APPENDICITIS: AN ANALYSIS OF SIXTY-EIGHT CASES, WITH COMMENTS AND A SUMMARY OF THE CONDITIONS REQUIRING OPERATION.¹

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THE title of a communication is not always of as much importance as it is in this. The use of the word typhlitis or appendicitis for the most part implies a different conception of the diseased condition, which carries with it at times important divergence as to the treatment to be adopted. Sometimes typhlitis may be the more exact description of the condition existing. I have seen an intense inflammation of the cæcum with suppuration in its walls and suppuration behind it in the right iliac fossa in one instance; in another a single perforating ulcer of the cæcum without suspicion of typhoid.

In the large majority of cases of inflammation in the right iliac fossa, however, my own experience, partly clinical and partly obtained in the *post-mortem* room, leads me to regard the vermiform appendix as the immediate focus of the disease which I, in common with many others, prefer to call appendicitis, whilst there are not a few who elect to use the term perityphlitis. To those who still regard the names typhlitis and perityphlitis as the most appropriate for the condition under discussion, I would briefly point out that anatomical considerations are opposed to them, and that experience derived from operations and *post-mortem* examinations is almost always so. Further, that cases presenting the ordinary features of so-called perityphlitis, which relapse and are then treated by operation, usually afford evidence that the appendix is the site from which the mischief originates and spreads.

THE PATHOLOGY OF THE DISEASE.

Inflammation of the vermiform appendix often has as its forerunner a catarrh of the cæcum, set up by indigestible food or occasionally by impacted fæces. This leads to catarrh of the appendix with retention of secretion and dilatation, which in turn sets up an inflammation of the walls of the appendix; or occasionally cicatrization of a typhoid or other ulcer at the orifice or in the course of the appendix may induce a similar condition; or this may be brought about by fæcal concretion or retained foreign body. In a few cases an intense inflammation of the vermiform appendix, with gangrene of part of its walls, is found without any obvious explanation.

Whatever may be its actual starting point, the inflammation varies extremely in its intensity; often subsiding, never to return, with rest and simple treatment, sometimes setting up a well-defined abscess, at others starting an intensely septic peritonitis, which is terribly fatal.

It is this remarkable variation in its course which has led to such conflicting utterances as to the treatment applicable in cases of appendicitis—on the one hand, physicians claiming excellent results from rest, enemata, and careful feeding; on the other hand, surgeons quoting their experience of well-formed abscess or perforated appendix with peritonitis as commonly existing, and therefore calling aloud for operation. In an attempt to reconcile these apparent contradictions, I have collected and examined all the cases diagnosed as typhlitis, perityphlitis, or appendicitis admitted into the General Hospital, Birmingham, for nearly seven years, beginning in 1885. But few of these have been under my care, and I have to thank my colleagues for permission to use their cases. The total is sixty-eight cases—some of them so mild as to recover in a few days, others requiring weeks and even then relapsing, a few with well-defined suppuration, and several of the fulminating kind; some of these last perfectly moribund when admitted.

Of the sixty-eight cases seven died, a mortality of 10.3 per cent. This differs widely from the estimate presented by other reporters, being far below the rate estimated by some, and somewhat higher than that of others. Seeing, however,

that my cases are compiled from the records of one hospital, it is probably more correct than some others gathered from mixed sources. It is possible, however, that 10.3 per cent. minimises the mortality, as a few of the cases were so mild that they might be excluded from the statistics as doubtful cases. In forty of the sixty-eight well-marked tumour was palpated in the right iliac fossa; in some of the others tumour probably existed, but the tenderness was so extreme that muscular resistance prevented a thorough examination. With regard to this absence of tumour, it is worth noting that in the most acute perforative cases tumour is only once mentioned, but these were nearly all late cases with distension and extreme tenderness, so that the obstacles to examination were unusually great. Another and rather remarkable point illustrated is that of the forty cases with tumour only four had well-marked abscess; all the others with one exception, a relapsing case operated on, recovered without suppuration. Only twice were redness and oedema noticed—once in a case which recovered without suppuration; in the other, a perforation of the cæcum, there was a well-formed abscess. In three out of the four patients with well-defined abscess of considerable extent, these two characters, redness and oedema, were absent. In two of the four abscesses fluctuation could be detected; in the two others it could not, the reason being, as operation showed, the extremely dense thickening of the abdominal wall over the pus collection.

The proportion of cases which relapse has been most variously estimated; of the sixty-eight patients here under consideration five relapsed, three of them twice, one three times, and one four times. Of course some others may have relapsed and found their way to other institutions, but one's general experience of acute conditions such as this is that the patient returns if he feels ill again. I am satisfied that the so-called relapse is occasionally induced by allowing the patient to get about before his disease has resolved; and I think it is important that a distinction should be drawn between such cases and those in which actual relapse occurs, for which some very definite cause, as retained secretion or impacted hard body in the vermiform appendix, can be found.

To return for a moment to the fate of those who relapsed, five in number, four eventually recovered to all appearance completely; the fifth was operated on and died. Of his case it is only right to say that the operation was done some years ago, before the modern procedure was formulated, and that under the same conditions now the result would probably be a more fortunate one.

The cases dying, seven in number, form the most interesting group in my statistics. One a youth, aged 17, had a perforating ulcer of the cæcum setting up suppuration, the abscess subsequently bursting into the general peritoneal cavity, and causing death. This case occurred in 1885, and has already been put on record. It is reasonable to say of it that at the present time it would certainly be operated on, with every expectation of success.

In the remaining six patients the appendix was the starting point of disaster. One of them has already been referred to as a relapsing case. He was operated upon before the modern operation had been formulated, and no abscess being discovered the incision was closed, except an exit for a drainage tube. Death occurred from peritonitis, and at the necropsy the appendix was found rather dilated, and containing three small concretions. In the remaining five cases the appendix was perforated, but in only one instance was there a concretion. All the patients were males, and their ages were respectively 12, 15, 19, 24, 30, and 35. It should be noted that all died from peritonitis, one due to the rupturing of a small abscess cavity; in the other instances the septic mischief appears to have spread directly from the inflamed appendix. In three cases out of the five the patients were admitted with advanced general peritonitis, without any very distinct evidence as to its starting point, and although section was performed on them, twice in the middle line and once over the right iliac region, the peritonitis was too advanced for any hope of a successful issue. In one of the cases remaining there was a basic empyema, and practically no evidence pointing to the condition of the appendix; in the fifth, and last, the symptoms were those of mild peritonitis, without any evidence pointing to the cæcal region as its starting point;

¹ Read in the Section of Surgery at the Annual Meeting of the British Medical Association held at Nottingham, July, 1892.

Chart 1.

indeed, the left iliac fossa appeared to be chiefly implicated. A few hours before death extreme collapse occurred after an action of the bowels, and the patient was moribund before operation could be performed.

WHAT CASES REQUIRE OPERATION?

Such, then, are the most important facts presented by a review of the cases in the General Hospital. If these cases stood alone they would be sufficient to show that operation should be the exception and not the rule. It would be much easier to answer the question, What cases require operation? if one had each individual case before one. In the absence of this, it appears to me that cases requiring operation may be classified under three heads:

1. Those in which pus can be diagnosed with something like certainty.
2. Those in which, from the acuteness of the symptoms, perforation or gangrene of the appendix may be regarded as imminent if it has not already occurred; and
3. Those in which prolonged rest, blistering, etc., fail to prevent relapse.

Class 1.—The characters on which I lay stress for the recognition of suppuration are the presence of a more or less distinct lump in the right iliac fossa, occasionally extending higher than this to the lower part of the lumbar region, increase in the size of this, especially if associated with cedema or suspicion of redness, or with rigor. Fluctuation, if present, of course makes the diagnosis absolute, but delay until it can certainly be made out is most undesirable. When it is absent an increase in and persistence of extreme tenderness is an indication of much value. The temperature, considered in conjunction with the other signs, is a most valuable guide; it is distinctly of the hectic type, and Chart 1 may be looked upon as typical. This temperature record, however, in the face of improvement in other directions, may mislead—a fact illustrated by the irregular hectic Chart 2, which is that of a patient who recovered completely without suppuration, although, in addition to his suggestive temperature, he had at first severe vomiting and a well-defined mass in the right iliac region, with slight redness over it. It ought to be mentioned that the motions were carefully searched for the presence of pus, and none was found. I am free to confess, however, that in such a case as this, despite the fortunate ending, I should operate, as involv-

ing the patient in less risk than delay. Abscess being diagnosed or strongly suspected, what procedure should be adopted for its evacuation? Any exploration with the aspirator or similar instrument is to be strongly discouraged. Incision directly over the most prominent part of the swelling should be resorted to, or, if there be no such distinct guide, then incision about the right semilunar line, the middle of the wound falling across a line from the right superior spine to the umbilicus. As the incision deepens it will often be found that, although cedema of the skin has not been noticed, yet cedema of the subcutaneous and deeper tissues is quite marked. This, together with inflammatory fibrosis of the muscles, will pretty certainly indicate for the comfort of the surgeon that an adherent abscess lies beneath. Under the conditions just laid down as calling for operation, it will generally be found that the abscess sac is adherent to the peritoneum in front, and that the pus is reached without any possibility of fouling the general peritoneal cavity. If adhesion does not exist, however, there should, with proper precautions, be very little risk of infecting the surrounding peritoneal surface. Careful sponging should be substituted for any form of flushing or irrigation, which may carry particles of infective material where they cannot escape again. At the bottom of the abscess cavity the deformed and, perhaps, perforated appendix may be found. If it is, and it can be ligatured and snipped off with little disturbance of parts, this should be done. If it is firmly bound down, even if it be perforated, I think it best left alone, and this may be done with the expectation that it will heal eventually, even if a sinus for a time exists. Should the appendix not be easily found, prolonged search for it is to be deprecated. Drainage must be provided, and in one of my cases this was through a counter-opening just above the crest of the ileum, the anterior incision being practically closed.

Class 2 is perhaps the most important, because it provides many of the cases requiring operation, and because the mortality in this class is very high. Each case requires most careful watching, so that the time when successful laparotomy may be performed, that is, ere general peritonitis is established, shall not be allowed to slip away. No cases are more difficult to come to a right conclusion about, so that, on the one hand, unnecessary operations may not be performed, and, on the other, interference may not be too late to prevent a fatal septic peritonitis.

Chart 2.

The signs and symptoms differ considerably from those of Class 1. There may be no tumour, no hectic temperature, and there will be no sense of fluctuation, no oedema or redness. As a rule the attack commences acutely, with vomiting, and it may be a rigor. Pain is very severe, and at first may be widely spread over the abdomen, but eventually the right iliac fossa is localised as its chief seat. Tenderness here is very marked, and its chief point in my experience corresponds very closely to that laid down by McBurney, namely, 2 inches from the anterior superior spine on a line between that spine and the umbilicus. As already mentioned, tumour there may be none, or it is so disguised by muscular resistance that it can only be felt under anæsthesia. In the next twenty-four hours the tenderness may have become even more marked and the pain more distinctly localised unless general peritonitis has supervened. The temperature will be generally elevated, to 102° or higher, from the first, and the pulse will be unduly quick in relation to the temperature, being perhaps 130 with a temperature of 101° . If at the end of forty-eight hours the extreme tenderness remains, the vomiting has recurred, the temperature is still elevated, the pulse quick out of proportion, and the patient's face is ill and painful looking, it will be a great question whether operation shall not be resorted to without further delay. If the patient be a child I would not wait for further development of symptoms, and, whatever the age may be, if there is commencing distension in addition to the other symptoms, the risks of delay are too great to be faced. To sum up concisely, an acute commencement, with vomiting which continues under treatment, increasing tenderness at McBurney's point, fever of two or three degrees, quick pulse, and the first sign of abdominal distension creeping from the right iliac fossa calls for operation even though the case has been in progress only two days. A word as to the general treatment during this early stage. The rest in bed should be absolute, the patient not being allowed out of the recumbent position, and the cold coil should be applied, or at first a few leeches. Purgatives or enemata are in this acute condition very doubtful remedies, and I prefer not to use them. It is necessary to refer a little more to the temperature as a guide in the cases now under consideration. The hectic temperature of the first class will not be present as a rule, but a continuous fever of moderate amount is common—up to 102° , 103° , or even higher. The absence of fever, however, must not be taken to contraindicate

operation if the other signs are in favour of it. This point is well illustrated by Chart 3 from a boy who died of perforative peritonitis in a few hours after its onset, the fever which prevailed in the early days of the illness having given place to a slightly subnormal temperature for three days.

Operation having been decided on, an incision is made directly over the appendix, with the knowledge that there will pretty certainly be no adhesion to the anterior wall of the abdomen, and that the general peritoneal cavity will be opened. An incision $2\frac{1}{2}$ inches long is sufficient unless the patient is stout, and it should be in the semilunar line, with its centre about corresponding to McBurney's point. The only instruments needed, in addition to those required for an ordinary abdominal section, are good broad retractors and an aneurysm needle threaded with silk. When the abdomen is opened the cæcum presents, and the fingers must be passed down its inner side in search of the appendix. Before this is reached it is quite possible that a small fetid collection of pus may be liberated. If so, this should at once be carefully sponged away, the inner margin of the wound being so retracted that, if possible, the operator may see what he is doing. The search for the appendix is then continued. It may be quite free, or it may be the centre of a pus cavity already evacuated, or it may be thickened, distorted, and adherent. No part of the body appears to vary so much in size as the vermiform appendix, and it varies also in position. Generally to be found behind a coil of small intestine just at the inner margin of the cæcum, it may have tucked itself quite behind the cæcum, or it may be found overhanging the brim of the pelvis freely down into the cavity. If it cannot be located, the anterior longitudinal band on the cæcum is a very reliable guide to it. The appendix having been found, if it is free or only moderately adherent and shows evidence of distension, thickening, or concretion, it should be removed. This may be done by transfixing the little mesentery of the appendix with the aneurysm needle threaded with silk, tying one half round the base of the appendix, the other round its mesentery, the appendix being then snipped off with scissors. It has been recommended to stitch the divided peritoneal coat of the appendix over the end of the stump. It is very doubtful whether this can be effected in the majority of cases; certainly I have seen several specimens in which it would have been impossible. Even if possible, experience has shown that cases do perfectly well without it, and, that

being so, it seems a mistake to expend time and to disturb the parts more than is absolutely necessary. If the appendix is firmly bound down, probably the best plan is to leave it and trust to drainage alone. Some form of sponge should be used for cleaning away pus or the contents of the appendix, irrigation being avoided for reasons already mentioned.

There are still advocates for exploration by median abdominal incision. Everything is so much in favour of the lateral one when the caecal region is clearly the starting point of the mischief, that the median opening appears to me only justifiable under two conditions: (1) When the diagnosis is not clear, the operation being really an exploration; and (2) when general peritonitis exists, the addition of a median opening (in addition to the lateral one) for flushing and drainage adding to the patient's chance of recovery.

Chart 3.

Class 3: Relapsing Cases.—None of these requiring operation have fallen under my own care, so that I only bring them under your notice to state completely the case for operation as it presents itself to me. The first point which arises is, What is a relapsing case? A fair definition appears to be, a case which, after apparent complete recovery, lights up again into active disease within days, or at the outside weeks of the date of convalescence. The second question needing an answer is, Does every such case call for operation? This will be answered differently by different observers. Personally I should wait for a second relapse before resorting to operation, unless the symptoms in the first relapse were of a severe kind. In reference to this question of relapse, it is necessary to emphasise the fact that insufficient rest is responsible for many cases. These are really incomplete recoveries, as apart from relapses, and in them the inflammatory condition has never become really quiescent.

Operation in relapsing cases appears to be best deferred until the acute symptoms have passed away, and the method of carrying it out is similar in detail to those of the acute perforative cases, the appendix being removed whenever it is found distorted, perforated, or the subject of any other pathological change.

The cases tabulated in my paper from the hospital records brought the date up to about the end of March, 1892. Since then I have had under my own care a girl who had a history pointing distinctly to three attacks of inflammation in the right iliac fossa during the last year. Rest in bed, blistering, leeches, salines, and careful dieting failing to remove the pain

and tenderness in the region of the appendix, and as, moreover, there was fever of two or three degrees at times, especially on getting up, I came to the conclusion that there was some condition of the appendix causing the relapses. Since my paper was written, I have opened the abdomen in the right iliac fossa, and found simply adherent omentum. This was attached to the parietal peritoneum and to the front of the cæcum to a slight extent, but no other morbid change was found. The appendix was found after a long search, to the front and outer side of the cæcum, and it was brought up into the wound and examined, but nothing abnormal was found in it, neither thickening of its walls, dilatation of its cavity, nor contained concretion. Just above its free end there was a slight narrowing, but nothing that could be spoken of as pathological. I hope to publish the case in full at some future time, as at present it seems to me that we are in need of accurate records of cases to set at rest many points in dispute.

A SUCCESSFUL CASE OF ILEO-COLOSTOMY.¹

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R. W., aged 57, a colour maker, was admitted to the Royal Infirmary, Newcastle-on-Tyne, under my care, on July 29th, 1891. His chief complaint was of constipation, with recurring attacks of abdominal pain.

History.—Fourteen months earlier, while leaning over a cask, he was seized with a pain in the lower part and right side of the belly, which rendered him unable to work for the rest of that day, but gradually passed off. A month later, without evident exciting cause, pain returned in the same position, and spread from it upwards to the navel down to the testicle, and he had also a feeling of cramp in the heel. This attack lasted for a week, during the first three days of which he was unable to pass either flatus or fæces, but the obstruction was eventually overcome by strong purgatives. He never vomited. Since then he had had similar attacks from time to time, never going for longer than a month without one. Since the first seizure he had never had the bowels moved without purgative medicine, and had lost more than a stone in weight. He had been unable to work for six months, on account of this illness.

Condition on Admission.—The patient was a sallow, poorly-nourished, depressed-looking man. His pulse was 84, strong and regular. Except for the abdominal condition, he appears to be healthy, there being no evidence of disease in any other organ. On deep palpation of the abdomen, one inch internal to, and three fingers' breadth above, the right anterior superior spine of the ileum, an indistinct, rounded, solid-feeling mass was discovered, lying against the back wall of the abdomen. It moved a little upwards and downwards on respiration, and, though not tender on pressure, caused a "sensation" when manipulated.

None of my colleagues who saw the case or myself were able to form any definite conclusion as to the nature of the abdominal tumour, but all agreed with me that the case was one requiring an exploratory operation.

Operation.—On August 7th, 1891, assisted by Dr. Hume, I opened the abdomen by a 4-inch incision in the right linea semilunaris, and drew forward the tumour for inspection. The ileo-cæcal region was found to be involved, the tumour being about 3 inches long, rounded, and like a thick sausage, and firm in consistence. From the character of the tumour and the in-folded appearance of the ileum at its junction with the colon the case was regarded as one of chronic intussusception at the ileocæcal valve. An attempt was made to reduce the intussusception, but the density of the adhesions and the free bleeding which followed tearing them soon warned me that no success was likely to reward perseverance in this direction. A loop of the emptied ileum and ascending colon was now drawn out of the wound, isolated by sponges, and each opened in their convexity between two constricting india-rubber bands passed through their respective mesenteries. By means of Senn's

¹ Read in the Section of Surgery at the Annual Meeting of the British Medical Association at Nottingham, July, 1892.