intervals, may give an indication whether pus is forming or not, a leucocytosis of 20,000 or more pointing to the presence of pus. During the past five years our technique has much improved, and it is now safe to evacuate pus from an appendicular abscess as soon as it can be recognized, provided that before doing so the area of operation is localized and shut off from the general peritoneal cavity, by careful packing with a double bulwark of gauze, the outer layer of which can be left *in situ* for twenty-four hours after the evacuation of the pus.

One of the greatest advances in the treatment of these cases in the past two years has been the greater attention that is paid to the position of the patient—the head and shoulders being raised, and if necessary the head of the bed also raised, so that pus may tend to gravitate into the pelvis, instead of tracking up into the subphrenic region, where it is much more likely to cause a fatal toxæmia.

It may be necessary to drain freely, using large rubber drains. In one such case that I saw successfully operated upon, pus poured out from incisions above the pubes, and in the right and left iliac regions. Four large drain tubes were put in, down to Douglas's pouch in each iliac region, and running up to the liver. The patient steadily and speedily recovered.

Our hope of saving such cases of general suppurative peritonitis has been immensely increased by the method of continuous subcutaneous infusion, several pints of saline solution being run into the thighs by one or two hollow needles and a simple siphon. No attempt should be made to flush out the abdomen, for this will only result in spreading the infection still further.

In these cases of general suppurative peritonitis it is absolutely necessary to get the bowels to act, calomel being given in grain doses hourly.

CONCLUSION.

I would recapitulate our position in dealing with appendicitis as follows:

1. The majority of cases will get over the attack if treated on simple medicinal lines.
2. During the quiet period the appendix should be removed.
3. During an attack the patient should be carefully and frequently watched, and on any sign of fulmination operation should be done at once.
4. If there be suppuration, if all is going on otherwise satisfactorily, the evacuation should be deferred until after the fifth day, care being taken not to open the general peritoneal cavity. But if in doubt whether to wait, the pus may be directly evacuated. If the appendix present in the wound it should be removed, but no elaborate search should be made for it. It may be removed later on.
5. In general suppurative peritonitis the use of drainage, massive infusions, and calomel.

REFERENCES.

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ONE YEAR'S WORK IN ACUTE APPENDICITIS.*

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DURING the year 1906 it fell to my lot to operate upon 47 cases of appendicitis at some period of the acute stage of an attack, and in order to conveniently study the results obtained I have classified them into four groups:

1. "Early" cases, where the infection was found at the operation to be still limited to the appendix, there being as yet no evidence of peritonitis.
2. "Abscess" cases, where an abscess was present, more or less securely shut off by localized peritonitis from the rest of the peritoneal cavity.
3. "Diffuse spreading" peritonitis, where the peritoneum was becoming rapidly and progressively infected, without any attempt at limitation of the process.
4. "General" peritonitis, where at the operation it was actually seen that the peritonitis extended everywhere, from the pelvis to the diaphragm. The difference between

the two last groups is merely one of extent of peritoneum involved, and many would include them together under the term "general" in contrast to "local" peritonitis. To do so, however, gives a wrong impression as to the recoverability of general peritonitis, for in many of these cases the infection, though rapidly spreading and tending to become general if left alone, yet has not actually done so at the time of operation, and, in fact, may by means of the operation be prevented from so doing. Truly general peritonitis is very rarely recovered from, and can be diagnosed with certainty only when, at the operation, the infection is actually seen to extend from pelvis to diaphragm.

	Cases.	Deaths.	Mortality.
Group 1. Early cases	6	0	—
" 2. Abscess cases	19	2	10.5 per cent.
" 3. Diffuse spreading peritonitis	19	0	—
" 4. General peritonitis	3	2	66.6 per cent.
Total	47	4	8.5 per cent.

This total mortality of 8.5 per cent. compares very favourably with what I have obtained in previous years (17.6 per cent. over a series of 26 cases in 1905, and 22.8 per cent. over 21 cases in 1904), and it is to be attributed to the undoubted tendency on the part of the medical practitioner to call in a surgeon at an earlier stage than hitherto. The 4 deaths that have occurred (2 in abscess cases and 2 in general peritonitis) cannot reasonably be attributed to the operation *per se*, but are unquestionably the result of the operation being delayed too long.

"Early" Cases.—Appendicitis is undoubtedly at first a purely local disease; it is absolutely limited to the appendix. The time which elapses before the infection spreads to the peritoneum varies in different cases, and hence the limit of forty-eight hours, as usually given, is not to be taken as absolute, but merely as a rough guide. I have found peritoneal infection as early as eighteen hours after the onset of the attack, and, on the other hand, have on the fourth day found a gangrenous appendix without any evidence of peritoneal reaction. If the appendix is removed at this localized stage the process is cut short, and all the possible dangerous consequences of delay avoided. Operation at this period is as safe as an "interval" operation—that is, it has a mortality which is practically negligible; it is, moreover, easier of performance, since there are no firm adhesions such as are frequently found at an operation during the quiescent period. The convalescence is short, drainage, even if necessary, is only so for a few days, and the risk of subsequent weakness of the scar is extremely slight.

In the early stages of an attack of appendicitis there are no signs by which we can foretell with any degree of confidence whether the infection will remain limited to the appendix and so subside without operation, or whether it will spread to the peritoneum and operation subsequently become inevitable. In many cases, by the time it is certain that it is spreading and *will* necessitate operation it is only too evident that the chances of recovery are against the patient. The ideal measure is to remove the appendix while the infection is as yet limited to it, at a time when recovery can practically be guaranteed.

Of the objections that have been put forward to the routine adoption of early operation in acute appendicitis the most important are: (1) The high mortality after operations performed in the acute stage. Taking all cases together, the mortality at the present time is undoubtedly high, not, I maintain, on account of the operation *per se*, but because of the toxic condition into which the patient has been allowed to drift before operation is undertaken. In no class of case is it more important to distinguish carefully between deaths *after* operation and deaths *from* the operation. The correct deduction from the present high mortality after operations in the acute stage of appendicitis is to have them performed before the patient reaches such a state of toxæmia that he will die *in spite of* and not *on account of* operation. Such deaths can, with far greater justice, be ascribed to medical rather than surgical treatment, inasmuch as reliance upon medical measures has been the

* Portion of a paper read before the Darwen Medical Society, February 21st, 1907.

cause of the operation being delayed. (2) The fact that many cases get well without operation, so that if one operates on every case in the early stages, then some cases will be operated upon who would have recovered (that is, so far as the immediate attack is concerned) without operation. This is, of course, quite true, but I would ask what harm has been done to them? They have, with a minimum of risk, been insured against death from appendicitis at a time when the issue of their case was doubtful; the premium they have been called upon to pay is not in any way out of proportion to the benefits secured. Whatever the mortality of appendicitis in the hands of "opportunistic" surgeons may be, it is certainly greater than that of appendicectomy carried out while the infection is still limited to the appendix. Moreover, if, as many now advocate, the appendix ought to be removed after recovery from one definite attack, then early operation simply antedates the removal by three or four weeks' time without increasing the risk, and thus the patient gains this much in time alone. (3) The objection of the patient and his friends to operation. If the medical attendant is himself convinced of the advisability of early operation, and, having placed the matter fairly before the patient or friends, is met with a refusal, he has, at any rate, relieved himself of the responsibility of any untoward event that may subsequently ensue. If a case of appendicitis dies without any operation having been performed, it will be difficult nowadays to convince the friends that operation would not have saved life; and if an operation has been performed and death has nevertheless ensued, the former tendency to put the blame upon the operation or upon the operator is being gradually replaced by a tendency to blame the one who was responsible for the operation not having been done sooner—i.e., in some cases, unfortunately, still the medical attendant. My experience of the past twelve months leads me to believe that the general public is becoming more and more alive to the proper treatment of appendicitis, and it is becoming correspondingly less difficult to obtain consent for operative measures.

Supposing, however, that the period where the infection is limited to the appendix has been allowed to pass, and that, instead of subsiding, the infection spreads, then we have peritonitis, which may be of one of the three types already mentioned—localized (abscess), diffuse spreading, or general. Whichever type the peritonitis assumes, an operation will be required.

"Abscess" Cases.—Of the three, localized abscess is usually regarded as the most favourable for the patient, and even at the present time there are some who teach that operation should not be performed in the acute stage of appendicitis unless pus has formed and has had time to become well shut off from the rest of the peritoneal cavity. For my part, I cannot look upon an appendicular abscess without a reproachful regret that the opportunity of preventing it has been missed. Operation in the stage of local abscess does not possess a single advantage over that carried out in the early stage where the infection is limited to the appendix, but has several well-marked disadvantages—the mortality is greater, not so much on account of the operation *per se*, but because of the greater toxic state of the patient; convalescence is more prolonged; the appendix is in many cases left behind, and unless it has completely sloughed away may cause a persistent sinus, or may give rise to further attacks of the disease; the drainage necessary, often for several weeks, leaves a weak scar, and predisposes, therefore, to hernia; and the numerous adhesions inevitably left after an appendicular abscess has formed may be a source of permanent discomfort, and may also be a cause of intestinal obstruction at a later date. Of the 19 cases of abscess in my list, 2 died three days and seven days respectively after the opening of the abscess from advanced toxæmia. Of the remaining 17, three have since had to undergo appendicectomy on account of persistent sinus, which in each case was found to lead down directly to a perforation in the organ; 2 still have a sinus after 4 months and 9 weeks respectively; 2 had recurrent abscesses locally; and 1 had three recurrent abscesses, the last of which burst into the lung; in only 5 of the 19 cases was the appendix removed at the time the abscess was opened. This analysis indicates that appendicular abscess is far from being the satisfactory condition it is commonly supposed.

"Diffuse Spreading" Peritonitis.—Here operation is urgently demanded if life is to be saved, as, if left, the case soon becomes one of general peritonitis—an almost hopeless state. One often hears it said that operation between the second and fifth days is more dangerous than at other times, because of the absence of adhesions walling off the infected area. Such is, however, not the case; the mortality increases directly with the length of time that has elapsed before operation is undertaken. By means of strips of sterilized gauze the infected area can be safely packed off from the rest of the peritoneal cavity, and this can be done at least as readily in the early as in the later days. Delay merely increases the general toxæmia and lessens the chances of recovery. Moreover, the more one trusts to natural adhesions forming the less would one be willing to disturb them by searching for the appendix, and, consequently, it becomes increasingly more and more probable that the appendix—the primary source of the infection—will be left behind. In all of the 19 cases of this class perforation or gangrene of the appendix was present, with diffuse peritonitis around. In all the appendix was removed as the first step of the operation, the peritoneal cavity flushed out with sterile saline solution, drainage arranged for (in all the female cases vaginal as well as abdominal), and the Fowler position of the patient maintained for at least forty-eight hours after operation. It is interesting to compare the successful issue in each of these instances with the results of the "abscess" cases; the number of each was the same—19—but in the abscess series were two deaths, and this in spite of the much greater severity of the operation *per se* in diffuse spreading peritonitis.

"General" Peritonitis.—The chances of recovery after true general peritonitis has supervened are very small indeed, and this ought to be most carefully explained to the patient's friends before any operation is performed. I certainly think that one is justified in saying that, although very small, yet the chances of recovery after operation are greater than if no operation is undertaken. The difference, however, is not sufficiently marked to justify one in strongly urging an operation when convinced that the peritonitis has become generalized. The *pros* and *cons* should be fairly placed before the relatives (or, under certain circumstances, the patient himself) and the decision left to them.

"Subsiding" Cases.—Sometimes one is called to a case of appendicitis where the symptoms are admittedly improving, and where it seems only reasonable to suppose that the patient will recover without operation. Under these circumstances no operation is to be done; the case should be carefully watched, and any relapse, or any doubt whatever as to the continuance of the improvement should be met by immediate operation. In this connexion I must offer a caution against the possibility of mistaking the deceptive improvement which sometimes occurs when the appendix becomes gangrenous or perforated for real improvement; in such cases the improvement is due to a temporary arrest of toxin absorption—from arrest of circulation in gangrene, from suddenly diminished tension in perforation. Such improvement is merely a dangerous calm before a mighty renewal of the storm, and is of a very temporary character, and any failure to recognize it is fraught with the gravest danger to the patient.

What course is to be pursued after a patient has recovered from one attack of appendicitis without operation? Many surgeons hold the view that the appendix ought to be removed after the subsidence of the first attack as a routine measure, but to this I cannot subscribe. If, according to this view, a single attack of appendicitis is *ipso facto* to condemn a patient to operation, then surely it is more rational to give him the benefit of that operation in the early stages of his attack, at a time when the issue of his case is doubtful, and when operation is at least as safe and in all probability easier to perform. Is he to receive no reward for having successfully braved the storm? I venture to think that were the holders of this view to fully explain to their patients in the early period of the first attack that they would in any case now have to submit to operation, the majority, if not all, would wish the operation to be undertaken at once. When recovery has occurred after a single attack it is by no means certain that a recurrence will take place, there is a very fair chance that it will not. The logical position to my mind is to

wait until a recurrence has actually occurred, and then to remove the appendix in the early hours of the second attack. An exception should, of course, be made where a patient is so situated that early surgical assistance would not be available.

In conclusion, then, I maintain that, for a disease which in its early stages is a purely local infection, appendicitis has yet far too high a mortality. Early removal of the infected appendix is the only means we have of reducing the mortality to a minimum, and will, I am convinced, ultimately become the generally adopted rule of practice.

THE TREATMENT OF COMPLICATIONS AND SEQUELAE OF GASTRIC AND DUODENAL ULCERS.*

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I wish to draw special attention to only one of the many complications of gastric and duodenal ulcers, and that is as to the immediate treatment of perforation of ulcers situated in either of these viscera.

At present it is a surgical dictum that prompt surgical interference is the right and proper treatment when this calamity occurs, and the earlier the abdomen is opened and the ulcer closed the higher will be the percentage of lives saved. I do not think that any medical man will question the wisdom of treating these cases by operating early, rapidly, and skilfully; but the circumstances and the conditions are frequently such that it is not only difficult, but impossible to carry it out.

It is everybody's experience to hear histories of cases which point to perforation, the patients having recovered or died without operation; it is necessary to examine very carefully under what conditions recovery took place without surgical interference.

It is not possible in most cases to judge or to form opinion from the history of a case, or from the condition of the patient, whether the perforation be small or large, or to locate its anatomical position with precision; but what we do know is that perforation usually takes place when the stomach is full and not when it is empty, and we also know that the majority of such patients rapidly slide downwards towards a precipice with the valley of death below if Nature is left unaided whilst waiting for the coming of a surgeon.

I desire to invite your attention to a method of treatment which seems to me to be the most rational, and it should be carried out as a matter of routine and without delay in every case pending surgical interference.

The natural forces which cure cases of perforation vary according to the symptoms from which the patient suffers, and these symptoms have been described as beneficent, in the sense that they call forth some reserve force to attempt to prevent extravasation of the contents of the viscera into the peritoneum. I would tabulate the symptoms and their indications as to what we should do to assist Nature to get on the right path to cure. For example:

1. *Collapse* makes the patient assume the horizontal position, and stops peristalsis of the intestine and prevents the force of gravitation in disseminating the visceral contents towards the lower part of the abdomen.

2. *Tenderness and rigidity* of the abdominal walls indicate that palpation and manipulation of these must be harmful and dangerous.

3. *Cramp and colic* make the patient draw up his knees and roll from side to side; by so doing he gives the great omentum an opportunity of getting nearer the seat of the perforation.

4. *Thirst* indicates that water is needed in the system, and therefore it should be given, but not by the mouth.

5. *Vomiting*, when it takes place (usually does, I believe, in cases which recover without operation), indicates the use of a stomach pump.

We know from recent war experiences that Nature has cured a large number of bullet perforations of the stomach,

* A paper read before the South Wales and Monmouthshire Branch of the British Medical Association.

and that the conditions under which such happy results have taken place were:

1. The patient had an empty stomach when shot.
2. He had no food nor drink given him for long hours afterwards.
3. Suffered from shock.

We also know that a complete tear across the jejunum has been temporarily mended by natural processes under similar circumstances of profound shock and no food.

Knowing all these facts, which demonstrate that conservative surgery of a very high order can be performed by the peritoneum and the omentum under favourable conditions, therefore we must act in like manner in ordinary cases of perforation of the stomach and duodenum, and I think the proper treatment should be the following:

1. Place the patient in the horizontal position.
2. The administration of morphine in sufficient doses to relieve pain and to check peristalsis.
3. The avoidance of palpation and manipulation of the abdomen.
4. The emptying of the stomach by means of a stomach pump. Ordinary siphonage is unsatisfactory, because the solid contents of the stomach cannot be thus satisfactorily removed.
5. No food nor drink to be given by the mouth.
6. The abdomen should be covered with several inches' thickness of cotton-wool and bandaged.
7. Water and food to be given by the rectum only.

Never blister the abdomen in acute abdominal pain of unknown cause. It is not only a pernicious habit, but it very seriously interferes with subsequent surgical interference when required; one so often sees blisters applied in abdominal trouble that it is necessary to protest against the habit until it is discontinued.

The principles which Dr. Ochsner of Chicago has so clearly laid down for the treatment of cases of perforative appendicitis which have not been subjected to an early operation should, I think, be applied also to cases of perforation of the stomach at the earliest possible moment. If necessary, a local or general anaesthetic should be given in order to completely empty the stomach, and I feel convinced that many lives could be saved if immediate medical treatment on the above lines were adopted instead of wasting valuable hours in the search for a surgeon.

In two cases of perforative peritonitis in which I operated, I simply mopped out gastric contents from the abdomen, drained and washed out the stomach. The patients were *in extremis*, and only the slightest surgical interference was justifiable, yet both recovered without my closing the perforations.

When I operate for perforation of the stomach, of course, wherever possible, I suture the opening, but I have joined the school which simply mops out quickly the peritoneum and drain according to circumstances, suprapubically, loins or vagina, according to the exigencies of the case.

I have given up for some years flushing out the abdomen with normal saline solution, as I had a series of four deaths and then a series of recoveries by the "other method." I have never adopted the still more radical method of evisceration and leaving the abdominal wound open; it seems to me to be founded upon want of confidence in natural processes of repair and of misplaced confidence in bacteriological considerations. The practice is revolting and barbarous, and seems to me to be unscientific.

The sequelae of duodenal or gastric ulcers are so numerous that time will not allow me but to touch upon one aspect of the question. It is important for the surgeon to have an open mind as to what particular operation, if any, he will perform after opening the abdomen upon patients who are "chronic dyspeptics" from the effects of ulcers. During the last three or four years the operation of gastro-jejunostomy has been so highly lauded as a curative agency in these cases that some surgeons to my knowledge have advised it before seeing what the actual conditions were within the abdomen; under these circumstances an unnecessarily severe operation may be performed upon these cases unless careful examination be made of the conditions of the viscera suspected of causing the trouble.

The following case is a striking example of the curative