, the results of four previous operations. The anal canal showed marked stenosis, but he had good sphincter power. At the operation the subcutaneous tissue was so completely riddled

Fig. 4.

Fig. 5.

with tracks that the diseased skin had to be freely removed. The internal opening was found in the middle line posteriorly, but not without some difficulty, and a track running up to the coccyx was discovered. This was well drained after being thoroughly scraped, and the patient was sent back to bed without interference with the internal opening.

Three weeks later, as the posterior sinus was still discharging pus, a second operation was undertaken, when it was found on incising the tissues down to the coccyx that it was a mere sequestrum, which was removed along with the lower two pieces of the sacrum, as they were found to be extensively diseased.

Three weeks later the internal opening was laid open, and he made a slow but steady recovery, though, needless to say, the stay in hospital was prolonged on account of the large area that had to heal by granulation.

Fistulae, whether complete or incomplete, nearly always have their origin in abrasion of the bowel, which leads to infection of the tissues by absorption of septic matter. Complete fistulae are much more common than the internal and external varieties, which may be said to be comparatively rare, especially the latter. These (the so-called external) are nearly always cases of complete fistulae, in which the internal opening proves to be peculiarly elusive, and they resist treatment until it has been found and dealt with.

I mention in illustration three cases that were considered to be blind external fistulae, in which foreign bodies (in all small particles of fish bone) were removed under local anaesthetic from the ischio-rectal fossae. The wounds soon closed up to the original small sinuses, but made no attempt to heal, and after several weeks a probe passed into the track could easily be felt up to the mucous membrane between the two sphincter muscles. One, indeed, entered the bowel, but in the other cases when subjected to operation several weeks later the internal apertures were found quite easily, though no internal opening could be palpated with the finger at any time after removal of the foreign body. In one case the fistula had been in existence for a year. It follows, therefore, that all cases of supposed external blind fistulae that have existed for any length of time must be regarded with suspicion.

The majority of patients suffering from the most common form of internal fistulae come complaining of pain, like that of a fissure, with itching. They are invariably submucous shallow tracks (extending upwards or downwards from Morgagni's crypts) from which pus can be squeezed out, and are only, as a rule, found by careful examination of the anal canal with a speculum and a hooked probe. This is a common cause of pruritus ani, and it may be necessary to make a thorough search under a general anaesthetic with the sphincters dilated, as the openings of internal fistulae are by no means easy to find, and there are few cases of pruritus ani in which a rectal lesion cannot be found.

TREATMENT.

It is important, before operating upon any case of fistula, even the most simple, to examine the rectum for stricture or ulceration, and to inquire for a history of any present or previous urinary trouble.

In dealing with the horseshoe fistulae of long duration and multiple external openings the first step is to expose the outlying tracks, and, when these are laid bare, islets of necrotic skin are often left. These must be removed and

the edges of the wound trimmed down until fairly healthy skin remains, without any undermining of the skin edges, for if particles or tags of skin be left in chronic cases, they become undermined, and nearly always have to be removed at a later date. The area should now be scraped thoroughly with a sharp spoon, and the internal opening into the bowel located, but not divided, for where there is an extensive area of subcutaneous tissue left to granulate the operation on the internal opening is best postponed for three weeks or a month, depending upon the size of the fistula and the progress of healing, as by this means the wound is kept free from faecal discharge. After dealing with haemorrhage, the exposed tracks and entire wound should be carefully and firmly packed to prevent oozing.

When the wound is covered by clean granulating tissue and the edges show a tendency to flatten down in the formation of new epithelium, the internal opening may be laid open, and this, if previously located, can often be done successfully with a local anaesthetic.

It is surprising how much diseased skin can be removed without any difficulty arising in the process of healing, and I am sure, from what I have seen, that free removal of infected skin is the best and quickest method of getting these large and old-standing fistulae to heal.

The coccyx should never be removed unless it is extensively diseased, and in doubtful cases it is better to scrape the bone and wait, as removal means a large wound which can only granulate slowly.

Much has been written about the damaging results of injury to the sphincter muscles in operating upon fistulae. In this connexion it must be recognized that the internal is the important sphincter muscle, which will explain the fact that the external sphincter may be destroyed without any loss of control. In one case, for example, a patient admitted under the care of Mr. Gordon Watson, it was found impossible to lay open all the tracks without division of the external sphincter in three places, and yet the patient made a good recovery without any loss of control. On the other hand, an operation involving serious injury to the internal sphincter would in all probability be followed by permanent weakness.

I have had little experience in the method of treating fistulae by scraping and suturing in the manner advocated by Sir Charles Ball of Dublin, but I may say I was not impressed by the results in the few cases I have seen treated in this way.

For the dressing of fistulae I think the best material is ordinary white wool soaked in hydrarg. perchlor. 1 in 2,000, and prepared in the following manner: The wool is cut into $\frac{1}{2}$ -yard lengths, and after sterilization is soaked in a solution of perchloride of mercury for half an hour. It is then wrung out, dried, and cut into 4-in. squares and kept in sterilized glass jars ready for use, and these can easily be separated into layers and pulled into any form suitable for the track to be dressed.

Unless the wound is soiled by faecal matter, no further dressing is required during the first three days after operation, and during this period very light diet should be insisted upon. The patient should be allowed two baths a day and directed to soak the parts thoroughly in warm water, for half an hour at a time, until the process of healing is practically complete.

It is well after the first dressing to pack the tracks lightly, as pressure may interfere with healing, which, indeed, may make very slow progress at first. By the end of the second week, if the granulations are not healthy, the addition of *lotio rubra* might be of service; and in the early stages iodoform oil (grains xx to 1 oz. of olive oil) is also useful, especially for tracks leading into the bowel, as facilitating the packing, for the first few dressings in these cases are usually painful.

No bowel track can be satisfactorily dressed without a finger in the rectum, and the same method should be employed when it is found necessary to examine the wound. The probe generally employed is too thin. It should be a solid, round probe, about half the thickness of an ordinary lead pencil, for with such an instrument the dressing is more readily inserted, and there is no danger of tearing the mucous membrane.

Hydrogen peroxide is invaluable for cleaning up unhealthy granulating areas and blind pockets, which latter should on no account, as Mr. Wallis points out in his book on *The Surgery of the Rectum*, be treated by

injections of silver nitrate, as the caustic acts as an irritant to the tissue, and if the external opening should become blocked, extensive and sloughing new tracks may form.

After the healing process has advanced well beyond the stage of uncertainty the patient may be allowed up for a little while each day, but he must not be lost sight of until the fistula is quite healed.

THE SIMILARITY BETWEEN ACUTE ABDOMINAL AND ACUTE PULMONARY CONDITIONS.

WITH ILLUSTRATIVE CASES.

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ACUTE pulmonary conditions in certain stages simulate very closely indeed the signs and symptoms of acute abdominal lesions and vice versa. Nor is it generally recognized that the two are frequently combined. It is not uncommon, for instance, to find acute pneumonia combined with a pneumococcal infection of the appendix going on to suppuration. It is, perhaps, better known how frequently chest conditions supervene on acute abdominal lesions. Cases of abdominal lesions seen not quite at their inception sometimes show marked signs of bronchitis, and this bronchitis clears up when the abdominal condition is relieved. This is especially seen in children, and occurs fairly frequently in those who have some chronic obstruction of the bowels. In making a diagnosis of acute abdominal mischief, examination of the chest should never be neglected, and the converse is also true.

It is absolutely essential that any possibility of pulmonary lesions should be excluded before performing laparotomy for what is evidently an acute abdominal lesion, because laparotomy in the former condition has nearly always a fatal ending.

These points are illustrated in the following cases:

CASE I.

A boy, J. W., aged 9 years, was sent into hospital with a diagnosis of appendix abscess and with the history of having a typical attack of appendicitis. Four days before admission he had come home from school with a bad headache, which lasted till he went to bed at night; the next morning he vomited and complained of pain in the abdomen, apparently most round the umbilicus, especially on the right side. Temperature and pulse began to rise and he developed a very slight cough. These symptoms continued up to admission, his pain increasing every day.

On admission the boy complained of pain in the abdomen on the right side above the umbilicus, and said it felt worse when he coughed or breathed deeply. He was not sick, but felt thirsty. He was flushed and the face was pinched. Respiration was shallow, and, although chiefly thoracic, the upper part of his abdomen moved. He was unable to take a deep breath, but in his efforts to do so his whole abdomen moved, though with pain. The temperature was 104.4°, pulse 140, and respirations 40. The skin felt dry and pungent. The abdomen was tender, most so between the umbilicus and right costal margin. There was slight resistance in the right rectus muscle. There was no dullness of the abdomen, nor was any lump felt nor thickening round the appendix, nor was there any tenderness per rectum. There were no physical signs in the lungs. A diagnosis of diaphragmatic pneumonia was made, in spite of the history and the general signs, on the facts that the respirations were hurried and painful, his face flushed, the character of his pulse, and the pungency of the skin—a very valuable diagnostic sign of pneumonia. He was treated as a case of pneumonia. Next day the abdominal signs were less and the respiratory more marked. Physical signs were absent, except at one point in the seventh interspace, right side, mid-axillary line, where a small patch of dullness was localized, accompanied by bronchial breathing and very fine crepitations. These physical signs were more marked next day and the patch enlarged. On the eighth day of his illness the temperature fell by crisis, and he made an uninterrupted recovery.

The interesting points about this case were that his early symptoms were entirely those of acute appendicitis with absolutely no lung signs, while on admission he had signs of both, and later he had only lung signs.

CASE II.

A man, H. H., after breakfast went for a walk and suddenly felt a pain in his right side and had to go home. He had had some indigestion for a week or two and also had been troubled