ACUTE APPENDICULAR OBSTRUCTION:

THE THIRD DAY IN ACUTE DISEASES OF THE APPENDIX.*

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A DISEASE which annually kills in England and Wales upwards of 1,500 people, and whose mortality under modern scientific treatment still runs to from 5 to 25 per cent., according to its type, demands vigorous investigation. Few of the numerous writers on the subject base their views about diagnosis, prognosis, or treatment, on the pathological findings of the operation room. In Sir Berkeley Moynihan's picturesque words, "the pathology of the living" has failed to receive due consideration, and no satisfactory classification or differentiation of cases has hitherto existed. All acute diseases of the appendix have been included under the general term "appendicitis," whether the ordinary and classical signs of inflammation were present or not, or whether these signs, when present, were primary or secondary in point of cause. Some four years ago Mr. Robert Campbell made the observation that many of these cases were not due to inflammatory causes at all, but to obstruction of the appendix; and in a short paper published in the *Transactions* of the Ulster Medical Society for 1912-13, he showed from his own experience that out of twenty-two consecutive cases of acute diseases of the appendix no fewer than eighteen were obstructive in type, and he made this further statement, that all the really anxious cases belonged to the latter class.

Mr. Campbell's views are supported by the results of a series of experiments on cats, carried out by Mr. Wilkie of Edinburgh, to determine the effect of obstruction in a piece of intestine in which complete occlusion of the lumen of the gut had been produced without interference with its blood supply. His observations were published in the *BRITISH MEDICAL JOURNAL* of December 5th, 1914. The results of Mr. Wilkie's experiments prove that the presence of caecal content in such an obstructed loop of bowel leads to distension of the loop with purulent fluid, followed by gangrene and perforation. In Mr. Wilkie's words:

Apparently the two factors determining the degree and the rapidity of the morbid changes in the isolated loop are (1) the amount of faecal matter, and (2) its nature, as determined by the previous feeding of the animal. If the loop be completely filled with faecal matter at the moment of obstruction, rapid changes, culminating in gangrene, are apt to result, no matter what be the nature of the content, though they are more rapid and striking after protein feeding.

In the light of these facts, let us now turn for a moment to the appended series of cases operated on at the earliest possible moment after being seen; they are arranged according to the interval between onset of symptoms and operation. These are all the cases seen by me in which acute disease of the appendix was diagnosed, with the exception of two, upon whom, for non-medical reasons, no operation was performed. The cases have been classified in the accompanying table.

Acute Appendicitis.

There were 13 cases of true acute appendicitis, of which the following are examples:

No. 9 in the list—N. M'C., 24 years of age, an otherwise healthy young bricklayer—was seen with Dr. G. F. Campbell on July 17th, 1913. He had taken ill about eight days before, with a feeling of sickness, especially after meals. There was no actual vomiting, but nausea had been persistent and distressing. The bowels became sluggish. He had a varying amount of pain, which was worst in the evening and at night, and sometimes had to be relieved by poulticing. He had suffered from indigestion for some years. His pulse was 100, his temperature 99°. There was a tender point just internal to the anterior superior spine on the right side and a small phlegmon was present. Operated through the right rectus incision and found the appendix inflamed, with thickened walls, lying external to and buried in plastic lymph, on the outer side of the caecum. There was no pus, and the abdomen was therefore closed in layers without drainage.

* Read before the North of Ireland Branch of the British Medical Association.

Case No.	Sex.	Age.	Day of Illness.	Pulse.	Temp.	Condition of Appendix.	Distribution of Pus.	Result.
1	M.	10	1	100	100.8°	Inflamed	None	R.
2	F.	39	1	115	101°	Inflamed	None	R.
3	F.	25	1	100	99.8°	Perforated	Localized	R.
4	F.	20	3	108	102.2°	Inflamed	None	R.
5	F.	14	3	120	99°	Inflamed	Localized	R.
6	F.	17	4	—	—	Inflamed	None	R.
7	F.	16	6	110	102°	—	Localized	R.
8	M.	10	6	96	99°	Inflamed	None	R.
9	M.	24	8	100	99°	Inflamed	None	R.
10	M.	17	10	90	103.8°	—	Localized	R.
11	M.	20	14	120	100.8°	—	Localized	R.
12	M.	25	21	104	98.4°	—	Localized	R.
13	M.	21	21	106	101°	Inflamed	None	R.
14	F.	18	6	120	102°	Perforated	Localized	R.
15	M.	13	7	100	98.4°	—	Localized	R.
16	M.	18	7	115	102°	—	Localized	R.
17	F.	58	7	140	97°	Perforated	General	D.
18	F.	11	7	—	—	Perforated	Localized	R.
19	M.	10	12	—	—	—	Localized	R.
20	F.	20	21	120	104.6°	—	Localized	D.
21	M.	15	1	84	98.4°	Obstructed	None	R.
22	M.	26	1	115	99.6°	Perforated	Localized	R.
23	F.	17	1	120	98°	Perforated	General	R.
24	M.	66	2	80	98.4°	Gangrenous	None	R.
25	M.	52	2	132	100.2°	Gangrenous (patch)	None	R.
26	M.	38	2	100	101.2°	Perforated	Localized	R.
27	F.	50	2	112	101°	Perforated	General	R.
28	M.	8	2	142	102.4°	Obstructed by band	None	R.
29	F.	18	3	120	101.5°	Perforated	Localized	R.
30	F.	19	3	112	99.8°	Perforated	Localized	R.
31	M.	4	3	110	100.4°	Perforated	Localized	R.
32	F.	7½	3	125	99.8°	—	Localized	R.
33	M.	11	3	126	100.6°	Perforated	Localized	D.
34	F.	14	3	132	97°	Perforated	General	R.
35	F.	12	3	164	100°	Perforated	General	D.
36	F.	35	3	112	101.2°	Perforated	Localized	R.
37	M.	19	3	100	99°	Perforated	Localized	R.
38	M.	10	3	122	98°	—	Localized	R.
39	F.	38	3	98	97°	Perforated	General	R.
40	F.	2½	3	142	100°	Perforated	General	D.
41	M.	56	5	64	99°	Perforated	Localized	R.
42	M.	34	5	120	102°	Perforated	General	D.
43	M.	56	7	100	99.4°	Perforated	General	R.
44	M.	4	7	138	100.8°	Perforated	Localized	R.
45	M.	13	7	124	97.4°	Perforated	Localized	R.

R. = recovery; D. = death.

I would specially direct attention to the indefinite onset, to the absence of any great pain as the initial symptom, and to the absence of troublesome constipation.

No. 2, A. R., a single lady, aged 39, seen with the late Dr. Gorman on August 6th, 1913. For fifteen years she had been subject to dyspepsia, and this was the third attack of appendicitis during which she had been under Dr. Gorman's observation. She had taken ill the previous night with pain in the right side of the abdomen. The temperature was 101° and the pulse 115. I was asked to see the patient next day, and operation was decided on. This was done through an oblique incision. A long appendix with thickened walls, which were adherent to the surrounding structures, was found. The removal of the appendix was comparatively easy, and the

wound was closed without drainage. Recovery was uninterrupted; the patient's temperature never reaching higher than 99°.

Many of these cases, however, go on to suppuration. The following is an example:

No. 5, I. S., a girl aged 14, seen with Dr. F. C. Mann on November 8th, 1913. She had taken ill on the 5th with pain in the abdomen, which gradually settled down towards the right side. The temperature at the onset was 101° and the pulse 110. The temperature and pulse varied little till the evening of the 7th, when the temperature rose to 102°, and the patient began to perspire freely. A probable diagnosis of suppurative appendicitis was made, and Dr. Mann advised operation. The patient had had several similar attacks, but they had always passed off in a few days. When seen on the 8th, the temperature was 99° and the pulse 120. An easily palpable phlegmon was discovered on the right side, just above Poupert's ligament. On opening the abdomen a swelling lay on the outer side of and below the caecum. This consisted of the appendix, buried in a mass of coagulum, and bent at an acute angle, with a small perforation and a small amount of pus—about a teaspoonful. The walls of the appendix were very much thickened, but there was no distension of the lumen. The removal of the appendix gave little trouble; the wound was drained, and the patient had an uneventful convalescence.

These are examples of acute appendicitis in which, from the onset, the temperature and pulse are elevated, and in which pain, though present, is not of such a severe type as in the cases about to be quoted, and even from its first beginnings is definitely localized to the right iliac fossa. In these cases, too, vomiting and constipation are not troublesome, and if pus be present it is small in amount, and well walled off by the surrounding organs, which are adherent to the appendix and the caecum. The walls of the appendix are thick and fleshy, and there is no distension of its cavity. Judging from the history of these cases of true acute appendicitis, it would seem to be capable of argument that they do not constitute a very fatal form of illness, even when operated upon in the later stages of the attack. And this is probably so. Symptoms, signs, and pathological changes keep close company. Pus formation, when it occurs, is usually not unannounced. It is safely limited in its extravasation, and can readily be dealt with surgically. But can we, for these reasons, delay or postpone operation? I think not, and for the following considerations:

In the first place, in an early operation it is practically always possible to remove the appendix. Secondly, in an early operation we are less likely to encounter pus, and therefore drainage, with all its disastrous sequelae of discomfort, delay, and subsequent hernia, will be avoided, for with modern methods of closing the abdominal wall in layers, there is little risk of bulging apart from drainage. Thirdly, serious complications, such as general peritonitis, subphrenic abscess, portal pyaemia, etc., increase in frequency and gravity with delay in operation.

Acute Appendicular Obstruction.

I have come across 25 cases of acute appendicular obstruction. Three were seen during the first twelve hours, 5 others within the first forty-eight hours, 12 were seen on the third day, and the remainder at a later date. A typical case from this series is as follows:

No. 37, W. P., a youth aged 19, was taken suddenly ill on December 28th with a very severe pain in his stomach, and he vomited three times that evening. His bowels, up till then regular, became constipated. He was seen next morning by Dr. Boyd, who found that he complained of pain in the left hypochondriac region. His pulse and temperature were normal. There was a slight rigidity over the right rectus below. His breath was foul, and his tongue thickly coated, but otherwise he looked well. The next day, however, he was again seized with a sudden severe pain, now localized to the right lower abdomen. His temperature had risen to 99°, his pulse to 100. I was asked by Dr. Boyd to see him, and having come to the conclusion that he was suffering from a perforated gangrenous appendix, had him removed to the Royal Victoria Hospital, where, through the kindness of Mr. A. B. Mitchell, I was allowed to operate upon him. The operation was carried out under open ether anaesthesia, and through the right rectus incision. The appendix was found to be gangrenous for about 2 in. from the tip; to have a large perforation, the size of a sixpence; and to be lying in an abscess cavity containing about an ounce of pus. The appendix was removed, the cavity drained, and the boy made a good recovery.

Sir Berkeley Moynihan has pointed out the injurious effects of administering purgatives to patients of this type, and that the abscess in the foregoing case remained localized in spite of the large perforation was possibly due to the fact that on the advice of Dr. Boyd, the mother, a

trained maternity nurse, had done considerable violence to her feelings, and had refrained from her first impulse, which was to administer a dose of castor oil.

The foregoing is a type representative of a very large percentage of the critical cases which a surgeon is called upon to see. They are, so far as my experience goes, the most fatal of all the common emergencies in abdominal surgery. And let us consider for a moment what the pathology of this case was. Judging by Wilkie's experiments, and by our own experience of the morbid anatomy of cases seen in the earlier stages and by the appearances found at the operation, we should say at once that this boy had an obstruction near the base of his appendix; that there was present within the appendix a certain amount of faeculent matter; that this obstruction led to gangrene of the appendix; and that, following the gangrene, perforation had supervened. If, then, this be the pathology, and if the appalling mortality in acute diseases of the appendix be due to this type of case, then obviously the remedy lies in diagnosing the condition before perforation occurs; in other words, had one been able to foresee that, in spite of this boy's normal temperature and normal pulse, there lay interned within his abdominal cavity a sloughing appendix, then no excuse would have justified us in allowing perforation to take place. That this is no unusual type of case, and that it is no unusual thing for symptoms and signs to be unalarming on the second day, numerous arguments and examples go to prove. Here is another:

No. 38. On December 8th, 1914, at the Royal Victoria Hospital, I was asked by Mr. Fullerton to operate upon a boy—W. H., aged 10—who had just been admitted to hospital. He had taken ill on December 6th, so that the operation was called for on the third day of the illness. He had been seen on the second day by his own doctor, who was present at the operation, and who told me that the boy had suffered considerable pain on December 6th, but that when he saw him on December 7th he was so much better that he thought, and told the relatives, that he might be able to do without operation. On the night of December 7th, however, he was again attacked by acute pain, and when the doctor saw him the next morning he sent him straight into hospital. On admission the temperature was 98°, and the pulse 122. A large area of dullness was present on the right lower abdomen. He was operated on by the grid-iron incision, the pus released, and a tube placed in the abscess cavity.

The boy's condition precluded the removal of the appendix, but there can be no reasonable doubt that this case was identical with the one already quoted. Now let us examine one or two cases which showed similar symptoms at the beginning, but which were not allowed to go on to perforation.

No. 21, P. B., a youth aged 15, was taken suddenly ill on January 13th, 1915, at 6 p.m. He was seen immediately, and sent into hospital. The pulse was 84, and the temperature 98.4°. The history was that he had been suddenly seized with a violent pain about the region of the umbilicus, gradually moving towards the right side of the abdomen below. He stated that he had had a similar pain at Christmas, but that the pain had then gradually subsided. Operation was advised, and carried out six hours after the initial symptoms. On opening the abdomen through the oblique incision, considerable difficulty in drawing out the caecum was observed, and this was found to be due to intussusception of the caput caeci. It was found, as well, that the base of the appendix was obstructed by a very tight peritoneal band, which ran from the outer side of the caecum across the base of the appendix, and was inserted into the edge of the peritoneum, near the origin of Lane's band. The body and tip of the appendix were adherent in the iliac fossa, purple in colour, greatly distended, and containing a brownish fluid. The mucous membrane lining the appendix showed recent haemorrhages. Removal of the appendix and reduction of the intussusception were easy.

This was a case where abnormal peristalsis of the appendix in the effort to overcome the obstruction by a band was conducted to the musculature of the caecum, and gave rise to an intussusception, and it seems to me that this was a case of appendicular obstruction in the very earliest stage, before gangrene had had time to take place.

Here is another case operated on within twelve hours, also at the Royal Victoria Hospital:

No. 23, B. F., a young woman aged 17, was taken ill on January 14th, at 7 p.m., with pain in the lower abdomen. She was brought to hospital at 1 a.m., and at that time complained of pain extending over the whole of the lower abdomen, and more especially over the appendix region. The temperature was 98°, the pulse 120. On examination it was found that there was no abdominal movement on respiration. Dullness and tenderness

extended from the right kidney region in a crescentic manner across the abdomen beneath the umbilicus to the left anterior superior spine. The patient kept her knees drawn up, and screamed when the hand was laid upon the abdomen. Even the lightest pressure caused great agony. The diagnosis of a perforation of the appendix with consequent spreading peritonitis was made, but no explanation of its sudden character was forthcoming. The abdomen was therefore opened immediately through the right rectus, ten hours after the onset of the pain. The appendix and caecum presented easily into the wound, and it was then found that the appendix was constricted at the base. It was kinked about an inch from the tip at an acute angle, and in this kink a perforation was found. The lumen of the appendix contained some bloodstained fluid.

There was no congestion and no discoloration, and the explanation, to my mind, was this: that the kink had produced a weak part in the appendicular wall; that almost as soon as obstruction developed this weak part yielded; and so the contents of the appendix were shed immediately into the general peritoneal cavity. Probably in this case no gangrene would ever have occurred, because the perforation had allowed the faeculent matter to escape, and so relieved pressure. And here is another example of a similar condition:

No. 22. On February 4th, 1914, I was asked by Dr. T. Kennedy to see a young man, aged 26. He had always been subject to slight attacks of abdominal pain, but was apparently quite well up to 6 o'clock, when he was suddenly seized with an acute pain in the epigastrium. He called at a chemist's on his way home from his work, and asked for a dose of laudanum, which he took, and promptly vomited. On arrival at home he went to bed. About 10 p.m., after the pain had subsided, he was again seized with a more severe attack, and looked so ill that his friends at once sent for Dr. Kennedy, who found the patient's temperature normal, but the pulse was 100, the face pale and drawn, and the whole right side of the abdomen rigid. Dr. Kennedy felt sure that a perforation either of the appendix or of the duodenum had taken place. I saw the man about midnight. I was told on arrival that he was so much better it was a pity I had come. However, Dr. Kennedy insisted upon my seeing him. We found that his condition, speaking generally, had improved, but that the temperature had gone up to 99.4° and the pulse to 115. Rigidity was still present, but only over the lower part of the right rectus. This seemed to suggest to us the diagnosis of perforation of the appendix rather than of the duodenum, and chiefly on account of Dr. Kennedy's history—we came to the conclusion that it was not safe to leave the future course of events to Nature. He was therefore removed to hospital, and at the request of Professor Sinclair I opened the abdomen, eight hours after the first attack of pain and four hours after the second. The right rectus incision was adopted. The appendix was found lying free without adhesions. It contained a small seed resembling that of a grape, and near the tip was found a perforation admitting a fine probe. The lumen, contracted at the base, was greatly dilated from the middle to the tip; a small amount of pus was free within the abdomen. The appendix was removed, drainage carried out by means of a narrow tube, and the abdomen closed. This patient subsequently developed a pelvic abscess, which was drained per rectum, but otherwise made a not unusual convalescence.

This seems to me a case similar in type to the preceding—a weak part of the appendix wall had yielded as the result of the obstruction and increased pressure, and had allowed the contents of the appendix to escape in a stream into the peritoneal cavity.

The following case also was seen within twelve hours and operated on within twenty-four hours of the commencement of the attack:

No. 24, S. P., aged 66, was taken suddenly ill at 2 o'clock a.m. on the night of May 14th, 1912. I was asked to see him in the morning. He was complaining greatly of pain—referred to the epigastric region, of persistent vomiting, and of unrelievable constipation. His temperature was 97.6° and his pulse 80. I examined him thoroughly, but could find very little sign of disease. I ordered him enemata of soap and water and olive oil. These were used several times without effect, and when I saw him again some hours later he was still vomiting when he took either food or drink. The pain, not severe, was gradually localizing itself to the right side of the abdomen. The abdomen was not rigid, and there was only slight tenderness over McBurney's point. The temperature had risen to 98.4° and the pulse to 88. The man was brought to hospital, and, with the assistance of Mr. Mitchell, I opened the abdomen through the right rectus. The appendix, 5 in. long, was distended, and its terminal inch or so was gangrenous, but no perforation had occurred.

In this case a previously healthy and sound organ yielded nowhere to the increased tension, and therefore gangrene of the whole appendix was the result. This, too, is an example of appendicular obstruction in which the symptoms were so suggestive of acute intestinal obstruction that the latter diagnosis was provisionally made.

In this case there can be no doubt that had the patient been left for a few hours longer rupture of the gangrenous appendix would have occurred, and a case identical in all respects with other third day cases would have resulted.

And here allow me to refer to a case not given in the printed list. About six weeks ago, at 6 p.m., I was sent for to see a medical student. He had taken suddenly ill through the night with a violent pain about the umbilicus. He vomited several times, and the pain continued with intermissions until the morning. The man then prescribed himself an alkaline mixture to settle the stomach, as he imagined, but this he vomited too. Through the day the violent attacks of pain were replaced by soreness in the right iliac fossa, and when I arrived at his rooms he was ready with the diagnosis of appendicitis. I asked Mr. Mitchell to see him with me, and, in spite of a pulse of 68 and a temperature of 98.2°, an operation was decided upon. The appendix was swollen, purple in colour, tightly kinked about an inch from the base, and suggestive of imminent thrombosis of the vessels. Here was a case with symptoms almost identical with those of the previous case, and I think it is reasonable to assume that if left without surgical aid the appendix would have gone on to gangrene.

Diagnosis.

I will now consider more fully this great class of cases in which the demand for surgical interference is first made on the third day of the illness. With some slight variation in time, due, according to Wilkie, to (1) the diet of the patient, and (2) the fullness of the appendicular apartment, and—in my opinion—(3) the soundness of the walls of the appendix, these cases show an almost identical history. There is a sudden severe attack of abdominal pain, referred at first to the umbilical region, lasting in spasmodic fashion for some hours, and then gradually disappearing. Not infrequently the pain begins during the night, and the next day if and when the doctor is called in the patient seems well, but a complaint of cramps in the night is made, and the patient has a distaste for food, his tongue feels sticky, his breath is foul, and bowels constipated. He feels some uneasiness on the right side of the abdomen. His pulse and temperature, if not quite normal, are so little elevated as to excite no suspicion. On examination of the abdomen it is soft everywhere, with the exception of some rigidity in the vicinity of McBurney's point. This may be slight, and if marked the appendix will be found near, if not adherent to, the anterior abdominal wall. After a review of the meagre signs and symptoms, the patient is probably told that he has just escaped an attack of acute appendicitis, but the crisis in the case is not long delayed, for between twenty and forty-eight hours of the onset a fresh attack of pain, even more violent and severe than at first, but now definitely localized to the right iliac fossa, ushers in acute perforative peritonitis. The determination of the perforation is often greatly accelerated by the administration of a purgative, and the movements consequent on purgation do much to prevent limitation of the infective material. There is no longer any doubt of the urgency of the symptoms, of the grave peril of the patient, or of the supreme need of active surgical assistance.

Let us now reconstruct the progress and pathology of our typical case. In the first stage we shall find violent intermittent pain, due to irregular and exaggerated peristalsis of the appendix in its endeavour to overcome the resistance, whether that resistance be stricture, concretion, foreign body, or band. In the second there is disappearance of the pain, due to commencing gangrene of the appendix, analogous to the relief so characteristic of the onset of gangrene in a case of strangulated hernia. In the third stage rupture of the appendix occurs with onset of the pain of perforation and its attendant signs of shock and oncoming peritonitis.

As regards the duration of each of these stages, some variation must naturally be looked for, but it is a point not without significance that so many cases in this small series should have called for surgical intervention on the third day. And here I should like to put in a plea on behalf of the operator. Perforation of the stomach, or of the duodenum, to-day receives the promptness which its urgency and its serious consequences deserve, so that a man will move heaven and earth to have his perforated

gastric ulcer operated upon at the earliest possible moment. Not so in perforation of the appendix, where the infectivity of the extravasating fluid is of tenfold virulence. Cases are frequently seen perforated eight, ten, and twelve hours after operation is arranged for. The profession as a whole has yet to grasp the importance of this aspect of acute disease of the appendix, and if such urgency is demanded in adults, it is the *sine qua non* for successful treatment in children, for here the margin of safety narrows down almost to the vanishing point. Here is a case of a child from the records of the Ulster Hospital, in which, in spite of the rapidity with which operation was carried out after the patient had been seen, at the operation, and at the subsequent *post-mortem* examination, pints and pints of purulent fluid were found within the peritoneum:

No. 35, M. B., aged 12, on being seen by Dr. Martin was sent straight to hospital, on the third day of the illness, after having been perforated apparently about twelve hours. There was a typical history of acute appendicular obstruction. Operation was immediately carried out—Dr. Elizabeth Robb administering open ether. On opening the abdomen a very large escape of purulent contents took place. A tube was quickly placed in the iliac fossa, and a second tube in Douglas's pouch, and the abdomen closed. The patient died about eighteen hours later. A *post-mortem* examination was kindly undertaken for me by Dr. Robb. In spite of the enormous quantities of pus which had escaped at the time of the operation, Dr. Robb told me that pints of pus seemed to escape on the *post-mortem* table. The appendix itself was gangrenous, and showed a very large, ragged perforation.

If no time should be lost after the onset of peritonitis how much more valuable will it be to operate before perforation! All arguments in favour of early operation in cases of true acute appendicitis are applicable to cases of acute appendicular obstruction, with this difference—that delay until perforation occurs, in the latter case often spells death. Therefore, the question now arises, Is it possible to diagnose these cases during the second day? I cannot help inserting here a statement made by Mr. Arthur Burgess in a paper he published in 1908, in which he reviewed the result of 500 consecutive cases of appendicitis. He says:

I feel strongly that fewer cases would pass unrecognized in their earlier stages were it to become the universal rule never to take a temperature nor count a pulse in a suspected case of acute appendicitis. They are only too apt to mislead.

What, then, are the points that we depend upon for our diagnosis on the second day? (1) The history of a sudden severe intermittent pain referred to the region of the umbilicus; (2) vomiting, rarely persistent and never faecal; (3) constipation; (4) some muscular rigidity on the right side; (5) dirty tongue and fetid breath. These occurring during the day after the onset of the pain are strongly suggestive of a gangrenous appendix, and therefore of the need for immediate operation. Endless almost are the arguments in favour of operating in the absence of pus, but I would mention the following:

Out of a series of 500 consecutive cases operated upon by the several members of the staff of the Royal Victoria Hospital and reported by Mr. A. B. Mitchell, although there was a total mortality of 15 per cent., there was not a single death in a non-purulent case, and this is my own experience in some 80 appendicectomies.

Prognosis.

As to the prognosis of these obstructive cases, they include, as Mr. Campbell has stated, all the rapidly fatal cases. The mortality-rate, therefore, cannot but be high if perforation be allowed to occur, but it will depend upon the following factors: First, and most important of all, the time of the operation. Let us get these cases before perforation occurs, and therefore before pus develops, and we shall be rid for ever of our ghastly figures for appendix operations. It will, from what I have said, be readily agreed that the ideal time for operation will probably be on the second day, though one could have no objection to operating earlier. These cases do not fall like thunderbolts—there is a margin of safety, but it is limited to the first twenty-four hours. By no other precautionary measures that I am aware of can we attain our ideal in the treatment of this disease. Looking at the list in your hands, it is very striking how the fatal cases occur at the foot of each series. With operation on the second day

I see no reason why the mortality-rate should be other than infinitesimal. After perforation many other factors will influence the prognosis—such as the type of the disease, the presence of adhesions, the size of the perforation, the diet of the patient, the age of the patient, the amount of disturbance to which the patient has submitted after perforation has occurred, the skill, speed, and technique of the operator, the judicious use of the drainage tube, the employment of open ether only as the anaesthetic, the subsequent management of the case by the adoption of the Fowler position, with proctoclysis, and, if necessary, the hypodermic injection of pituitrin.

Conclusion.

In conclusion: (1) Acute diseases of the appendix may be divided into two classes—acute appendicitis and acute appendicular obstruction. (2) To the latter class belong most of the tragedies of abdominal surgery. (3) Safety only lies in the way of early operation—that is, before perforative peritonitis has supervened upon distension and gangrene of the appendix. Lastly, what of the third day in acute diseases of the appendix? Let us blot it out altogether, and rename it the first day—after operation!

AUTOGENOUS LIVING VACCINE IN THE TREATMENT OF ENTERIC FEVER.

WITH NOTES OF SIX CASES.

(PRELIMINARY OBSERVATIONS.)

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HAVING recently treated cases of enteric fever with vaccine and obtained satisfactory results, it occurred to one of us (S. R.) that better results might be obtained by employing autogenous living vaccine for each case. The clinical notes and temperature charts of our first successive cases treated by this method and the satisfactory results obtained will, we hope, lead to this method being given a more extensive trial. Our cases have demonstrated that this method of injecting living bacilli in suitable doses is perfectly safe. The vaccine was injected subcutaneously—as a rule in the pectoral region—and was followed by very slight local reaction, but marked general reaction. No local or general complications were observed. The injection, as a rule, was followed by a rise in temperature within the first few hours, followed by a marked fall within twenty-four hours of inoculation. Careful notes were made, and in our minds there is no doubt that this treatment had a beneficial effect and tended to cut short the duration of the disease. It promotes perspiration, the aspect of the patient undoubtedly becomes brighter after injection, and the tongue becomes much cleaner.

The diagnosis was verified in all cases by blood culture. Several of the cases on admission to hospital gave the impression that the attack would be severe; in this opinion our consulting physician, Sir Wilmot Herringham, agreed. To him, also, we are indebted for valuable suggestions as to dosage, and frequency of administration of the vaccine.

Preparation of the Vaccine.

The disease was in each case diagnosed by means of blood culture. For this purpose 5 c.cm. of blood was drawn from the arm and immediately transferred to 1 per cent. sodium taurocholate. From this a broth culture was prepared, and the purity and identity of the growth verified by agglutination and sugar fermentation tests. The broth culture was reinoculated into fresh broth every day and itself constituted the vaccine. No further preparation whatever was employed. The age of the culture used was generally eighteen hours, and the number of bacilli contained in it was obtained by a direct method of counting which has been previously described by one of