the width of the intercostal spaces rather than pushing down of the whole liver. When an exploratory puncture has been made and the pus has not got the characteristic odour of an appendix abscess the suspicion that the case is one of hepatic abscess will be considerable. It is often stated that cases of hepatic abscess following appendicitis will show some amount of jaundice, or at any rate an icteric tinge in the conjunctivae. This sign, however, cannot be of great importance, as it did not exist in either of my patients.

With regard to treatment, it is important that the surgeon should be prepared to operate immediately he has discovered pus by means of an exploring needle, since there is a risk of escape of pus into the pleura or peritoneal cavity when the needle is withdrawn.

The abscess will practically always be reached by a similar incision to that employed for subphrenic abscess, namely, one over the ninth rib behind the anterior axillary line. Portions of the ninth and tenth rib are resected, and the diaphragm exposed. In some cases the pleura will be opened in this incision, and if so, its edges should be stitched to the diaphragm.

When the diaphragm is divided, the posterior surface of the liver is exposed, and the exploring needle should be inserted in the direction in which pus had previously been found. When pus is found a director is passed down by the side of the exploring needle, and the exploring needle removed. Gauze is then packed in between the liver and the diaphragm. A pair of sinus forceps are inserted along the groove of the director into the abscess cavity, and a track broken down through the liver substance by withdrawing the forceps. Along this track a large drainage tube is inserted, and the abscess sac is washed out with saline solution by means of a small catheter inserted through the drainage tube. The drainage tube is fixed to the skin, and the rest of the wound closed. There is little risk of any trouble with the pleura, but there may be more risk of infection of the subphrenic space; this occurred in my first case, and was responsible for its fatal termination. The following are the two cases which have occurred in my practice:

CASE I.

A young man, aged 25, was first seen by me on February 7th, 1903. He had had an attack of appendicitis at Christmas, 1901, but this only lasted one or two days. Another more severe attack occurred at Easter, 1902, which lasted three or four weeks, and during the attack the patient had a high temperature, vomiting, and a definite lump in the right iliac fossa. The lump, however, disappeared after rest in bed, and he remained in good health until the middle of January, 1903, when he suffered from another acute attack of appendicitis. It commenced with vomiting, and the temperature had been irregular, varying between 102° and 99°. A definite lump had been discovered a few days before I was asked to see the case, three weeks after the commencement of the attack.

On examination there was a large swelling in the right iliac fossa, which was dull on percussion. The rest of the abdomen moved well and was quite soft. On rectal examination it was found that the inflammatory mass extended towards the pelvis. On the following day the patient was anaesthetized and an incision made in the right iliac region. The abscess was opened without separating any peritoneal adhesions. It was found to extend into the pelvis; no search was made for the appendix; two drainage tubes were inserted, one upwards towards the appendix, and the other downwards into the pelvis. The temperature became normal on the day following the operation, but on the third day some faecal matter was noticed in the dressings. This, however, stopped after about a week; the tubes were removed and the discharge became trifling in amount, the temperature remaining level. Three weeks after the operation the temperature again rose. Careful examination of the wound failed to elicit any cause.

I saw him on March 4th, and again on March 10th, but could not discover any evidence of a collection of pus. The temperature remained high, the pulse rapid, and the tongue foul.

On March 15th I found that the liver dullness was slightly increased downwards, and there was some tenderness over the liver. I decided to explore the liver. An incision was made in the upper part of the linea semilunaris, and the liver exposed. There were no adhesions in the neighbourhood of the liver. On passing a trocar into the liver pus was obtained. A free opening was made into the abscess of the liver, and a drainage tube inserted. The patient progressed favourably for a week. The temperature became normal, and his general condition improved. On March 20th his temperature again rose, and on examination it was found that there was a mass in the right lumbar region, which was tender on pressure. An incision was made in the loin, and a subphrenic abscess opened and evacuated. The temperature fell after this, but the patient died a few days later from exhaustion.

In this case the original appendix abscess had formed nearly three weeks after the commencement of the attack of appendi-

ctitis. When opening the appendix abscess no adhesions were disturbed and no evidence of any septic absorption appeared until three weeks after the operation. Without any rigor the temperature suddenly rose and remained high until the abscess of the liver was discovered and opened, thirty-five days after the original operation.

The further complication of the subphrenic abscess was probably due to some escape of pus from the liver abscess, which tracked round to the posterior surface of the liver. This would probably have been avoided had a counter-opening been made into the liver after resection of a rib.

CASE II.

A boy, aged 15, was admitted into the West London Hospital on January 14th, 1910. He had been seized with acute pain in the right iliac fossa forty-eight hours previously and had vomited several times. On admission his temperature was 102°, pulse 100. The abdomen did not move on respiration, but was not distended. There was acute tenderness and rigidity of the lower half of the right rectus muscle. There was no loss of resonance in the right iliac fossa. The patient was put under an anaesthetic immediately after admission, and the abdomen opened by the gridiron incision. An abscess cavity, containing 2 or 3 oz. of pus was found between the caecum and the anterior abdominal wall. This was emptied and wiped clean.

The appendix, which was gangrenous, was removed, and a gauze plug left in the abscess sac. The patient's temperature fell to normal immediately after the operation, and remained so for three days, when the gauze plug was removed. The temperature remained up for three days, and then dropped to normal, and remained nearly normal for a week. Fourteen days after the operation the notes state: "Discharge very slight, temperature normal, progress satisfactory, wound almost healed." After this the temperature rose on several occasions to 101°. There were no signs of any bowel irritation, but some dullness was found at the base of the right lung.

On February 3rd, as the temperature was still up, and the dull area at the right base had increased, an exploring needle was introduced, and about 2 drachms of clear fluid were removed. This was examined microscopically. No pus nor micro-organisms were found; the cultures also were sterile. The chest condition remained unchanged, the temperature varied between 103° and 100°, so an exploring needle was again inserted on February 10th, and clear fluid again drawn off. This was again examined, and no micro-organisms found. On February 12th there were still signs of fluid in the right pleura, the lung was compressed, and the heart slightly displaced to the left. Whispering pectoriloquy was well heard over the dull area. The liver was slightly depressed, and extended a fingerbreadth below the ribs. The rest of the abdomen was normal. The temperature was 101°. The chest was aspirated, but only 1½ oz. of clear sterile fluid was obtained.

On February 15th it was noted that the liver extended three fingerbreadths below the costal margin. The signs at the right base were unaltered. The temperature remained 101°. The right base was again aspirated; a long needle was used, and was pushed deeply into the liver, when pus was drawn off. This pus was examined in the laboratory, and was found to be swarming with bacteria, which were mostly coliform organisms, but there were also streptococci; the former were obtained in cultures. In the pus there were also many cells of the liver parenchyma, some in columns, and others detached. The exploring needle had been inserted in the seventh interspace, so an incision was made over the eighth rib, which was resected in the mid-axillary line. The pleura was opened; it contained some clear fluid, and was shut off with sutures.

The diaphragm was divided, and the posterior surface of the liver exposed. The abscess was opened, as described above, and about 8 oz. of pus let out. A large drainage tube was inserted, and the cavity washed out in saline. The temperature fell to normal immediately after the operation, and the discharge quickly diminished in amount, the tube being removed a fortnight after the abscess had been opened.

The patient was discharged to a convalescent home five weeks after the incision of the liver abscess, all wounds healed soundly, and he is now in perfect health.

A CAUSE OF DEATH AFTER OPERATION FOR APPENDICITIS:

THE THREE LINES OF DEFENCE.

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It cannot have escaped notice that operations for appendicitis, especially when performed upon children, are far too frequently followed by a fatal ending, which sometimes occurs with startling rapidity, not necessarily in the severe and apparently more dangerous cases of general peritoneal infection, but where a localized abscess has been operated upon by a skilled surgeon, and there is no obvious reason for such an untoward result.

Unfortunately in the medical journals it is too customary to record successful cases, and for the fatal ones we must

look to the obituary columns of the daily press. Some years ago I had a very painful experience in my hospital practice, losing four or five cases of appendicitis in quick succession, in the same mysterious manner. Such an experience "gives one furiously to think," and I believe I have found out the explanation. It is in the hope that this may avert a similar experience in the practice of others that I feel obliged to call attention to these cases. The cases were all very similar, the operation was performed in the same manner, and one description will suffice.

A boy of about 9 years old was admitted to the hospital with a definite inflammatory swelling in the appendix region with all the signs of abscess formation including leucocyte count. His general condition fairly good.

Operation on the fifth day from the onset.

An incision was made in the semilunar line opening the peritoneal cavity; the inflammatory swelling around the appendix was carefully packed all round with gauze so as to shut off the peritoneal cavity. The abscess was opened by insinuating the tip of the finger between two adjacent coils.

Pus as it escaped was immediately mopped up with gauze, and when no more escaped the abscess cavity was opened up further and sponged with gauze till it was quite clean and dry. (In cases in which the appendix was easily removable, it was removed at this stage, but in most of the cases the appendix was left.)

A drainage tube was introduced into the cavity, which was also packed with gauze soaked in iodoform emulsion and squeezed fairly dry.

The ends of the wound were closed, leaving sufficient space in the centre for the gauze and tube. I hoped by operating in this manner to cut short the period of healing, and that little or no suppuration would occur.

The operation took a very short time, there was no evidence of shock, and the patient left the table in a perfectly satisfactory condition.

From six to twelve hours later an obvious change took place. He became pallid and restless, the pulse increased considerably in rate up to 140 or 160 per minute, and the temperature usually rose, with intervals of sleep alternating with restlessness. The symptoms steadily became worse, and coma was followed by death within twenty-four or at most thirty-six hours after the operation. There had been no vomiting, and no abdominal distension, the abdomen remaining flat and soft throughout. On post-mortem examination nothing was found, a little serum in the abscess cavity and on the gauze, but no pus anywhere.

The deduction which I draw from these cases is as follows:

In endeavouring to treat a disease we should first try to understand how Nature is working for the same end.

After all, Nature has had a far longer experience than any surgeon, and her methods ought not to be lightly interfered with. We may consider that when suffering from an ordinary attack of appendicitis, by which I mean an attack going on to localized abscess formation, there are *three lines of defence* by which the organism protects itself against the bacillus.

The *first line* is obvious to all—the lymph agglutination of mesentery, intestines, etc., around the appendix, which limits the abscess, and prevents infection of the general peritoneal cavity with pus. It is these adhesions which surgeons are so careful to preserve, and fearful of breaking down.

But, after all, this is only the outer rampart, and if destroyed it is not necessarily a very serious matter.

The *second line of defence* is a far more important one, and its importance is, I believe, not sufficiently recognized. I refer to the layer of lymph covering the surface of the intestine and omentum, and forming the wall of the abscess cavity. I believe this lymph acts as a filter, allowing soluble toxins to pass through into the lymphatics and blood stream of the surrounding viscera, but presenting a barrier to the passage of bacilli, like the porcelain of a Berkefeld filter.

It is this barrier which it is all-important to preserve until the third line of defence has been established.

The *third line* is in the blood itself; the passage of toxins into the circulation results in a rise of temperature, quickening of pulse, etc., and the formation of protective antibodies in the serum.

More and more toxin passes through as time goes on, and the abscess becomes larger, until in course of time, generally during the second week of an attack, the temperature may fall to normal, or nearly so, and the serum become saturated with antibodies.

By this time the patient has become protected. If the abscess is opened, foul-smelling pus flows freely over the

abdominal wound, which may afterwards be sutured for the greater part of its extent and heal by first intention, without even any sign of redness round the stitches. There is no more danger to the patient than in opening an abscess anywhere else. This seems to be the meaning of the old-fashioned idea of ripening.

But in the cases I have described—and I believe the same thing has occurred in the practice of others—time was not left for the proper development of this third line, and the second line was removed by the too vigorous sponging with gauze, and probably at the same time some infective material was rubbed into the unprotected surface of the abscess wall, as vaccine lymph is rubbed into an unprotected skin in the ordinary method of vaccination—an acute septicaemia resulted, and death was due to an invasion of blood by the bacilli.

If this theory is correct—and I can think of no other satisfactory explanation for these cases—the moral is obviously this:

1. Not to be in a hurry to operate, unless an operation can be performed within the first twenty-four hours, when the mischief is presumably confined to the appendix itself, or where general peritoneal infection is impending or has already taken place.

2. When a definite abscess has formed, wait till after the first week; when about ten days have elapsed it is probable that protection will be complete. During this period the patient should of course be kept under close observation, so that an operation can take place at any time if necessary.

3. Be contented to drain the cavity. Gentle flushing may be employed at the time of the operation if preferred, but do not do more than is necessary for this purpose.

4. Above all things, if operating early, simply evacuate the pus without touching the abscess wall, and leave the appendix to be dealt with at a later date, when all infection has subsided.

Since I have endeavoured to follow out these maxims I have had no repetition of the experience I have related.

DIRECT OESOPHAGOSCOPY.

BY

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EXAMINATION of the oesophagus by means of a straight rigid tube is regarded by some medical men in England as a barbarous and dangerous proceeding. If, on the other hand, this method of examination is at all generally used, there is a singular lack of records. This lack cannot be due to the rarity of the occasions on which oesophagoscopy may be supposed requisite, for medical literature bristles with the rare and interesting type of case.

Some are incredulous that it is mechanically possible thus to examine the oesophagus, with its difficult buccopharyngeal entrance, its natural curvatures, and its proximity to vital thoracic viscera. Such incredulity is best removed by demonstration. Nor is the professional sword-swallower yet extinct; and, in fact, there is no better way of practising oesophagoscopy than by the aid of such an artist.

Others, not incredulous for anatomical reasons, are deterred by various other considerations from admitting the utility of the oesophagoscope. Thus, the field of vision is too small and distant, the difficulty of illumination too great, the chance of fallacy too serious. Such objections are well founded.

However, the field of vision is extensive by comparison with that of the urethroscope.

As to the best method of illumination opinions vary. If the light is to be reflected down the tube the requisites are adequate brilliancy, condensation, and parallelism of rays. The inner surface of the tube should be dulled. It is a little difficult but not impossible by these means to light up an area of oesophageal wall as far down as the cardiac orifice of the stomach.

The chance of fallacious observation is certainly great, but not more so than is the examination by artificial light of any hollow structure with muscular walls, such as