A simultaneous step must be the assurance that careers will be provided for those who train themselves successfully. And careers must be assured to individual workers at the earliest possible moment. Young and competent men cannot be expected to hazard the best years of their lives in long and special training without reasonable prospect of corresponding careers before them.

There are at present a very few academic posts, the units, concerned primarily with organized teaching in the schools, appointments of uncertain development and destiny, but offering, it is true, limited possibilities of research. Sure it is that as long as these posts are concerned with the function, important as it is, of teaching general medicine, their capacity to advance medicine by research will remain limited. There are also one or two purely research posts with full facilities; but these are personal appointments, and, being such, cannot be regarded as possessing stability.

It is unreasonable to expect, it would be unwise to advocate, the sudden creation of many posts; for there are not the adequately trained men to fill them. But the vicious circle now existing, whereby there can be no posts till there are trained men, and no trained men till they can see the prospect of posts, must be broken. It can be broken by clear statements of policy that posts will be made for those who render themselves competent for such careers. The posts must be full-time posts, for full-time work can alone ensure the leisure for efficient study, and freedom from that most distracting of thoughts, the imminence of an alternative career. The workers must be secured free and full access to the material they desire to study, and full medical charge of that material; work upon patients in another's charge fails to give sufficient freedom of control and dulls the fine edge of personal responsibility. General hospitals provide the necessary wealth and diversity of material; a teaching element in general hospitals sorts the material and renders it quickly available. The presence of research departments in general teaching hospitals stimulates teaching, and links science and art. For these and other reasons these hospitals are very probably the most suited to house such departments; but if that is the decision these departments should enjoy independence of the more purely curative departments, they must in no sense be subordinated to these, as is the strong and natural present tendency. The need is for *research physicians*, and their departments should include adequate but not abundant beds, and proper laboratory facilities; there should be arrangements for exchange of patients with other departments of the same institution, ensuring by this means supply of material and relief from the care of patients no longer suited to research. Their teaching should be limited to the demonstration of new methods and observations, and to the exposition of new ideas.

The future creation of research posts requires the present promise of financial backing; their creation in teaching institutes would require the early promise of active co-operation by these institutes; the alternative is the foundation of special hospitals or institutes.

The future of medicine lies with the younger and recently qualified generation and with their successors. It is within their power to bring clinical science in this country to a great revival. It is for them to bind themselves into a new association, which by influence and by example may carry the standard of observation and thought to precisely the same level as prevails in allied sciences, and firmly to link up with these on the one hand and with practical medicine on the other. To this end existing associations of physiologists and pathologists will not suffice them. There are problems arising out of contact with patients that are of little or no interest to the associated sciences. It is necessary that clinical science should enjoy its own intimate and untrammelled discussions. It is necessary that it should constitute its own courts of inquiry, of criticism, and of approbation. It is necessary to its full development that it should have its separate scientific societies, should control its own publications, and should be able to confine its original reports to journals restricting themselves exclusively to original matter of proper quality. It should develop its own training ground for new recruits. It should achieve independence and freedom.

EIGHT HUNDRED CONSECUTIVE OPERATIONS FOR APPENDICITIS.

BY

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On returning from France in 1919 I decided to take careful note of all cases of appendicitis that I operated upon, first with a view to more firmly establishing, modifying, or altogether disestablishing the very definite ideas that I held upon the treatment of the disease; and, secondly, in the hope of being of some assistance in the diagnosis of its atypical forms; but I determined to publish no results until the number of cases exceeded 500. When this total was reached I decided to go on over a ten years period. This produced 792 cases, and another month completed the 800. The period covered is from January, 1919, to February, 1929. The total does not include the very many cases in which I have removed the appendix as an adjunct to operations upon the bile passages, stomach, or duodenum, nor those in which I have removed a diseased appendix when I came across it while I was operating in the peritoneal cavity for some other purpose. It is strictly limited to operations performed for appendicitis *per se*, or its results, and it includes all of those cases. An additional point of interest is the fact that in December, 1921, I made a radical change in my operative technique—a change suggested to me by Mr. Upcott of Hull—and its results have been so good that it is now my universal practice.

A glance at my tables will show that 462 cases (that is, 57 per cent. of the whole number) were either interval cases—that is, cases that had weathered at least one acute attack—or they were acute cases that had gone on to perforation. This is a very undesirable state of affairs, and it is especially undesirable when we consider that, apart altogether from the risks of the severe, and possibly fatal, complications that may develop during the course of palliative treatment, early operation offers the quickest and least painful method of recovery from the initial attack, with, of course, the additional advantage that this recovery is final.

In my opinion there are four principal reasons why early operation is not the universal practice.

1. The first, and, as I think, now the commonest, is the fact that patients do not summon the doctor soon enough.
2. The second is the fact that textbook descriptions are frequently misleading, in that the symptoms there described are in reality late symptoms, and consequently practitioners may be tempted to await their appearance before calling in surgical aid.
3. The third is that symptoms are frequently atypical, because the appendix is by no means always in the normal anatomical position.
4. It is extensively held, and, I regret to say, taught, that operation is unnecessary until palliative measures have failed; and that it is inadvisable after the second day of the attack.

My object is to combat these reasons. The first can only be combated by the education of the people, and more particularly by educating them to avoid aperients for abdominal pain. Abdominal pain means that some intraperitoneal structure is inflamed, distended, perforated, or obstructed, and the giving of an aperient in such circumstances is about as sensible as would be the waggling about of a septic finger. I am convinced that castor oil is responsible for more perforated appendices than is any other single thing or act. For the second reason the makers of books must be held responsible, and I hope they will mend their ways; while the third can only be combated by our own experience and acumen, and the fourth will disappear when those of us who are opposed to its teaching are able to convince its holders that better results are to be obtained by its abandonment.

Acute appendicitis is still the commonest of all acute abdominal emergencies, and while it is met with in patients of all ages, by far the greater number of cases occur between the ages of 12 and 25, and consequently the majority of patients are otherwise healthy and vigorous

young people. The attack commences suddenly, and the first symptom is pain, usually referred to the umbilicus. Shortly after the onset of the pain nausea or vomiting supervenes, to be quickly followed by tenderness over the right iliac fossa. These symptoms—pain, vomiting or nausea, local tenderness, and in that order—are the classical symptoms of appendicitis, and upon them alone one would be justified in making a diagnosis. Fever, leucocytosis, increased pulse rate, local swelling, dry furred tongue, peritonitic facies, etc., are undoubtedly symptoms of appendicitis, but they are late symptoms, which in an ideal world would never be encountered, and their presence means that someone has been responsible for inadvisable delay.

If, therefore, we see a patient who exhibits the above three symptoms—pain, vomiting, and local tenderness in the right iliac fossa (which I repeat because of the enormous importance of the sequence)—our first suspicion must be that he is suffering from appendicitis. Up to this point we are, of course, only suspicious; we must be reasonably certain before we can recommend a patient to submit to operation. The scope of this article does not permit of an exhaustive examination of the differential diagnosis of appendicitis from other diseases. It must suffice to say that before a positive diagnosis of appendicitis is made the possibilities of the case being one of pneumonia, diaphragmatic pleurisy, renal or ureteral calculus, or infection, intestinal obstruction, biliary colic, gastric or duodenal ulcer, acute pancreatitis, intussusception, tuberculosis, carcinoma, salpingitis, ruptured ectopic gestation, cyclic vomiting, pneumococcal peritonitis, Henoch's purpura, hip disease, a gastric crisis of tabes, etc., must be weighed; as also must it be decided whether the patient has a definite abdominal lesion of surgical consequence, or is merely suffering from an unimportant temporary disturbance, such as a bilious attack in a child, or a transient colic in an older patient; and the only warning that I would issue in this connexion is that it should always be remembered that a patient who has had many trivial attacks of colic or biliousness, or whatever it has been called, may on this occasion have a really important lesion.

If after a careful review of the case the diagnosis is still in doubt I advise the following course in all cases of acute abdominal emergency. Keep the patient in bed, and apply a warm fomentation over the painful and tender area. Starve him—absolutely. He must not even have a drink of water by the mouth, and, of course, he must have no opiate. The whole immediate object is to allow an inflamed structure to quieten down, extravasated products to become localized, or an obstructive viscus to become released; and this can best be done by the abolition of peristalsis. Having ordered this treatment, see the patient again in two or three hours. By this time the diagnosis will have become reasonably certain, or, if not now certain, the time has arrived for the assistance of a colleague with the case. Assuming that the diagnosis of acute appendicitis is now established, I am definitely of the opinion that, save in the circumstances mentioned below, immediate operation should be advised.

There is one great pitfall to avoid during this preliminary stage: beware of the sudden apparent improvement. Most practitioners have already had, and all in the course of time will have, experience of the following case.

He is called to see an acute abdomen, and, suspecting an attack of appendicitis, he orders palliative treatment. At a subsequent visit he is received with joyful smiles, and is told that the patient is so much better. The pain suddenly ceased, and all is well. All may be well; but, if the attack was really acute, it is more likely that a tragedy is in progress, and that the sudden relief from pain was due to the appendix rupturing, with a consequent release of the pressure upon its distended walls. Before joining in the general rejoicing the doctor should examine the patient carefully, and if he finds that the relief from pain has been followed by an increased pulse rate, a rising temperature, an increased area of local tenderness, a grey and anxious facial expression, and other signs of peritoneal infection, he can be sure that, far from all being well, all is very ill indeed, and instant operation has become imperative.

In order to get that operation carried out all our tact and firmness may have to be brought to bear, for we must remember these two things: (1) Pain is the only thing that really concerns a patient who is acutely ill. (2) It

is very difficult to persuade him that he is not better when his pain has markedly diminished in severity. Finally, we should remember that in the early stages of the attack the severity of the vomiting is usually directly proportional to the degree of distension of the appendix, and therefore the more severe the retching the more likely is the appendix to perforate early; also, we must remember that, as a general rule, those attacks which commence by waking the patient out of his sleep are going to be severe, and they brook no delay.

I have rapidly passed over the symptoms of appendicitis in its diagnosis from other conditions, first because these things are too well known to need a lengthy recapitulation here, and secondly, because I want to devote some space to the consideration of the most difficult element in differential diagnosis. This is the apparently paradoxical diagnosis of appendicitis from itself. I stated as my third reason why early operation is not universal, "the symptoms are frequently atypical, because the appendix is by no means always in the normal anatomical position." This fact presents the greatest problem in the whole question. The symptoms already described are those of an attack in the normally situated appendix. Normally the appendix is lying behind the ileo-caecal junction, with its tip directed towards the spleen. My own experience of the inflamed appendix is that it is not often in this situation, and quite possibly that is why it becomes inflamed. Where may it be?

For practical purposes of diagnosis it should be realized that the appendix may be internal to, external to, behind, or below the caecum. When it is internal to the caecum it is probably lying in the normal direction, but its tip may be in front of or behind the mesentery, and upon this distinction will the local signs vary. If it is in front of the mesentery there will be early and considerable local tenderness and rigidity, and the diagnosis should present no difficulty; but if it is behind the mesentery these local signs will be less well marked because of the intervening coils of small intestine, and the consequent freedom from irritation of the parietal peritoneum.

When the inflamed appendix is external to the caecum it may be in the iliac fossa pointing upwards, lying between the caecum and ascending colon internally and the parietal peritoneum externally. In either of these sites the parietal peritoneum will be irritated at an early stage of the attack, so that tenderness and rigidity will be well marked, and should not be mistaken.

When the appendix is behind the caecum the symptoms may be very slight, and their meaning obscure. Usually pain is less, and it may be altogether local, while tenderness over the appendix is often very slight, as very little, and sometimes no, parietal peritoneum is involved. Vomiting and nausea may be absent, as also may local rigidity. A very valuable sign which is nearly always present in these cases is the local tenderness which can be elicited by pressure in the flank below the right costal margin at the outer border of the erector spinae; though it must be remembered that this is a common situation for tenderness in the prevalent sufferer from chronic rheumatism.

When the appendix is below the caecum its distal end is frequently hanging over the brim of the true pelvis, and it is in this event that the greatest difficulty in diagnosis arises—largely because the inflamed appendix is for the time being entirely a pelvic organ. There is no local tenderness or rigidity of the anterior abdominal wall, and, furthermore, the inflamed tip may be lying upon the bladder or rectum, causing painful micturition or tenesmus; or it may, by irritation of the peritoneum over the obturator foramen, give rise to symptoms suggesting an inflammatory condition of the right hip-joint; or by attachment to the Fallopian tube make the diagnosis between appendicitis and acute salpingitis almost impossible. Before the pelvic appendix perforates epigastric pain and vomiting will be the most marked symptoms, and may lead to a suspicion of a lesion of the upper abdomen; while after perforation the true state of affairs may be in doubt until a rising tide of dullness appears above the inguinal ligament, giving us the unwelcome information that the pelvis is full of pus. It is this type of attack that so urgently calls for a rectal examination. Rectal examination should, of

course, be made in all cases of abdominal illness, but in the ordinary course of events its omission is an easily condoned sin, for there are few things that patients object to so much, and more especially do they object to such examinations in children. If, however, there is one class of case more than another in which a rectal examination is imperative it is in the case of the suspected pelvic appendix.

Finally, as to the situation of the appendix. It must be borne in mind that in a small proportion of cases the caecum has not descended into the right iliac fossa, and therefore the appendix may be found anywhere between the liver and its normal site, while in a patient with a very movable caecum it can wander into an inguinal hernia sac or other unusual situation.

Before discussing treatment I should like to say a word or two about the probable results of rupture of the appendix in these various situations. In the case of the internal or pelvic appendix they are likely to be hazardous or tragic. If the internal appendix is lying in front of the mesentery its rupture places the patient in imminent danger of extensive flooding of the coils of small intestine, and a consequent and rapid general peritonitis; therefore this type is by far the most dangerous to leave. If the appendix is behind the mesentery there is more chance of the formation of a limited, local abscess, but a very real risk of the onset of acute intestinal obstruction due to the involvement of the ileo-caecal region in the inflammatory products. Delay with the external appendix will, on the other hand, probably result in nothing more serious than a well shut off local abscess (though this is surely serious enough); while in the case of the retrocaecal appendix we have the additional risk of portal infection, subphrenic abscess, etc. Delay with the perforated pelvic appendix will certainly lead to serious trouble; at the best a local abscess or a collection of free pus in the pelvis with all the dangers of septic absorption, and a weary and prolonged convalescence, followed by the lifelong risks and discomforts incidental to a pelvis full of adhesions; at the worst a catastrophe; and it is the pelvic appendix that is most frequently overlooked, because its symptoms show the greatest departure from the usual textbook description.

TREATMENT OF ACUTE APPENDICITIS.

In considering the treatment he should recommend for acute appendicitis the uppermost thought in a doctor's mind should be that appendicitis is an acute inflammatory infection of an intraperitoneal structure that may lead to the death of his patient. The second thought should be that it is quite impossible for him, or for anyone else, to know the actual state of the particular appendix under review without seeing it. If he accepts these thoughts the only conclusion that he can come to is that immediate operation is the proper, as it is the safest, treatment.

That this view, in early stages of the attack, is becoming fairly generally recognized is a matter to be thankful for, but unfortunately it is still extensively held that immediate operation should not be advised if the patient is not seen, or the disease not recognized, until the second, or later, day of the attack. I entirely dissent from this view, and, excepting as mentioned below, I advise operation as soon as possible after diagnosis, irrespective of the stage and duration of the attack. I absolutely refuse to trust the appendix, and my experience of my own and others' work convinces me that the advocates of the alternative policy greatly exaggerate the risks of operation during the later days of an acute attack. That there were grave risks in the pre-aseptic days I readily admit, but these risks disappeared with the abandonment of the use of strong antiseptic lotions, the introduction of the practice of surgeons wearing sterile gloves and masks (by far the greatest surgical advance in my own time), the better understanding of the functions of the peritoneum, and the improved technique in the toilet of the wound. I must leave my results to prove the truth or otherwise of my contention. Most of my own acute cases were operated upon on the second or a later day. In none did I regret my decision to operate; in many of them I was supremely thankful for the views I hold.

The only occasions upon which I would advise delay, or an alternative treatment, are when:

1. The attack has practically subsided before the patient is first seen.
2. The patient is unable, because of some intercurrent disability, to stand an operation.
3. Operation is refused.

If the attack has practically subsided when the patient is first seen, and he is an otherwise healthy individual, operation may safely be deferred, but the appendix should be removed before he is allowed to get about again. In my experience an exception to this rule is justified in the case of patients past 50 years of age, for I have seen a fair number of such patients in whom the diagnosis was certain who have had no recurrence. This is not to say that operation should not be advised in patients past middle life if they are seen in an early or acute stage of the attack. On the contrary, it should be urged with more than usual force, for, if operation becomes imperative at a later stage, these middle-aged people do not stand it as well as healthy young adults do. *A fortiori*, early operation should be strongly urged in the case of children, for not only is there a tendency to rapid gangrene or abscess formation, with little attempt at localization, in these young people, but their small body weight makes them bad subjects for the resisting of an acute septic infection.

If the patient is unsuitable for operation, or if operation is refused, we must, of course, trust to palliative treatment, and I know of no better treatment than that which I have already recommended to be carried out while we are doubtful of the diagnosis at an early stage of an acute attack; but if it has to be long continued the patient must be kept going with rectal feeding, etc. If and when, in either of these classes of patients, the case is getting progressively worse, we are faced with a very difficult problem. My own opinion is that in the case of a patient who is an altogether unsuitable subject for operation we should continue to do our best by palliative measures, and that hopeless operations should not be advised. If, on the other hand, delay in operation upon an otherwise suitable patient is due to his refusal to submit, we must do our best to make him submit, and we shall not often fail.

OPERATION.

Of the operation of interval appendicectomy I have nothing to say here, for I have no knowledge that is not generally known, and no methods that are not generally practised. In acute cases my drainage procedure has been considerably modified in recent years, and now follows the lines indicated to me by Mr. Upcott of Hull. I always employ the usual oblique incision, excepting when I am in some doubt as to the appendix being the guilty organ with which I have to deal. I then use a right rectus incision. I have called my incision the usual oblique incision, instead of McBurney's, because the latter implies separation, rather than division, of the fibres of the deep muscles, and I do not always separate them. If the case is an early one and a first attack—that is, if I have reason to believe that the appendix is still freely movable and can readily be drawn out of the peritoneal cavity—I do separate the fibres of the internal oblique and transversalis; but if I am doubtful of its mobility, or there is a palpable swelling, I divide them. As a matter of fact, I have no particular preference for either method, and rarely decide which I shall employ until I am commencing the operation.

Having opened the peritoneum, one of many conditions may present itself.

1. We may open directly into a local abscess adherent to the anterior abdominal wall.

In this event the wisest course is to mop out the pus gently with gauze, insert a drainage tube, close the remainder of the wound, and apply warm moist dressings, leaving the removal of the appendix to a later date. In the cases of such local abscesses in children a single drainage tube may not be a sufficient drain, and it may be found wiser to leave the whole parietal wound open, lightly stuffing the whole abscess cavity with gauze. The same course should be adopted in local abscesses in children.

which are not adherent to the anterior abdominal wall, or, better still, the abscess, before it is opened, should be made adherent to the parietal peritoneum by means of a few sutures of fine catgut. Whatever course is adopted, it cannot be too strongly insisted upon that in all cases of appendix abscess in children in which the appendix is not removed at the primary operation efficient, and even more than sufficient, drainage must be provided.

Instead of opening directly into a local abscess we may find:

2. The appendix acutely inflamed, or gangrenous, but unperforated, and freely movable; or,
3. The appendix acutely inflamed, or gangrenous, unperforated, but densely buried in adhesions; or,
4. The appendix acutely inflamed, or gangrenous, but perforated, and freely movable, with more or less extensive suppurative peritonitis; or,
5. The appendix acutely inflamed, or gangrenous, and perforated, but shut up inside a local abscess not adherent to the anterior abdominal wall; or,
6. Generalized purulent peritonitis

In either of the second, third, fourth, or fifth event the appendix should be removed unless there is some strong reason for its being left behind. In the unfortunate event of a general suppurative peritonitis being disclosed the appendix itself has probably spent its virulence, and in view of the value of time it can well be left alone unless it presents itself in the wound; certainly no prolonged search should be made for it.

It is of the method of dealing with the parietal wound after the removal of the appendix that I wish to write in detail. In my undergraduate and house-surgeon days we were taught that anything, even sterile blood, was a dangerous foreign body in the peritoneal cavity, and, as such, must on no account be enclosed. Consequently, extensive drainage by tubes and gauze was employed in all cases where it was thought that there was any chance of the peritoneum being even locally infected, as in the case of acute unperforated appendicitis; or soiled with blood from a ruptured ectopic pregnancy. I always held, even before much effort was made to prove it, that this lack of faith in the peritoneum was unjustified, as it seemed to me highly probable that Nature would make the greatest provision for the resistance of infection in those regions where successful invasion would lead to the greatest disaster. Furthermore, it was no uncommon event in the "clean" cases of those days to find superficial suppuration in the wound without any evidence whatever of peritoneal infection; which fact, as I always maintained, was a sufficient proof that the peritoneum was by no means the least resistant structure to bacterial invasion. Still, early teaching dies hard, and I continued to drain many things, I am sure, quite unnecessarily.

For many years I have aimed at the elimination of the drainage tube from the general peritoneal cavity. It is a long time since it disappeared in cases of blood soiling, and for several years I have closed the abdomen completely in cases of perforated gastric or duodenal ulcer, pyosalpinx, etc., and with the happiest results. Until December, 1921, I still retained it in cases of suppurative appendicitis, and, although I had got down to smaller and smaller tubes, I had never had the courage to close the peritoneum completely when appendix pus had been present. Before this time I had noticed that the after-history of an appendix abscess, in which I had removed the appendix, cleansed the peritoneum, and inserted a tube, was as follows.

For the first day there was a fairly profuse discharge of blood-stained serum. The wound then remained dry until the third day, when it commenced to suppurate, and there was more or less free discharge of pus through and from around the tube. With the commencement of this suppuration there was a considerable improvement in the patient's general condition, so much so that we looked anxiously for pus to appear, and felt that at last we knew what our predecessors meant when they spoke of laudable pus. When suppuration was established the tube was removed, cleansed, and reinserted for a longer or shorter period, and we had to deal with a suppurating wound of the extent of the drain track and the infected parietal parts, which wound was healed in four weeks.

Our results were good, in that the patients recovered, and we only had a very small number of incisional hernias

to deal with later, but I felt that we had not reached finality, and that there was a pathological process at work that we were not understanding, for there should be some way of preventing this secondary suppuration in the abscess cavity.

In the light of the results of my present treatment the solution is easy, for it is beyond doubt that there had been no secondary suppuration in the abscess cavity itself, but a secondary infection of the tube track from the suppuration of the abdominal wall; that, in fact, instead of being beneficial, the insertion of the tube had been actually harmful.

For the institution of my present methods I am indebted to Mr. Upcott. In the autumn of 1921 a letter from him on the subject was published in the *British Medical Journal*, and he very kindly gave me fuller particulars of his technique, and his reasons for it. The stages are as follows; the description applying to the cases in class 5, where the appendix is perforated, and lies embedded in a local abscess not adherent to the anterior abdominal wall. Suitable modifications are made as required for cases in classes 2, 3, and 4, the essence of the method being that whenever the appendix is removed the peritoneum is closed, except in cases of general suppurative peritonitis.

1. An incision that inflicts the least amount of trauma on the abdominal wall.
2. The free peritoneal cavity is packed off with strips of gauze.
3. Adhesions are separated until the abscess is opened, when the pus is mopped up as fast as it escapes, and the abscess cavity is carefully dried.
4. The appendix is removed.
5. A fresh piece of gauze is placed in the abscess cavity, and the original packing removed. Any collection of pus in the pelvis or kidney pouch is carefully mopped up.
6. The gauze is removed from the abscess cavity, and the peritoneum completely closed with a continuous catgut suture.
7. The muscular and aponeurotic layers are closed with interrupted catgut sutures, an interval being left for the emergence of a strip of rubber half an inch wide, which is laid along the peritoneal suture line. The skin is closed with silkworm-gut, excepting for the small space left for the rubber strip.
8. A dressing wet with 5 per cent. saline, to encourage exudation, is applied. This should not be changed for two or three days.

Excepting that I have not always, nor usually, left the saline dressing unchanged for two or three days, I have carried out this technique with the most satisfactory results, immediate and remote, and on only two occasions since December, 1921, have I inserted a drainage tube into the peritoneal cavity when I have removed the appendix. These exceptions were not because of weakening faith, but because in these two cases the whole of the appendix was gangrenous and sloughing, necessitating the removal of an ellipse from the wall of the caecum, and I dared not place unlimited faith in my suture line. As a matter of fact in both cases all was well, and there was no fistula.

There is nearly always some suppuration, but it is entirely extraperitoneal, and is much more limited in amount than it was when a tube was inserted into the abscess cavity. The peritoneum has looked after itself; healing is by at least a week more rapid; and the resulting scar is more firm. Though it is not the matter of first importance when one is dealing with a life-saving operation, it is an interest and satisfaction that, so far as I know, no patient has developed a ventral hernia after this operation.

In the hope of further advance and greater safety in healing I have tried various methods of preventing this muscle suppuration. I have used bipp, spirit, eusol, etc., but I cannot say that any of them has been helpful, and I have abandoned their use almost entirely. Very occasionally I give the abscess cavity a final mop out with gauze wet with eusol, and it may, or may not, be helpful.

I have also drained the muscle layers in all acute cases in which the appendix is not perforated. In these cases the rubber strip is removed in forty-eight hours, when it has served the very useful purpose of allowing the post-operative serous exudate to escape into the dressings. A primary union has invariably resulted. I am sure that this

is a wise proceeding. Since first doing it I have had no trouble whatever with the abdominal wall, and when the sutures are removed it is impossible to recognize any evidence of the use of a drain; whereas, if the wound is completely closed at the time of the operation, there is at least some risk of suppuration among the muscles, with, possibly, serious extension.

For the employment of this method Mr. Upcott's reasoning was that serous membranes are tissues specially organized for protection against infection, and that they can be safely left to perform this function. On the other hand, muscles have specialized for the one function of movement, and fall a ready prey to microbic infection. I am fully convinced, both by theory and practice, that these views are sound. As a final proof that they are I asked Dr. Cookson, pathologist to the Sunderland Royal Infirmary, to make some observations for me. This he very kindly did.

He provided me with six culture tubes, and during an emergency operation upon a case of acute appendix abscess one of our residents inoculated these as follows. The first from the wound as soon as I had made the superficial incision. The second from beneath the external oblique muscle. The third from beneath the deep muscles. The fourth from the peritoneal cavity before the abscess was opened. The fifth from the abscess cavity. The sixth from the muscles after the peritoneum was closed. Dr. Cookson reported that numbers one, two, three, and four were sterile; numbers five and six were infected. Number five would necessarily be so, and although the fact of number six being infected completely confirmed the above views, it was somewhat surprising, for I had endeavoured to protect the muscles very carefully during operation. It was certainly instructive.

The following are the analyses of my cases.

TABLE I.—*Acute Cases in which the Appendix was Removed at the Primary Operation.*

Situation of the Appendix.	Appendix was not Perforated, and not Adherent.	Appendix was not Perforated, but was Adherent.	Appendix was Perforated, but was not Adherent.	Appendix was Perforated in a Local Abscess.	Died.	Total.
Internal to caecum and in front of ileum	69	28	2	11	0	110
Internal to caecum and behind ileum	18	8	5	17	1	49
External to caecum...	25	12	8	24	0	69
Retrocaecal ...	46	25	11	42	0	134
Towards pelvic brim ...	45	12	17	6	0	80
In true pelvis ...	23	16	13	15	3	67
Totals ...	266	111	53	115	4	549

TABLE II.—*Acute Cases in which the Appendix was not Removed at the Primary Operation.*

	Recovered.	Died.	Total.
Circumscribed local abscess ...	26	1	27
Diffuse general suppurative peritonitis ...	7	6	13
Totals ...	33	7	40

TABLE III.—*Interval and Subacute (Resolving) Cases.*

Situation of the Appendix.	Not Adherent.	Adherent.	Died.	Total.
Internal to caecum and in front of ileum	43	36	0	83
Internal to caecum and behind ileum	7	18	0	25
External to caecum ...	5	18	0	23
Retrocaecal ...	7	47	0	54
Towards pelvic brim ...	30	14	0	44
In true pelvis ...	4	16	0	20
Totals ...	102	149	0	251

In the interval cases and subacute cases there were no deaths, and if we confine the death rate to the acute cases it is exactly 2 per cent. If, however, we eliminate the cases of diffuse suppurative peritonitis we have a death rate of 0 per cent. for interval and subacute cases; of 0.93 per cent. for the whole of the acute cases; and of 0.64 per cent. for all cases.

By general peritonitis in the above list is meant diffuse suppurative peritonitis, in which the peritoneal cavity contained pints of pus, in which the appendix was neither seen nor searched for, and in which the only operative procedure was the introduction of drainage tubes. Each of these patients had been ill for more than a week before admission, and in only one was the appendix ever seen at all, and that was post mortem; but the history of the cases left no doubt in my mind that the appendix was the cause of the peritonitis. Naturally, in such cases, there was a very high mortality, and I was very thankful that seven out of thirteen cases recovered.

It is obvious that lesser degrees of suppurative peritonitis were present in all the cases where the appendix was perforated and free—that is, fifty-three cases—and the amount of free pus varied from a few drachms to two pints. These cases accounted for two further deaths, in both cases the appendix being pelvic, while a perforated appendix in a local pelvic abscess accounted for a third. Another death resulted from acute obstruction which came on five days after the removal of an acutely inflamed appendix adherent behind the lower end of the ileum, while the remaining death occurred in a healthy woman, 30 years of age, who had been admitted to hospital with a large local abscess, adherent to the anterior abdominal wall. She had been ill for ten days before admission, and I simply incised the abscess and inserted a drain. A week later, during a satisfactory progress, she died suddenly from a pulmonary embolus.

Of the acute non-perforated appendices the degree of inflammation varied from acute catarrhal inflammation to complete gangrene. As the essential point is that they were not perforated no useful purpose would be served by further particularization.

Of the perforated appendices, 53—as already noted—were free, and 142 were in local abscesses of greater or lesser extent. Of these 142 cases, the appendix was removed at the primary operation in 115, whilst simple drainage was employed in 27. A subsequent appendicectomy was performed in 18 of the latter. In 7 cases the caecum was undescended, and in 2 of these the greatest difficulty was experienced in removal of the gangrenous appendix tucked up between the liver and the ribs.

I have limited my analysis to cases actually operated upon by me, and to all of those cases. Many others have been operated upon from my wards by my colleague Mr. G. S. Robinson, on similar lines, and with equally good results, and I am definitely and finally of the opinion that, once the appendix is removed, an intraperitoneal drain is entirely useless and unnecessary, and it may be harmful.

While I shall not be content to admit that the treatment of appendicitis is completely satisfactory until such time as the recovery rate is 100 per cent., I think I can fairly claim that the above results show a definitely favourable advance upon the generally accepted mortality rate; and that they justify my advocacy of immediate operation in all acute cases—with the aforementioned exceptions—and my faith in the peritoneum. It only remains for me to express my sense of the greatest indebtedness to those who have assisted me in attaining these results, and more particularly to my house-surgeons, and to the theatre and ward nursing staffs.

Since February, 1929, I have operated upon a further 112 cases, of which 70 were acute, and 42 were resolving, or interval. They are not analysed in detail, and would not have been noted at all but for the unfortunate fact that there were five deaths among them. The ages of the patients who died were respectively 53, 59, 15, 56, and 58, and all were gravely ill on admission. Adding these cases to the 800 detailed above we get a total of 912 cases, of all degrees of severity, with 16 deaths—a mortality rate for the whole number of 1.75 per cent.