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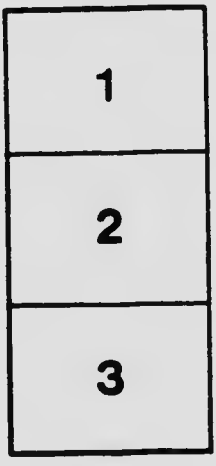

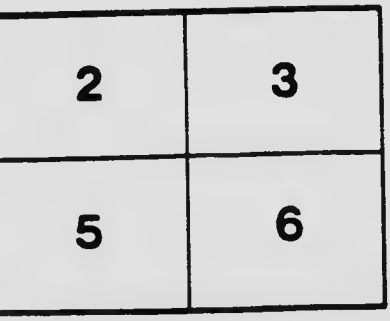

R. W. Todd.

APPENDICITIS

A PLEA FOR IMMEDIATE OPERATION

APPENDICITIS:

A PLEA FOR IMMEDIATE OPERATION.

BY

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24, Upper Berkeley Street,
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To Sir Frederick Treves, Bart., G.C.V.O.,
Consulting Surgeon to the London Hospital.

My dear Treves,

Appreciating as I do the excellence of the pioneer work which you have done in connection with the Surgery of the Appendix, I should be glad if you would let me dedicate this little book to you.

Faithfully yours,

Edmund Owen.

PREFACE

On February 10th of last year (1913) I read a Paper at the Medical Society of London in which a strong plea was set up for immediate operation in appendicitis. A full debate ensued, in which all the speakers shared that view.

The discussion was further continued in the medical journals, and with but slight disagreement. One writer asked what was meant by *immediate* operation. To this the reply is that it means that operation ought to be urged as soon as it is well-nigh certain that the appendix is inflamed—that there should be no speaking with the enemy in the gate.

Another wrote that it ought not to be thought that in thus setting forth the advantage of the early operation I was saying anything new. The reply to this is that such an idea certainly never passed through my mind, and I would be sorry if anything in the Paper, or in this little book, seemed to suggest it. I said nothing new: nothing which has not been said over and over again by many other surgeons.

My reason for writing the Paper was that I thought the time had arrived when a gathering of physicians, surgeons, and general practitioners in this country might well be arranged, in which a sort of *credo* could be agreed on, with regard to the greatest safety in the greatest number of cases of appendicitis being in very

early operation. And, judging from letters which have since been sent me, this general expression of opinion has already had the direct effect of clearing away doubt and delay, and bringing in a happier state of affairs in several instances.

But even yet, professional opinion is not solid on the advisability of early operation in appendicitis, so that some more hammering at the subject may be useful.

Many times in the course of this Essay some such statement as this occurs—that if only the case were diagnosed early and quickly operated upon, disaster would have been avoided, time saved, or immediate success secured. My object has been to help in making the early operation the routine treatment of appendicitis, and my desire has been to lose no opportunity of pointing the moral.

From every aspect, it seems to me, it is best to operate immediately the disease is diagnosed, and it is in the hope of rendering this opinion more widely acceptable that I have written this monograph.

I do not claim to have written a complete Essay on appendicitis. On the contrary, I have desired to treat the interesting and important subject from one point of view only, and to insist once more that safety in the treatment of appendicitis can be obtained only by early recognition of the disease and by prompt operation.

E. O.

CONTENTS

APPENDICITIS.

CHAPTER I.

STRUCTURE AND FUNCTION OF THE APPENDIX.

Structure.—The appendix comes off from the inner side of the cæcum rather far back, and is, therefore, generally found behind the large intestine, either straight or curled up. Its narrow canal opens into the bowel under a valve-like fold of mucous membrane.

The appendix is the rudimentary representative of the long cæcum found in mammals. Sometimes as it springs from the cæcum it is almost as large as the ileum itself, but it gradually tapers off towards the end. Largeness of the appendix suggests reversion to the original type. Further, there is a form of appendix in which the opening into the cæcum is so wide as to render the base of the appendix funnel-shaped, the rest being of ordinary size, and in these circumstances fæcal matter is certain to find its way freely into the interior. This is the fœtal variety of appendix, and as unfortunately there is no efficient arrangement for its clearing itself of its contents, the fluid part of them is likely to be absorbed, the solid part being left to form a date-stone-like concretion, over which ulceration is very apt to take place.

The normal length of the appendix is about three inches. A long appendix is, of course, more likely to give trouble than a short one, in that it offers greater chances for kinks and twists, for concretions and obliterations.

The longest appendix that I have removed was between 7½ and 8 in. There was not much wrong with it pathologically, but its removal gave great relief to the patient—a lady below middle height. It is easy to understand that a vermiform process such as this, hanging loose amongst the abdominal and pelvic viscera, would be quite likely to cause irritation; and if, by chance, the tip became inflamed and formed vesical or other attachments, the risk of its snaring a loop of intestine would be considerable. The smallest that I have seen was in an adult; it measured about three-quarters of an inch in length. Its small size may have been due to atrophy after a quiet attack of inflammation.

An appendix which has found its way into the sac of an inguinal or a femoral hernia may become the seat of strangulation or of inflammation, but it is unlikely that the exact anatomical condition would be made out before the operation for a supposed strangulated hernia was performed.

As a rule, the appendix has a complete investment of peritoneum, a small fold of which constitutes its mesentery, as shown on *page 72*.

Beneath the serous coat are longitudinal and circular muscular fibres, corresponding with those of the large intestine. Indeed, the longitudinal bands of muscular fibre of the colon run down into the

appendix, and the surgeon takes them—especially the anterior band—as his chief guide in searching for the appendix.

The interior of the appendix is lined with mucous membrane continuous with that of the large intestine. It consists of tubular glands and of lymphoid tissue similar to that which abounds in the tonsil. And in connection with this statement, it may be remarked that in certain cases of septic tonsillitis, a similar condition also exists in the appendix, and is urgently demanding the operation of appendicectomy (*p.* 37).

The blood-supply of the appendix is from a branch of the ileo-cæcal artery. In the absence of inflammation this vessel is quite small, but it may become of considerable size when the appendix is inflamed, and its ramifications may then be seen as a conspicuous network upon the surface. In amputation of the appendix it is advisable to place a ligature around its base, so that this artery may be secured against hæmorrhage (*p.* 137).

The nerves of the appendix are derived from the sympathetic plexus in front of the abdominal aorta, and into this plexus run branches of the splanchnics, the pneumogastrics, and also, indirectly, of the spinal nerves. These various filaments join in an entanglement from which the finest instruments of the most skilled dissector are unable to unravel them, and each abdominal viscus takes supplies from it according to its needs.

With an innervation-scheme in which medullated and sympathetic filaments are thrown with ganglia into a central pool, from which each viscus helps

itself, as it were, it can hardly be a matter of surprise if the result does not always work out quite satisfactorily in a clinical sense. Of course, such an arrangement of nerve-tissue could not possibly suffice for supplying motor influences to the voluntary muscles of the body, which have to contract with energy and precision, nor would it serve for the prompt and precise conveyance of sensory stimuli to the brain, but for quiet-going viscera in smooth working order the scheme answers perfectly. But when disturbance arises in the affairs of any individual viscus, confusion is liable to occur, and errors of diagnosis and treatment are apt to ensue in consequence, as will be further discussed in Chapter VI.

Nausea and vomiting are the earliest signs of serious disturbance affecting any viscus which takes its nerves from this plexus. Thus, they are associated with inflammation of the stomach or the liver, with an inflamed or a movable kidney (*p.* 65), with strangulation of an omental hernia, and with inflammation of ovary · of appendix.

The explanation of this constant association of vomiting with abdominal lesions is an interesting subject for speculation—Is the vomiting due to disturbance of the pneumogastric filaments; of the sympathetic filaments; or of both? A blow over the solar plexus gives rise to the same symptom, as may also a squeeze of the testis, the nerve-supply of which is practically the same as that of the appendix. But the statement of this fact does not help in the solution of the problem.

Jackson's membrane may best be described in con-

nection with the normal anatomy of the appendix; and though it may possibly be going too far to say that its association with the symptoms of appendicitis is always accidental, it may, at any rate, be safely affirmed that it is not of inflammatory origin, and that it may persist in a marked degree without giving rise to any symptoms whatever.

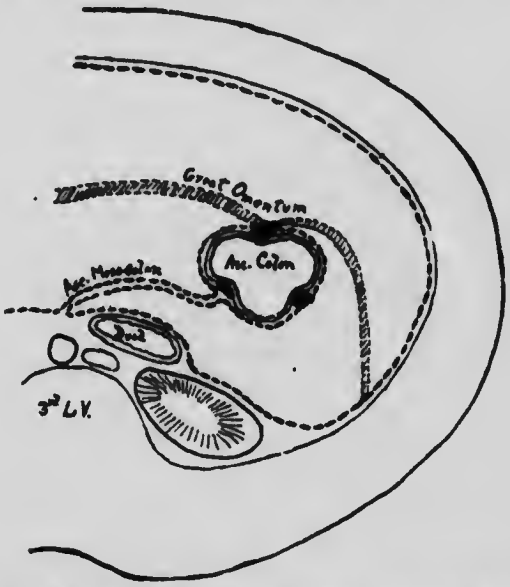

Fig. 1.—Transverse section of abdomen, crossing ascending colon, showing first stage of fixation of ascending colon. Persistence of this stage gives rise to Jackson's Membrane. (From Mr. Morley's paper).

Jackson's membrane is also called *pericolic*, which suggests that it is wrapped around the colon. This is not the case, however, for reaching the front of the ascending colon from the border of the great omentum, it is at once reflected thence to the serous lining of the right flank. It is distinct from, and altogether

independent of, the peritoneal coat of the cæcum and ascending colon, though it may give it a reinforcement upon the front and outer aspect. That

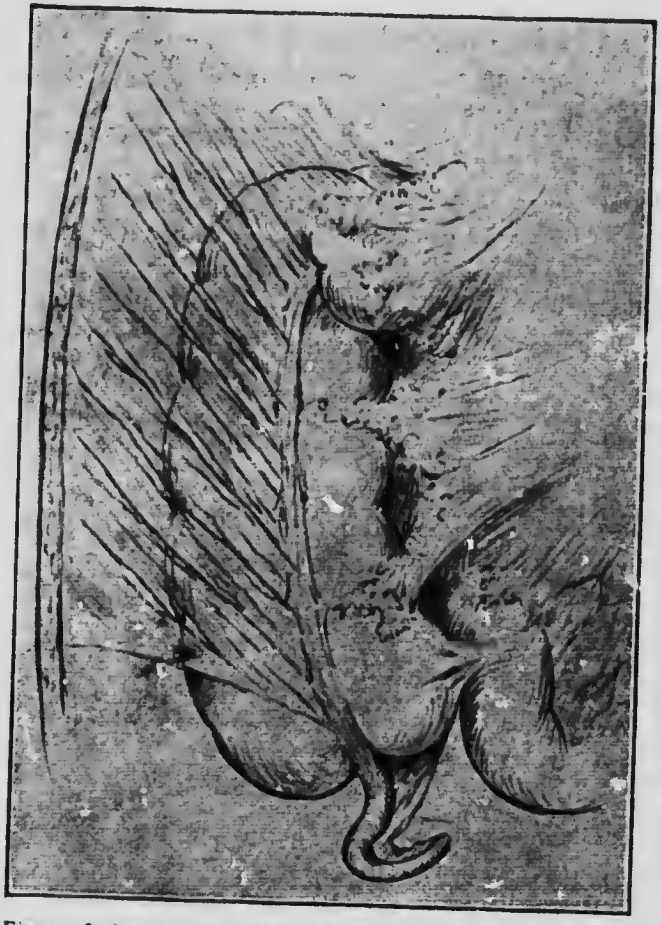

Fig. 2.—Jackson's Pericolic Membrane. (From Mr. Morley's paper).

it is not of inflammatory origin is evident from the fact that, as Mr. John Morley points out,* it is some-

* *Lancet*, Dec. 13, 1913, p. 1685.

times found in the fœtus and also in infancy, as well as in adults whose only abdominal trouble may have been nothing worse than habitual constipation. It is apt to be associated with a persistent ascending mesocolon and a movable cæcum.

The fact also of the membrane, when present, being always of the same filmy nature, of its always possessing the same general arrangement, and of its containing a regular supply of blood-vessels, suffices to differentiate it from the indefinite, dense, and tough tissues of inflammatory origin. Though without much doubt this membrane has had an unromantic and obscure existence in a certain proportion of individuals ever since man became an erect animal, it has in recent times attracted a considerable amount of surgical attention. (" Colitis " and " Movable Cæcum," *pp.* 65 and 75.)

Function.—As regards the function of the appendix, nothing is certainly known. It is doubtful, indeed, if it has a function. Some people hold the opinion that its office is to pour out a secretion into the large intestine which is in some way helpful, or even necessary. But the physiological chemists have hitherto failed to discover in the secretion any material of special importance or interest, and, seeing how much more comfortable many people are after the appendix has been removed than they were before, one is not inclined to regard its secretion as of any value.

The appendix is the tailing off of the cæcum, and in the human subject it is but a shadow of what it is in certain of the lower animals; but being continuous

with the cæcum anatomically and developmentally, its walls have a similar structure. This is only what one would expect. Compared with the cæcum, however, its size is insignificant, and its mucous lining, though of a definite type, is of very small area.

One would be inclined to think that if its secretion were of importance, the appendix would have retained a more respectable size. And, after all, the chief element of its mucous membrane is lymphoid (tonsillar) material rather than secretory, tubular glands.

In the human subject, the coccyx, being no longer needed for support in climbing or hanging, is tucked away in anatomical obscurity, and it is much the same thing, I take it, with the appendix.

If the human appendix is of real value it is, to say the least, remarkable that amongst the thousands of people, young and old, who are now going about without one, none gives evidence or suggestion or hint of his being the worse for the loss of it. On the contrary, they all express themselves as being much better since its removal.

Darwin writes ("Descent of Man," *chap.* i.), "That this appendage is a rudiment, we may infer from its small size. . . . It is occasionally quite absent, or again is largely developed. The passage is sometimes completely closed for half or two-thirds of its length. . . . Not only is it useless, but it is sometimes the cause of death, of which fact I have lately heard two instances."

If the illustrious naturalist were alive at the present day, he would probably have expressed himself more strongly in connection with the fatal associations of the appendix.

CHAPTER II.

GENERAL REMARKS.

THERE can be no doubt that cases of appendicitis are being met with with increasing frequency. On all sides one hears of this disease—in the profession and out of it; in the circle of one's friends and acquaintances; in the first column of the *Times* and in obituary notices. And it often happens that in the first column the reference is worded somewhat thus—"of appendicitis, after operation," as if the sorrowing friends were not quite sure whether the death ought to be ascribed to the disease or the treatment. Indeed, I have seen the notice running thus, "the result of ar. operation for appendicitis," which almost suggests a feeling of vindictiveness in the sorrowing friends of the deceased against the medical attendants, and of the existence in their minds of the belief that if only he had been left alone he would not have died. On the other hand, it is quite likely that the relations stood effectively in the way of the medical attendants when they first proposed the treatment by which alone the life might have been saved.

I confess that I have been professionally associated with a share of these cases, and I know that the wording of some of the notices is, to say the least,

misleading. In most of them it might more truthfully have been put somewhat thus—" of appendicitis, after a belated operation," or " of appendicitis, after operation, which the surgeon was not allowed to perform until it was too late," or " of appendicitis, after operation, the services of a surgeon not having been called in until 'medical' treatment had been found unavailing." Perhaps the simplest form is the best, however; and I feel sure that if the publisher of the *Times* could give instructions that the word " belated " should in all these announcements precede the word " operation," it would be not only in the cause of truth but also in the interest of future sufferers.

In the public mind the three words " appendicitis," " operation," and " death " are unhappily thus connected. If the surgical treatment could always be quick there would be little chance for death. At any rate, this unhappy association of ideas cannot be laid at the door of the surgeon. If he had his way—if the physician would always say, " This case of localized septic disease, or mortification, or abscess, or whatever it is, is not a case for me, it is a purely surgical question "—there would be much less loss of precious time and much less of life.

And if matrons in charge of children at schools, and if parents, could be made to understand that severe " stomach-ache " in a child is not a case for treatment by " first aid," but that a practitioner should at once be called in, things would go more happily. The case may be urgent—much more so than it may seem to be—and professional aid should always be quickly sought for it.

An acute abdominal affection ought not to be considered as a medical case. I remember some years ago, a physician to a children's hospital writing upon the subject of intussusception, and speaking slightingly of what he called the *apotheosis* of surgical measures in the treatment of that disease. But if every child with intussusception were submitted to operation as soon as the diagnosis was made, much of the terror of this disease would be removed. Surely it is safer to deal with an intussusception directly and gently with a surgical finger and thumb, than to try and unravel the intestinal sheathing by forcible and blind distention of the large intestine.

I drag in this subject of intussusception only to strengthen the claim that true progress in acute abdominal disease is in the line of quick surgical assistance. Acute disease of the appendix is no more a " physician's case " than is one of septic gangrene of the foot, whitlow, or strangulated hernia, to each of which diseases, by-the-by, appendicitis has considerable pathological resemblance.

Figures show that appendicitis is rather more common in males than females. It is no respecter of persons : rich and poor, young and old, are attacked by it. But it is particularly apt to be met with in athletic young men who are, apparently, in vigorous health.

Appendicitis may exist even in young infants, in whom it runs an exceedingly rapid course ; and the probability is that before the diagnosis is made with certainty, the infant is alarmingly ill. The outlook in infancy, therefore, is highly unfavourable, and the

only chance is in early recognition and prompt operation.

It is quite a common experience of those who are in the habit of operating upon cases of appendicitis to find the disease much further advanced than the symptoms suggested. In fact, one can no more be sure of the exact state of affairs in an inflamed appendix than one can be of the course which the disease is going to run.

If a surgeon sees a patient with appendicitis within a few hours of the occurrence of the first symptoms, he must not even then imagine that he may regard it as safe and certain as an "interval" case, and confidently promise a successful result of the operation in the belief that it will be an aseptic one (*p.* 85). For there is always the possibility that the disease began many hours before symptoms were manifested; and operating at this early period he may be greatly surprised to find the disease quite far advanced. But in these circumstances the early operation has obviously given the patient the best chance.

The suddenness with which grave symptoms may come on—perhaps after a meal—takes the patient and his friends by surprise, and in searching for a likely cause of the distress, the possibility of the case being one of "ptomaine poisoning" may likely be suggested. It is a comprehensive and mysterious sort of term, and probably for this very reason it may be found acceptable to the lay mind. But the medical man will be shy of adopting such an explanation, even though severe "stomach-ache" and vomiting are the only prominent signs.

It may be that during an attack of vomiting, or whilst the patient is raising himself in bed, or even at a moment when he is sitting propped up, or lying quietly in bed, the dull pain which has been annoying him gives place to one of great intensity somewhere in the region of the umbilicus.

A sudden, acute pain in the course of an appendicitis, and especially in those cases which have been going on quietly, and apparently on the way to clearing up, is a strong suggestion that a perforation has taken place, and it is a further indication that operation must at once be performed. No other explanation for the occurrence of such pain need be sought: something has undoubtedly given way. Sometimes the acute attack is followed by a feeling of relief, and by a dropping of the pulse-rate and the temperature (*p.* 55). But at other times it is associated with the signs of profound shock, with a rigor, with profuse perspiration, and with a rapid fall in the temperature (*p.* 56).

The exact pathological condition of the appendix bears no constant relationship to the length of time that the symptoms of the disease have existed. The medical man, therefore, ought never to say to himself, "There is no immediate hurry in this case; the time has been so short that there cannot be much wrong at present." In hurricane cases, the fatal issue may be determined in the course of a few hours.

The presence of a "lump" in the iliac fossa in appendicitis is probably a good sign, in that it may mean that adhesions have formed and have set a

boundary to the disease. Where inflammation is diffuse and of an aplastic nature, there will be no local swelling, and the outlook will in consequence be less favourable.

As remarked on page 101, if a case is unmistakably one of acute appendicitis for which operation is being urged, it by no means follows that it will end fatally if the patient declines to be operated on, and the medical attendant would be unwise to insist that there could be but one alternative to operation. There is, however, an enormous risk, which only the doctor is able duly to appreciate, and this it is his duty clearly to explain, but he should not go beyond this.

Nature has various ways of her own of satisfactorily dealing with a case of acute appendicitis, and one has often seen a gradual subsidence of an iliac swelling under the influence of fomentations, even in cases in which extensive suppuration threatened. The fomentation, which is always comforting, induces a greater flow of blood through the part, so that an ever-increasing army of leucocytes is brought through the inflamed area to wage war against the bacilli of the septic disease.

In other cases, Nature successfully discharges the abscess through the abdominal wall or into some hollow viscus, such as the large intestine, the bladder, or the vagina. A medical friend of mine had some years ago, as he told me, an abscess in the right iliac fossa which was not operated on. At last, to his relief, it discharged itself by the bowel, and he had the satisfaction of learning that a mortified vermiform

process had been recognized in the discharge. Nature, however, is not always so fortunate in her treatment, and she ought in no case to be left without efficient and timely help.

The opinion has not been hurriedly formed either in this country or in America that the greatest safety in appendicitis is in the early operation. Certainly I did not start with that opinion, but I have been steadily driven to it. I have seen a fair share of appendicitis, and my deliberate opinion is that if the view were generally accepted that safety lay in prompt operation, the present high death-rate in the disease would be greatly lowered.

At various times in our professional life we have to study our bearings, take soundings, and re-shape our course. How greatly thus, has our treatment of cancer of the breast, for instance, improved in recent years; for even if there is a slight margin of doubt in that diagnosis we now urge immediate examination or complete operation. There is not any longer a waiting for the appearance of signs which shall render the diagnosis so clear that there is no chance of mistaking a chronic inflammatory thickening for a malignant infiltration; the patient and not the tumour is now given the benefit of the doubt, and the improvement in our results has, in consequence, been most remarkable and gratifying.

And though I do not for a moment suggest that there is any clinical association between appendicitis and strangulated hernia, I would like to say that in no respect has improvement in surgical treatment in the last quarter of a century been more marked

than in that of strangulated hernia. Taxis and the hot bath happily have become things of the past. The general practitioner sends his patient into the hospital without hesitation or delay, or calls in the surgeon for immediate operation; and instead of there being now a high death-rate from strangulated hernia, statistics show a most remarkable diminution. And what, in my opinion, is wanted at the present time, is a similar waking up of the professional opinion with regard to the treatment of appendicitis.

We have heard of the sailor who, when his ship was in action, saw an unexploded shell, with a time-fuse attached, land upon the deck. He did not wait to see the development of events, but, taking the shell up in his arms, dropped it over the ship's side out of harm's way. An inflamed appendix is a shell with a lighted time-fuse, and though in any case it may happily fail to explode, it is far safer to lift it out at once and drop it overboard.

If, in the course of performing some other operation upon the abdomen, such as ovariotomy, for instance, the surgeon finds evidence of disease in the appendix, it is better that he should remove it. But if he finds it of normal appearance, he should not interfere with it. To remove it, indeed, in such circumstances would be meddlesome, to say the least.

CHAPTER III.

PATHOLOGY.

APPENDICITIS is not a new disease, though the name is new. Years ago, in the post-mortem room one used to meet with cases from time to time. They came chiefly from the medical wards, and were written down as *suppurative peritonitis*; but it was not realized that the trouble had begun in the appendix.

When the pathologist opened the abdomen he found the distended and injected intestines matted together and bathed in pus—the worst of the trouble being probably in the cæcal region. It may have been noticed that the appendix was mortified or perforated, but, if so, this was considered as part of the general disease. And if the pathologist was not satisfied with the term *suppurative peritonitis*, he had no fault to find with the word *perityphlitis*.

And as I look back through years of surgical practice, I see in my mind's eye various cases of acute and chronic abdominal trouble which I now feel sure must have been due to disease of the appendix. These might have been saved endless distress—to say the least—if only their correct pathology had been recognized, and they had been submitted to operation.

But it is not improbable that if Lister had not rendered the opening of the abdomen a safe operation, the pathological importance of the appendix, and the exact part which it played in acute abdominal disease, might even now have been misunderstood or have remained hidden in mystery. It is greatly due to Lister's work that we now know all about the troubles of the appendix, from the mild catarrhal attack to the acute inflammation which may bring disaster or death, not only to children who are obviously unfitted to carry on a successful struggle against virulent infection, but also to those who, in the very prime of life and youthful vigour, suddenly fall victims to it. Indeed, the young athlete seems above all people liable to the disease, and his strength is of no avail against the acute bacillary attack.

It was Lister's work, I say, which emboldened the surgeon to open the abdomen in these patients and enabled him to see the appendix in the various stages of inflammatory disease. And no one took greater advantage of this privilege than did Frederick Treves.

Mr. Henry Hancock (1848) was one of the first surgeons to record a case of disease of the appendix. A lady had an intensely painful swelling in the right inguinal region. The abdomen was tympanitic and tender. "As she was evidently sinking," wrote Hancock, "I proposed to make an incision." This he did, evacuating a foul abscess, and discovering in the pus a fæcal concretion.

He said that the treatment which he pursued was new; that he was cognizant of no record of a case

in which the abdomen had been opened for abscess where there had been neither redness nor fluctuation; and he expressed the hope that the time would come when his plan would be successfully employed in other cases of peritonitis—a hope that in later years has been fully realized.

He ends his short paper with this valuable piece of advice: "We should no longer be justified in leaving the patient to his fate, but, by performing the operation, we should endeavour to rescue him from certain death."

But unhappily, the seed which Hancock sowed fell upon such stony ground that it brought forth no fruit.

In looking up old reports of cases of appendicitis, reference should be specially made to the work of Dr. Bontecou, of Troy, in the State of New York, who, forty-one years ago, was consulted by a man, in whom he found, to use his own words, "evidences of inflammation of the appendix vermiformis." He opened the abdomen and let out three ounces of pus; but, unfortunately, it did not occur to him that he ought also to remove the appendix, which, post mortem, he found to be perforated by an ulcer.

That same week he saw a woman with like symptoms. He incised the abscess, and she recovered. A third case was also successfully operated on.

In his commentary he said that he had made post-mortem examinations of about twenty cases of this disease, and had seen other fatal cases which were undoubtedly peritonitis due to perforation of the appendix.

About fifteen years earlier " a distinguished physician " of Troy had become the subject of this malady, from which he recovered without abscess. But he begged Bontecou, should he ever again have a similar attack with indication of perforation, to cut down to the abscess before it could have time to break into the general peritoneal cavity.

It is always interesting to hear of the course o the illness of any " distinguished physician," and to learn his views on his own case. This physician was certainly in advance of his time. Many physicians since then have been quite content to regard an inflamed appendix as something to be treated by drugs.

Dr. Bontecou said that, soon after this, Willard Parker, of New York, carried out the radical treatment in several cases. But they occurred many years after Hancock had published his important paper.

In the study of old reports it comes out as clear as daylight that the appendix was, years ago, as now, very liable to an inflammation which might entail a grave local peritonitis ; and that the best thing to do was to make an early incision into the suppurating area, so that the risk of the occurrence of general peritonitis might be diminished to the utmost.

The earlier *Transactions* of our Pathological Society contain many references to the subject of disease of the appendix. Apparently the custom at that society was to bring to the meeting a sloughing mass of abdominal viscera with the peccant appendix adhering to them. In later years, however, only

amputated appendices were exhibited, the convalescent patients themselves being on show elsewhere. This was evidence of remarkable surgical progress.

In 1870 the second edition of Holmes's "System of Surgery" was published—the standard work of the time. The article on "Disease of the Intestines" was written by the late Mr. George Pollock, a practitioner of wide experience, a surgeon of great skill. He is talking of fæcal abscesses, and he remarks that their most frequent seat is the region of the ileo-cæcal valve. On reading his account of the disease it is clear that he was quite familiar with the localized or general peritoneal suppuration which is associated with an inflamed appendix, just as we meet with it to-day. The only thing is that he did not realize that the disease of the appendix was the sole cause of the trouble; otherwise he must have opened the abscess, removed the appendix, cleaned up and drained the suppurating area, and sent the patient back to bed with a fair chance of making a complete recovery.

"Sometimes," he says, "the formation of pus is so rapid, and the mischief in the peritoneal cavity is so general, that the patient dies within a few days of the first symptoms of pain. Mr. Blank, late House Surgeon of St. George's Hospital, while walking in Hyde Park, was suddenly seized with excruciating pain about the right iliac fossa. Though but a very short distance from his lodgings, he was obliged to be carried home. When seen by the author in the evening, there was intense pain in the right iliac region, with a certain amount of fullness, and great

tenderness on pressure. The skin was hot, the pulse rapid, and there was a great anxiety of countenance. The symptoms were in no way relieved by the treatment prescribed. The case proved fatal in a few days. On examination after death, a large abscess was found to occupy the right iliac fossa; the boundaries were formed by adhesions of the intestines and the parietal peritoneum. The contents were pus and fæces. The appendix was found ulcerated through at its extremity."

This is as clear a description of appendicular inflammation with suppurative peritonitis as one could write at the present day. It is also interesting because, though the abscess was "walled in" (*p.* 28), the patient died—probably of blood-poisoning.

The fact of there being such an abundance of theories as to the reason of the disease being so widely spread at the present time, almost suggests that the actual cause has not yet been certainly determined. The explanation must be sought in some condition which affects equally the rich and the poor, the old and the young. It can scarcely lie in the nature of the food, or in the way in which it has been preserved or cooked; it must be sought in some condition by which all people are influenced.

If some particular germ were constantly found in the inflamed appendix, which, when cultivated in the laboratory and injected into one of the lower animals, set up a like infection, there might be little difficulty in tracing the germ to its origin, and possibly in preparing a curative serum from it. But there is

apparently no specific germ of the disease, the germs present in the inflamed tissues being the common bacilli of the colon and the usual micrococci of suppuration.

Then, if there is no specific germ of the disease, and if the germs chiefly associated with it are those which harmlessly abound in the contents of the bowel, why should their presence in the inflamed appendix bring them into suspicion ?

The answer is that the colon bacilli are powerless for harm whilst they are in the intestinal flow, the mucous membrane acting as a protecting barrier. But if they are introduced into the substance of the appendicular wall they may there make havoc —especially if the vital energy of the part has been lowered by wet, or cold, or by any general cause.

The subject of the hæmatogenous infection of the appendix, and the likelihood of its being due in many cases to breathing the clouds of septic road-dust raised by motor vehicles, is referred to on *p.* 34.

It is by no means an uncommon thing to hear that an attack of appendicitis came on with, or soon after, a sore throat.

Sometimes there is a history of so-called rheumatism in cases of appendicitis, " rheumatism " being the name given to the group of vague symptoms due to infection of the blood by septic micro-organisms which have entered, more likely than not, by the tonsil or the naso-pharyngeal mucous membrane.

It is probably owing to the abundance of the tonsil-like material in the appendix that its liability to inflammatory disease is due. The affections of

the appendix are not unlike those of the tonsil—there is the catarrhal condition, coming and going and coming again, like the chronic tonsillitis, which in the end calls for operation, and there is the acute affection resembling a quinsy.

The results of inflammation vary. In most early cases the appendix, scarcely enlarged, has its surface spread over with a fine network of dilated vessels. Or it may be covered with flakes of lymph; or the lymph may be already organized and setting up adhesions with neighbouring structures. Sometimes the appendix is red, stiff, and swollen, and as soon as the peritoneum is opened, it may spring up into view in a sort of physiological erection, whilst in other cases it may be found perforated or gangrenous.

Catarrhal Appendicitis.—In the early stage of appendicitis, the mucous membrane is swollen and injected, and its interior is filled, or even distended, with glairy mucus. Inasmuch as the appendix does not at that period of the inflammation contain pus, the condition is called catarrhal appendicitis. But one cannot say what course it might take. It may be that it is the early stage of an acute suppurative attack. But, on the other hand, it may prove unimportant and transient. In any case, however, it must be closely watched, and preparation must be made to deal with it at any moment. If it steadily passes off, to return later on, the appendix should then be given no further quarter. And the probability is that it will return; so the wisest thing would be appendicectomy in the first attack. Still,

the case is not an urgent one, and the time of operating on it may be arranged to suit convenience (*p.* 121). It is the surgeon's aim to operate on all cases of acute appendicitis when in this simple, catarrhal stage. It must be remembered that catarrhal appendicitis may either quickly or slowly pass on to gangrene without the occurrence of anything in the course of the symptoms to notify the serious change.

The inflammation of the mucous membrane being septic, the engorged vessels are apt to be thrombosed, and, the walls being softened, give way, with the result of the occurrence of hæmorrhages into the swollen tissues. Ulceration and mortification are further stages of the inflammation. And as this may be going on without clinical signs, it is obviously the safer practice to remove the appendix whilst yet the disease is in an early state.

In some operation cases, the appendix appears swollen by vascular congestion, bright-red and raw-looking. In others it is thickly covered with a layer of plastic lymph. In other cases, again, there is a thin and partial exudation of lymph ready to glue its tip or side to any neighbouring serous surface.

If the blood-vessels are thrombosed, the appendix is dark red or purple, and if the inflammation has continued long enough, it may be black from general mortification.

Sometimes, especially over a fæcal concretion or stercolith, there is a grey patch, which shows that the disease is of so long standing that the colour of the corpuscles has been removed, and this ashy-grey condition may affect the whole appendix. Often a

perforation is found just where the grey tissue joins the rest of the appendix, and through this perforation a concretion may be seen, or from it pus may be found escaping, stained with fæcal material. Not infrequently the grey slough has been widely detached, and the fæcal concretion—perhaps of the size of a date-stone—has already set itself free.

In cases of this sort the fluid is extremely septic, and in it are floating flakes or shreds of coagulated lymph.

These cases are apt to run a rapid course and to end fatally, and if they could be recognized by trustworthy clinical signs, even the most conservative practitioner would agree that they should be operated on "at sight." And inasmuch as they often come as a surprise upon the person who is operating, it is well to suspect that each case may be going to prove of this nature, and to operate at once.

The mucous membrane of the appendix being swollen, the opening into the intestine is blocked, and, the appendicular secretion being locked in, the tension may give rise to great distress. As the circular muscular fibres of the appendix ineffectually try to drive it out, the pain may be spasmodic and acute, the resulting clinical condition being spoken of of as *appendicular colic*. If the acute attack passes off, and is followed by one of chronic inflammation, degenerative changes may be gradually set up and permanent occlusion may ensue, a condition more often met with in people at or beyond middle age.

A quiet attack of inflammation may cause the formation of new fibrous tissue in the submucous

coat, and, as in the case of urethritis, this may eventually cause a gradual narrowing or a complete obliteration of the passage, in which case the fluid collected on the distal side of the stricture, unable to escape into the colon, may distend the unyielding canal and so cause much pain. Other effects of inflammation may be the appearance of a kink or twist in the appendix, a condition which may prepare the way for immediate or future trouble.

In rare cases, the appendix undergoes a torsion (volvulus), the result probably of some obscure and irregular peristaltic movements, inflammation coming on at once. The actual cause of the appendicitis is unlikely to be even guessed at before the abdomen is opened for the needful appendicectomy.

As the result of a previous attack of inflammation, in which the middle part of the appendix may have sloughed over a concretion, the distal end of the appendix may be found atrophied, and joined to the proximal part, or stump, by merely a short fibrous band. Such a condition gives ample evidence of the power of the peritoneum in certain conditions to take care of itself; and yet in other cases of a far less serious nature it fails to possess that power.

A long-continued inflammation may also cause wasting of the appendix, or may end by leaving it as a scarcely-recognizable fibrous mass, as harmless as an extinct volcano. The individual, however, has to pass through much danger before this could occur, and it certainly is not to be looked upon as a condition which may be hopefully expected or waited for.

Adherence of the appendix to the intestines, bladder, ovary, or any other viscus, is evidence of there having been inflammation at some time. Similarly, the narrowing of the lumen at any part, or a twisting, or a kinking, if not actually caused by inflammation, is more than likely to produce it, and amply justifies the removal of the appendix.

In a large proportion of cases the inflammation, beginning at the appendix, spreads to the neighbouring tissues—the intestines, ovary, tube, or omentum —and glues them together in a close investment of the appendix. Further, the mass becomes attached to the abdominal parietes, and if an abscess then forms about the appendix, the pus is, for a time at least, " walled in," and it may eventually find a way for escape without setting up general peritonitis. Or if the surgeon makes an incision to reach the appendix, and does it without breaking through the other side of the adhesive barriers, he may hope to leave the infection still localized. This " walling off " is already referred to on page 22. Unfortunately, there is a large proportion of cases in which no such walling off takes place, the sero-purulent fluid rapidly tracking across the abdominal cavity or down to the pelvis. There is no way, however—short of operating—by which the surgeon can inform himself that such a walling off has happily taken place, though if he finds a general peritonitis he may be sure that it has not occurred. As to whether the walling off is likely to occur in any case, it can at the best be a guess, and, as is remarked elsewhere, the surgeon who is expecting it is apt to meet with disappointment.

Probably the occurrence is determined by the nature of the bacillary infection; virulent germs have neither the time nor the power to erect adhesive barriers.

Gangrene of the Appendix.—The cause of gangrene of the appendix is the presence in its cavity of extremely poisonous material set free by bacillary action. Locked up in this narrow passage, the toxic material exerts its influence directly upon the blood-vessels of the wall of the appendix, setting up in them an inflammation which causes thrombosis and necrosis. Nature then endeavours to get rid of the gangrenous part by ulceration, and as this advances, a virulent leakage takes place into the neighbouring part of the abdominal cavity. This condition is often met with in those cases in which a concretion is lodged in the appendix; the concretion is likely to escape with the pus through the opening, and to be found at the operation loose amongst the inflamed tissues

It is held by some, that the oncoming of gangrene may be known by the intensity of pain; but seeing that from first to last in an acute appendicitis there may be no pain whatever, and that, nevertheless, the appendix may be mortified, there cannot be much clinical value in the statement (*p.* 85).

When mortification takes place over a concretion, there is certainly no time for the formation of adhesions, and when the gangrenous patch gives way, the intensely poisonous contents of the appendix escape into the general peritoneal cavity, and set up a widespread inflammation. Nothing but an early

operation could have obviated this disaster; operation undertaken at this late stage is often "too late."

In those cases in which the appendix is lying behind the cæcum in but a partial investment of peritoneum, suppuration may give rise to a *retro-peritoneal abscess*. But the cases are very rare, and the surgeon would not be likely to diagnose the condition without operating. Probably there is not a great clinical importance in the condition, as the surgeon who proceeded to remove the inflamed appendix would most likely approach it in the usual way and by the usual incision. If he happened to remove it without opening the peritoneum, it would be by chance rather than design, for the appendix is almost always wrapped around with peritoneum.

It is sometimes held, that if a person has had one attack of acute appendicitis which has been allowed to run its course, he is not likely to have another, and that subsequent attacks, if he had any, would probably be of increasing mildness. There is no clinical evidence, however, to support this theory; and it is quite possible that a person who has escaped the perils of a first attack, and continues in possession of his damaged appendix, may fall a victim to a second or to some later attack.

Sometimes at an operation or at a post-mortem examination, one finds the appendix shrivelled up and scarcely recognizable; and, judging from what we know of the common results of chronic inflammation, we may conclude that the obliteration of the appendix was due to that cause, just as shrinkage of the liver in chronic hepatitis is due to contraction of

the new fibrous tissue, and atrophy of the testis is a result of chronic orchitis.

Occasionally, when symptoms have clearly pointed to appendicitis, and the surgeon finds no naked-eye appearance of disease, he is apt to think the appendix must, after all, be normal, and to assume that the the operation was, therefore, unjustifiable. But experience shows that in a very large proportion of such cases, even in the absence of all gross changes in the appendix, the patient is cured by the operation.

In connection with the question of diagnosis in cases of obscure troubles in the appendix region, I freely admit that I have sometimes operated, or have been present at operations, when, on the subsequent examination of the appendix, no pathological change was discoverable of so gross a nature as to suggest that it certainly must have been the cause of those troubles. Still, as in some of these cases the removal of an apparently well-behaved appendix has, nevertheless, brought complete and permanent relief, it is quite possible that the appendix may be the cause of trouble, even when, to the naked eye, there may seem to be nothing much wrong with it. It is quite likely that we do not yet fully understand the pathology of the appendix and the physico-chemistry of its secretion, and that further study in the laboratory will be needed for their explanation. But until this matter is better understood, the surgeon should be anxious to avoid operating on cases of such slight affections of the appendix, that some persuasion on his own part is needed to satisfy himself of the presence of morbid

changes in the appendix, and still more so to carry conviction to other people who may be present at the operation.

The presence of a little fluid fæculent matter in the appendix is not a suggestion of disease, but a more solid material could scarcely lie there without causing symptoms. Kinks and strictures are definite pathological signs, as are also hæmorrhages into the mucous membrane, or the presence of patches of granular inflammation or ulceration. A collection of thick mucus or of muco-purulent fluid imprisoned at the end of the appendix or in isolated pouches of it, would be quite sufficient to have given rise to serious physical disturbance.

CHAPTER IV.

CAUSATION.

ONE of the most interesting problems of modern surgery is the explanation of the fact of appendicitis being such a common disease at the present time. The medical man who is able to look back into the seventies and eighties of the last century will admit that, though cases of suppurative peritonitis of the right iliac fossa were met with from time to time, the reports of patients with appendicitis at the present day are common out of all comparison with them. There must be some explanation for this, but the question is still shrouded in mystery. The explanations usually given are referred to in the following pages, and, in addition, one is offered which may be found worthy of further consideration.

Appendicitis is a *microbic* disease, but the germs vary in different cases. When appendicitis first began to attract the attention of pathologists, it was thought not unlikely that there might be some particular, specific germ to which the presence of the disease should be ascribed, just as tetanus is due to the "earth bacillus," and wool-sorters' disease to the anthrax bacillus. But such a germ has not yet been found, if, indeed, it exists.

As it is, the disease may be caused by one of several kinds of germs—staphylococci, streptococci,

and pneumococci; by the bacteria of the colon, or of influenza, or by a combination of two or more of then

For a while some observers were inclined to think that there might be a specially close association between the *influenza bacillus* and appendicitis, and so it may be; but cases of appendicitis were often seen coming on tempestuously in people who had till then been in perfect health, and who certainly had had no experience of influenza.

Without much doubt, however, all these people have had the chance of being shrouded from time to time in an atmosphere of the *germ-laden road-dust* which motor traffic, even in our quiet country roads, keeps in restless circulation. On a dry day this dust comes up from the road or street in a cloud after the passing of every motor vehicle, and the larger and heavier the car, and the greater its pace, the thicker is the cloud and the longer the time it takes to settle down again. It is almost impossible to get away from this dust. The rich man in his car is bothered by it; but he is generally able to get in front of the car which may be annoying him, and in doing this he creates a heavier cloud of dust for those whom he leaves behind; whilst the less fortunate person who is plodding along the road on foot, receives the dust of them both.

In the country, one finds the hedges and trees of the roadside covered with a layer of this dust; and some of it falls upon the strawberries, currants, and lettuces of the neighbouring gardens, and upon other fruits and vegetables which are eaten uncooked.

Thus, the people of to-day, the rich as well as the poor, are constantly breathing and swallowing road-dust, which consists for the most part of fine and angular portions of flint, limestone, granite, or other road-metal, and of germs of various kinds, one of the worst of which is, perhaps, the *Bacillus coli*.

This dust, getting between the eyelids, is apt to set up ophthalmia. It may also give rise to nasal irritation, and it lodges upon the mucous membrane of the naso-pharynx and may set up tonsillitis or catarrh; it may also injuriously affect the lungs. It is more than likely that germ-laden particles of silica entering the blood-stream and finding their way to the tonsillar tissue of the appendix, may seize upon it as a delicate and convenient breeding-ground, and that a local inflammation is the result.

Whilst upon this subject, I may say that within recent years another disease has apparently come into existence and attracted considerable attention, pyorrhœa alveolaris. My friend Mr. Herbert Smale attributes much of it to the dust particles raised by motor cars finding their way into the crevices between the gums and the teeth and there setting up septic inflammation. If his surmise is correct, it greatly strengthens the theory which I have just advanced concerning the causation of appendicitis. At any rate, if the septic disease of the mouth was in existence before the advent of motor cars, it was little heard of. Probably it was in existence, but it was not the common affection that it now is. The two diseases have become of every-day occurrence only since the introduction of motor traffic.

Mouth-breathing children are particularly liable to pyorrhœa alveolaris; this is probably due to the more ready access of dust to the delicate gums.

In those cases in which appendicitis is associated with "rheumatism" or tonsillitis, the probability is that the micro-organisms common to the two diseases found their way to the appendix by the *blood-stream*.

Though the lymphoid tissue of the appendix may have been proof against attack from the bacilli which reach its free surface from the interior of the colon, it may be particularly vulnerable when attacked from the side of the blood-supply—soldiers who offer a bold and steady front to the enemy may be thrown into disorder if they find that they are also being attacked from behind.

It is no unusual matter for germs to attack a tissue from the blood-vessel side, especially when the vitality of the tissue has been lowered by internal or external influences. As an instance may be given the occurrence of a deeply-seated carbuncle in a diabetic man, and of an attack of acute osteomyelitis of the tibia in a boy earning his living by making chalk drawings on the pavement at the time that the weather is wet and cold. Such a case was once under my care, and it unfortunately ended in double amputation. For my own part, I see a close etiological resemblance between the case of this boy and that of the boy who falls a victim to acute appendicitis after getting wet to the skin in a bicycle ride, or after sitting on a cold river-bank at Easter when his thin clothes were wet with perspiration and he was exhausted by rowing (*p.* 40.)

When, as occasionally happens, two members of a household, or two children who have been at the same school, or have been playing together, are attacked with appendicitis within a short while of each other, the probability is that they were exposed to infection at the same time. It is quite likely that they may have been poisoned by the same dust-cloud. I will not press the matter further, but will suggest that the question of special exposure to road-dust, and also of the previous "sore throat," be kept in view. A sore throat often precedes appendicitis.

With regard to the association of disease of the lymphoid tissue of the tonsil and that of the appendix, I would remark that such association must be more than a coincidence. And in some cases appendicitis has seemed to be the direct effect of operations upon the tonsil, especially operations for complete or partial removal on account of chronic enlargement. The lymphoid tissue of the two areas being identical, it is small wonder if there should be a resemblance in their diseases: that they should be attacked at the same time and by the same influences, or that an affection of one should be followed by that of the other.

Constipation.—There is so often a clear history of habitual constipation in reports of cases of appendicitis that it may be looked upon, if not as an actual cause, at any rate as a predisposing one, of that disease. The constant presence of a hard fæcal mass in the blind end of the colon would be likely to set up chronic irritation at and around the opening of the appendix, and this may so lower the vitality

of the mucous membrane as to allow the ever-present bacilli coli to make a direct and successful attack upon it. Having in mind the fact that the lining of the appendix is allied in structure to the tonsil, and admitting that catarrh of the naso-pharynx is apt to determine tonsillitis, it is easy to see how a like condition of the mucous membrane of the cæcum may similarly affect the lymphoid tissue of the appendix.

Catarrhal inflammation of the cæcum and colon is, no doubt, one of the causes of appendicitis, though it is probable that the more likely condition is that chronic inflammation of the appendix causes the colitis. A good reason for holding this opinion is that sometimes a chronic colitis, which has obstinately refused to respond to treatment, quickly disappears after the appendix has been removed. It is quite possible that the appendix was providing a home for the cultivation of germs, which, being set free into the colon, irritated its lining and kept it in a state of chronic inflammation.

The presence of indigestible or undigested food in the large intestine may set up appendicitis. A lady, on whom I recently operated for recurring attacks, found that her chief enemy was nuts; after the operation she could digest "anything." With some people uncooked vegetables, such as salads, give rise to recurring attacks of appendicitis. And it not infrequently happens that the "bolting" of a meal is followed by appendicular trouble, which is, of course, to be explained by the presence of unmasticated and undigested food in the bowel.

The person whose teeth are so bad that he cannot masticate his food, is much in the position of the man who bolts it; and if the putting of his mouth in order, and the acquisition of artificial teeth, do not make him feel secure, he had better be made safe by the operation of appendicectomy. For fate may show an utter disregard to his convenience when she decides that a critical attack shall come on. It is when away from home and travelling, that this is likely to occur; when the food has not been such as he is accustomed to; when his meals have been ill-cooked or quickly swallowed, and when he has been so hurried that he has not had time for the usual morning evacuation.

As regards the influence of the food generally in causing the disease, nothing is certainly known. Infants at the breast may be attacked with appendicitis, as may also those who are being brought up on the various substitutes for mother's milk. Free-livers and ascetics, teetotalers and vegetarians, all come in for their share of the disease.

In many cases the first symptoms of appendicitis appear after the eating of an ice or the drinking of cold water. Of course, the chilling of the stomach does not *cause* the disease, but the sudden shock to the splanchnic nerves lowers the vitality of the appendicular elements, and renders them an easy prey to the germs which were already there and prepared to make their attack.

Sudden exposure of the body to external cold is often the direct cause of the on-coming of the disease. Here is an instance:—One Easter Monday a strong, healthy

young man, who had never had a day's illness, became heated as he was sculling with a friend on a country river. Getting out of the boat, he sat down on the bank with nothing on but thin flannels, which were already damp with perspiration. Very shortly after his return home he was attacked with shiverings, and an appendicular abscess quickly declared itself. And if cold from without may so lower the vitality of a weak spot that it is unable to withstand the attack of the bacilli, it is equally probable that a sudden chilling from the inside of the abdomen, as by swallowing iced water or iced cream, may have the same effect (*p.* 36).

Foreign Bodies.—A common determining cause of inflammation of the appendix may be the presence within it of the bristle of a tooth-brush, a hair, a pin, a small flake of enamel detached from a cooking vessel, a shot-pellet, a spicule of bone, or some other small foreign body. The irritation caused thereby sets up an inflammation, as it is only by means of an attack of inflammation that Nature is able to free the appendix of the disturbing element. It is her only method of procedure, and for most parts of the body it is perfectly successful, but for the appendix it is perilous.

Cases of appendicitis are on record in which the disease was due to the presence of *ascarides*. This has been proved by the discovery of the worm in the appendix at the time of the operation, and by the perfect recovery of the patient afterwards. Recovery in other cases has taken place on a worm having been cast adrift without operation having been performed.

It is difficult to say to what extent *gout* may be responsible for appendicitis, but this association must be kept in mind.

Tuberculosis is not a very rare cause of inflammation of the appendix, and *malignant disease* is also apt to invade it.

Injury.—It is unlikely that a kick or a blow upon the abdomen could of itself set up appendicitis, though it is possible. But if there were a concretion in the appendix, the mucous membrane might be bruised against it and rendered vulnerable to the lurking germs. Similarly, it is quite within reason that a man or boy with a slight, unnoticed attack of appendicitis, might have the disease lighted up or made worse by a severe local injury. But of the existence of a "traumatic appendicitis" I have no personal knowledge.

I was once called to an urgent consultation on a boy at school who was very ill after having received a spiteful kick in the abdomen from another boy. The master was in a state of great apprehension lest the boy should die—a contingency which seemed quite likely. On opening the abdomen in the right iliac region, a perforated appendix and abscess were found. It is probable that the kick had nothing to do with the illness, and as the boy recovered, the dread of a coroner's inquest passed away. But had he died, it is quite likely that trouble would have arisen on account of the sudden illness so quickly following on the receipt of the local injury. I was inclined to regard it, however, merely as a coincidence.

CHAPTER V.

DIAGNOSIS.

THE diagnosis of appendicitis is not always easy: sometimes it is difficult and uncertain. Not infrequently it is missed altogether, and this, perchance, by persons whose judgment and skill are of no mean order.

In the very early stage of the disease it may be impossible to be sure of the diagnosis, for the appendix has as its close neighbours the cæcum, the colon (with, perhaps, diverticula liable to attacks of inflammation), the ileum, the ureter, the ovary, and sometimes the gall-bladder. (For "Differential Diagnosis," see *p.* 62). Each of these viscera is liable to its own troubles, the chief symptoms of which are pain and tenderness. Lastly, there are behind the peritoneum, lymphatic glands which may be attacked by septic or tuberculous inflammation, rendering them tender.

The so-called classical symptoms of appendicitis are really the signs of a local peritonitis, and appendicitis ought to be diagnosed and operated on before they have time to arise. To wait for the appearance of these symptoms before operating is to court disaster. (I regard this statement of so great importance that I shall repeat it shortly).

There may be a weird and complete absence of symptoms of appendicitis—certainly of the classical or text-book symptoms—and yet at the exploratory operation the appendix, may be found swollen by inflammation, mortified or perforated. The more one insists on this well-recognized fact, the more one helps in dispelling a rather widely-spread belief that a knowledge of the condition of the inflamed appendix can be arrived at by a proper reading of the signs and symptoms. It cannot be done. The practitioner who has seen the largest number of cases has probably seen also the largest number of surprises in this matter. It has been truly said that the appendix region is the seat of surprises.

Two or more medical men may have been closely watching a patient with some obscure abdominal disease in which they hesitated to give a precise diagnosis. At last they agree that a laparotomy is demanded, and then, to their surprise, it is found that an inflamed appendix is the cause of all the trouble. And this may happen in chronic cases as well as in acute—in cases in which the possibility of the existence of appendicitis had been fully discussed and then deliberately put aside as improbable.

It is in those cases in which the chief classical symptoms are absent or ill-defined that there is the greatest danger to the patient, because time may be lost whilst the medical attendant is looking for their manifestation or waiting for a clear indication for operation (*p.* 116).

As remarked elsewhere (*p.* 58), if the blood-vessels are plugged, the appendix is in the first stage

of gangrene, and, the sensitive nerves being dulled or deadened, there is little or no pain—at any rate, much less than there was earlier in the course of the disease,—and in this way many an observer has been misled. Finding less tenderness in the iliac fossa, he had formed the opinion that the disease was clearing up; as a matter of fact, the patient was getting steadily and rapidly worse. A claim to the ability to know exactly what is wrong with the appendix by judging from the symptoms, is extremely rash; could one actually do this, one would be able to say with safety which cases need immediate operation and which might be allowed to wait. But unfortunately this is impossible in our present state of knowledge. The future of every case of appendicitis which is allowed to go on without operation rests upon the knees of the gods; one may *guess*, but one cannot *know*, what is exactly wrong and what is going to happen.

In the case of chronic disease of the appendix in a thin subject, it is just possible that the surgeon can dimly make out the appendix by rolling it under the tips of his fingers. I have sometimes satisfied myself that I have been able to do this, and then, on opening the abdomen, I have perhaps found the appendix hidden behind the colon, and far removed from the position in which I had imagined it to be. In acute cases, the thick, hard edge of the muscular part of one of the flat muscles may easily be mistaken for the appendix.

Of course, if the symptoms of appendicitis are clearly marked, and as given in the text-books, the

diagnosis is easy and unmistakable. But the text-book signs of appendicitis are apt to be those of *peritonitis*, and the presence of appendicitis ought to be recognized long before they arise. In the very early stage of the disease the symptoms are likely to be but slight, so that, as just remarked, the diagnosis of appendicitis may be uncertain or may be altogether missed.

Almost anyone can recognize the existence of appendicitis when a man has a deep-seated, tender lump in the right iliac fossa, with flushing or œdema of the skin, and a fullness of the superficial veins; when he is vomiting, complaining of intense pain, and is, perhaps, lying on his back with his knees drawn up. But this, I repeat, is the rough sketch of a case of appendicitis which has been allowed to run on till the neighbouring peritoneum has become involved, and an abscess has, perchance, arisen. The diagnosis of appendicitis should, of course, have been made much earlier; yet, unfortunately, there are still members of our profession who hesitate to make a definite diagnosis, and to agree in the adoption of the proper line of treatment, until this perilous state of affairs has been duly manifested. To secure the perfect result of the treatment of appendicitis, the disease must be diagnosed at the onset, or, at least, quite early, and be operated on within the first twenty-four or forty-eight hours. The presence of all the classical signs of the disease is not to be expected or waited for; they are the beginning of the end.

Pain and Tenderness.—The appendix is lined by mucous membrane rich in lymphoid tissue.

The lining is more or less like the elements of which the tonsil is composed, and, like the tonsil, it is liable to acute or chronic inflammation.

As soon as the mucous membrane is inflamed it begins to swell, and there is little room for swelling, as the narrow tube is shut in by the sheath of peritoneum, and by a strong wall of fibrous and muscular tissue. The condition is something like that of an inflamed toe in a tight boot.

If the bacterial invasion is mild, the swelling of the lining and the exudation of mucus do not cause much distress, as the appendix has time to expand itself and provide increased room. And thus it happens that, though the symptoms of appendicitis may not have been severe, when the surgeon exposes the appendix he may find it enlarged to the size of a man's finger, and containing a good deal of fluid (hydro-appendix). The more rapid the increase of the contents of the appendix, the greater, of course, the local tenderness and pain; and the slower the process, the less the local disturbance. When the germs are virulent and the attack is tempestuous, there is no time for the providing of increased space. So the appendix becomes quickly engorged, suppuration takes place in its interior, the blood-vessels are blocked, and mortification comes on.

There is a great difference between these two pathological conditions, as also between their symptoms; but in each case there are pain and tenderness.

As a rule, in describing the symptoms of any disease one begins with the objective signs, bringing

in the subjective ones of pain and tenderness at the end. But because the inflamed appendix can be neither seen nor felt, one has often to rest satisfied with only the subjective signs—at any rate in the early hours of the disease. Little wonder, then, if in the beginning of an attack of appendicitis the practitioner cannot speak with certainty, that he can say only that the case looks as if it might turn out one of appendicitis, and that he will come again in an hour or two before making up his mind. This is quite the proper course to take.

Pain.—As is noted in Chapter XXII. (*p.* 167) the chief pain may be, and often is, in the epigastric region. That is, the effect of the disturbance in the appendix is referred to the area of the network of nerves of the solar plexus. Exactly the same thing happens in strangulated hernia: the pain is not in the hernial sac but at the "pit of the stomach," and it is because of this peculiar transference of pain that the diagnosis of so many cases of strangulated hernia has been missed In the case of appendicitis, pain is found later in the iliac fossa, but at first it is likely to be confined to the epigastric region. *Pain is usually the first symptom.*

On carefully questioning the patient, it may often be made out that he has suffered from similar attacks of pain at various times previously, or from attacks of what, perhaps, he called "indigestion"; so that the appendix has for a long while been a weak spot in his body. But, of course, it often happens that the attack in which he is found is the first; that he has never in his life been, as the saying is, "sick

or sorry," and that it has suddenly struck him down from robust health.

To take off the pressure from the inflamed appendix and diminish the pain, he generally lies with the right thigh slightly flexed. In this way the fascia lata is slackened, the tension of Poupart's ligament removed, and the lower attachment of the oblique muscles loosened. In the case of a child with intussusception, the pain passes off at times, as the muscular spasm in the intestine remits; but in appendicitis it is constant (*p.* 31).

Tenderness.—The most tender spot is generally about a third of the way in the line leading from the anterior superior iliac spine to the navel. It is known as McBurney's point, but this is considerably above the spot at which the appendix comes off from the large intestine. The spot which corresponds with the origin of the appendix is marked on the surface of the body in the line connecting the anterior superior iliac spines—at a third part of the line from the right. This is called Lanz's point. Whatever may be the explanation, however, the chief seat of tenderness in appendicitis is generally McBurney's point. And, strange to say, the chief tenderness is at that spot even in cases in which the inflamed appendix is down in the pelvis. Moreover, tenderness sometimes persists at this point for many weeks after the appendix has been completely removed (*see Fig.* 3.)

The anatomical explanation for the presence of tenderness at McBurney's point is not yet clear.

Sometimes the tender spot in appendicitis is

[illegible] 1½ in. from the navel instead of being about that distance from the iliac spine. In this case the tenderness may possibly be due to acute infection of one of the lumbar lymphatic glands.

When examining for deep-seated tenderness, the surgeon should begin by gently thrusting his fingers into the left iliac fossa, the knees being flexed so as

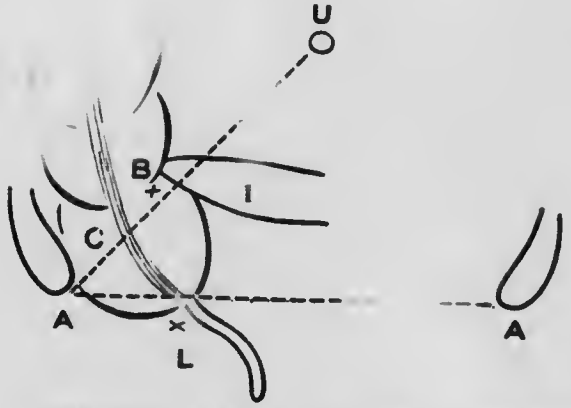

Fig. 3.—Diagram showing position of appendix and McBurney's point.
A A Iliac Spines; C Cæcum; I Ileum; U Umbilicus; B McBurney's Point; L Lanz's Point. (*After Garau.*)

to relax the abdominal muscles; after this, the right fossa is to be examined in the same way. By beginning with the sound side, the patient's attention is drawn off, and thus a truer result is likely to be arrived at.

If in a case of appendicitis, when the colon contains much gas, firm pressure is made with the hand over the descending colon, the gas is forcibly driven towards the cæcum, and, the inflamed tissues being

disturbed, the patient may complain of pain in the right iliac fossa. This would scarcely happen in the case of ovaritis or other pelvic disease, so it may prove useful as a diagnostic measure in an obscure case of appendicitis (*p.* 66).

Again, it may be that a person with appendicitis tolerates a considerable amount of pressure with the hand over the right fossa, and if the steady pressure is maintained long enough to drive some of the gas out of the blind end of the large intestine, and the hand is then suddenly taken off, the quick return of gas into the cæcum so disturbs the inflamed appendix that the patient calls out with pain.

Percussion over the iliac fossa is carried out by some persons, in the desire to make a more exact diagnosis in a case of suspected appendicitis, though what can be learned by it I fail to see. If the note is resonant, it shows that the entire region is not occupied either by abscess or by fæcal accumulation. If the note is dull, it shows that inflated bowel is absent. But this information is of no practical value, and the obtaining of it leads to waste of time and to further and perhaps harmful fingering. The making of an incision into the fossa is the method of examination needed, and the sooner that it is done the better; when the diagnosis is such a matter of uncertainty that percussion seems to be called for, it is high time that an exploration be undertaken Even then it may have been too long delayed.

Fullness in the Right Iliac Fossa.—This may be due to impaction of fæces in the cæcum, to

inflammatory thickening of the appendix and the adjacent intestine and omentum, or to abscess, and it is impossible to say in many cases which it is. If the skin is flushed or œdematous, there is probably a deep-seated abscess—or there may be one shortly if the case is allowed to drift. The iliac fullness is more apt to be a symptom of peritonitis than of appendicitis, and its appearance certainly ought not to be waited for, or even regarded as a necessary symptom of appendicitis (*p.* 43). Indeed, as soon as an inflammation which may have begun in the lining of the appendix has reached its external coat, the disease has become a peritonitis; and though it is for the moment a local peritonitis, the probability is that it will not long continue as such.

If there is simply a catarrhal inflammation of the appendix, or if the appendix is gangrenous, there need be no fullness whatever in the fossa.

Vomiting.—When the appendicitis is acute, it is apt to be ushered in, or associated with, a feeling of sickness or with actual vomiting. This may be due to shock conveyed to the splanchnic nerves from the appendix, much as in the case of a sudden pinching of the bowel in a hernial sac, or of a blow over the pit of the stomach; or it may be caused by the absorption of poisonous material from the inflamed part, which, circulating in the blood, irritates the central nervous system.

In the later stages of the disease, the vomiting is more likely due to the presence of fæcal fluid which, instead of being carried off by the intestines (which are paralyzed and distended), has found its

way into the stomach. Lastly, it may be the result of a poisoning of the nervous system by the circulation in the blood of toxic material which has been taken up by the intestinal mucous membrane. In this case, it is like the vomiting which is often associated with imperfect excretion by the kidneys in Bright's disease.

Clearly, in any case the worst thing that can be done to check the vomiting is to give the patient ice to suck, or to pour food or medicine into the stomach, or to give injections of morphia. The vomiting is but a symptom. The best course is to wash out the stomach by means of a soft rubber tube and a funnel, pouring in from a gentle height hot water in which a little bicarbonate of soda has been dissolved. If this is done whilst the medical attendants are waiting for the operation, it will probably give great comfort. Or it may be done after the operation, and before the patient is taken off the table. But it should not be looked upon as an alternative to operating—it is only an accessory to it.

And if vomiting distresses the patient when he is put back to bed, the washing out of the stomach may give him great relief; but if the conscious patient strongly objects to it, the irrigation of the stomach may not be practicable, and the surgeon may have cause to regret that he did not resort to it before the patient left the operating-table.

The vomiting is not like that of a strangulated hernia, which keeps on until the strangulation is eased or the patient becomes exhausted. In appendi-

citis, it comes on soon after the beginning of the attack of pain, and may be repeated two or three times; but it is not continuous. The cessation of vomiting, therefore, must not be taken as an indication that the appendicitis is quieting down and that danger is passing away.

Collapse in appendicitis may be due to rapid absorption of poisonous material from the inflamed appendix; this is the general explanation of the condition in children (*p.* 81). It may also be due to shock produced upon the splanchnic nerves by the occurrence of perforation and the escape of irritating fluids. But it must be understood that perforation may exist without the patient having given any manifestation of shock or collapse (*p.* 60).

Chronic Diarrhœa, with ill-defined pains in the abdomen, may be caused by appendicitis. In the absence of any symptoms to direct the attention of the medical attendant specially to the appendix, the actual cause of the intestinal irritation may long escape recognition. Eventually, however, suspicion may be aroused, and the removal of an infected appendix may bring the trouble to an end.

Bladder Symptoms.—Irritability of the bladder, with a frequent desire to pass urine, may be a symptom of appendicitis. It may be but a reflex condition, but may be due to the end of the inflamed appendix lying against the bladder, or to the fact that it is actually attached by adhesive inflammation to the bladder-wall, and to the bladder-wall being thus involved in the inflammation. (On rare

occasions the abscess formed at the end of the appendix discharges itself through the bladder.)

It may be that the pain is felt *after* micturition. This means that the inflamed appendix—perhaps surrounded by an abscess—has been resting upon the bladder, and that, as the bladder empties itself and its summit sinks, the inflamed tissue loses its support and suffers in consequence.

An acutely inflamed appendix lying against the bladder may give rise to painful micturition, or to retention of urine, according to the manner in which it affects the vesical nerves.

Similarly, the inflamed appendix may become connected with the rectum and cause troubles with defæcation. A case illustrating these points is recorded on page 182.

Furred Tongue.—The tongue is usually furred; sometimes it is thickly coated, and the breath is foul. The foulness of the breath is suggestive of advanced disease of the appendix, and at the operation, gangrene and perforation are apt to be found.

Shivering.—This may be amongst the earliest symptoms, and, later on, the patient may have a definite *rigor*, a symptom highly suggestive of the formation of abscess.

This symptom is dependent upon the irritation produced upon the central nervous system by the presence in the blood of toxins absorbed from the area of inflammation.

Pulse.—The pulse is quickened, its rate depending on the nature of the attack and the patient's powers

of resistance. Thus, in a child it may, from the very beginning of the attack, run up to 100 or more, and become very irregular. In the early stage of the disease the quickening will be due to shock; vomiting also will hasten it, as will also, in the later stage, toxic absorption.

But neither by its fullness nor rate does the pulse always show the actual condition of the appendix, though, if a few hours ago it was beating at 80 a minute and now is at 90, it is evident that matters are getting worse. Then, later, as one has too often had occasion to see, when it is running at 120 to 140, and the temperature is falling, evidence is clear that the condition of the patient has become desperate.

But it should be clearly understood that sometimes in the adult, or even in the young man, the pulse-rate may be under 70, and yet the appendix may be gangrenous or surrounded by abscess. If too much reliance be placed upon the pulse-rate, the surgeon may be led astray. He will be wise, therefore, in a case of appendicitis in which certain other symptoms are unfavourable, though the pulse remains quiet, to ignore its misleading evidence and proceed to exploration. When the pulse and the temperature conspire, as it were, to mislead the medical man, the patient is more than likely to suffer. And not infrequently they do so agree, and occasionally they induce the facial-aspect-symptom to join in with them (*p.* 122).

Temperature.—A rise of temperature may take place, or it may not. If the attack is acute, the temperature may run up a degree or several degrees,

and, later on, if pus forms, it may ascend still higher. Then if, by chance, an abscess bursts into the peritoneum, the shock may cause a sudden fall in the temperature, which, in the circumstances, is a very grave sign, but likely to be misread by an incautious practitioner.

The great feature of the temperature is probably its irregularity. It may have been up to 104° yesterday, and to-day it is down to 100°, and many a nurse thinks that in consequence of this, the patient must be about 4 per cent better than he was. But if septic absorption is taking place, collapse may be imminent and the temperature must needs be lowered. Thus, a boy may be as bad as he can be with suppuration about his appendix, and possibly with an abscess already burst into his peritoneal cavity, and his temperature may actually be marked along the normal line, or even a little below it.

Too much heed should not be paid to the thermometer. I have heard a medical man say at a consultation over what proved to be a very serious case, "His temperature has come down; let us leave him for a bit and give him a further chance" —as if the chances of recovery in an obscure case of appendicitis were improved by delay!

I think there are no cases in which the thermometric readings are more apt to mislead than those of appendicular disease, and if one is watching the temperature very narrowly, one must do so only in conjunction with other signs. The temperature-sign has not nearly the value of the pulse-sign, and what could be worse in a case of suspected abscess

than that the temperature should be coming down whilst the pulse-rate is going up?

It must be constantly borne in min[illegible] disease of the appendix may be far advance[illegible]-even to gangrene and perforation—notwithstanding the fact that there is no urgency in any one symptom, and, indeed, that the sum of all the symptoms amounts to very little. Perhaps it does not happen now so often as it did formerly, but it was no uncommon thing to hear such a remark as this in a consultation over a case, "He can't be very bad after all, for his temperature is scarcely raised and his pulse is not very quick." But this matter will be alluded to again in Chapter XIII (*p.* 122).

Aspect.—The *aspect* of the patient sometimes gives the surgeon valuable information as to the seriousness of the disease of the appendix. But, on the other hand, it may actually mislead him; for every now and then one sees a case in which, though the patient is smiling, and apparently free from all pain and anxiety, operation shows advanced inflammatory disease, or even gangrene or abscess.

In one of the earliest recorded cases of operation for appendicitis (*p.* 22), the surgeon remarked that there was "great anxiety of the countenance." And so usually there is. This may, indeed, be the first thing to strike the surgeon on his entrance into the room, and it is very important. The information which one can obtain with one's eyes is of greater value than that which can be gathered by the sense of touch or hearing, and the aspect of a patient with appendicitis may be full of suggestion. But, on the

other hand, as already remarked, it may be actually misleading.

Muscular Rigidity.—Though rigidity of the lower part of the right rectus abdominis muscle is a suggestive sign of appendicitis, it is not symptomatic of that disease. It is, for instance, a feature of salpingitis, as, indeed, of inflammation of any neighbouring viscus. The contraction is purely reflex, and is with the design of fending pressure off the tender organ. But, as already remarked, if the appendix becomes gangrenous its sensibility is lost, and the muscle, which before was watchful and rigid, may then become careless and slack. And, thus, the passing away of the rigidity is actually a bad sign (*p.* 44).

If, in examining an early and doubtful case of appendicitis in which, though there may have been pain, there is certainly no marked tenderness, the surgeon placing his hand over the fossa finds no trace of rigidity, he may be inclined to decide against the presence of disease. But if he will allow his hand to remain still gently pressing towards the fossa, he may at last detect the muscular rigidity for which he at first looked in vain. The explanation is that, there being but slight inflammation, the grey nerve tissue, as well as the nerve fibres, are not yet disturbed or on the watch, and the reflex muscular contraction is consequently slow, and has to be waited for. But rigidity may be markedly absent.

Blood-count.—By means of the blood-count the medical attendant is informed what steps Nature is taking to deal in her own way with a suppurating

appendix. In the early stage of appendicitis she has not begun to make such preparation, and as it is at this period that operation secures its best results, the surgeon who deems it right to appeal for early operation has not much to gain from a blood-count. Later on, if an abscess is encysted, the blood-count may be perversely silent.

By the formation in the blood of immense swarms of white corpuscles, Nature is making a vigorous effort to deal effectually with the micro-organisms of the disease. But for this the patient must be otherwise in a fairly good state of health; in the case of extreme physical exhaustion, the production of the corpuscles could not be expected—Nature would not possess the energy to create them. If too much reliance is placed upon the blood-count, the patient with gangrenous appendix, or of suppuration with great shock, might probably be classed amongst those cases which did not seem urgent, or might possibly be allowed to drift on, because of the absence of leucocytosis.

But when an obscure case has been hanging fire for some time, and the surgeon cannot make up his mind as to whether abscess is forming beneath the diaphragm or elsewhere, or whether there is, perhaps, some aseptic condition working in the dark, the condition of leucocytosis may give him valuable information, and possibly even a clear indication for procedure.

Rectal Examination.—Sometimes the making of a rectal or a vaginal examination proves helpful. In the case of a child, when there is doubt or

uncertainty, rectal examination should obviously be made, the child being rendered only partially insensible by chloroform, so that he may give evidence when the appendix region is gently pressed between the finger in the bowel and the fingers on the surface. But if the anus is well lubricated and the finger is very gently introduced, the child does not, as a rule, resist or resent, and no anæsthetic is called for.

In doubtful cases in the adult, as well as in the child, the interior of the pelvis ought always to be examined by rectal exploration. But when the diagnosis is clear there may be no need for it, and the patient may be spared the discomfort.

Frequent Absence of Clinical Signs.—As a summing up of this chapter, I would say that there may be a comparative absence of clinical signs in the presence of advanced and perilous disease in the appendix. It does not at present seem to be universally realized that the pulse and temperature of a person may be normal in spite of the appendix being gangrenous or perforated; that in some cases there is absolutely no fullness in the fossa; and that if the chief pathological change in the appendix is gangrene, there need be very little local tenderness—for there is no sensation in dead tissue; that as there is no sensation in a mortified appendix, there need be no reflex rigidity of the abdominal muscles covering the fossa; that there being no excitement of pulse or temperature, and little or no local pain or tenderness, the patient may make light of his trouble, and his aspect may be deceivingly cheerful.

Thus, in the most dangerous class of cases of appendicitis there may be but little either to cause anxiety or to attract serious attention. Every operating surgeon would bear witness to this, and claim also that, for the happiness of all concerned, the family doctor should never sit pondering over his case of suspected appendicitis, but should *at once* call in friendly aid. If a surgeon then says that because he is not sure he would rather wait a little, at any rate, whatever happens, the doctor will not afterwards have anything to reproach himself with. But I do not think that there are many surgeons who would counsel delay; we have all seen enough of the danger of waiting.

CHAPTER VI.

DIFFERENTIAL DIAGNOSIS.

Stone in Kidney or Ureter.—When a man is suddenly attacked with acute pain in the right side of the abdomen—and perhaps with vomiting—his distress may be caused by a renal or ureteral calculus.

In a case of *renal calculus*, there will be tenderness below the last rib, which may best be made out by a deep and sudden thrust of the finger, or by a sharp blow on the back of the hand laid flat over that region. It is likely that, sooner or later, blood will be found to the urine.

If there is a *calculus in the ureter*, and the patient is asked to place his finger over the exact spot at which he feels the pain and chief tenderness, he may indicate it in the loin or over the front, but it will probably not be at McBurney's point (*p.* 48). If the calculus is tightly plugging the ureter, there can, of course, be no blood in the urine; but if it finds its way into the bladder, with the cessation of pain the urine will be blood-stained.

Examination by *x*-rays may demonstrate the presence of the stone.

If I may be allowed the digression, I will say that the surgeon who, ever on the look-out for appendicitis in his daily work, is so keen to recognize it that he sees it in the pain and the vomiting of ureteral

calculus, is somewhat like a man walking up a marsh for snipe, who is so anxious to be ready for the bird that he lets off his gun even when a startled lark makes an upward dash.

Acute Intestinal Obstruction.—This is apt to be mistaken for appendicitis; indeed, the exact diagnosis is sometimes impossible without resort to operation. And it is a fortunate thing that, when this error of diagnosis has been committed, the operation which was designed for dealing with an appendicitis may be directed with equal advantage to the morbid condition found on opening the abdomen.

In obstruction, the pain is usually of a griping nature, due to the muscular fibres of the bowel trying to force onward the contents; it is thus felt all over the abdomen, and there is no special complaint as regards the right iliac fossa, nor, as a rule, is there tenderness there. *If the obstruction is of a mechanical nature, there will be no rigidity in any part of the abdominal wall.* But, of course, if it is due to peritonitis there will be general rigidity—not particularly over the right iliac region, however.

Again, in mechanical obstruction, the distended coils of intestine are seen through the abdominal wall writhing in an ineffectual struggle. If the intestinal obstruction is due to peritonitis the result of an unrecognized appendicitis, as in the case described on page 175, the explanation will be discovered during the needful operation of laparotomy. In peritonitis the bowel is distended but paralytic, and, therefore, at rest.

Neither immediate nor remote obstruction would be associated with appendicitis if the principle of early operation for the primary disease were accepted.

Gall-bladder.—If there is a collection of stones, a large single stone, or an abscess in the gall-bladder, there will probably be a tender swelling near the ninth right costal cartilage. But if there is no palpable tumour, the best way for examining is by thrusting the fingers beneath the costal arch, and asking the patient to draw a deep breath. As the diaphragm drives down the liver, the tender gall-bladder strikes the fingers, the inspiration suddenly comes to an end, and a sharp pain is complained of. If the case is acute, the man will not be able to bear so vigorous an examination; he may scarcely endure even the slightest pressure in the subcostal region.

Appendicitis, however, is somewhat apt to be associated with gall-stones, and in those cases in which the symptoms of the two diseases are not clearly differentiated, it is quite likely that the patient has the double affection. In operating on an obscure case of this nature, therefore, it is well to examine the gall-bladder at the time that the appendix is being removed.

Duodenal Ulcer.—If this should rupture, it may give rise to acute pain in the appendix region, but the earliest complaint of the pain, and the present situation of the tenderness, will be in the duodenal rather than in the iliac region, and the muscular rigidity will certainly not be limited to the lower part of the rectus, as it often is in appendicitis. There

will be general tenderness in the abdomen, but especially in the duodenal region, and the upper part of the abdominal muscles will be hard and fixed.

Colitis.—In certain cases there is difficulty in deciding whether the pains and discomforts in the right iliac region are due to colitis or appendicitis. Indeed, colitis and appendicitis often co-exist in the same patient. The question may arise as to whether an appendicitis may have set up a colitis, or a colitis may have set up an appendicitis. The more common explanation is that the appendicitis is the cause of the disturbance of the colon. The removal of the appendix, at any rate, is likely to bring complete and lasting relief, and in intractable cases of colitis it is well to make an examination of, and perhaps to remove, the appendix.

Typhoid Fever is an insidious disease which has certain resemblances to appendicitis. The inflamed Peyer's patches in the ileum give tenderness in the right iliac fossa, and there may be slight distention of the abdomen. If the inflammation runs on to perforation, there will be peritonitis and muscular rigidity. It may be distinguished from appendicitis by the gradual and steady rise of the temperature; by the headache; by the presence of rose-coloured spots on the abdomen, and by the behaviour of the blood under Widal's test.

Movable Kidney.—Every now and then one sees a case, especially amongst females, in which there is uncertainty as to whether the pain in the right iliac region is due to inflammation of the appendix or to a movable kidney. The first symptoms in each case

are nausea and vomiting, pain, and occasionally tenderness, in the appendix region.

In the case of a movable kidney, if the patient is placed on her back, with her knees drawn up, and the displaced kidney is manipulated into its proper position, the tenderness disappears from the iliac fossa, and firm and deep pressure is readily borne. Then, when the patient is put upright again, and the kidney drops towards the pelvis, the tenderness returns. And during the examination, the shifting kidney can probably be made out.

But it must be remembered that a person may be the subject of movable kidney and inflammation of the appendix at the same time.

Fæcal Accumulation.—A hard fæcal mass in the cæcum may cause so much irritation as to give rise to pain and tenderness in the right iliac fossa, and to cause nausea and vomiting. And yet, in answer to the question as to whether the bowels are regularly open, the patient will probably reply that not only are they open, but that he is troubled with diarrhœa—the diarrhœa being a flow of fæcal fluid caused by the presence of the lump. Massage and the administration of a dose of castor oil will remove the hard accumulation, set the bowel at rest, and establish the diagnosis.

Ovarian or Tubal Inflammation.—It is apt to be more difficult to make a correct diagnosis of appendicitis in women than in men, because of the close-lying tube and ovary. Vaginal and rectal examinations may clear up the doubt, especially

with the help of the other hand upon the iliac region.

The pain and tenderness in ovaritis are below and to the inner side of McBurney's point, but too much heed must not be paid to the subjective sign. As a rule, a tubal or an ovarian inflammation does not come on suddenly, as an appendicitis is apt to do, and there is often a suggestive history with it. There may be no rigidity of the abdominal wall, and the local and constitutional signs will not be severe unless the disease is acute.

Vaginal examination will prove helpful, and it is quite possible that it will reveal a tubal swelling upon the left side as well as upon the right. Further, uterine or vaginal discharge may be found, or the history may reveal some old-standing affection of those organs which may assist in clearing up the diagnosis.

If the tubal inflammation has run on to acute *salpingitis*, there will necessarily be muscular rigidity in the lower part of the abdominal wall, and, short of operation, the correct diagnosis may not be made with certainty. In writing this I do not mean, of course, that it is altogether a matter of indifference to the surgeon whether he is going to operate for disease of the tube or the appendix, but I wish to say that, even after taking the greatest care to differentiate, the operation may possibly show him that he was wrong.

Sometimes in appendicitis the patient does not object to steady pressure being made with the hand over the iliac fossa, but complains if the pressure is quickly taken off. This is due to the sudden return

of gas into the area of inflammation disturbing the relative position of the inflamed tissues, and this method of examination may give useful help in distinguishing appendicitis from ovaritis or other pelvic inflammation (*p.* 49).

Ectopic Gestation.—In one urgent case, in which I was associated with Sir Bertrand Dawson, the diagnosis was far from being clear at the time of operation. There were no marked signs of internal hæmorrhage, but the lady had been suddenly seized with great pain in the right iliac fossa. The operation, which was hurriedly called for, revealed a tubal hæmorrhage in the neighbourhood of the appendix. In such cases there may be a history of missed periods, and blood may be found oozing from the os uteri.

Inflammation of Lumbar Glands.—When the lumbar glands on both sides of the umbilicus are tender to deep pressure, the cause is most likely of pelvic origin; but when the tenderness is only on the right side, the probability is that it is due to appendicular disease.

Pleuro-pneumonia.—In the case of pleuro-pneumonia of the right side, the pain and tenderness are referred to the front of the ribs rather than to the iliac region, respiration and pulse are greatly quickened, and the lower ribs on the right side scarcely move. Percussion and auscultation give clear evidence of the nature of the affection.

Inasmuch as the lower intercostal nerves have their ultimate distribution in the area of skin above

and below the navel, the pain associated with pleurisy on the right side is apt to be referred to the "pit of the stomach," where the early pains of appendicitis are also likely to be felt (*p.* 47). The same thing happens in lower dorsal caries, where the primary irritation is at the posterior roots of the spinal nerves. Thus, pain is apt to be a will-o'-the-wisp symptom, and lead astray the careless or too trustful examiner.

Tuberculous Peritonitis.—Should this be situated in the right iliac region it might simulate chronic appendicitis; but the former disease is much more slow and quiet in its symptoms, and there would possibly be patches of inflammation in other parts of the abdomen. The history also would be suggestive. But if it were impracticable to make a definite diagnosis short of operating, it is highly satisfactory to know that the simple laparotomy would probably be curative in either disease.

Locomotor Ataxy.—Here there is sometimes acute pain in the right iliac fossa—a pain which comes on every now and then with great suddenness and intensity, and, it may be, limited at first to that region. But when the attack has passed off, there is no deep-seated tenderness or muscular rigidity. If, in connection with the presence of these pains, there were also "gastric crises" with vomiting, the case might, at first sight, bear a suggestive resemblance to appendicitis; but a careful practitioner would not be misled. Unless his range of vision were very narrow, he would notice the presence of

other signs of central nervous disease, and the absence of most of those of appendicitis.

Perhaps I may be allowed to say that, in these days, when surgeons are ever on the look-out for appendicitis, and equally ready to operate, they ought to be exceedingly careful in the matter of diagnosis. The iliac pain and the vomiting ought surely not to suffice to lead to the diagnosis of appendicitis. Yet we hear that operations have been performed in these circumstances, with, of course, no advantage to the patients, but with great discredit to the Art of Surgery.

I will say once more that the diagnosis of appendicitis is not always an easy or simple matter. Sometimes, indeed, it is an extremely difficult and delicate one, and in these circumstances the question must be approached with great caution and circumspection. Such a case, as a rule, is not an urgent one, and the surgeon must be content to watch it for a while, and keep from it all trace of officiousness and prodigality.

Imaginary Appendicitis.—I do not know if anything has been written about hysterical appendicitis; I do not know, indeed, if the condition has ever been met with. But I am quite prepared to hear of such a case. When disease of the hip-joint and of the knee, of the spine, of the breast, and of the elbow are so successfully mimicked, I do not see why one should expect the appendix to go scot free.

Let the case be imagined of a girl of, perhaps, ill-balanced nervous system, who is so circumstanced that she is constantly hearing of appendicitis, and

is noticing how much sympathy and attention the subjects of it receive. What more likely than that she should declare herself, or imagine herself, to have a "touch" of it, or even a serious attack? The descriptions of pain and tenderness would come glibly from her tongue, and the nausea or actual vomiting would not be far to seek. She would probably take to her bed, and, as likely as not, in the excitement, her pulse would quicken. The mother very naturally applies a fomentation, and as there is no improvement, she sends for the doctor.

(For this which I have written I have drawn entirely on my imagination, but, knowing what one does about hysteria, it will, I think, be admitted that I have not made a large overdraft.)

At this period the doctor arrives, and the mother tells him that she fears appendicitis. He finds the patient lying in bed with a fomentation over her right iliac region, and she is complaining of deep-seated pain and tenderness there; she has been vomiting, and her pulse is quick. Unless he is circumspect he will fall into the trap, and will accept the mother's diagnosis. The girl would be likely to describe her sufferings as *intense*, and the pains as *excruciating*. Like the Player-Queen, "the lady doth protest too much." She over-acts her part; and if the surgeon gently—very gently—pinches the skin over the fossa, she declares that he hurts her greatly. But, when he has drawn her attention away from that part of the body, and has focussed it on some other part, he will find that he may thrust his fingers to the very

depths of the appendix-region without her complaining. This should be enough. But he may further assure himself that the tongue is clean, and that there is no serious elevation of the temperature. He will be wise, however, to wait before giving a decided answer. He may order a full dose of castor oil, and keep the girl in bed for a day or so. To have operated on such a case would, indeed, have been a calamity!

Fig. 4.—Ileal kink due to the cæcum dropping several inches and dragging down with it the end of the ileum. The kinked piece of the ileum is fixed by its mesentery.

Ileal Kink. — Given a thin, pale, "weedy" individual, with a poor chest-development, with feeble muscular fibre, and with no desire for physical exercise—he will probably be the subject of habitual constipation and chronic dyspepsia. Every now

and then one meets with such a person. His face is not only pale, but dull and sallow; his tongue is foul, and he has no appetite.

In such a case the abdominal viscera are most likely sinking towards the pelvis, and if the large intestine of the right side happens to have a meso-colon, and at the same time to be weighted with fæces, the cæcum will probably slide down until it has reached the end of its tether, or until it meets with support from pelvic viscera. Relatively, the small intestine is securely hung by its short, strong mesentery from the back of the abdominal cavity, but the cæcum in its descent drags with it the last three or four inches of the ileum—indeed, without so dragging it, it could not sink—and, unfortunately, the iliac mesentery is not strong enough to entirely prevent the cæcum sliding down. The result of all this is that a sort of elbow forms near the end of the ileum, with the salient angle upwards. The condition was first described by Arbuthnot Lane, and people have, therefore, called it Lane's kink. Personally, I think it inadvisable so to associate the name of any medical man with a piece of anatomy, normal or morbid; and I am sure that Lane would be the last man to desire it in this case. I shall, therefore, content myself with calling the peculiar elbow in the bowel an *ileal kink*.

No doubt, the kink may, and often does, exist without giving rise to any symptoms; for, the contents of this part of the intestine being fluid, it may offer no serious impediment to their passage unless the "elbow" is very acute. But in such a case definite

symptoms of obstruction might arise, and be highly suggestive of appendicitis. Thus, there might be dull pain and, perhaps, tenderness in the right iliac region, and, on account of the dragging on the splanchnic network, there might be discomfort or actual pain in the epigastric or umbilical region, or over the abdomen generally, or "in the back." There might also be nausea and vomiting.

A very suggestive feature of the case, however, might be that the pains disappeared, or, at any rate, were much less severe, when the patient lay down, for the simple reason that there would no longer be any dragging upon the splanchnic nerves. A patient with appendicitis is in pain in every position; indeed, he sometimes gets out of bed and walks about in the hope of finding relief. And sometimes one hears such a patient say that he got up out of bed, walked about a little in search of relief, vomited, and then felt better. But the patient with an ileal kink is not, as a rule, restless or in severe pain, and he is quite content to lie flat in bed. He is likely to find comfort from enemata. Further, as distinguishing the condition from appendicitis, there will be no elevation of temperature, probably no quickening of the pulse, and no muscular rigidity or other sign of peritonitis. Certainly there is no leucocytosis.

In some cases, however, the griping pain is found so constantly in the region of the appendix, and so much tenderness may be located there, that an exploratory operation is clearly called for, notwithstanding the fact that the surgeon may be in doubt as to the actual nature of the trouble.

Although the question of ileal kink is thus dealt with in the chapter on *Differential Diagnosis*, it may be impossible always to effect that diagnosis. And it is because of this difficulty and uncertainty that the advice is given on page 134, that in those cases in which a laparotomy has been resorted to, and nothing much is found amiss with the appendix, careful search should be made of the neighbouring parts, so that an ileal kink or other definite lesion may not be overlooked, such as a mobile or twisted cæcum.

Treatment.—The abdomen being opened, the cæcum is drawn up out of the pelvis, and its long mesentery allows of its being laid upon the surface of the abdomen for the easy removal of the appendix. It may then be found that if the cæcum is taken up to its proper position in the loin, the kink disappears. All, therefore, that is needed is securely to moor it there by sutures. But if the elevation of the cæcum does not suffice to straighten out the kink; if, as may happen, the kink is associated with unmanageable inflammatory adhesions, some form of short-circuiting may, in addition, be called for.

Movable Cæcum.—From what has been said in connection with the pericolic membrane (*p.* 6) and with the ileal kink, it is evident that, in a certain proportion of cases, the cæcum and ascending colon have an unusually long mesentery; that, in consequence, their fixation is imperfect, and that, thereby, they may get into trouble. And the cæcum is not only liable to slide towards the pelvis, but sometimes, like the ovary and testis, and like other parts of the intestinal canal itself, to undergo a certain

amount of rotation. In these circumstances, the pain, tenderness, and obscure swelling in the iliac fossa, with nausea and, perhaps, vomiting, would make an almost complete picture of appendicitis. Indeed, it is somewhat as if Nature were setting a trap for the medical attendant—a trap into which many of us would be likely to fall. I have seen it stated by a hospital surgeon, that the diagnosis of appendicitis is always easy; but that is not my experience. I will admit that it is generally easy to say that such and such a case is a proper one for an operation—but that is not at all the same thing—and amongst those cases there must be some in which the correct diagnosis can be made only when the abdomen is opened. And if the surgeon hesitates to place upon a comparatively innocent-looking appendix the entire load of clinical blame, he should at least assure himself that the blind end of the colon is in its proper position, and that it has not a mesocolon of sufficient amplitude to allow the cæcum to twist upon itself, or to sink into the pelvis and cause a kinking of the ileum.

For **Intussusception**, *see* Chapter on *Appendicitis in Children*, pages 81 and 87.

CHAPTER VII.

APPENDICITIS IN CHILDREN.

APPENDICITIS in the case of a child is especially liable at the onset to be associated with uncertainty of diagnosis and, therefore, with delay and its attendant risks; thus it is very apt to end fatally.

The earliest and most marked symptom is generally sickness, and for a while this may be all; perhaps the child complains of "stomach-ache." But an attack of sickness, or of sickness, stomach-ache, and diarrhœa, is of such common occurrence in a child, that it is apt to be unheeded, or to be dealt with only by mild nursery remedies. But the vomiting may recur, and the "stomach-ache" may continue and increase, so that the child cries or screams, and the family doctor is then hurriedly sent for. He also may at first be inclined to think lightly of the case, and may content himself with prescribing some mild aperient and a fomentation. It is not at all unlikely that he may be taken off his guard by some conversation with the mother, who tells him that the child's illness ought doubtless to be attributed to the fact that he had been lately indulging in some festal indiscretions and that she had even been expecting such a break-down. The doctor should be apprehensive, however, and should not allow himself, with the desire of allaying fear, to speak slightingly

of the matter; many a fatal case of appendicitis has a mild and uneventful beginning.

When a medical man is seeing a child for the first time, and especially a case of abdominal disease, it is well that he should sit at the bed-side and have a good look at the patient, and a little chat perhaps, before turning down the bed-clothes and examining the abdomen. The aspect, the manner, and the expression may give him most valuable information, and may prevent his brushing aside the child's complaints as of trivial importance.

When a child vomits and complains of stomach-ache, nothing is more likely than that the illness is at first ascribed to a "bilious attack"—whatever that is. And as sickness and stomach-ache are two of the warning symptoms of appendicitis, the practitioner will be wise to disregard entirely the mother's diagnosis, and carefully examine the child for himself. He should not leave the case until he feels quite sure that it is not one of appendicitis. In every obscure and acute abdominal case, the thought of this disease should be kept in the front of his mind.

As renal or ureteral calculus upon the right side might at first give signs highly suggestive of appendicitis, the urine should be examined, and, if expedient, the child should be brought under the *x*-rays. Digital examination by the rectum, and bimanual examination, may also help. But if the doubt continues, the safest course will be to expose the appendix: a doubtful case must not be allowed to drift because its diagnosis is not clear.

Before giving a decided opinion, the child's chest should be carefully examined, in order to shut out the risk of mistaking pneumonia of the right base, or pleurisy, for appendicitis.

Great care and circumspection are needed in the case of children for distinguishing pneumonia or pleuro-pneumonia from appendicitis. The symptoms of the two diseases are apt to overlap, and to mislead even a skilled practitioner. And not only may the symptoms overlap, but the two diseases may be running their course in the same patient (*p.* 68).

In every case of acute abdominal disease in a child, the respirations are hurried, but when their rate has risen to thirty or forty a minute, it is more probable that the chief trouble is above the diaphragm.

The situation of the pain in catarrhal appendicitis in a child is quite uncertain. "About here," says the child in answer to enquiry, and in saying it he may move his hand vaguely over nearly the whole of the splanchnic area, and as much upon the left side as the right. This diffuseness of the region of pain is rather a suggestion that if the appendix is in trouble it is distended with mucus (catarrhal appendicitis); and if the inflammation is acute, the probability is that the pain is localized in the position of the appendix.

If the child at last fixes on some definite part of the abdomen where, he says, "it hurts most," his attention should be drawn away from it whilst the medical man gently thrusts his fingers into that region. If he then calls out from pain, one's suspicions are aroused, especially if it is in the

appendix region. If he takes no notice of the pressure, it is evident that there is no deep-seated tenderness.

Children very quickly undergo toxæmia, becoming restless, excited, and then dull, apathetic, and delirious or unconscious. Quickly also does the appendix become gangrenous, and quickly does the peritonitis spread widely from the iliac fossa. A few hours may suffice for all this to occur.

With regard to children generally, it is far more difficult to arrive at a precise and correct diagnosis than with adults. The child is powerless to help the practitioner in his investigation, and he, being still in doubt and apprehension, and in dread of making an incorrect diagnosis of grave importance and probably entailing a serious operation, is apt to allow a case to drift until its diagnosis has become abundantly clear. He is afraid of making a needless fuss, and properly anxious not to make a mistake. And thus it comes about that appendicitis in children is less likely to have the benefit of prompt operation.

When speaking of the treatment of appendicitis in the adult (*p.* 102), it will be urged that from the moment of the appearance of the first symptoms, no food or medicine should be given; in the case of children, observance of this rule is of greatly increased importance. Yet the parents will be apt to implore that a sip of something should be given to allay the thirst. Food and medicine must both be withheld—even milk and water,—and an operation should be undertaken at the earliest possible moment. No other treatment can be trusted. If the thirst

is great, water at a temperature of about 100° F. may be allowed to flow drop by drop, and continuously, into the rectum, the child being kept in bed in the sitting position. But no enema should be given, as this would disturb the inflamed area and possibly set up harmful action in the intestine, which, beyond all things, is in need of rest.

Acute appendicitis may appear in a child without any warning. Intense pain and tenderness, with vomiting and collapse, may come on with great suddenness; the temperature may rise several degrees, or it may even drop below normal; the pulse may hurry on at an alarming rate, and there may be convulsions or rigors. The case may at first look a good deal like one of intussusception, but there is no mucus or blood passing by the anus, and there are not the quiet intervals (*p.* 87) when the child is free from distress. In acute appendicitis, the pain and tenderness steadily and perhaps rapidly get worse. There may be later an obscure fullness in the iliac fossa, and the abdomen may be distended. The outlook has thus suddenly become grave, and the progress of the case must be measured by hours, not by days. General peritonitis and gangrene are apt to come on at a rapid pace, and to render the case well-nigh hopeless.

Sometimes there is distressing diarrhœa, and sometimes the bowels are confined. One does not talk about "constipation" in a disease which may run its complete course in a few short days. There must be no wasting of precious moments; early operation is the only trustworthy line of treatment.

In the case of a child, the appendicitis, as just remarked, is apt to run on quickly to peritonitis, and the fact of the child's appendix being free to hang into the pelvis or to wander across the middle line, increases the risk of diffuse peritoneal suppuration. It is of the utmost importance, therefore, for the case to be diagnosed quickly and for the appendix to be removed before the harm is done.

A case of appendicitis in a child is apt to be full of anxiety for the practitioner, especially if he is still not quite sure what is amiss. He is anxious not to give the parents needless alarm, and neither is he nor are they willing to believe that this boy, who a few hours before was the picture of health, can now be upon the brink of a disaster. But so it is.

The practitioner is wise who, in these circumstances, asks a friend to come and see the case with him. But perhaps by this time the vomiting may have ceased, and, for some reason or another, the pain may be less. There may be still tenderness in the fossa, and the child may greatly resent being examined; still no tumour or fullness can be made out, and the temperature has not gone up.

What wonder if, in these confusing circumstances, the doctors are tempted to advise delay?

It is not unlikely that the absence of elevation of temperature has specially misled them, for one is accustomed to find a rise of several degrees in most inflammations, and especially in that of the appendix. In the case under consideration the absence of rise is unfortunate; had it been recorded, it is quite

likely that their course of action might have been different.

If they could look into the abdomen at that actual moment, they might find the appendix red and swollen; or there might be a blackish or grey patch upon it, overlying, may be, a fæcal concretion; or there might be even in the first, or early in the second, day of symptoms, a considerable perforation, or, with or without a perforation, the appendix might be lying in a small abscess. But, notwithstanding the presence of so serious a condition, there yet might be no iliac fullness, no appreciable tumour, and certainly no redness of the skin—signs which sometimes are still, unfortunately, sought before a practitioner will venture upon a definite diagnosis of appendicitis, or, at any rate, consent to operation for it.

On their return in a few hours they find no improvement; there may have been no sleep, and the nurse may say that the child has been, what she calls, "light-headed," which is to be explained by the fact that septic material, absorbed from the inflamed area, and circulating with the blood-stream, has disturbed the brain.

Perhaps at last, within twenty-four or forty-eight hours of the beginning of the symptoms, the abdomen is opened and a small abscess is found; the appendix is removed and a drainage-tube is inserted. The shock of the operation is borne badly, and for a while the child hovers between life and death. The peritonitis refuses to remain localized as it was found at the time of the operation, and, as likely as not, the child falls a victim to septic intoxication.

Or it may be that, in some way which we do not yet understand, the store of vital energy which the child possessed enabled him successfully to struggle through the serious crisis. What this "vital energy" may be, one does not know. It can scarcely be mere physical energy, for many of the children who are thus carried off by the reaper are amongst the most vigorous and the best of the race. It is, I suppose, always a question of the poisonous nature of the material absorbed, and the amount of it, as compared with the state of preparedness of the child's system to battle against it.

In connection with the history of a case of appendicitis, one must not lose sight of the fact that the disease may have been in progress some hours or even days before the first symptoms declared themselves. This is always so in what I have called elsewhere (*p.* 105) stealthy appendicitis, and it is, of course, greatly against the probability of the successful conduct of the case. The doctor is able to judge only from symptoms, and until they arise the child is, so far as he is concerned, in perfect health. Within an hour or two of the appearance of the first symptoms—within an hour or two of the occurrence of the pain and the vomiting—he may have correctly diagnosed the case, and he is apt to assume that, having detected the presence of appendicitis so early, as he thinks, he has a good many hours in hand during which he can watch and study the case before deciding on operation. But his calculations may be quite wrong, and the case may be running out of hand even in the course of these

few hours. For although the symptoms are young, the disease is not; and he cannot possibly know the exact state of the appendix. At last the operation is undertaken; the surgeon proceeds with great confidence, because he feels assured that the disease has not got a long start of him, and yet, when he exposes the appendix, he finds that it has already perforated.

Here is the record of a case which illustrates these remarks:—

A healthy boy of sixteen years had been working in Dr. Eckenstein's pathological laboratory for two years. He had had during this time no serious illness, but six months previously he had had a slight pain in the right side when he ran. There had been no other trouble whatever. On Monday, March 25th, 1912, he was quite himself, feeling hungry and eating well. On Tuesday, 26th, he ate his breakfast as usual, and felt perfecty well all morning till about 11 o'clock, when he had some bread-and-butter and cocoa, after which he felt slight pain. He was not really ill, however, for he did his work and went on several messages. But between 1 and 1.30 o'clock, pain became severe, and when Dr. Eckenstein arrived at the laboratory at 2 o'clock the boy complained of bad "stomach-ache." He was made to lie down; he did not vomit. At 3 o'clock he said that he felt very ill, and he was then sent in a cab into the French Hospital, where, on admission, he was half conscious, and his pulse was hardly perceptible. His temperature was 96·2°.

I saw him at 5 o'clock that evening, *within six*

hours of the beginning of his symptoms, and found the lower part of the right rectus abdominis contracted and hard. But I gave it as my opinion that there was no perforation of the appendix, not only because of the shortness of the history, but because the boy's aspect was good—particularly good. We were all agreed that it was a case for immediate operation. But on opening the peritoneum there was an abundant escape of odourless yellow serum; the end of the appendix was as large as one's little finger, and there was perforation in it (near a concretion) from which fluid was running freely. The appendix was removed, and the peritoneum of the cæcum was sewn over its stump. There were no adhesions. On passing the finger towards the pelvis a considerable rush of serum took place, so a large drainage tube was introduced deeply and there left. Next day the odour of the discharge gave clear evidence of coli-bacillary infection. The boy made a rapid recovery.

There is no possibility of the times recorded here being wrong. Dr. Eckenstein, an old house surgeon from the French Hospital, was with the boy, and it was after 11 o'clock in the forenoon that the first symptom—slight pain—occurred. His abdomen was opened within six hours, and the appendix was already perforated and leaking.

Some of the most stealthy and treacherous cases are those which are associated with a concretion and a perforation. It may be that the solid body has been formed so gradually as to give rise to no symptoms, its presence creating, as it were, a sort of tolerance, and then, when the acute inflammation

comes on, the ulcerated wall of the appendix easily gives way over the solid body, and the symptoms flare up.

Every case of appendicitis ought to be looked upon as if it might be one of a sloughing wall or appendicular concretion. And as no medical man can possibly tell the exact state of the appendix, it behoves him to be ever watchful and suspicious. In this way the risk of wasting time and of losing opportunity is greatly lessened, and the result of the operative treatment of appendicitis proportionately improved.

If a child with acute appendicitis has a localized abscess, it is quite possible that the pus may find its escape by the rectum, after which the symptoms may clear up and the child become convalescent. But inasmuch as a diseased appendix has been left behind, it is more than likely that sooner or later there will be some return of the trouble. If this should happen, and the new attack should come on acutely, and a strange medical man be called in, he might easily misinterpret the case—he finds the child vomiting, and complaining of pain and tenderness in the right iliac fossa; the parents tell him that the child had a like attack on a former occasion, when he passed "slime" from the bowel and quickly got well; perhaps they might also say that every now and then blood and slime have been found on his linen. What wonder if the practitioner were inclined to regard the case as one of intussusception? Digital examination by the rectum, however, would reveal much pelvic thickening, and would probably

correct misapprehension. In any case, an immediate operation would be needed, so that if, by chance, the doctor had not already made a correct diagnosis, the case would soon be made clear to him. And in finishing his operation, the truth of the saying that the appendix region is the region of surprises, would become very real to him.

Digital examination in children should never be omitted, as it may give clear and unmistakable information, and especially so in those cases in which there has been any symptom associated with micturition or with the passage of blood or "slime" by the bowel.

Too much attention should not be paid to the question of the temperature. One sometimes hears it said that the case cannot be one of appendicitis because the temperature is not raised. It is an unwarranted conclusion, for there may be advanced appendicular disease though the temperature remains normal. In any case shock lowers the temperature, and as the shock which some children undergo in acute appendicitis is great, one must not expect to find the temperature raised—rather does it drop below normal. At the same time the pulse-rate will quicken.

The pulse-rate should, of course, be carefully observed, and it should be recorded hour by hour, whether operation is decided upon or not. An increasing rate gives important indication of advancing trouble. In some cases the toxic absorption has such an influence upon the cardiac nerves that the pulse-rhythm is greatly disturbed. Thus

an irregular pulse, or a rapid pulse, is a bad omen, and especially is this so if at the same time shock has caused lowering of the temperature (*p.* 123).

If the inflammation is intense, or if the amount of septic absorption is large, there is severe shock to the nervous system, and the child is pale and restless, or collapsed and quiet, the heart's action being quick, feeble, and irregular. Children and young people are more quickly and deeply affected by toxæmia than are adults, exhaustion rapidly setting in, probably with distention of the abdomen and grievous vomiting.

What is the special indication by which the surgeon may be made aware of the need for operation in a child? In my experience there is none; or, to put it more forcibly, there may be urgent need for immediate operation in any case, and yet no danger-signal may have been hoisted.

The *temperature* certainly cannot be depended upon as a guide. Indeed, if the absorption of poison has been considerable, the chart may be tracking along the normal line or even below it, as in the case just recorded, where in an acute ulcerative appendicitis it marked but just over 96°.

The *pulse*, as a rule, gives some help in the case of pain in the abdomen; but it must be remembered that it takes very little to send up the pulse-rate in children. And it sometimes happens that in a case in which the surgeon has discovered a mortified appendix, there has been no marked quickening of the pulse. So the pulse cannot be depended upon much more than the temperature.

The *aspect* of the patient I for some time considered as the most trustworthy guide to the condition of the appendix, but having seen certain patients smiling and of good colour, whose appendix had already given way, I have ceased to pay much heed to the aspect as a sign. In the case just recorded, the good aspect of the boy was particularly misleading.

The *history?* Well, no surgeon of experience pays much regard to history; and in this case the shortness of the history certainly helped to mislead. In children, moreover, where symptoms have to be observed and translated by nurse or parents, history must count for very little.

Local signs are also apt to be misleading. There may be no pain, and not much tenderness in the region, even with advanced appendicular disease; and rigidity of the abdominal muscles in the right inguinal region, though generally present, and most helpful as a guiding sign, may be wanting, though disease of the appendix is far advanced (*p.* 60).

Generally, however, the most wilful cases show *one* sign of danger, either in rigidity, tenderness, aspect, pulse, or temperature. It is surely an unreasonable or very young practitioner who would expect *all* the danger signals, described in books, to be hoisted at the same time in the case of a sick child.

I would say, before leaving this part of the subject, that in children and young persons, appendicitis is apt to run an unusually acute and disastrous course, and that if the practitioner is hesitating about the diagnosis, or waiting for the appearance of some

further sign which he thinks needful in order to justify the recommendation of an operation, he is, perhaps, letting slip the chance of a successful issue.

The child with appendicitis should be operated on the moment the diagnosis is clear. And for insuring success this should certainly be within the first twenty-four hours (*p.* 85). And it is hardly necessary to say that the operation must be carried out with the greatest gentleness. The child should be kept very warm during the operation, and be put back to bed with the least possible delay. Every moment is of importance in the matter of avoiding shock, which is the cause of death in many operation cases in children.

If the child is the subject of septic peritonitis, he may possibly die of shock during, or just after, the operation. Of this, the parents should be made fully aware. But the risk must be duly accepted.

If the child is operated on within the first twelve hours, the result will most likely be good ; but if the operation is put off until the next day, or until the peritonitis has become diffuse, or until there is evidence of suppuration, the prospect of recovery is extremely unfavourable. If, to command success in the treatment of appendicitis, the operation should be undertaken early in the case of adults, much more important is it in the case of children.

When speaking of the after-treatment in the adult (*p.* 102), it will be said that as early as practicable the bowels should be got to act. But in the case of the child there should be no hurry—they may be well left to take care of themselves.

CHAPTER VIII.

DANGER OF WAITING BEFORE OPERATING.

In the correspondence to which I have referred in the Preface, Dr. F. J. Dixon urged that it was better "to take a little increased risk by waiting than subject a great many patients to unnecessary operations." But unfortunately the man who is "waiting" cannot measure or control the amount of the risk to which he is subjecting his patient. A delay of a few hours in one case may prove fatal; in another case it may do no harm; and as one cannot possibly tell in which it may be harmful, delay is best avoided altogether.

Of course it is to be understood that no surgeon would be in such haste to operate as to open the abdomen for a passing attack of colic, for instance. Such haste as that would, indeed, be blameworthy; but if, at the consultation upon a case, it could not be positively settled whether the appendix was in trouble or not, the greatest safety would be found in looking at it. In a case of doubt, localization of the symptoms of "colic" in the right iliac fossa should render one anxious to exclude appendicitis, and this can be done only by making a small incision (*p.* 108).

According to Mr. Paterson, fifteen hundred deaths take place in England and Wales every year from

appendicitis—"unnecessary deaths," I call them. If all of these cases could be diagnosed and operated on straightway, every one of them might be saved. And the only reason that can be urged against their all having the benefit of an immediate operation is a vague fear that, if the practitioner were to make it part of his working creed that such treatment was advisable, he and his surgical associates might be regarded as needlessly enterprising, or "too fond of the knife"—to use a common expression. But if, as would happen as the result of their treatment, pretty nearly every one of their cases got well, that would not, after all, greatly matter.

"Wait until Adhesions have Formed."—Even now one hears the expression of a desire to wait until "adhesions have formed." But an inflamed appendix may perforate or rupture very early, and when this happens, and the serous fluid which bountiful Nature pours out becomes infected with the colon bacilli, it is impossible that a limiting barrier of adhesions can form. And if there has been delay in operating, the patient would probably die without a trace of that "walling off" of the affected region by the adhesive peritonitis of which so much used to be said. And even if there is no perforation of the appendix, there may be an entire absence of adhesions.

The more that I see of appendicitis, the more convinced I am that the greatest safety lies in the quickness with which the radical operation is undertaken. "But," says some one, "so prodigal a

surgeon is likely to be found operating on cases in which the appendix was very slightly—if at all—affected. Surely it is better to wait a bit until there is no doubt about the appendix being at fault?"

To him I would reply that there is, of course, the possibility of such an error, but that, after all, this is a small matter compared with the risk of letting an uncertain case of appendicitis drift on either until "adhesions may have formed," or until the dangerous nature of the disease has been rendered abundantly clear by the appearance of signs which had hitherto been absent. I suppose that every operating surgeon has at times been regretfully compelled to hold his hand by the well-meaning advice of other persons connected with the case, till in the end he has been brought into the unhappy state of the submissive Job, who mourned that when he looked for good, evil came upon him, and that when he waited for light there came darkness.

When every practitioner holds such views as those now advocated by most English surgeons, and, I think I may say, by practically all American surgeons, the Golden Age in Surgery will have begun to dawn. And then the operator who has his fair share of cases of appendicitis throughout the year will be able to say at the end of it, "I have not lost a single case, because I have got them all early"! And this will be by the family doctor, the physician, and the surgeon all agreeing that as soon as the diagnosis is made that an appendix is inflamed, it should be removed; and that if there is doubt about

the diagnosis, it must be settled by the making of an incision, the making of the incision being part of the scheme for arriving at a sure diagnosis in a difficult case—just as one employs the *x*-rays in an obscure case of hip injury.

It is more than likely that before long all classes of practitioners in England will have agreed that immediate operation in every case of appendicitis is the only way of insuring success.

Some practitioners who hesitate to affirm that safety lies in immediate operation, advise that operation should be undertaken if improvement has not taken place at the end of forty-eight hours. But in some cases forty-eight hours more than suffice to bring on a fatal ending. Less than twenty-four, indeed, may suffice. To talk, therefore, of a time-limit is quite unsurgical. In the case of a child, indeed, twenty hours may include the whole history of an attack, ending in death (*p.* 80).

The more hours that an operation is delayed, the greater is the chance of there being suppuration outside the appendix, a condition which is highly prejudicial to recovery.

If all cases of appendicitis were exactly alike as regards their beginning and their course, and if the power of resistance were the same in all patients, treatment would be a simple matter, though the surgical interest of the disease would be far less. It is the unknown and the unknowable in each case which so strongly appeals to the surgeon and makes him anxious, for the sake of safety, to see the case early and to deal with it promptly.

Appendicitis and the Public.—But before a general and marked improvement can take place in the treatment of appendicitis, public opinion will have to be educated. At present the greeting given by the friends to the surgeon who has been called in is apt to be, "We *do* hope that you will not think it necessary to operate." The mention of the word "appendicitis" has already caused alarm in the household. The people have heard of so many deaths from that complaint after operation, that they are inclined to attribute the fatal result to the operation rather than to the disease (*p.* 9).

Our profession recognizes the fact that it is not well for the public to be kept ignorant on medical matters, and from the platform and by the newspapers much useful medical knowledge is being constantly and widely imparted. Thus, on such questions as the Listerian method, hygiene, food and drink, tuberculosis, and infection, the public have been told much and have learnt much, and the time has now come that they should be told something about the danger of delay in appendicitis; that in the case of acute or obscure pain in the abdomen they ought at once to send for their doctor, and if he advises that a surgeon be called in, no opposition should be urged to the proposal of an operation. They should be made to understand that it is not the *operation*, but the *delay in performing it*, to which a fatal result should be generally attributed.

Not long since I was called to operate on a boy from a large school with whose obscure abdominal pains the matron had deemed herself competent to

deal! Persons with abdominal pains are not cases suitable for treatment by matrons or first-aiders; for every case of the kind the doctor should be *at once* called in. If, after making his examination he is able to say that the complaint is not serious, so much the better. If, on the other hand, he finds the appendix at fault, the case at once becomes serious; and neither he nor anyone else can say how serious it may prove if it is allowed to drift.

Uncertainty concerning Actual Condition of Appendix.—Appendicitis is different from most other acute diseases in this, that one cannot tell exactly what is the state of affairs without making an incision. The senses are prevented in their working, in that the deeply-lying appendix is unapproachable. In the case of pneumonia, bronchitis, or heart-disease, the ear tells precisely what is wrong and how things are going; when the liver, the kidney, or the bladder is in trouble, the sense of touch imparts valuable or precise information, whilst in most cases the eye gives important help. But an inflamed appendix can no more be felt than seen, and it is impossible to inform oneself of its exact condition. Holmes, the poet and physiologist, suggestively remarked that one cannot tell what wood a table is made of until he lifts up the cloth. And so it is with the disease in question: one cannot tell the exact state of the appendix until it has been exposed to view by operation.

No part of the body has caused so many surgical surprises as the appendix. In one case the symptoms

of disease have been uncertain, or definite but slight; and when the surgeon exposes the appendix he finds it mortified. In another case, he thinks that he can distinctly feel it in the iliac fossa; but in the operation, not only is it absent from its proper situation, but, after half an hour's anxious search, he finds it in the depths of the pelvis or tucked up behind the liver.

In other cases, where the symptoms have been unmistakable and even acute, much to his surprise, the surgeon finds nothing worse than a little catarrhal inflammation in the vermiform process. But the commonest surprise of all is the discovery of a perforated appendix when the symptoms have been slight and the operation has, by good fortune, been undertaken early I think that the time will come, and that shortly, when the perilous associations of appendicitis will be obviated; this, however, can only be by a general agreement that no case ought to be allowed to drift, but that operation should be resorted to as soon as the presence of disease is recognized.

The "Quiet Stage."—It is generally considered that operations done on about the fifth or sixth day of the disease have a particularly high mortality. The explanation is simple: precious time has been lost. It does not mean that the surgeon is not to operate on the fifth or sixth, or any other day: it means that the disease has gone on developing from, perhaps, an apparently simple beginning; that by this time, as likely as not, an abscess has formed, and that the surgeon's chance is by so much the worse.

Further, it does not mean that if the operation is postponed to the seventh, or eighth, or to any other day, the chances of recovery would be better. With or without operation the patient may die; but the surgeon must do his best without regard to omens or statistics. It is out of the question now that he could advise waiting for the oncoming of the "quiet stage" before operating. The quiet stage in any case may be nothing less than the silence of death itself.

There would be no "fifth" or "sixth" or any other ominous day in the course of an appendicitis if operation had been promptly resorted to. And as for the so-called "quiet stage," I think it a misfortune that the specious term has ever been applied in appendicitis. But it has a great attraction; and even in medical conversation it is often spoken of as if there were actually a period in the course of the disease in which all urgent symptoms, local and general, passed away, and Nature seemed to be pausing in order that the surgeon might have a free and unhampered chance of putting a happy end to the trouble.

Of course, in many cases the urgent symptoms do so clear up; but who is to know whether in any individual case they are going to subside or to rush forward with hurricane speed? No one can possibly tell; and it is because of this uncertainty that recourse to immediate operation offers the greater safety. One hears people talking of the oncoming of the quiet stage in appendicitis as if it were as clearly marked in the pathological time-table as is

the crisis in pneumonia, or the fall of temperature in a remittent fever. It may prove, however, but a will-o'-the-wisp.

"Walling off of the Appendix."—Associated with the theory of a "quiet stage" in the general run of cases of appendicitis, is that of a "walling off" of the area of disease. In some cases there is, no doubt, a walling off, and it is pleasant when operating on them to find the appendix shut off and lying handy in a small abscess. But in hurricane cases there can be no attempt at a walling off. Nature seems to be taken by surprise and robbed of all chance of building up protective earthworks.

One could scarcely expect a gangrenous appendix to glue itself to neighbouring coils of bowel, or to cause the production of helpful plastic lymph. In these furious cases there is usually no attempt at "walling off," so the germ-laden, sero-purulent exudation may be found tracking across to the opposite side, or draining down into the pelvis. There is evidently no more chance for a "walling off" than for the on-coming of the "quiet stage."

Statistics show that better results are obtained in operations done on the first day of the disease than on the second. Why, then, put off the operation to the Tuesday for an appendicitis which has been clearly diagnosed on the Monday? (Statistics, *p.* 185).

However much a surgeon may be in favour of operating, and of operating early, in appendicitis (a qualification which would include most of us), he must not venture to declare that any particular

patient will not be able to recover unless operation is performed. Many cases of appendicitis, and bad ones too, get well without operation; but unfortunately we are unable, in the present state of our knowledge, to say which of them may safely be left. If a patient declines operation against the judgment of his surgeon, it must be made clear to him that he is doing so at his own risk; but he must not be told that disaster is well-nigh sure to attend on his decision. We cannot presume to the possession of such absolute knowledge.

CHAPTER IX.

WHILST WAITING FOR OPERATION.

Cases are sometimes met with in which, whilst there is no doubt that an operation will have to be performed, for some reason or another it must for a time be delayed. It may be that the consent of parents or guardians must be obtained, or that the surgeon, who has a long way to come, has not yet arrived, and the question may arise as to what had best be done in the meanwhile.

The answer is that the patient should be propped up in bed in the half-sitting position, with the knees bent over a bolster or two, or some pillows.

Nothing whatever should be given by the mouth: no food, nor drink, nor medicine. If, however, the thirst is intense, a few sips of hot water may be allowed. But the less of this the better. Certainly no ice should be given, for stagnant fluid in the stomach is apt to cause vomiting, and thus to disturb the inflamed tissues—possibly even to cause rupture of a suppurating appendix.

Under the apprehension that chronic constipation is a predisposing cause of appendicitis, some practitioners have advised that the treatment even of acute appendicitis should begin with the administration of castor oil, Epsom salts, or calomel. But so many cases have failed to answer to this treatment, or have gone absolutely wrong under it, that fortu-

nately it has now few supporters. Not until the appendix has been removed should aperients be given. Then, in many cases, the sooner that the bowel empties itself, or is emptied, the better.

And although the patient may be in pain or discomfort, no opium or morphia must be given. To administer either of them might be to mask some of the symptoms and, by giving the idea of improvement in the patient's condition, lead to the disastrous postponement of an operation which is urgently needed. But as soon as it is settled that the operation is to be done, a small dose of morphia may be given beneath the skin; it will help in the general anæsthesia, and its good effect will last for some time after the patient is put back to bed.

The application of ice over the iliac fossa is certainly not to be recommended. Its only effect is, like that of the administration of opium, to deaden pain and conceal symptoms; but during all that time the acute bacillary infection will be going on, perhaps at headlong speed. Sometimes after the application of ice to the iliac region, the patient says that he feels much better, and, because of this, begs that the operation may be put off a while; and if the doctor falls in with his request, the use of the ice may prove extremely unfortunate and harmful. Moreover, its application would probably have wetted the skin and hindered the good effect of the tincture of iodine, which should be painted on ready for the operation.

An hourly record of the pulse and of the temperature should be kept.

And, whilst waiting, if necessary, the pubic hair may be removed, but without using soap and water; and the skin of the iliac region should be painted over with fresh tincture of iodine. But no fomentation should be applied, as to wet the skin with water is to cause the epidermal scales to swell and to hinder the antiseptic influence of the tincture.

Let it once more be stated that, from the moment that appendicitis is diagnosed, nothing whatever should be given by the mouth—neither food nor drink, nor medicines, and that if an exception is made for sips of hot water, the less of this that is given the better.

The theory of administering salol or other chemicals before operating, with the view to rendering the contents of the bowel less septic and dangerous, seems somewhat a counsel of perfection. Indeed, it reminds me of a candidate whom I once met at a surgical examination who said that, before operating for piles, he should render the interior of the rectum antiseptic. The theory, of course, is excellent in both cases. I do not know on what grounds salol has acquired a reputation in the treatment of appendicitis; but so it is. I have seen it stated that if it is administered frequently it "disinfects the bowel"—I should think that one might as well claim to be able to purify Barking Creek by pouring carbolic acid into the Thames at London Bridge. There is no drug which has any curative value in appendicitis: if there were one, the physicians would have found it out long since.

CHAPTER X.

STEALTHY APPENDICITIS.

THERE is a small group of cases of appendicitis of extreme interest and importance, to which special attention should be drawn in a monograph of this sort. Two or three of them, I dare say, might be found in every hundred cases, and they come like a thief in the night.

Let me give an imaginary clinical sketch of one of them :—An athletic young man, who has never known a day's serious illness, has been for a long bicycle ride, and, returning home, has eaten a hearty supper and gone to bed dead tired. In the night he wakes up feeling very ill ; he vomits, and then, finding himself much better, goes back to bed and falls asleep. But in the morning he is not inclined to get up, and as he complains of pain, his mother calls in the doctor, and, meeting him in the hall, says that her son had eaten something for supper which made him sick ; that he is better now, but she hopes the doctor will not let him go to the office that day.

He looks fairly well, and he is lying flat on his back with his knees not drawn up ; his pulse-rate is scarcely quickened, and his temperature is but slightly above normal. May be, his face is a little flushed and anxious ; he has some slight tenderness in the right iliac fossa, but there is no swelling to be

made out. Perhaps there is some rigidity of the neighbouring muscles.

He is strictly dieted, and a fomentation is applied all over the abdomen. In the evening he is not so well, but he has not vomited again, and he says that the fomentations have eased his pain. The doctor is by no means happy about him, but he says some cheering words, and promises to come round early in the morning to see him. The patient passes a very restless night, and when the doctor examines him, he finds that there is a marked contraction of the lower part of the right rectus and more tenderness in the fossa. An operation is talked about, but, for some reason or another, it is not done till the evening. A gangrenous and perforated appendix is then removed, and a large quantity of foul sero-purulent fluid wells up; a drainage tube is inserted, and fomentations are reapplied.

What is the prognosis? Is it not quite likely that the lad will die?

We all meet with these cases, quiet and deceiving in their origin, and formidably quick in their course.

The surgeon wishes that he could have been called in the day before; but if he had been called in, would he have been allowed to operate? If his rule had been to urge operation in every case as soon as he realized the existence of appendicitis, and he had been allowed to follow it, he would certainly have increased the chances of recovery of this man.

For aught that one knows, every early case of appendicitis may be going to turn out like this—no one can tell. Probably it is always a question of the

virulence of the germs or of the vulnerability of the tissues—or both—which determines the pace at which the local changes will work out. And as one cannot possibly have any knowledge on either point, it will be far safer that the surgeon should act as if he suspected in each case that he had virulent germs and vulnerable tissues to deal with. He should banish all hesitation.

CHAPTER XI.

EXPLORATORY OPERATION IN DOUBTFUL CASES.

It is constantly argued that if the appendix is removed as soon as it is believed to be inflamed, some cases will be submitted to operation in which, after all, no disease of the appendix is discoverable, and that many others will be so dealt with which might probably have got well without any active surgical help. This I fully admit; but it is the only argument which can be raised against the early operation. However, the admission by no means weakens my appeal. We sometimes hear the same sort of criticism made in the course of our practice by persons who have no claim to express any opinion of value in the matter—"This boy," says a proud mother, "had an attack of stomach-ache last month, and the doctor wanted to have him operated on. But his father wouldn't allow it, and the boy has been perfectly well ever since!" That valiant decision exalted the man in his wife's opinion, and at the doctor's expense: but professional sympathy may be with the doctor. And it is more than likely that if the boy got another attack of the kind, and the father again stayed the surgeon's hand, the result would be disastrous, and the father might regret

that he had ever stood in the way of operation.—The conclusion of an attack of appendicitis is not infrequently associated with regret.

There are, I believe, surgeons who profess to be in possession of the knowledge—a knowledge obtained by experience—which will enable them to differentiate the dangerous types from those which will run a mild course. I certainly do not lay claim to having possession of such a valuable endowment, and I have no personal knowledge of any one who, in my opinion, can rightly make such a claim.

Note what Dr. J. B. Murphy says upon the subject. It is to be found on page 484 of the second volume of his " General Surgery " for 1913 :—

" If there is one thing that a man of experience has concluded, it is he does not know what is going to occur in the ten or twenty or forty hours following the onset of appendicitis."

With every word of this strong statement I heartily agree, and it is because of this belief that I am anxious to avoid needless risk in the conduct of any case.

Let me briefly give a clinical sketch of an imaginary case :—A boy had been sitting on damp grass watching a cricket match, and next morning he is seized with acute catarrhal appendicitis. The doctor finds him with a pulse of about 120 ; his respirations are quick : he has vomited, and he complains of pain and tenderness in the right iliac fossa. The doctor, perhaps, had recently had a case with like symptoms in which, when an operation was tardily resorted to, a mortified appendix was found in a stinking abscess,

and the patient had sunk. He dreads a repetition of the scene, and is anxious to be in time on this occasion, and advises immediate operation. And he is right, although the attack is not yet twenty hours old; he is anxious to operate because he cannot tell what is going to happen.

It is because of the twofold uncertainty which must always be associated with appendicitis—uncertainty as to the actual state of the disease, and uncertainty as to the course which it will take—that the surgeon should be anxious to *look and see.* But, as it is, there is no general agreement as to what should be the exact procedure. One medical man may urge treatment by rest and opium, because he has seen several patients get satisfactorily over an attack when thus dealt with. Another may insist that treatment should be by castor oil or Epsom salts, because he has known it answer well; and a third will swear by starvation, fomentation, and enema. And no one can affirm that in any particular case the adoption of one of these methods may not meet with success. But after dealing with a few more cases on such lines, he would scarcely fail to be pulled up short, and to find his faith rudely shaken.

A whist-player with five trumps in his hand may win the trick although he leads from his short suit, but a fuller acquaintance with the game will prove to him that it is not safe play. In the course of time the experience of the many has been crystallized out into *Rules,* which intelligent players find it to their advantage to observe. And so is it in Surgery: out of the experience of the many, definite principles of

practice are constantly being laid down, to become, in due course, accepted as rules. And, judging from what one sees and hears, the rule is gradually being established in this country, that a case of appendicitis should be operated on so soon as the diagnosis is made—within the first twelve hours, if possible—that the patient will then not only get well, *almost for certain*, but will get well very quickly.

But would it really be a terrible calamity if an incision were made over a suspected appendix in a case in which it was not actually affected? For my own part, I give the question an unhesitating "No." A cleanly-made opening into the abdomen can do no harm, and I look forward to the time when it will be no unusual thing to hear that such and such a surgeon has been looking into an abdomen, or, to be more precise, has been passing his finger into an abdomen, and that, after all, there was nothing wrong with the appendix. It would show, at least, that he is a man who does not fall asleep on sentry-go, and also that he is fully alive to the danger of drifting appendicitis.

But the harm of advising an incision in a case where the appendix might be found little or not at all affected, is greatly exaggerated. The surgeon's reputation as a diagnostician is of far less importance than the safety of the patient, and if his fruitless act be called a *mistake*, at any rate it is a mistake on the right side. The surgeon who is haunted by the fear of making a mistake has made an unfortunate choice of his profession. I can remember the time when a surgeon was afraid to cut into a mass of inflamed tissues lest, by chance, there should be no pus found.

He preferred to " wait for fluctuation " (the expression even yet sounds familiar). But now that one understands the danger of acute inflammation and of tension, one unhesitatingly makes a free incision into an area of acute cellulitis, so as to end painful disease and diminish the risk of sloughing, and of other effects yet more serious. But the same surgeon is still apt to be content to dally with, and hover helplessly over, an inflamed appendix, because he is not " quite sure." In politics, the motto " Wait and see " may suffice : for the surgeon, in a case of possible appendicitis it should be " *Look and see,*" and medicine and surgery will not be in a satisfactory state as regards the treatment of appendicitis until the prompt making of a small iliac incision becomes part of the routine treatment in an urgent but uncertain case. An inch incision through the abdominal muscles will suffice if it is made quite early, but an incision of six inches or more may prove ineffectual if it is delayed.

It is well to bear in mind that the appendix is occasionally found upon the left side of the body. It would be unfortunate if, in a case of left-sided appendicitis, the rarity of the condition entailed delay in affording relief.

CHAPTER XII.

WHEN TO OPERATE IN APPENDICITIS.

I HAVE long since made up my mind what I shall do if I, in my turn, become the subject of appendicitis—I shall forthwith call in a surgical friend, and if he says, "Yes, I think that the appendix is at fault," I shall ask him if he would mind my getting another surgeon (not a physician) to see me with him for the purpose of confirmation; and on the diagnosis being confirmed, I shall beg him to operate *at once*. And if such principles were adopted in all cases of appendicitis, would not the mortality of the disease be lowered by more than 90 *per cent?* I think so.

I have been severely criticized for saying that I would like a *second* surgeon to confirm the diagnosis of appendicitis in the event of my becoming attacked with that disease. The reason for my suggesting another opinion is that, as there might possibly be some uncertainty in the making of a very early diagnosis (such as I would desire), some other friend might come in to help (for I should not try to be surgeon as well as patient), and in deciding in favour of an "immediate" operation, I think it right that always *two* medical men should be in agreement. Obviously there must be no reckless haste in advising

operation. If it is possible, there should be at least two medical men in agreement that it should be done, and if, at a consultation in a doubtful case, the surgeon was in favour of immediate operation and his colleague was in favour of delay, a third person should be called in to decide, for it is unlikely that a surgeon would insist on operating in opposition to the judgment of his colleague. But the colleague, be he physician or general practitioner, would probably be little inclined to withhold his consent from an operation when the surgeon could give valid reasons for advising its immediate adoption.

But, supposing that the first attack quiets down and the appendix is not then resected, what may be the issue? Firstly, there may be no further trouble from it whatever, and the individual may be as useful and vigorous a member of society as he was before. Or, after a certain time, there may be a recrudescence of the disease, and if this should happen, very few surgeons, I should think, would willingly fall in with the desire expressed by the patient or his friends that the operation should be still further postponed.

If, however, the resection is not only deferred but altogether declined, attack may follow attack, and if, by good fortune, the patient is not carried off by some unlooked-for and fatal complication, at least he may have his future activity and comfort materially interfered with.

At last, when there is obviously no possibility of further escape from operation, the surgeon probably finds his work rendered more difficult by the delay, whilst the risks of the operation, the length of time

needed for convalescence from it, and the chance of a materially weakened abdominal wall in the future, are all increased.

Inasmuch as septic thrombosis of the vessels of the appendix may occur within a few hours of the beginning of the symptoms of appendicitis, the operation of appendicectomy can scarcely be undertaken too early. Far better is it to operate when the condition is only one of appendicular colic, than to wait until the cæcum and the neighbouring part of the peritoneum have become involved, and the need for doing something is imperative. The early operation means a quick and thorough cure almost certainly, and it leaves no cause for any sorrowful looking back. The earlier the operation, also, the greater the probability of removing the whole of the infected tissue without soiling the peritoneum. In adults this can generally be effected within the first twelve or twenty-four hours—though not always; but in the case of children, greater promptitude is advisable, as set forth in Chapter VII.

Supposing that there is a surgeon who does not hold clear and definite views in connection with the treatment of appendicitis, and some one asks him, as a matter of information, what are his guides as to when an operation should be advised, he may not find it easy to reply. The pulse and temperature may be normal, and the patient's aspect may be good, although the disease is far advanced, and there may be no fullness in the iliac fossa and but slight resistance; yet the case is in urgent need of help. It is unsurgical for him to wait for some beacon-flash

telling him when in any particular case he should advise operation, and he might, perhaps, find it difficult to satisfy his questioner. On the other hand, if he held the opinion which has been forced upon most of us, he would simply reply, "I would urge operation as soon as ever I had good grounds for believing that the appendix was inflamed." That is a clear answer; it cannot be misunderstood, and it serves in all cases of appendicitis.

With regard to the operative treatment of appendicitis, there has hitherto been much vagueness. In one case, whilst the medical man has been hesitating, the patient has been rapidly drifting towards the water of Lethe; whilst in another case, every hour of delay has brought the sufferer nearer to recovery —but this is exceptional. In many other diseases Time proves himself to be a great healer; but in appendicitis, the practitioner is rightly beginning to distrust him. It was a celebrated lawyer, Matthew Hale, who declared that Time was the wisest thing under the sun. To a lawyer, time is not usually regarded as of vital importance; but to a medical man dealing with a case of appendicitis it may mean the difference between life and death.

In spite of the uncertainty which is inseparable from appendicitis—perhaps, indeed, because of it—the medical profession has long been in search of some sign which may be taken as an unfailing indication as to the propriety of advising operation, and as to the exact time when it should be done.

There used to be a frequently occurring head-line in the medical journals, "*When to operate in*

appendicitis." The prevailing idea was that safety rested in operation and the question was, When should it be done? With some practitioners this question may have meant, How long could the operation safely be put off? but with others—and their number seems to be rapidly increasing—it meant, How soon could it be done without incurring the charge of rashness? "When to operate?" The answer is, "*Immediately; as soon as ever it is certain, humanly certain, that the appendix is inflamed.*"

And amongst the many great advantages of the early operation is this, that no risk is run of the need of any of those secondary procedures which are so apt to be called for if the case is allowed to drift on to suppuration. After the early operation the wound is closed once and for all; no drainage tube is used, and there is no fear of a future ventral hernia or of a bulging at the scar, of inflammatory adhesions, or intestinal obstruction.

In short, the removal of the appendix in the early stage of the disease is a prophylactic as well as curative treatment, in that it protects the person from the risk of all those disabilities, risks, and troubles which are apt to attend upon a case of appendicitis which is allowed to drift.

It is certainly advisable to have a rule as to operating in appendicitis, and the simple one just given is easily remembered. If it were universally adopted—as it probably will be ere long—there would be comparatively few deaths from the disease.

When a surgeon talks about "treating each case upon its merits," he is, in my opinion, thickening the

mist which already surrounds the surgery of appendicitis. The uncertain and high-sounding phrase seems to imply that he can tell just what is wrong with a diseased appendix, and, more than that, that he can tell just what course the disease will take under his "guidance." It is my belief that no surgeon is justified in making such a claim.

It may be remarked that in this book very little is said about alternative methods of treatment of appendicitis. In my opinion, *there is no place for the discussion of general measures until after the inflamed appendix is out.*

I am not unwilling, however, to make an exception to the foregoing rule, and it is with regard to those persons who have a slight attack of appendicitis after, perhaps, an indigestible meal—the person who wakes up at night and vomits, and complains of pains at the pit of the stomach and later in the iliac fossa, but whose pulse is scarcely quickened, whose temperature is scarcely raised, and who evidently is not seriously ill. Though it is in all probability a case of appendicitis, if there is at hand a medical man to watch, and to assure himself that all is going on well, there is no urgency. The attack may quickly pass off: but if it recurs, the appendix should certainly be removed, as there is no knowing under what unfavourable circumstances the next attack might come on. Personally, however, I would prefer to perform appendicectomy in, or very soon after, the first attack, however mild it may be. It would render the individual safe.

Operation in the Quiet Stage.—If everything has gone smoothly with the patient, the attack having passed off, leaving only a little resistance and tenderness in the iliac fossa, the pulse having quieted down to about a normal rate, and the temperature having for some days marched along the normal line, the prospects of obtaining a perfectly satisfactory result from the operation of appendicectomy are bright in the extreme.

Sir Frederick Treves, who was the first surgeon to advocate the adoption of the operation when the appendicular inflammation was in the quiet stage, showed how, in the hands of a careful worker, the operation might be rendered one of the simplest, as well as one of the safest, in the whole range of surgery.

Nevertheless, it is not an operation to be lightly undertaken, for if the appendix has once been inflamed it is impossible to say what difficulties may have to be encountered before its resection is concluded. (The operation is described on *p.* 140).

There are probably few surgeons at the present time who would be willing to maintain that it is rather precipitate to operate after a first attack, which may have been only a transient catarrhal affair. If one could but look into the abdomen and ascertain the exact state of the appendix, it would be an easy matter to say that one should not advise operation after a first attack. But without making an opening into the abdomen, it is impossible to know in what condition the attack of inflammation has left the appendix. It may have left it none the

worse, all pain, tenderness, and swelling having passed entirely away, in which case its removal would, of course, be superfluous. But, in my experience, this happy state of things is not of frequent occurrence, one attack being generally the precursor of other attacks.

One definite result of the inflammation may be that, when the attack passes off, it leaves the appendix permanently glued to adjacent or neighbouring viscera—cæcum, colon, bladder, or ovary. This may, by chance, give rise to no inconvenience whatever, but if the tip of the appendix happen to be fixed whilst the rest of it up to the base is free, it is apt at any moment to occasion an acute intestinal strangulation. The presence of an appendix which is fixed only at the extremities is a most dangerous object in the abdomen—and it needs but a slight attack of inflammation to cause the tip of it to acquire firm adhesions. If the appendix contracts adhesions in its entire length, this element of danger does not arise.

Constantly when operating in the abdomen for conditions other than those which are due to an inflamed appendix, one has come across the results of an antecedent, and perhaps long-forgotten, attack of inflammation, the appendix being closely adherent to some serous surface. But as this is doing no harm, the surgeon passes by it without further heed. But rarely is this the way in which the clinical history of an attack of inflammation of the appendix ends. As I have said, one attack is generally the precursor of others, and if only the appendix could have

been taken away after the first of them, how much suffering and risk would have been saved the patient, and how much anxiety the friends!

Many of us, I suppose, have had friends or acquaintances whose lives have been sacrificed, or whose happiness has been clouded, or whose prospects in life have been seriously damaged, by the dyspepsia symptoms, by the aches and pains, or by the downright distress, which have been caused by the continued presence of an appendix which has been the subject of recurring attacks of inflammation.

The more that I see of appendicular disease, of the danger of delay in operating, of the comparatively slight amount of risk which the early operation involves, and of the great sense of relief and freedom from anxiety which it affords, the more fully am I convinced that the patient had best take his courage in both hands and submit to a prompt resection even in or after a mild first attack.

The theory of interval operations is a wrong theory and ought to be discarded, as it implies that an acute case can be allowed to wait until the quiet interval arrives. If, however, a patient seen for the first time has evidently passed securely through his attack and is on the high road to recovery, the operation may well be postponed until the local and general symptoms have entirely quieted down. But it is only by favouring Fortune that this quiet interval has arrived (*p.* 99).

CHAPTER XIII.

A FOOL'S PARADISE STAGE.

THE surgeon must be constantly on his guard, and must speak with much caution, when a sudden improvement seems to have taken place in a patient's condition; for there is apt to be a fool's paradise stage in appendicitis, and it may come early or late in the course of the disease.

Its occurrence is somewhat in this manner:—A patient has been complaining of pains in the abdomen for a day or two, with some slight tenderness in the right iliac fossa; the pulse has been, perhaps, at about 100 to 120, and the temperature at 101° F. After a baddish night the man wakes up and finds that the pains have gone, and that he is better in every way. The pulse has dropped, may be, to 90; the temperature is a degree lower, and the man's appearance is much better. His nearest relation, who has been in to see him, is delighted with his improvement. The nurse also recognizes a great change, and the family doctor admits that since his visit of the previous night a marked alteration has taken place.

But in spite of all this, the lower part of the right rectus remains motionless or rigid; there is still a

resistance in the other muscles over the iliac fossa, and some tenderness on pressure over the cæcal region still remains. The patient is not actually better; he is worse. The state of his pulse and of his temperature is of no real clinical value—it is, on the other hand, actually misleading, and the sensations and the aspect of the patient are certainly not to be taken as indications of improvement in the presence of persistent rigidity of the lower part of the abdominal wall. What exactly has happened to produce this sudden change one cannot say. As likely as not, the swollen appendix has given way to internal pressure, and some thick muco-purulent fluid, or even a solid concretion, has escaped. Or it may be that an abscess in, or close to, the appendix has burst its bonds. At any rate, some deeply seated tension has been relieved, and quiet has been restored—at least for a time.

Or it may be that with the general improvement there is actually less muscular rigidity; but, if so, probably further search will show that there is some unsatisfactory symptom present, such as hiccough, or increased tenderness on rectal examination. There is most likely something there to warn the doctor or excite his suspicion, if he will only search for it.

This remission of symptoms is not seen in the course of every case of appendicitis, but it is fairly common, and its occurrence is apt to be fraught with great danger, especially if it so happens that a consultation with a physician has been arranged for that particular morning.

Of all those who are in connection with the case, the surgeon certainly ought not to allow himself to be deceived. The continued rigidity of the abdominal muscles (which probably is still marked) should be evidence to him that the storm-warning must not be lowered, although some heavy clouds have been rolled away and the sky looks brighter. He should be more than ever anxious to open the abdomen and so to *assure* himself; but in the altered circumstances he may possibly be tempted to give way. Indeed, unless he is unusually firm—obstinate, his friends call it—he *will* give way. And perhaps by night the urgent symptoms will have returned, the patient will break out in a sweat, or have a rigor, and after a loss of twenty-four precious hours, leave to perform the necessary operation may at last be given. The surgeon then finds a diffuse abscess, and possibly the patient is so bad that he dare not venture to search for the ruptured appendix. How greatly does he then regret that he did not open the abdomen as soon as the diagnosis was definitely made!

If only the figures from Nature's clinical case-book could be shown in bold type of how many times, say in the last year, the abdomen was opened too early in appendicitis, and how many times too late, there would be no occasion for anyone to appeal for more resolution and promptness in the treatment of this disease.

Of course, it may happen in appendicitis that pain suddenly gets less, or passes away altogether, leaving the patient on the happy road to complete recovery. But in this case all the symptoms clear up together;

the man looks better in the face; his pulse and temperature come down, and the stiffness of his abdominal wall passes away. This is perfectly satisfactory; but even if one unfavourable sign remains after the pain has gone, if the bad aspect, the quick pulse, the high temperature, or the muscular rigidity still lingers, there may yet be serious trouble close at hand.

CHAPTER XIV.

OPERATION.

ONE great advantage of the early operation is that the surgeon is enabled then and there, and without difficulty or anxiety, to remove the appendix, to close the wound firmly and solidly, and to render the future of the patient free from all those ills that may be associated with an appendicitis that has been allowed to drift, or that has been treated by palliative measures—which is, practically, the same thing. Moreover, if inflammation runs a disastrous course and operation is tardily resorted to, the patient may be in so serious a condition that a deliberate search for the appendix cannot be justified, and the surgeon has to content himself with merely evacuating the abscess and inserting a drainage-tube.

Before opening the abdomen, the surgeon is unable to say for certain how long the patient will be under the operation, so it is well to have the temperature of the operating-room somewhat above 70° F., for prolonged exposure of the interior of the abdomen to cold air entails great shock, and shock is the cause of death after not a few of these operations. Further, in the case of a child, the limbs and the chief part of the body should be swathed in cotton wool or Gamgee tissue.

It may be well to give a quarter of a grain of morphia beneath the skin of an adult an hour before operating; it helps the action of the anæsthetic, it diminishes the shock of the operation, and it is likely to keep the patient quiet and comfortable after he has been put back to bed.

Anæsthesia.—If the case is unhappily so far advanced, and the condition so serious, that it would be unsafe to give a general anæsthetic, the abdominal incision must be made under cocaine, or under the anæsthesia produced by the application of pounded ice and salt. In this way an abscess can be quickly opened and a drainage-tube slipped in, and this simple measure may sometimes bring immediate and almost unlooked-for improvement in apparently hopeless cases. But, at the best, this treatment can be regarded only as provisional; the diseased appendix will have to be removed later on.

Beyond question, ether is the safest general anæsthetic in these cases, and its administration may be preceded by that of some nitrous oxide gas, which makes the inhalation of the ether far less unpleasant.

When the patient is placed upon the operating-table, his bed-dress is drawn up, and an aseptic cloth, spread over the thighs and legs, is pulled up above the level of the pubes; a second cloth, spread over the upper part of the body, reaches just below the level of the umbilicus, and at the sides aseptic cloths are arranged, so that merely the region of the right iliac fossa remains exposed. These cloths are

fixed in position by sharp-toothed clips, and in the bite of the clip a little piece of the skin may also be caught, so that the cloths will not be able to shift their position during the operation. This being arranged, the exposed region of skin is once more painted over with fresh tincture of iodine.

CHAPTER XV.

OPERATION IN ASEPTIC CASES.

If the case is an early one with but slight though definite symptoms, or if the operation is being done in the quiet stage—*à froid*, as the French say—the so-called "grid-iron" method may be adopted. The term is quite incorrect, but it serves; a gridiron consists of a series of parallel bars, but the incisions in this operation are by no means parallel, the deeper one passing at right angles to the first, which is to slope downwards and inwards, in the direction of the fibres of the aponeurosis of the external oblique muscle. The middle of this incision may conveniently fall over McBurney's point. The fibres of the external oblique aponeurosis are then separated by the point of the knife in the line of the skin incision.

The fatter the subject, or the more muscular the abdominal wall, the longer will the skin incision have to be. About three inches is an ordinary length. Some surgeons may claim that this is needlessly long, and that the appendix can be easily removed through an incision of half that length. The latter statement is quite true; but the disadvantages of a small incision are greater than the advantages, while it is as easy to close securely a two-inch opening into the abdominal cavity as one of three-quarters that length or even half. Of course, if the case

is a perfectly simp. straightforward one, the appendix can easily be fished up and removed through a mere inch incision into the abdominal cavity, and such an operation looks showy and attractive. But the practical surgeon is content to disregard showiness, and make his incision long enough to give him room.

But though the incision in the skin may measure three inches, the deep part of the wound, and especially the opening into the abdominal cavity, will be much less. The wound is almost sure to become somewhat conical, and especially so in people who are not thin.

The external oblique having been traversed, the adjacent parts of the aponeurosis are loosened up by the handle of the scalpel, and the cut edges are drawn asunder by two pairs of clip-forceps or by small retractors.

Then the bundles of fleshy fibres of the internal oblique are observed running almost at right angles to the line of the original incision. Two of these bundles are separated by a blunt director, and the fleshy transversalis muscle, seen a little deeper, is dealt with in the same way.

At this stage of the operation I like to pass in my two index fingers and stretch the wound open, and so prepare for the introduction of two retractors rather larger than those which were used for holding apart the edges of the wound in the external oblique aponeurosis. In this way a good view of the thin transversalis fascia and of the peritoneum is obtained.

The transversalis fascia having been scratched through and pulled aside, the peritoneum should be seen for the extent of an inch and a half to two inches. But if the surgeon has been bent upon operating through a very small incision, he may not have clearly recognized the various layers which he has divided, and may now be at a loss to know whether the membrane which he sees in the depths of the wound is the peritoneum or a piece of large intestine. Almost for certain, however, he is on the safe side, and on making a small nick into this layer, the escape of a little serum, or the appearance of omentum or of the shining serous coat of a piece of bowel, gives him his bearings and reassures him. In every case, however, the surgeon should proceed very cautiously in cutting the peritoneum, for if there had been a previous attack of local inflammation rendering the bowel adherent to the peritoneum, he might by misadventure open it. He had better use the knife held horizontally.

When the peritoneum is incised, its cut edges should be caught with two pairs of clip-forceps, so that they cannot hide away behind the abdominal wall and need to be searched for later on when the surgeon begins to close the wound.

Then the index finger, or the index and middle fingers, of the left hand, may be passed into the abdominal cavity, and search made for the appendix. Sometimes it is found at once. But if it is not forthcoming, the colon should be fished up; this is recognized by its longitudinal muscular bands, by its pouched appearance, and by its appendices

epiploicæ. If the appendix is still not discoverable, one of the longitudinal bands of the colon should be followed downwards. It leads to the appendix.

But finding the appendix is sometimes a difficult matter, especially in those cases in which attacks of local inflammation have caused the displacement of parts from their proper position, or have left them matted together in a tangled mass. That useful guide to the appendix, the anterior longitudinal muscular band, may not at first be distinguishable, or may supply but little help, and the operator has to work on in comparative anatomical darkness.

Believing that he has at last discovered the appendix, and following it along by careful dissection, he may eventually find the object of his attention presenting a frayed or pointed end. This is enough to inform him that it is not the appendix; for the appendix, even in these old cases, has a blind and thickened end. If the surgeon is in doubt as to whether it is the appendix or not, almost for certain it is not, and he had better search elsewhere. When he has actually got the appendix there is no doubt about it. He has a definite, sometimes thick and hard, cord to deal with, and, tracing it onward, perhaps a very long way, he at last reaches the blind end. Then, having followed it in the opposite direction, he reaches the intestine itself. Sometimes the appendix breaks across as he is following it, and then he sees the slender, open passage and its mucous lining.

Unless, after the removal of what he takes to be the appendix, he can find a passage in it along which

he can run a probe, or the blunt end of a needle, he is not justified in believing that he has done a complete appendicectomy.

And should a patient who has been submitted to such an unsatisfactory operation, return to work in the belief that his appendix has been duly removed, and should he later become the subject of further appendicular trouble—which is quite likely,—he would be worse off than before, and he would have to submit himself for the second time to the risk and annoyance of an operation.

But in cases in which former attacks of inflammation have disturbed the relation of the parts, and the surgeon has been following the band, as he thinks, in the direction of the appendix, he may, after all, have been going in the wrong direction. And he will be suspicious of this if he sees the colon becoming more normal in appearance and the adhesions lessening. He must therefore retrace his steps and follow the intestine into the thick tangled mass, in the interior of which he will probably discover the appendix.

If there is no mass in the direction of the pelvis in which the appendix might be hidden, it is quite likely that it has made its way behind the ascending colon in the direction of the liver, and there it should be sought.

Imperfect Appendicectomy. — An imperfect operation may be due to one of several causes. The surgeon may leave behind a stump of appendix which, later on, becomes the seat of abscess (*p.* 137). Or,

not being much in the habit of operating on difficult cases, he may have become alarmed at the enormous amount of search and following up which the straying appendix called for, and have left the operation unfinished. Or, having lost his way amongst the viscera, he may have decided to close the abdominal wound rather than run the risk of doing actual damage.

Then, he may, in some strange way, have shaped an imaginary appendix out of a piece of mesentery or some other fibrous tissue and have taken it away in mistake for the appendix. Or, finding the appendix torn across, he may have contented himself with removing the base and leaving the tip—or the reverse.

A patient who has been the subject of an incomplete operation, and who has, nevertheless, been assured that his trouble will henceforth be at an end, will have good reason for complaint if the symptoms recur. He would assume that, having undergone a complete operation, his relief would be perfect—and this is not likely to be the case if some, or all, of the appendix is left behind.

The operation of appendicectomy has become so common that, unfortunately, people are apt to regard it as of slight surgical importance, and as one well-suited to the hand of little employment. This is far from being a correct appreciation, however, for every now and then it is found full of difficulty and anxiety.

In the operation for the removal of an appendix in a case in which, though the symptoms were marked, no naked-eye appearance of anything amiss is dis-

coverable with regard to the appendix, the surgeon should gently draw up the neighbouring viscera and examine for the possible existence of other pathological defects, such as bands or kinks, and he should carefully feel for enlarged glands behind the peritoneum of the iliac fossa. In this way I have on rare occasions detected an enlarged gland which, on being incised, has been found to contain pus. It is not unlikely that such an infected gland, left undealt with in an appendicectomy, may explain why a patient does not make satisfactory progress after the operation, and why a wound has to be re-opened for a deep-seated abscess, though, at the time of operation, no complication or set-back seemed likely to arise.

Dealing with the Appendix.—There are many ways of dealing with the appendix, and each surgeon naturally thinks his particular way the best. But the appendix may be so swollen, soft, and friable that the least pull upon it causes it to break away, and the neighbouring part of the colon may not be firm enough to hold a stitch. In that case the surgeon must do the best he can, putting on a broad ligature at the base of the appendix if there is room, cobbling up the appendicular opening in the bowel, and trusting to Nature and to efficient drainage.

But if the appendix is not too soft or friable, he may proceed as follows:—The cæcum and appendix having been gently drawn out of the abdomen, the wound is packed around with dry gauze, and the mesentery of the appendix is tied off by silk sutures

introduced by an aneurysm-needle. In this way the appendix is made free to its very base. If the last suture and the adjacent part of the appendix are clipped by a pair of forceps, the assistant can hold the appendix steadily in position.

With the exception of the cæcum and appendix, all escaping bowel or omentum should be gently wiped with gauze and put back into the abdomen. A deep notch is then cut into a thin square of gauze, and this is slipped beneath the appendix, so that when it is divided there is no chance of any of its contents fouling the intestine.

A circular incision is then made around the appendix at a quarter of an inch from its base, so that a cuff of peritoneum can be stripped back. The bared base of the appendix is then compressed for a moment in the grip of a strong pair of clip-forceps, so as to squeeze the mucous lining out of the way and lessen the risk of a subsequent soiling of the parts. A fine silk ligature is tied in the groove left after the removal of the forceps. The appendix is then slowly cut through by the scalpel close on the distal side of the ligature, and as the surgeon does this he scrapes away with the edge of the scalpel the mucous membrane which bulges out, and he then touches the central part of the stump with a single drop of pure carbolic acid.

The scalpel and forceps used at the amputation of the appendix, being by this time septic, should at once be sent away, so that they do not become mixed with the other instruments. Whilst this is being done, the surgeon may take the opportunity of

rinsing his hands in the bowl of antiseptic solution which is ready beside him.

If a half-inch or even a quarter-inch of the appendix is left, the operation has not been a *complete* appendicectomy, and the remaining piece may possibly give further trouble later on. The appendix should have been tied quite close up to the cæcum (*p.* 133).

Some surgeons do not put a ligature round the base of the appendix, but I have heard of more than one case in which there was fatal bleeding from a small artery in the stump. I therefore make it a rule to place a fine ligature around the stump before burying it, deeming it unsafe merely to crush and cut it. When the appendix is inflamed, its blood-vessels are greatly increased in size, and they should not be disregarded in the amputation.

By a purse-string suture of fine silk, or by transverse Lembert sutures, the stump of the appendix (which is not more than an eighth of an inch long) is then buried and hidden from view; the adjoining part of the intestine is gently wiped with dry gauze, the notched protective pad is taken away, and the cæcum is dropped back into the abdomen.

The operation being an aseptic one, no drainage is needed.

The peritoneal wound is closed by a continuous suture of fine silk, and the edges of the internal oblique and transversalis are brought together by a few silk sutures. In the same way the aponeurosis of the external oblique is dealt with, and the skin wound is closed. No water or lotion is used.

The region of the operation is then painted with

tincture of iodine and c red with a dry gauze dressing. If all goes well, the dressing need not be disturbed for ten days, when the stitches are withdrawn and the wound is sealed with gauze and collodion.

CHAPTER XVI.

OPERATION IN SEPTIC CASES.

If the abdominal wall is œdematous, or the skin is flushed, or if there is bogginess or fluctuation, or symptom of a deeply-seated abscess, the grid-iron method (*p.* 129) should not be employed, for the reason that, as likely as not, the opening may need to be considerably enlarged, and this cannot be conveniently done when the superficial incision and the deep one are at right angles to each other.

The grid-iron method is suitable only for an aseptic appendicectomy or for a "look and see" (*p.* 112) operation.

The best line for the incision for a septic operation is one of three or four inches, passing downwards and inwards, in the direction of the fibres of the external oblique, and continued in the same line through the internal oblique and transversalis muscles, the transversalis fascia, and the peritoneum. If more room is afterwards needed for proceeding in the direction of the pelvis or of the liver, the incision can easily be prolonged downwards or upwards.

Some surgeons prefer a transverse incision running inwards to the external border of the rectus muscle, and others advise a vertical one along the outer border of the rectus. But the oblique incision,

which is, as a matter of fact, a compromise between these two, is the one most widely convenient. For a case that needs drainage the incision along the outer border of the rectus is unsuitable, as the drainage tube will be lodged between the rectus and the deep epigastric artery, and, pressing against this vessel, it is apt to involve it in secondary hæmorrhage.

A vertical incision in the middle line has its advocates; but this is likely to be found too much to the inner side of the seat of trouble, and it would be obviously inconvenient in the case of an appendix which was hidden behind the ascending colon.

In the case of suppuration in connection with an inflamed appendix, there is no telling in what direction the exigencies of the operation may lead the surgeon. He may explore the iliac fossa and be disappointed at finding that it contains neither appendix nor cæcum, and it may take him some time to discover any part of the large intestine. Eventually, he may come across a piece of large intestine which he takes to be the right colon, and, guided by one of its muscular bands, he looks onwards for the appendix, which he may discover after much delay. Sometimes he finds the appendix in the depths of the pelvis; not infrequently he has to continue the abdominal wound up to the costal region, and may then discover it hidden away behind the liver, with which it had formed an illicit connection. There is no organ in the body which is so regardless of anatomical proprieties as the appendix.

In some acute cases, almost as soon as the peritoneum is opened, the red and swollen appendix springs

up into view in a kind of state of erection; its surface is apt to be covered with flakes of lymph, and it is likely to contain thick mucus or pus.

In searching for a straying or adherent appendix, a large retractor should be introduced, so that the surgeon may see exactly what he is doing; to work in the dark is dangerous, and likely to bring trouble.

Even when, as the result of old attacks of inflammation, the cæcum, the colon, the appendix, and the adjacent viscera are in an anatomical tangle, by resolutely following the anterior longitudinal muscular band in the right direction, the appendix is surely reached. When the position of the viscera has been much confused by inflammation and adhesions, the surgeon may at first be at a loss to know which is the "right direction," but he will generally recognize it by its leading towards, and not away from, the thickest part of the adherent tissues.

In many cases, in order to reach the appendix, the surgeon has to thrust his finger gently through adhesions which are glueing the intestines together around an abscess-cavity in which the appendix is hidden. This is the condition known as a "walling off" of the append... it is referred to on page 100. The pus which wells up from the abscess is usually of a very foul odour, the result of infection by the *Bacilli coli*; but, fortunately, the foulness of the odour bears no relationship to its infectivity.

With plenty of dry gauze, the pus should be mopped up and the abscess cavity wiped out, and then the appendix should be loosened from its attachment

and brought to the surface. The mopping up of the pus and the wiping out of the abscess-cavity should not be done with loose pieces of gauze, lest, by chance, one of them, or a piece of one of them, should get adrift and be overlooked or forgotten. The safest plan is to use the end of a broad roll of gauze which the assistant holds ready to unwind; when the end has served its purpose it is drawn out of the abdomen, cut off, and thrown away, and the next piece is then ready. No irrigation or lotion should be used; the drier the parts are kept, the better. And as the pus is being mopped up, there should be no scrubbing or rubbing of the inflamed surfaces; everything should be done gently.

When the abscess cavity has been dried, a good-sized drainage tube should be introduced, and the upper and lower parts of the wound may be brought together by a couple of through-and-through sutures. It is useless to stitch up the wound layer by layer, as the stitches will necessarily become septic, and will have to make their way out; whereas, if the stitches are through-and-through, and are knotted on the outside, they can be easily removed when they have done their work or have been found of little or no service.

If the abscess-cavity which one wishes to drain is deeply placed, it is well to use a drainage tube of about the size of a man's thumb, and to run down to the end of it a wick of absorbent gauze. The wick may be changed every few hours, and, in all probability, it will be practicable to remove the tube itself within forty-eight hours. It is well to turn the tube

on its long axis every now and then, so that the surrounding viscera may not have the chance of fastening themselves into the slits or holes which have been made in the tube.

The plastic exudation on the granulations which spring from the surface of the inflamed bowel, mesentery or omentum soon force themselves into every nook and cranny of the gauze, and for this reason it is unwise to remove the gauze during the cavity is a permanent dressing. Removing gauze dressings from the viscera at the end of seven days is something like stripping adhesive plaster from a hairy limb.

Whether the discharge is scanty or free, it is well to have the tube out on the second day, but if drainage is still necessary, a smaller and shorter tube can be passed in. A large, stiff tube should lie too long against an inflamed piece of intestine, or against one of the blood-vessels, it might cause a perforation. And a slight injury to a blood-vessel in a septic area may give rise to fatal hæmorrhage. If at the time of its introduction the tube seems needlessly stiff, it may be split, and still further weakened by having large notches made into it.

The inflamed appendix is often found adherent to the omentum and if the former is gangrenous, the neighbouring piece of omentum may be a swollen, dusky mass, which must be removed with the appendix.

The omentum cannot be looked upon as a protective covering to the appendix.

If the facial aspect of a patient with suppurative

appendicitis is very bad, if the pulse is quick and small, and the temperature subnormal, there can be no doubt that he is deeply under the influence of toxic absorption, and, therefore, not in a condition to bear prolonged anæsthesia or too deliberate a search for the appendix. The surgeon must, therefore, content himself with making an incision into the abscess and introducing a large drainage tube. But at the present time the surgeon is much less inclined merely to incise a bad appendicular abscess and to leave the appendix uninterfered with. To leave a diseased appendix unremoved is always a source of extreme regret, and it is now rarely done; the operation is dangerously incomplete unless the appendix has been entirely removed.

A diseased appendix is an ever-present source of danger, and though, after having given rise to one acute abscess, it often causes no further trouble, still the patient would be much safer without it. The majority of persons who have, so far as one can see, entirely recovered after an incomplete operation upon an acute appendicular abscess, are apt to be disinclined to be put again upon an operating-table in a quiet interval, in order that the lurking appendix may be removed. And though in most instances the appendix gives no further trouble, still, at any moment, it may again cause an alarming conflagration. Taking all this into consideration, the surgeon has now become far more aggressive in his dealings with acute appendicular abscess; and experience shows him that the extra risk is justified, for the presence of an acute appendicular abscess apparently

causes these patients spontaneously to undergo a process of auto-immunization against the toxins set free by the growth of the septic micro-organisms. And though one would not, of course, desire to make a prolonged search for a diseased appendix in the acute stage of peritonitis, it is, nevertheless, in many of these anxious cases, the right course to pursue.

The misfortune is that the operation has been put off until such a crisis has arisen.

If the patient is very bad whilst on the table, some pints of hot normal saline fluid may be injected into the loose tissue of the axilla.

If the tip of the appendix is adherent to some neighbouring viscus, it is quite likely that it will tear through if the surgeon tries to drag it free. If this happens, the wound must be enlarged, and the detached piece of the appendix must be brought away; if left, it is almost sure to give trouble. The appendix is particularly apt to break across if the pressure of a concretion within has caused a weakening of its wall. Sometimes the appendix is found practically in two pieces joined together by a fibrous band—the result of former inflammatory trouble. The operator must be careful to remove the whole of it.

In these delayed and serious cases, the surgeon will be guided by circumstances as to what he should do—as to how far he should go in his search for the appendix. There was a saying which used often to be applied to such cases, "Quick in and quick out," which meant, I suppose, that operation should be performed at a rapid pace, and that if the patient

were in a state of serious depression at the time, the surgeon should by no means linger over it in his desire to remove the appendix, nor try to accomplish too much. If it also meant that operation should be resorted to very early in the course of the appendicitis, so much the better. These principles still hold good; but the surgeon is rightly becoming more anxious to conclude the operation with the removal of the appendix. He has learnt that by the subsequent adoption of the sitting posture and the use of continuous rectal irrigation he is better able than he used to be to ward off the effects of shock. If, however, after th incomplete operation, suppuration continues, and the other local, as well as the general, symptoms do not improve, no further time should be lost. It is evident that the septic appendix is the cause of all the trouble; it must be sought for and removed. It would be unsafe to wait for the arrival of a more quiet and suitable state of affairs; it might never come.

Merely to open and drain an abscess caused by appendicitis is by no means a satisfying procedure. The appendix being left unsought and undiscovered, or at any rate unremoved, may still be powerful for harm. And though many cases thus dealt with give no further trouble, one knows quite well that a good many of them sooner or later call for another operation.

It is impossible to imagine a more septic and dangerous body in the abdominal cavity than a sloughing appendix. The surgeon, therefore, should make it his first endeavour to remove it, and he can-

not consider his operation successful unless he has taken it away; its presence would certainly prolong the mischief.

If, however, the patient is desperately ill at the time of the operation, or if during the progress of it the anæsthetist sees cause for its being brought to an immediate conclusion, he may be unable to do more than put in a large drainage-tube. In the case of the operation being, for one reason or another, uncompleted, the surgeon should not fail to make it clear to the patient or his friends that though the desperate condition at the time of the operation prevented his searching for, and taking away, the appendix, the patient would be wise to submit himself later on to further operation in order that the appendix might be removed, and that unless this is done he will not be *safe*. The time for this operation may generally be chosen to suit the patient's convenience; it should be when convalescence has been well established, local conditions having entirely quieted down, and temperature and pulse having dropped to normal. It requires a good deal of courage on the part of the convalescent patient, however, and much faith in the judgment of his surgeon, for him to submit himself for this second operation. But by doing so he makes himself safe, and [illegible] slight risk.

[illegible] of these patients, who were so ill at the time of [illegible]ation that the appendix had to be left, afterwards become the subjects of hernia at the scar, and if the appendix is sought at a later operation, the opportunity would be taken of making the scar

sound. The fact, indeed, of there being a hernia would be likely to diminish the patient's objection to submit to operation.

It has sometimes been urged that an appendicular abscess ought to be drained through its lowest part, or, at any rate, through the space between the last rib and the iliac crest, because (as it was alleged) pus cannot find its way uphill. But this supposed inability is not in accordance with experience; the iliac or pelvic abscess can perfectly well discharge itself through the operation-wound on the front of the abdomen; the fluid does find its way uphill, in apparent disregard of gravity. This is brought about partly by the pressure of the intestines, and partly by capillary attraction, but chiefly by some strange natural provision which one does not clearly understand. Moreover, the sitting posture greatly helps in the evacuation of the abscess, and if, from time to time, the patient desires a change of position, the further escape of the fluid may be helped by turning him on to his face for a while.

As regards the treatment of diffuse suppuration of the peritoneum, the surgeon must realize the fact that he cannot possibly remove all infective material at the time of the operation. This being admitted, he should content himself with gently mopping up the chief part of the sero-purulent fluid, and leave the peritoneum to deal with the rest—which, as a rule, it is able to do. He had better not resort to washings, flushings, or douchings; but, having provided for free drainage, should close the wound quickly, return the patient to bed, place him in the

sitting position, and at once start the administration of normal saline solution by the rectum (*p.* 151).

By turning over the coils of intestine, and trying to cleanse their surface with swabs, he is injudiciously prolonging the operation as well as doing actual harm by detaching the pavement cells of the peritoneal surface.

It has been recommended that an abscess within the pelvis secondary to appendicitis should, in certain cases, be emptied through the rectum or vagina, instead of by an operation through the abdominal wall; that in this way, the time of the patient's confinement to bed would be likely to be shortened; that there would be no risk of subsequent ventral hernia; and that, above all, the drainage of the abscess would be very perfect.

But there are two grave objections to opening an appendicular abscess through the vagina or rectum. The first is that the operator cannot tell exactly what he is doing. He is operating in the dark; and, for aught he knows, the instrument which he is using in his attempt to reach the pus may be traversing a piece of small intestine which has been emptied by pressure, softened by inflammation, and glued by adhesions in a faulty position. The second objection is that his operation may be followed by a fæcal fistula which absolutely refuses to close. It would be a real calamity if by chance a wounded piece of small intestine persisted in draining off its contents into the rectum or vagina, or if, the large intestine being implicated, fæcal evacuations continued to take place through the vagina. Of course there is

a risk of fæcal fistula following a straightforward iliac incision of a pelvic abscess; but in this case the surgeon would probably see exactly what was amiss when he had the abdomen open and the piece of bowel between his fingers, and he could deal with the condition then or later on. Supposing that he thought it advisable to defer attempting to close the intestinal perforation, he could at least bring it up to the abdominal wound and fix it in a position where it would at any time be readily accessible if a radical operation for its obliteration were demanded.

But the unassailable argument in favour of the abdominal route in the treatment of appendicular abscess is that, by adopting it, the surgeon may be able, not only to clear out the abscess, but to remove the diseased appendix which is the cause of it. It would by no means follow that, because an abscess had been evacuated by a blind vaginal puncture, there would be no further suppuration; and it would be quite easy to believe in the probability of the existence of oft-recurring suppuration due to the continued presence of the diseased appendix; and no operator would propose resection of the appendix by the vaginal route.

Then, if, as often happens, the chief purulent focus were associated with secondary abscesses amongst the adherent coils of intestines, they could all be thoroughly dealt with by abdominal section, whilst a rectal or vaginal operation would leave them untouched. The question of the length of stay in hospital as an argument in favour of the vaginal or rectal operation is not worthy of consideration.

CHAPTER XVII.

TREATMENT AFTER OPERATION.

On being put back to bed, the patient should be propped up and secured in what is known as the Fowler, or sitting position. This is more comfortable for the patient than the supine position, and in the case of suppuration it is the better adapted for drainage. Further, it diminishes the risk of pus tracking up behind the colon and forming a subphrenic abscess—a complication which would be unheard of in appendicitis if the rule were accepted of resorting to operation as soon as that disease is diagnosed. Moreover, according to Dr. Renton, there is less sickness after the anæsthetic when the patient is so placed. And this remark applies to other cases than those of appendicectomy.

If there is much collapse, some pints of hot normal saline fluid should be slowly injected into the loose tissue beneath the pectoral muscles, in addition to continuous rectal irrigation—the first of them may be given before the patient leaves the table. These hot-water injections are of great service, and especially so in the case of suppurative peritonitis. Their administration should be so planned (by the arrangement of reservoir and tube) that the introduction of the water into the bowel takes place

drop by drop in order that it may be readily absorbed. Care must be taken that the temperature of the water entering the bowel is not too much lowered in its passage through the delivery tube. This continuous irrigation, or proctoclysis, as it is called, greatly relieves the thirst to which those who have undergone the operation are particularly liable. About a pint an hour should be injected in this way.

If, when the patient has recovered from the anæsthesia, he complains of excessive pain, an eighth of a grain of morphia may be given every hour beneath the skin. It is better to administer morphia thus than by large doses at longer intervals. Personally, I have a disinclination to give morphia, and if the patient can do without it, so much the better: certainly it should not be given as a usual practice, but sometimes it proves of extreme value.

If there is flatulent distention of the bowels, the occasional introduction of a rectal tube may give relief, and it may spare the necessity of administering an aperient. But if the distention causes distress which is not thus relieved, an enema of soap and water with a little turpentine may be given. And if further treatment in this direction is called for, half a drachm of sulphate of magnesia may be taken in a little hot water every hour until the desired effect is produced. But if the patient is unable to take this medicine on account of vomiting, three or four grains of calomel may be placed on the back of the tongue, and an additional grain may be put there every hour afterwards until relief is obtained.

The treatment of peritonitic distention of the bowel by sulphate of magnesia was introduced by the late Lawson Tait. Its object is to flush from the bowel the stagnant septic material which is entering the vessels of the mucous membrane, poisoning the nerve-centres, and threatening the life of the patient. The administration by the rectum and by the loose sub-pectoral tissue of large quantities of normal saline solution, greatly adds to the value of the purgative treatment; and the combined method may be found to have the effect of preventing the patient from sinking into that hopeless condition which was so often associated with the old-fashioned treatment by opium. It is obvious that if the normal saline fluid is being taken into the blood and poured thence into the alimentary canal (on which the purgative saline solution is also acting), not only is the blood washed of impurities, but the bowel itself is also effectually cleansed.

If all goes on well after the operation, if there is no more sickness than can be attributed to the effect of the anæsthetic, and if there is no serious abdominal distention, there need be no hurry to get the bowels to act. Some medical men are needlessly anxious in this matter, and some go so far as to inject a solution of Epsom salts into the cæcum before closing the mouth of the appendix. The bowels will be likely to act of themselves in the course of three or four days; if not, an enema or some mild aperient, such as castor oil, may be prescribed.

Perhaps the most important point in connection with appendicitis and aperients is their absolute

unsuitability until the appendix has been removed; if given before that they may, by disturbing the inflamed bowel, cause rupture or perforation of the appendix, or a breaking down of adhesions which till then had been happily shutting in a perityphlitic abscess.

If the bowels can be got to act, the abdominal distention at once diminishes, the tongue cleans, the aspect of the patient greatly improves, and the medical attendant feels that the crisis is passed.

It is a comfort to the patient recovering consciousness to have the mouth washed out with a weak solution of bicarbonate of soda, or gently wiped with a soft handkerchief dipped in eau-de-Cologne and water, and as he begins to grow sensible, the smell of the scent is a great relief after the penetrating odour of the ether.

CHAPTER XVIII.

AFTER-RESULTS OF OPERATION.

In the large proportion of cases of appendicitis which have been dealt with by a complete operation, the result leaves nothing to be desired, the patient making a prompt and complete recovery. If the appendicitis was acute, and the operation was performed within the first twenty-four or forty-eight hours, or if the case was a quiet one and without complications, there is, as a rule, no after-history of pain or trouble. And if the operation was done for chronic disease, the patient generally says that he has lost all his old dyspeptic troubles (*p.* 167), and that he has been much stronger and better since the operation; that he began to eat "everything" shortly afterwards, and steadily to put on weight.

But if, at the time of the operation, abscess had been present, or if in the "interval case" there had been long-standing though quiet inflammation, it is possible that the operation would be followed sooner or later by "draggings," pains, flatulence, constipation, indigestion, or other effects of bands, kinks, or adhesions. In such circumstances, a patient on being questioned some months, or, perhaps, a few years after the appendicectomy, would regretfully express himself as being far from "cured" by the operation.

Indeed, trouble might be so severe and persistent that the proposal of a second operation would be gladly accepted. In some such cases it is found that the appendix had never been actually removed (*p.* 132), or that a considerable stump of it had been left, and a *complete* operation might be expected to put the case quite right.

It may be that there had been so much shortening of the ileo-cæcal mesentery left after the operation, that a definite kinking of the small intestine near the cæcum had been produced, or that the small or large intestine was being worried by inflammatory bands or adhesions. A laparotomy, with a careful examination of the ileum and of the cæcal part of the colon, the gall-bladder, kidney, ureter, and ovary, should be undertaken. It is scarcely necessary to say that chronic discomfort or actual pain in the right iliac fossa is not always due to appendicitis, and that the removal of the appendix may leave the original trouble entirely unrelieved.

In connection with the subject of incomplete operations in appendicitis, I will say that the smaller the incision through which the surgeon works, the greater the risk of their happening. If I may be allowed the use of the term, I would remark that the craze for operating by a very small incision has no anatomical basis, and that surgically it is apt to prove highly disadvantageous. Unless the surgeon gives himself room—I do not say *elbow*-room, but I insist on *finger*-room—he is apt to be operating in the dark, and therefore to blunder, and to leave things undiscovered which he ought to have seen.

And if, unfortunately, he is a person who prides himself on his power of operating through such an incision, and he begins to get into difficulties, he may not like to take up his knife again in order to provide himself with more room. Therefore, let him, to start with, make an incision in the skin of at least three inches—and more in a patient with thick abdominal walls.

Sometimes complaints are made of a lurking tenderness in the iliac fossa or in the scar, but in the course of a few months these subjective troubles might be expected to pass away. Patience, therefore, is desirable.

Occasionally, keloid growth attacks the scar. This condition may also be effaced by [illegible] If not the effect of *x*-rays or of radium may be tried; but no attempt should be made to cure it by cutting away the scar, or a worse condition will almost certainly ensue.

Bulging of the scar, or a definite hernia, may occur; but, so far as my experience goes, this only happens in those patients in whom an abscess was found at the time of the operation, or in which suppuration took place directly afterwards. In those cases in which the operation was an aseptic one, and in which the abdominal wound, closed layer by layer, promptly healed, hernia does not occur: but it is very apt to follow in the old track of drainage tube. Thus, hernia is one of the evil effects of appendicitis which can certainly be avoided by a prompt and early appendicectomy.

The worst hernia that I have observed following

an appendix operation was in a young man who had been operated on in South Africa. He had a bulging in the right flank which extended from the the last rib nearly to the iliac crest; but as he was able to keep it under control by a belt, I did not advise him to undergo radical treatment for it. Evidently his operation had not been undertaken until the appendix was involved in extensive suppuration, and a large abscess-cavity had had to be opened up.

In the ordinary way the hernia may be successfully dealt with by a radical operation in which the planes of muscle and fascia are dissected up wide of the opening, and then stretched over it layer by layer and fixed with sutures.

CHAPTER XIX.

CHRONIC AND RELAPSING APPENDICITIS.

The first attack of inflammation of the appendix may not have been a serious one; it may even have passed off without being recognized. As likely as not the person attributed his indisposition, rightly or wrongly, to improper food, and after taking a dose of aperient medicine and resting for a day or two, he thought himself all right again and resumed his occupation. But from time to time he got reminders of his old trouble: he had pains at the pit of the stomach (*p.* 47), at the umbilicus, or in the right iliac fossa—and in the last-named region there might have been some tenderness. He had "indigestion" (*p.* 118), and he found it necessary to be extremely careful about his food. Then things would clear up, and he would be all right again for some weeks or months, and then the symptoms would return. This is quite a likely sort of history of a man who has slight, recurring appendicitis. The subject is further considered on page 167.

But it is possible that the recurrent attacks might be much more serious than those given above, in which case there might be nausea and vomiting, together with severe pain and obvious tenderness

in the right iliac fossa. The man might, from time to time, have severe colic; he might perspire freely, and his pulse and temperature might sometimes go up to over 100. It is quite clear that such a man will not be well until his appendix is removed; and the sooner that this is done, the better for his happiness and safety.

If a person knows himself to be the possessor of a vulnerable appendix, he must take his courage in both hands and submit to operation. For he is not safe if he is far away from his home comforts and his doctors. And, as remarked elsewhere (*p.* 39), Fate is likely to show him little consideration when she determines that his critical attack shall come on. And it is particularly likely that this attack comes on when he is travelling. If he is a soldier or a sailor, or if he is likely to be travelling, to be leading an up-country life, or a wanderer in search of work or sport, there is, practically, no choice for him. He must submit himself to the operation —an operation, by the by, which, as universal experience shows, is attended with so small an amount of risk that it may virtually be ignored.

It may be asked, "How can the writer advise the removal of the appendix after a first attack when he has insisted that this ought to be done as soon as it is found to be the seat of disease—which is probably in the first attack?" The answer is that sometimes the surgeon does not see the case during the first attack, or that if he does he is unable to have his own way with regard to it, or that the friends, seeing that all is going on well, decide to wait—and

for this they cannot be blamed, perhaps, if the previous attacks have been quite mild. And not infrequently the surgeon is called in at what is clearly the end of the first attack. Nausea and pain have passed away, and perhaps only a little tenderness remains in the iliac fossa.

It does not, of course, follow that if the appendix is left after the first attack, other attacks will ensue; but it is generally so. In some cases each succeeding attack becomes milder, till at last there is no more trouble. On the other hand, the second attack may be much more severe than the first; indeed, it may be fulminating, and may end in suppurating peritonitis. In short, no one can tell what is going to happen; but experience has clearly shown that the individual is not safe after the first attack until the appendix is removed.

If a person is the subject of chronic appendicitis, his chief discomfort or pain may be in any other part of the abdomen than the right iliac fossa. It is especially apt to be felt at the pit of the stomach, round the navel, or in the sigmoid region. Of course, it may be chiefly in the right iliac region, but it may be so much removed from that part that the surgeon who pays too much attention to pain as a symptom, is apt to be led astray, and for a while may quite fail to understand the case. But, as a rule, during the attack of appendicitis there is some tenderness in the appendix region—provided that the appendix has not shifted its position (*p.* 182). The strange distribution of pain in the "pit of the stomach," around the umbilicus, and even on the

left side of the abdomen, is due to the widespread distribution of the splanchnic nerves. It may, indeed, be compared with the reference of pain to the umbilical region in the case of strangulated hernia, and even when the injured bowel is down in the femoral canal, the pain is referred over the area of the solar plexus.

After the removal of an appendix for chronic disease, the patient may be expected to improve greatly in health; his appetite and power of digestion undergo a happy change, and, as a rule, he puts on weight and loses all his old physical worries.

CHAPTER XX.

TYPHOID APPENDICITIS.

TENDERNESS in the right iliac fossa, with a rising temperature, a foul tongue, and headache, are symptomatic of typhoid fever, as well as being suggestive of appendicitis; and if these symptoms occur in a young adult, the making of a diagnosis may prove a very difficult matter. Indeed, for a while it may be impossible to form a positive opinion —at any rate until the blood-test has been made.

Fortunately, when the typhoid enteritis spreads from the ileum to the appendix the symptoms are not usually acute, and the typhoid characteristics gradually assert themselves. The treatment of the patient is that of enteric fever. No operation is called for; indeed, the case is one of enteric fever passing from the ileum to the lining membrane of the appendix.

Supposing that, in a case of typhoid fever, perforation of the ileum takes place, the resemblance to acute appendicitis will be very marked, and it may be only on performing abdominal section that the nature of the case becomes clear.

When appendicitis comes on as one of the sequelæ of typhoid fever, there is less chance of the symptoms being mixed and of the nature of the disease being

mistaken. Indeed, in all probability the enteric fever had been duly recognized as it ran its course.

Examination of the blood would, of course, prove helpful in a case of doubt and difficulty; but, in all probability, the medical attendant is troubled neither with doubt nor difficulty, the case being quite clear.

In rare cases, the symptoms of appendicitis come on some weeks after the convalescence from enteric fever has set in. Unless the occurrence of sudden pain, of a falling temperature, and of a quickening pulse points to the probability of rupture of the appendix having taken place, the medical attendant will content himself with watching and waiting, but the diagnosis of perforation leaves him no alternative to operating.

The germs of enteric fever have been found actually invading the appendix.

CHAPTER XXI.

APPENDICITIS DURING PREGNANCY.

From time to time one is called in to advise in connection with an attack of appendicitis in a pregnant woman. The symptoms are the same as in a case met with in the ordinary way. The only point for remark is that it is possible that the due recognition of the condition may be somewhat delayed, as the nausea or vomiting, and the complaint of abdominal pains, may be disregarded, or wrongly ascribed to the pregnancy.

By no means should the case be allowed to drift on, but the appendix should be removed at the earliest possible moment. Obviously, it would be an extremely serious thing to allow the occurrence of septic peritonitis in a pregnant woman.

The operation, if undertaken early, will be simple and straightforward, and convalescence will run its usual course.

In such circumstances it comes as a considerable relief to the doctor if he finds that the woman has had other attacks of a like nature, with pains in the right iliac fossa. In this case he may be inclined to put on a fomentation and wait. But if the symptoms steadily get worse, nothing short of operation is likely to be of avail—and operation

undertaken when appendicitis is advanced may prove an extremely anxious matter.

Appendicitis after Parturition may for a while escape recognition, for if it comes on in the first, or even in the second, week after parturition, the symptoms are likely to be ascribed to child-birth.

The complaint of abdominal pains is apt to be discounted; but then, when the temperature goes up and the pulse quickens, the medical attendant becomes anxious, and fears that his patient has become infected through the open uterine sinuses. It is, of course, a matter of intense relief to him when he is able to ascribe the disturbance to the appendix, and a further relief if the symptoms gradually clear off and he is able to choose a quiet time for operating, if, indeed, an operation is decided upon. But he may find it necessary to advise immediate operation.

CHAPTER XXII.

DYSPEPSIA AND APPENDICITIS.

LIKE other surgeons who have seen their fair share of appendicitis, I have met with cases of the chronic form of the disease in which the most marked symptoms were those of indigestion, either with or without the suspicion that the "dyspepsia" might possibly be associated with, or dependent upon, gastric or duodenal ulcer.

In some cases, the discomfort after food, and the inability to digest what has been taken, have led to frequent, if not habitual, vomiting. Often there has been a good deal of flatulence, or diarrhœa, and the report of steady loss of weight is quite usual.

The patient may complain only of pain at the pit of the stomach—over the solar plexus, that is—and will then probably ascribe his trouble to indigestion. Indeed, it is not unlikely that in a considerable proportion of cases of chronic "indigestion" it is the appendix which is at fault. At any rate, careful inquiry should always be made as to whether there was then, or had probably been at some former time, suspicion or evidence of appendicular disease.

Some years ago I removed the appendix from the son of a former colleague whose trouble from his boyhood had been "indigestion." Almost "every-

thing" had been tried for him—bismuth, no doubt, and hydrocyanic acid, and probably arsenic. He had been carefully dieted, and he had dutifully followed the instructions laid down until he ate but little. But he did not get any relief. From the time of the removal of his appendix (1899) I had had no direct news of him, so, for the purpose of this monograph, I wrote to him in July, 1913, asking him to be good enough to report himself. The following was his reply: "I can, indeed, safely say that since my operation for appendicitis in 1899, I have had practically no digestive troubles. As a youth I was hardly ever free from them, and horribly 'delicate'! It is true I have had one or two bad breakdowns, but nothing whatever to do with the old trouble, and the last year or two I have been in far better health than ever before in my life."

The report of one other case of obscure nature will suffice to show how apt chronic appendicitis is to mimic gastric and duodenal disorders:—

The case is that of a lady whom I saw with Dr. Lewis Reynolds at High Wycombe. Her chief troubles had been indigestion, with pains at the pit of the stomach. She had been seen by several authorities, one of whom had diagnosed "gastric ulcer" with considerable certainty. The first time that I saw her with Dr. Reynolds I made no definite diagnosis, but thought—as he had thought—that the trouble was either gastric or duodenal ulcer, or else chronic appendicitis, a diagnosis comprehensive enough in all conscience! At the operation a fortnight later I first explored the gastroduodenal

region, and was ready to short-circuit the stomach and the small intestine. But nothing wrong could be found in those parts. So I closed the wound and made another in the iliac region, where we found enough evidence of past inflammatory trouble to justify us in removing the appendix.

With the exception of flatulent distention, and the appearance of a troublesome rash, which was ascribed to the application of tincture of iodine to the surface of the abdomen, she made a good recovery, and Dr. Reynolds thus wrote of her :—

" She has done marvellously well. She now takes more milky food than she has done for months, and more meat and poultry than she has for years. It is hard to believe that such a difference should take place after so little was found."

Obscure forms of gout, as well as " dyspepsia," may also be dependent upon chronic disease of the vermiform process.

CHAPTER XXIII.

COMPLICATIONS OF APPENDICITIS.

COMPLICATIONS which are otherwise apt to accompany or follow appendicitis are all happily avoided by the early operation, and the surgeon who habitually practises it has slight personal experience of them.

Subphrenic Abscess.—The presence of a subphrenic abscess in appendicitis is sure evidence that the case has been allowed to drift, the explanation for which may possibly be that the symptoms of the original disease were so slight, or so misleading, that the appendicitis was not diagnosed, and that the spread of the infection to, and the focussing of the later symptoms in, the region of the base of the right lung, withdrew attention altogether from the neighbourhood of the appendix.

Sometimes the on-coming of the abscess is long delayed after the original operation; but, as a rule, the first symptoms appear within a few days of the removal of the diseased appendix.

The abscess is generally due to the pus finding its way from the cæcal region to the phrenic vault, either in the loose tissue behind the colon, or through the peritoneal cavity. It may, however, form independently as the result of lymphatic infection—

being thus of pyæmic origin—and may have no direct association with the appendicular region. In any case, the surgeon may be unable to say before operating whether the pus is intraperitoneal or not.

Though probably the patient did well for the first few days, or even for a week or more, after the operation, he has of late been "hanging fire," and he does not look so well as he did. He may have had a rigor, and the temperature is now running an up-and-down course, and keeping, for the most part, above 100° F. He has profuse perspirations, and he is evidently losing ground. His pulse is rapid and of poor volume, and his appetite is bad. Microscopic examination shows the blood to be swarming with white corpuscles—provided that the man is still in a sufficiently vigorous state to produce them (*p.* 58).

As regards the local signs, there are pain and tenderness in the lower right costal region, and the area of dullness about the liver is increased. Probably, the diaphragm is being pushed upwards, for there is certainly an encroachment on the normal area of lung-resonance; breath-sounds are absent, and the lower ribs of that side scarcely move during respiration.

In rare cases the pus softens the diaphragm, and, finding a way through it, sets up an empyema. The abscess may even discharge itself though the chest-wall or by a bronchus.

If the presence of a subphrenic abscess is suspected, a careful and searching examination should be made—under an anæsthetic if necessary. And it may be

well to open up the wound and search with the finger in the direction of the liver, although there may apparently be nothing wrong with the immediate area of the operation. Or it may be that evidence is forthcoming that the abscess should be opened at the back, or even under the costal arch.

As regards searching for pus, it is far safer that it should be done by direct incision than by exploration with a hollow needle. The most satisfactory way of dealing with the case is by direct incision below the last rib, and, having introduced the finger and discovered pus, the track should be widely dilated, and then drained by a large tube.

If the abscess should have been left unattacked, and have already traversed the diaphragm and given rise to an empyema, it should be dealt with by resecting an inch or more of one of the over-lying ribs.

Iliac Abscess is sometimes a late complication. It may be that the operation-wound is soundly healed, and that the stitches have been removed without there being a trace of suppuration, and the patient is confidently looking forward to being allowed out of bed in a few days. Then he does not feel quite so well; there is some local pain and tenderness, and there may have been a slight shivering. The temperature may rise a little, or it may keep about the normal line. Shortly a swelling appears in the iliac fossa, and under a local anæsthetic the surgeon breaks through the line of suture with a director, and so provides for the escape of pus. Probably after this all goes well, but the occurrence

of suppuration has come as a surprise to the surgeon and as a disappointment to the patient.

It may be that at the time of the removal of the appendix one of the iliac glands was already infected to such an extent that the lymph-corpuscles failed to destroy the bacilli, the task being too great for them ; yet at the time of the operation there was no post-peritoneal swelling to attract the attention of the surgeon. It may be, moreover, that for a week or so a struggle for mastery was going on between the germs and the phagocytes, the germs at last getting the best of it. And then several days, even a week, might pass before the presence of the large glandular abscess became evident.

Another explanation for the occurrence of a tardy abscess may be that some slight infection of the iliac fossa took place at or before the operation, though not enough to cause immediate trouble ; that the germs remained slowly and stealthily preparing for a vigorous outburst—just as smouldering ashes may lie without giving any suggestion of the presence of danger, and then, when least expected, they may cause a sudden outburst of flame.

Or, as another possible cause of late suppuration, it may be that in spite of the most skilful surgery at the time of the appendicectomy, and after the conclusion of a perfectly aseptic operation, bacilli worked their way out from the bowel along the track of the sutures, and then set up a limited inflammation in the loose tissue about the cæcum.

Using the utmost care, the surgeon is unable to ensure against the occurrence of such set-backs, but

he has, nevertheless, to recognize the possibility of their occurrence. And, bearing them in mind, he will speak with caution when discussing with a patient the question of risks which may attend upon what he looks forward to being a perfectly simple operation.

However able a surgeon may feel himself to be, he must, at any rate, admit the possibility of the existence of a human element in his patient, and it would, therefore, be unwise for him ever to *promise* a straightforward and unhampered recovery after operation. Surgery being still an inexact science, the making of such a promise to a patient is an act of arrogance, and most of us have heard of instances in which it has been attended with grievous disappointment—and this not only in the case of an appendicectomy.

Fæcal Fistula sometimes follows the operation for the removal of a suppurating appendix, a possible cause of its occurrence being a giving way of the suturing by which the opening into the cæcum was closed. Or it may be due to sloughing of the bowel from acute bacillary infection, or from prolonged contact with a drainage-tube. Not improbably it is associated with the presence in the wound of septic pieces of silk suturing. In nearly every case the opening will close of itself in due course, and there should be no anxiety to meddle with it. If, however, the sinus obstinately refuses to close, active treatment may be needed. Possibly, after opening up the sinus, the edges of the aperture in the bowel may be pared and stitched together,

without causing a serious narrowing of the intestinal canal. If this operation does not prove entirely successful, and some escape from the bowel takes place in a few days, the opening may, nevertheless, eventually close without further interference. But if some more radical procedure is called for, resection of the cæcum may have to be considered. Nature, however, should be given a fair chance.

Intestinal Obstruction. — Appendicitis may cause acute intestinal obstruction, either by pinning down the ileum as under a band, or by setting up acute peritonitis, which paralyzes the muscular coat of the bowel. And in such cases the nature of the original disease may not have been suspected. As an instance of this, I may mention the case of an elderly gentleman, whom I saw in urgent consultation with a very able practitioner. He was vomiting, and was complaining of general abdominal pains in his distended abdomen. The history and symptoms did not suggest to me that there was appendicitis, and I drew the incorrect conclusion that his trouble was due to a sudden blockage of the sigmoid colon by a malignant growth. It was on the left side that he had had most pain. But on opening the abdomen I found nothing wrong with the large intestine, and on sweeping the hand across to the right side, peritoneal suppuration was discovered. An incision was, therefore, made over the right iliac fossa, and a gangrenous appendix was removed. The case ended fatally.

Acute intestinal obstruction may come on very soon after an operation on a suppurating appendix.

The abdomen becomes distended and tympanitic; the patient vomits grievously, and nothing passes by the anus. If, following Lawson Tait's plan, the administration of frequent doses of Epsom salts avails nothing, the abdomen will have to be opened without delaying. For this purpose the original incision may be again used, and the cause of obstruction sought. It will probably be found that some recent inflammatory adhesion is binding down the bowel, and the division of such a band may suffice to bring relief. But if the intestines are found so matted together that to attempt to deal with them would be to invite disaster, a Paul's tube should be inserted into the dilated piece of bowel nearest the block, and an anastomosis should be effected some days later, after things have quieted down. It might even be necessary to resect a considerable mass of the matted intestine. But the operation should not be undertaken at the time giving relief to the acute obstruction; the patient would not be able to undergo so serious an ordeal with even a fair chance of success.

When, as the result of peritonitis, coils of intestine are glued together in a tangled mass and are causing great distress by obstruction, the surgeon will be wise to content himself with performing a temporary enterostomy; and, later on, he may find it better to make an anastomosis of the intestine above and below the obstruction rather than attempt to disentangle the coiled mass.

The presence of distention is a very grave sign, indicating, as it does, intestinal obstruction due to

paralysis of the muscular coat of the bowel, the result of peritonitis. Once more, let it be clearly understood that the distention is not a sign of appendicitis but of peritonitis. And if it does not yield to treatment by saline purgatives, nothing but operation is likely to save the patient from death by toxæmia.

Intestinal obstruction coming on weeks or months after an operation for appendicitis would probably be due to the presence of a band or an adhesion, and, being thus of a mechanical nature, would be associated with active muscular movements in the distended bowel. The bowel certainly would not be paralyzed, as in the case of obstruction due to peritonitis, and the treatment by purgatives would be extremely injudicious.

Colitis.—Knowing, as we do, that when the appendix is inflamed its contents may be highly irritative and poisonous, it is easy to imagine that in the case even of a mild attack of appendicitis, colitis may be a secondary affection. The oozing of such toxic material into the large intestine may be the means of saving the appendix from mortification, but the cæcum and colon are likely to suffer from it. Thus, colitis is very apt to be a complication of appendicitis, and when that disease is treated by an appendicectomy, there may be but slight pathological change visible, at any rate to the naked eye, and yet the removal of the appendix may bring an ending to the colitis (*p.* 65).

Inflammation of the Gall-bladder is by no means a rare complication of appendicitis. Though

not, as a rule, a close neighbour of the appendix, and, therefore, liable to direct infection from it, the gall-bladder has a threefold indirect association with the appendix, namely, by the lymphatics and by the branches of the vena portæ, and by the intestinal canal itself. On page 64 an attempt has been made to differentiate appendicitis from cholecystitis, but it must be remembered that the two conditions may coexist in the same patient. If, therefore, there have been signs to suggest that an appendicitis may be associated with cholecystitis, the gall-bladder should be examined when the appendicectomy is done.

Hepatitis and **Hepatic Abscess** are rare, but may occur as the result of infection of the vena portæ or the lymphatics in septic appendicitis; they are sometimes secondary to a subphrenic abscess (*p.* 170).

Thrombosis.—One of the most serious complications of operations done for appendicitis is venous thrombosis. It is due to the micro-organisms of the appendicitis attacking the serous lining of the veins, just as is apt to happen in the case of a septic uterus. The germs may make their way directly into the neighbouring vein through its softened coat. But often the veins upon the left side are attacked, those on the right side escaping, at any rate for a time. In this case, the germs must have reached the serous coat of the vein through the blood-stream, and the condition is, therefore, like a septic pneumonia or a suppurating knee-joint; it is but indirectly connected with the appendicitis. Sometimes the thrombosis comes on suddenly, with a shiver or a rigor, when the

patient seemed to be making good progress towards recovery. There may be much deep-seated tenderness in the limb; the skin becomes œdematous and shiny, the pulse and temperature go up, and the patient feels that he has a bad set-back. Perhaps even pneumonia or some other pyæmic manifestation may arise, and the case end fatally. The first thing to do is to raise the foot of the bed by six-inch blocks, so as to help the venous return to the utmost, and to swathe the limb in cotton-wool. Quinine and stimulants will prove useful. Massage would be harmful; perfect rest is needed.

Pneumonia.—Extremely anxious are the cases in which pneumonia comes on as a complication. It may be the result of a direct infection from a subphrenic abscess, and it may quickly involve the left lung also. Or it may come on indirectly as a pyæmic manifestation. The patient with double pneumonia secondary to appendicitis stands, indeed, a poor chance.

Renal Complications.—Inasmuch as the appendix is in the close neighbourhood of the right ureter, it may happen that in the case of appendicular abscess the pus may find its escape by the bladder, and if the case then came under observation for the first time, and with no clear history, it is possible that it might be regarded as one of primary renal abscess, especially as the *Bacilli coli* would probably have involved also the kidney itself. Indeed, with pus in the urine and tenderness in the kidney, it would be difficult to make any other diagnosis.

Suppression of Urine may be a complication of acute appendicitis; it would be more likely to occur in a child than in an adult, as appendicitis is an extremely serious disease in children, and causes grave visceral disturbance (*p.* 80).

At a meeting of the Royal Society of Medicine on December 12, 1913, Mr. Arthur Evans reported the case of a boy of eleven years, who had been operated on for acute appendicular abscess. As there was a little free fluid in the peritoneal cavity, a drainage tube was left in. Normal saline solution was injected into the rectum at the rate of about eight pints a day. Calomel was given in half-grain doses on the third day, and the bowels were opened. The boy seemed to be going on well; but on the fifth day he vomited, and his scanty urine contained blood and bacilli, and his kidneys ceased working in spite of fomentations and hot packs. He got steadily worse and became unconscious, his pulse being scarcely perceptible. Each kidney was then exposed from behind and was freely laid open. The vomiting ceased, urine began to flow abundantly from the wounds, and the boy recovered. There can, I think, be little doubt that the boy's life was saved by the timely nephrotomy.

Secondary Hæmorrhage is apt to be an alarming complication of an operation upon a septic appendix, and it may come on without warning and with great suddenness. It may be that during the operation an inflamed and, therefore, a thrombosed artery was cut across, and because it was plugged it caused no bleeding and attracted no attention. But the plug

being septic was unstable and, under the destructive influence of the bacilli, broke down and was washed away by the escaping blood. The outlook is, of course, very serious, for one cannot tell what is going to happen next. If the bleeding is severe, or if it recurs, the safest course is to have the patient placed once more on the operating-table, and freely to open up the wound so as to be able to get a good view of its depths. Then, with some dry gauze the clot should be gently wiped away, and the leaking vessel made to reveal itself. And when it is found, a ligature should be placed deeply around it by means of an aneurysm needle, and the cavity should be gently stuffed with dry gauze, the wound being left wide open.

The general rule for the treatment of hæmorrhage holds good in this case, namely, to cut down and secure the bleeding vessel. The septic condition, of course, makes the case an anxious one. But should there be a lack of courage on the part of the surgeon, or of the patient and his friends, the case may be lost. At the best the outlook is bad.

Bubo.—It may happen that septic matter circulating in the lymphatics sets up inflammation in the glands of the groin of the right side, and sometimes even of the left side. This is best dealt with by fomentations, and if suppuration takes place, the use of the scalpel and sharp spoon may be called for.

(The question of reopening the wound for deep-seated abscess is referred to on page 172).

Chronic Pelvic Abscess is quite a likely complication of appendicitis, but if it takes place slowly and quietly, its origin may not be suspected, as the following account shows :—

A gentleman, aged 45 years, was sent to me in 1903, with a history of intermittent trouble with defæcation, and of a feeling of fullness and weight about the neck of the bladder. His doctor, a most competent practitioner, wrote that in May the patient had been treated by some one else (he did not say where, or by whom) for obscure abdominal pains which were centred in the hypogastric region. At that time, he said, no rectal examination had been made. But when the second practitioner had introduced his finger into the rectum he had found a tumour which, he said, felt like an enormously enlarged prostate gland.

The patient told me that he had constant pain on micturition and defæcation, and that occasionally there was a "discharge" from the urethra. He denied all possibility of venereal infection. For several years he had had obscure abdominal pains, and he had become dyspeptic to such an extent that he was afraid to eat meat. Three months previously he had had severe pains in the hypogastric region, for which he was kept in bed. He told the doctor who was attending him that he thought he must have got "appendicitis," so great was his distress. But the doctor, finding that there was neither swelling nor tenderness in the right iliac fossa, put down the distress to the after-effects of influenza, and applied fomentations over the hypogastric region. In due

course the attack passed off, and the patient was able to resume work. But he was miserable, and was steadily losing weight. He also told me that he felt as if he had a cricket ball near the rectum, and that he could never obtain a proper fæcal evacuation.

The finger introduced into the bowel at once came upon a hard, tender swelling at the base of the bladder. It was about the size of a small hen's egg. It was not prostatic, but it was so close to the prostate gland, and so intimately attached to it, that there was little wonder that it had recently been likened to an enlarged prostate. No lymphatic glandular invasion was anywhere discoverable, but I was afraid lest the tumour might prove to be malignant.

In the course of a consultation, a surgeon hazarded the speculation that the tumour might be hydatid, but we agreed that it was impossible to be sure of its nature without operation. I opened the abdomen in the middle line, and, working cautiously amongst coils of closely-adherent intestine, found at the very bottom of the recto-vesical pouch a tightly-filled abscess, the walls of which were composed of the rectum behind, the prostate below, and the bladder in front, whilst a kinked piece of the colon formed its roof. To the right of the abscess, and firmly glued to the base of the bladder, was the end of the appendix, inflamed and ulcerated. Having removed the appendix, and having wiped out the abscess cavity, I passed a large drainage tube down into the recto-vesical pouch, and brought the other end out a little below the umbilicus. Though the peritoneum showed itself proof against infection by the *Bacilli coli*, the

surface-wound became infected about a fortnight after the operation, and so severe was the attack of cellulitis caused thereby, that some large artery in the epigastric region burst out bleeding on two occasions, and the patient was near dying from secondary hæmorrhage. He made, however, a complete recovery.

So far as I could ascertain, the pain and tenderness had never been in the right iliac fossa, but always is the pelvic and hypogastric region. At the beginning of his trouble he had probably had a mild attack of inflammation which fixed the tip of a long and wandering appendix in the depths of the pelvis, and probably, a few months before I saw him there had been a recrudescence of the inflammation, with severe hypogastric pains, and with the formation of the abscess. Had he been operated on in his first attack (whenever that was), he would have been spared a large amount of suffering, and would have avoided the very serious risks inseparable from the more extensive operation.

CHAPTER XXIV.

STATISTICS OF OPERATIONS.

It was Talleyrand, I think, who said, "*La statistique, c'est le mensonge en chiffres*"—a bitter criticism, and, fortunately, not always true. Occasionally, however, it contains a good deal of truth. But because statistics may not be always trustworthy, it does not necessarily follow that they have been wilfully and deliberately "cooked." Human nature being what it is, however, and memory being very treacherous, errors are apt to creep in somehow or other, by which general results are beautified at the expense of stern truth.

Charles Darwin wrote, that he made it a rule to note without fail and at once any observation or idea which told against his theories, for he found by experience that such facts and thoughts were far more apt to escape from the memory than favourable ones. And if Darwin could not trust his memory for unwelcome facts, I think that very few of us can trust ours.

To deal with percentages as applied to human beings may be correct enough when figures are worked out in very large numbers by an unemotional, disinterested actuary in the office of a life-

insurance company; but I do not look upon such calculations as of practical value when they are compiled by a surgeon, in his evening leisure, to set forth the result of his own treatment of certain sick people. Two patients with a disease called by the same name are not of the same clinical value, nor are twenty, nor two hundred. The actuarial method in setting forth progress in connection with the treatment of disease generally is by no means satisfactory; still, statistics are not devoid of all value.

Too much respect, however, need not be paid to them. I remember in the last quarter of the last century, when ovariotomists were striving among themselves as to who could produce the best statistics for the operation, how one surgeon would refuse an unpromising case lest the result of the operation should spoil his figures, whilst another, less calculating, would boldly accept it, with the attendant risks. In various ways, statistics can be made unduly attractive.

The statistics which any particular surgeon is able to produce as the result of his operative work in appendicitis must greatly depend upon the skill of the general practitioners who send him his hospital cases and provide him with private work.

The figures which I give herewith of the result of the operative treatment of appendicitis have recently appeared in various medical publications. They are not my own figures, but I use them with the intention of showing how favourably the treatment of appendicitis is influenced by early operation.

The following table was supplied by Mr. Edward Harrison[1] as the result of recent work at the Hull Infirmary, where "every case is operated on as soon as possible after admission":—

	Cases.	Deaths.
Acute, with appendicectomy ..	56	0
Chronic, with appendicectomy ..	52	0
Abscess, with appendicectomy ..	10	0
With general peritonitis	4	0
Abscess, without appendicectomy..	54	4

In this series of 176 operations, the 4 deaths were in cases in which the appendix was not removed, all being moribund on admission. The custom at the Hull Infirmary, it seems, is, when abscess has formed, to be content with its evacuation, unless the appendix can be removed without separation of adhesions; but their statistics seemed to point to the removal of the *fons et origo mali* in every case. It would be difficult, I think, to produce a more satisfactory set of figures in a series of cases, bad and good, operated on without selection.

Mr. Eric Sheaf[2] wrote that he had operated on about 150 cases of all sorts, from the very earliest to those with large abscesses or spreading peritonitis. He had not lost one case where the disease was localized to the appendix, and all these had run a

[1] *Brit. Med. Jour.*, 1913, April 19.
[2] *Ibid.*, 1913, April 5.

quick, uncomplicated course to recovery. Of the remainder, two cases of spreading peritonitis, and one with a large abscess, died. The later cases, such as those with large abscesses, always had a longer illness, and two of them had empyema.

The mortality of early cases was *nil*, that of all cases was 2 per cent, and he was of opinion that the figures which he gave strongly supported the plea for immediate operation. The price paid for the policy of immediate operation was that he had "looked and seen" a normal appendix five times, but with the compensation that the correct diagnosis was made without serious injury to the patient.

Mr. Grey Turner,[1] who also strongly advocates the early operation, wrote that up to the end of 1912 he had operated on 681 cases of appendicitis of all varieties, with a mortality of 5·1 per cent, and that during the last year he had operated in all on 118 cases, with a mortality of 1·7 per cent.

He regretted, however, that the public in the north were only too ready to seize on any excuse for delaying operation, and that he and his friends had found that the views from time to time expressed in favour of delay had done considerable harm. Still, he thought that the general views were improving, as earlier cases were coming to hospital each year, and that the mortality from appendicitis was, in consequence, steadily diminishing—in his own series from 12·5 per cent to 1·7 per cent—whilst the figures of the Infirmary showed that

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[1] *Brit. Med. Jour.*, 1913, March 8.

the mortality had been exactly halved during the last ten years.

Mr. Gray,[1] of the Royal Infirmary and of the Children's Hospital, Aberdeen, published his figures for appendix operations in the years 1910, 1911, 1912. Altogether there were 697 cases, of which 106 were operated on for acute disease with limited infection, and of them not a single case was lost, although 32 were in children. In 208 cases which had already run on to infection of the peritoneum or other parts, there were 25 deaths. There were 383 "interval" and chronic cases operated on, with only one death.

In the advanced and acute cases of adults there was a death-rate of 9·5 per cent, while that in children was 1·8 per cent. "These figures," concluded Mr. Gray, "surely prove the advantage and necessity of operation at the earliest possible moment, *especially in children.*" (Reference may be made to *p.* 91, in connection with the importance of early operation in children).

Mr. W. H. Clayton-Greene[2] contrasted two sets of figures, namely, those obtained at St. Mary's Hospital, London, when "waiting" was the rule, and those of more recent times: "At St. Mary's Hospital, 1902, there were 73 acute cases, with a mortality of 28·5 per cent; in 1903, 77 acute cases, with a mortality of 30·5 per cent. In 1912, a 'no wait' policy being generally adopted, 136 cases were operated on, with

[1] *Brit. Med. Jour.*, 1913, March 15.
[2] *Lancet*, 1913, March 22.

a mortality of 5·9 per cent; in these cases no discrimination is made: some were early, some were late, but the total mortality is very low, as the very worst cases are included."

Mr. Clayton-Greene truly remarks that if operation is practised at once, we shall be called upon less frequently to consider our attitude in regard to the "late" cases. And he thinks that in the great majority of fatal cases, a "waiting" policy has been adopted, not necessarily by the surgeon, but by the general practitioner or the relatives of the patient.

In the second volume of his "General Surgery" for 1913, Dr. J. B. Murphy gives statistics of 4,000 cases which were treated in Kümmell's clinic. Acute cases, 1361 (599 in first twenty-four hours); 22 deaths (1·6 per cent). Interval cases, 1986; 15 deaths (0·75 per cent). Diffuse peritonitis, 321 cases; 137 deaths (42·7 per cent). Abscess, 306 cases; 41 deaths (13·4 per cent).

These figures prove to demonstration, what every surgeon teaches, that success is almost certain to follow operation in the early and in the quiet stage of the disease, but that if the operation is put off until abscess has formed, or diffuse peritonitis has come on, the result is apt to be disastrous.

In the *Glasgow Medical Journal* of November, 1912, Sir George Beatson publishes an essay upon 300 consecutive cases of appendicitis. As is well known, he is opposed to the rule of immediate operation in appendicitis, and relies upon medicinal, dietetic, and other measures. "To do nothing but what is necessary to carry the patient successfully through

the present illness should be the guiding principle and the basis of all treatment. To keep the peritonitis within bounds, and to prevent the dangers that would follow its extension, are the objects that should dictate the measures used." Evidently, then, Sir George is of opinion that by treatment he can hold in control a peritonitis started by a septic appendicitis. The experience of most surgeons is, however, that "treatment" is absolutely powerless, by drugs or in any other way, even to guide a septic peritonitis, and still less to "keep it within bounds." A farmer might as well talk of keeping within bounds a mad bull which had broken loose. The task is quite beyond him.

Sir George says, "Assuming that no surgical intervention took place in a number of cases (of appendicitis), and that only medicinal, dietetic, or other measures were employed, what results might be looked for? The general suppurative cases would die, as also would any of those with localized suppuration where the abscess burst early into the general peritoneal cavity. Both these groups, however, would form a small percentage of the cases. A very liberal calculation would be 5 per cent. *The other 95 per cent would, under careful and proper expectant treatment, recover from the attack*, and it should be made an axiom that, in the management of every case of acute appendicitis, there is one point and one point only, that should be kept in view, and that is *the safe conduct of the patient through the existing attack*."

I am strongly of opinion that watching and waiting

by a case of appendicitis is a dangerous line to take, because one knows neither the actual condition of the appendix nor the course which the disease will pursue. At any rate, if in Sir George's percentage cases he could have got to work as soon as the disease was diagnosed, he would have saved those five "suppurative cases" which under his expectant treatment he candidly admits "would die."

Short of operating, I am ignorant of any method of treatment which can be trusted to give a "safe conduct" of any patient through an attack of acute appendicitis, and I am apprehensive lest Sir George Beatson's advice should have the effect of greatly retarding progress in the treatment of that disease.

It is only fair to give Sir George's actual figures for 300 cases, and I am sure that he would admit that could he or some other surgeon have removed the appendix of those four cases of abscess, and of those seven cases of peritonitis, in the early hours or days of the disease, his figures would have been still better. "The following table gives the results (the expectant method) in 300 consecutive cases of appendicitis admitted under Sir George Beatson's care in the Western Infirmary":—

		Deaths.	Per cent.
Interval cases	126	0	*nil*
Acute cases, 69 of whom had localized abscess ..	164	4	2·4
General peritonitis	10	7	70·0

The percentage of deaths over the 300 works out at 3·6, a result with which many surgeons would be satisfied, but which, obviously, is not the best obtainable.

Having cast his eye over his figures once more, Sir George gives way somewhat to his feelings, and says: "The teaching that operation should be done in *acute* appendicitis directly the diagnosis has been made—irrespective of the period of time the attack has existed—has had a fair trial, for it has been largely put into practice for the last twenty years at least. What are the results it has to show? They are anything but favourable, and are not comparable to those I have just given."

I have no hesitation in saying that the immediate operative treatment has not yet had "a fair trial," at any rate in the British Isles; but when it comes to be adopted, the best figures which are at present available will look poor in comparison.

Sir George Beatson's position as regards operation in appendicitis is, perhaps, somewhat misunderstood in England. He is not opposed to the early removal of an acutely-inflamed appendix; indeed, he says, "many cases may be operated on *very early* in an acute attack without risk, and if the immediate operation is confined to that period, nothing can be said against it; but this does not hold good with the later stages of the attack, and it is the extension of the same principle to these later stages that has led to this high mortality in acute appendicitis treated surgically."

His objection is, therefore, to immediate operation

being advised in cases of appendicitis which have been allowed to run on to a certain, or an uncertain, stage undealt with. If in every case one could be absolutely sure of the on-coming of a quiet stage, I would gladly throw in my lot with him. But, as things are, it is safer at once to operate, no matter how far the disease has advanced, though, of course, the only trustworthy treatment is by operation in the early hours of the disease.

Personally, I do not think that much is gained by the publication of statistics in the treatment of mixed cases of appendicitis. And for all practical purposes, it may be admitted that operations in the first twelve or twenty-four hours of the disease, and for those in the "quiet stage," the percentage of failures is zero, but that if cases are allowed to run on to localized or general peritonitis—perhaps with abscess—the risks are great, whether operation is done or an attempt is made to tide the patient over to a possible "quiet stage." And in my opinion, and in the opinion of most surgeons, the safest course is in immediate operation in all cases.

Two Series of Cases.

In imagination let us take a hundred cases of appendicitis, from the beginning of their manifest infection, and form a rough estimate of the course which they will run, basing our guess on what we have seen in other instances. It might be fair to suggest that 30 of them would probably get well with what is called "medical treatment." This might be too large a proportion, but it may pass.

Of the 70 remaining cases, perhaps 10 might have subsequent slight local troubles, from which they also may get quite well without active help, whilst an equal number might have recurring attacks which rendered them chronic dyspeptics, or even, from time to time, suddenly and most inconveniently took them from their occupation and threatened them with disaster. At last, finding the appe[n]dix a constant source of worry and anxiety, they have it removed when the trouble was in the "quiescent stage."

Accepting this estimate, there are still 50 cases left which will not fall into any one of those three groups. Five or six of them, perhaps, will go on with alarming rapidity, and when a day or so later the abdomen is opened—tardily opened, I will say—the appendix will be found gangrenous or perforated, with, may be, a small unsuspected abscess in its neighbourhood. It matters not who the surgeon is who operates, some of those patients will certainly die, the proportion being settled, apparently, by blind chance. Of the remaining serious cases which do not run a hurricane course, some will be associated, perhaps, with subphrenic abscess, some with pelvic abscess, some with diffuse suppuration of the abdomen, with intestinal obstruction, or with septic intoxication.

The list of the later complications of neglected appendicitis is long and appalling, and they claim a large number of victims. They ought all to have been avoided. It is impossible even to make a guess of the actual figure of the fatal cases, so, being

unknown, let it be called *x—an x percentage* out of the fifty is lost.

Now, by way of contrast, let another hundred cases of appendicitis in the earliest stage be taken, and let every one of them be operated on as soon as the diagnosis is made. By the light of our former series, it is at once seen that 40 cases have been dealt with which would have recovered without surgical aid. I admit it. But has any harm been done by operating? Have any people been wronged by the operation, or any surgical principles violated? At any rate, those people, 40 of them (for they have all recovered), will not run the risk of having appendicitis again—and that is something to be thankful for. Then, by the early operation, we have put right those cases of slight relapsing forms of the disease; these 10 people have been saved the misery of an annoying chronic dyspepsia—which is a common, and often unrecognized, complication of a lurking appendicitis (*p.* 167). We have made those 20 persons absolutely safe and happy.

There yet remain 50 individuals who, in the other series, became the subject of local and diffuse abscess in the abdomen and pelvis, or were attacked by some form of blood-poisoning. We have got them also safe, every one. And we have not lost a single case out of the hundred—because the appendix was removed as soon as it was found to be diseased.

What a contrast between the two series! Yet in the beginning the patients were all alike—all apparently simple cases of appendicitis. There can, I think, be no difference of opinion on the subject

—*x per cent* of the first lot of cases was lost because of want of surgical enterprise, whilst not a single death occurred in the second series. So that early operation in appendicitis gives *x per cent* the better result.

Then, why is it that early operation in appendicitis is not the rule? The reply may be that it is all very well to talk about *series of cases*, but when the family doctor is in attendance on any particular case, and is surrounded by anxious parents and apprehensive and criticizing friends, he has to disregard the average and think only of the *individual*. That, in other words, circumstances alter cases. Still, if circumstances do alter cases, they ought not to disturb the principles on which surgical cases should be treated.

But hitherto there has been no principle laid down by general professional consent and teaching in England, as to what should be the rule and guide in the treatment of appendicitis. It must come ere long; and when it comes it will be, I think, in some such form as this: "As soon as it appears fairly certain that the appendix is inflamed, it should be removed by operation." The rule of treatment should be made as definite and rigid as is that for the treatment of a strangulated hernia or a cancer of the breast.

If statistics of my own operations were to be asked for, I should have to say briefly that I have not kept any, and that if I had, I might not have the courage to publish them. Many of my cases have been in children to which I have been called when the disease was far advanced. (In Chapter VII I have

referred to the great risk which children run of not having their appendicitis promptly recognized and quickly operated upon.) And many of the adult cases I have been asked to see when appendicitis had ripened into abdominal or pelvic abscess. But of the adult cases, as well as the childhood cases which I have seen early, and in which I have had a free hand, the results have been all that could be expected.

The surgeon who sees his cases of appendicitis early and is allowed to operate at his desire, can depend on securing good results, and, further, he will have but slight acquaintance with unfortunate complications.

Year by year the mortality of the disease is lessening. This is due to the fact that fewer cases are allowed to drift, and that an ever-increasing number of them are being operated on within the first twelve or twenty-four hours. The percentage of recoveries in operations done on the second day is not so good as that of the first, but better than that of the third, and a good deal better than that of the fourth; and the more one looks at the figures, the greater becomes the surprise that there is any hesitation regarding the advisability of operating at the earliest possible moment.

With increasing experience in the treatment of appendicitis, and especially as the result of early operation in acute cases, the statistics of the operation for appendicectomy are steadily improving. This improvement is due as much to the judgment and activity of the general practitioner and physician,

as to the skill of the operating surgeon. Nowhere, I think, is this improvement better set forth than in a communication from Mr. Gilbert Barling,[1] who gives the figures taken from the annual Reports of the General Hospital, Birmingham, for the last seven years:—

Year.	Cases.	Mortality.
1906	101	23·7 per cent
1907	131	18·5 ,,
1908	152	21·0 ,,
1909	193	16·0 ,,
1910	154	13·3 ,,
1911	238	13·02 ,,
1912	240	6·25 ,,

Mr. Barling continues as follows: "Appendicectomy in the quiet interval during the last eight years was performed 1,063 times by the whole of the staff, and there were two deaths—one from the anæsthetic and one from hyperthyroidism. I quote these numbers as showing the extreme safety of the operation in skilled hands. These operations were not undertaken under the temptation of obtaining fees, but in what was regarded sincerely as the real interests of the patients. I am aware, of course, that the mere safety of an operation is not its only justification, but it is one of the factors."

In a recent communication from Mr. Elworthy—in which he expressed views upon the treatment of

[1] *Brit. Med. Jour.*, 1913, Dec. 13.

appendicitis which are not in accord with those which it is the object of this little book to set forth—he concluded with the statement that only "something like half the real cases of appendicitis require operation, and the other half do not." I do not dissent from this. Indeed, I might have agreed if he had said that possibly *three-quarters* of them might get well without operation. But because we do not know which these cases are, and because we must not speculate in them and risk losing, the only safe line to take is to operate on them all.

In the *Lancet* for December 20, 1913, are given statistics of a large number of operations for appendicitis in Switzerland—a country which "still loses 400 of its inhabitants yearly" from that disease :—

In Professor Sahli's Bernese statistics of 1895, 21 per cent of all the operation cases died; the total mortality, however, in 7,213 cases was 9·6 per cent.

In 404 operation cases at the Basle clinic from 1910 to 1912, the total mortality was 5·7 per cent; 164 of these cases were operated on the first day, and 104 cases on the second day. How much depends on early operation the following data show :—

	Cases.	Mortality.
Operation on first day ..	1723	0·7 per cent
,, second day..	1389	4·7 ,,
,, third day ..	788	10·7 ,,
,, fourth day..	1197	21·2 ,,

The length of stay at the hospital increased according to the later date of operation from 17

(first day) to 21, 31, and 40 days (for the fourth day). At the Bernese clinic only six patients succumbed out of 299 acute cases which were operated upon, and these six had entered the hospital after the fourth day of the disease. All the cases undergoing operation on the first and second days of the attack were cured.

In the face of figures such as these, it is strange that one still hears the suggestion that surgeons are almost "crazy" in their anxiety to operate early in appendicitis; or, at any rate, that they seem influenced by indecent haste. These critics of modern Surgery would apparently prefer that the operator should give the disease a fair start—that he certainly should not "shoot at sight." But could they only realize (as surgeons do) the disastrous results which so often attend the policy of temporizing, hesitating, and delaying in the treatment of this disease, they would quickly change their opinion. And it is chiefly in the hope of enlightening those who at present are inclined to shake their head, or to express downright mistrust as to the righteousness of the most modern treatment of appendicitis, that the many tables of statistics in this chapter have been set forth. They are not the author's figures, nor have they in any way been "cooked" by him. But he fully accepts them, and most gladly avails himself of them. They show the results of the work of many surgeons in different parts of the world, but they all say the same thing, namely, that if only the surgeon operates in the first twenty-four hours or so, the patient will almost

certainly recover, and that the recovery will be quick and unhampered. And the figures say this with so much clearness and eloquence that it certainly ought not to pass unheeded.

And if physicians and others shake their heads at that which most surgeons deem to be the proper treatment for appendicitis, what have they to offer in its stead? Are the cases to be merely "left to Nature"? Are they to be treated by simple rest in bed, or by expectancy together with the use of drugs? Such gentle methods have been long on their trial: sometimes they have succeeded, but too often they have failed miserably. The failures, however, are never published. As Mr. Edmund Hughes has said, surgeons are still looking for the publication of a long and uninterrupted series of reports of cases which have recovered under what may be called Nature-treatment. When it comes, however, it will have to show better figures than those which have been set forth here before it can expect to replace the treatment by immediate operation. But, supposing that a practitioner could show a run of 50 or 100 cases successfully treated on these lines, he could by no means be sure of obtaining such a good result in the next series. Nor should he claim that he has *cured* the cases which he has reported as successful, for the simple reason that the patient who has "recovered" from an attack of appendicitis, and who still remains in possession of a damaged appendix, can never be looked upon as *cured*. At any moment the smouldering embers may burst into flames.

It would be interesting to know how the medical officers of the leading British insurance companies would regard the cases of two otherwise healthy young men who had recently gone through an attack of appendicitis, one of whom had been treated by appendicectomy, whilst the other had not. In my opinion there is no comparison between the actuarial value of the two lives, for the man who has not been operated on may have another attack at any moment, and this attack may be far worse than the former.

CHAPTER XXV.

CAUSES OF DEATH—UNNECESSARY DEATHS.

INASMUCH as appendicitis is a septic disease, the most likely cause of death is blood-poisoning in one form or another. The poisoning may be extremely acute, and in children, whose power of resistance is feeble, and in whom the delicate lining of the appendix offers a highly favourable hatching-bed for virulent germs, the toxic absorption often proves fatal with great rapidity and suddenness. The effect of the septic absorption upon the central nervous system is that of profound shock.

A common result of appendicitis which has not been early operated on, is peritonitis, in which condition toxic material is taken up, not only from the inflamed serous membrane, but also from the interior of the paralyzed bowel. It is much the same thing when drifting appendicitis is associated with abscess.

In some cases, septic micro-organisms are carried by the blood-stream to the pericardium or to other serous surfaces, or to distant areas of connective tissue, where pyæmic abscess forms with, probably, a fatal ending. The pneumonia which carries off some cases of appendicitis is, of course, of septic origin.

Another septic manifestation which is apt to entail death is venous thrombosis (*p.* 178). From tributaries of the iliac veins, the clotting extends downwards into the femoral veins, and it may also proceed in the opposite direction and implicate the vena cava. But in view of the frequency with which iliac and femoral thrombosis takes place after suppurative appendicitis, it is remarkable how often the cava escapes and the patient survives.

Seeing, then, in how many ways septic disease may be directly associated with appendicitis or closely follow in its wake, and seeing also how impossible it is to know in which cases this will be most apt to occur, or to provide against its occurrence, or to control it by any method of palliative treatment, it seems almost unnecessary to insist again on the fact that immediate operation in appendicitis is the only measure on which reliance should be placed.

Unnecessary Deaths.—If we look around the circle of our personal friends and acquaintances, say of the last twenty years, we can scarcely fail to realize the fact that a considerable number have dropped out as the result of blood-poisoning started by disease of the appendix. Several colleagues and friends of my own have thus needlessly perished. Indeed, medical men, who, in my opinion, ought to enjoy an exemption from all disease, have paid a heavy toll to appendicitis. Not a few have been rescued by prompt operation, but too many have not accepted for themselves that definite line of treatment which, in like circumstances, they would probably

have recommended to those for whose health they were responsible. But, unfortunately, medical men make, as a rule, bad patients—bad in this sense, that they do not readily hand themselves over, bodily and entirely, to their *confrères*, and bad also in that the *confrère*, when he has undertaken entire charge, is apt to hesitate to insist upon an extreme measure of treatment lest his views should fail to meet with the full acceptance of his friend.

The description which I have used in connection with most of these deaths as " unnecessary " would not so readily be applied to a death from typhoid fever, cancer of the liver, or pneumonia, for instance, but death is *unnecessary* in the case of appendicitis in that if only an early and simple operation had been resorted to, no calamity would probably have taken place.

Nearly all these deaths, I insist, were unnecessary, and most of us would admit, as we look back, that not a few of the cases which we have seen in consultation might have been saved if an early operation had been resorted to.

In Surgery, as in the affairs of the State, what is to be desired is the greatest good for the greatest number; and if we could have once again amongst us those friends whom uncontrolled appendicular disease has taken away, and could start treatment afresh, and begin it by early removal of the inflamed appendix, many of them, no doubt, would still be with us. But, unfortunately, the nature of our work is such that we cannot have our failures back and try them over again in a different manner.

The barrister who is not satisfied with the result which his conduct of a case has received from any particular judge, can take the case up to another Court and have it tried again, altering his treatment, may be, and securing, perhaps, a different verdict. But there is no Court of Appeal for the surgeon who has been unsuccessful in his management of a case. It behoves him, therefore, so to act that he may take no needless risk when entering into a contest with his great adversary, the Man with the Scythe.

THE END.

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