

**A contribution to the surgical treatment of diseases of the appendix  
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A CONTRIBUTION TO THE  
Surgical Treatment of Diseases of the  
Appendix Vermiformis.

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ENFORCED absence from the annual meeting of the British Medical Association at Carlisle last year prevented my adding a contribution to the literature of the treatment of diseases of the appendix vermiformis as I had intended (the subject which was so ably introduced to the Section by Dr. MacDougal). It is, however, an important subject, and I should like to place before the Association a few remarks relative to the treatment of two of the varieties under which disease of the appendix presents itself to the surgeon.

In the first place, as regards relapsing appendicitis, I would submit a method of operating which in my opinion presents many advantages over the usual methods. Towards the end of the year 1894 I was asked to see a case of recurring attacks of inflammation in the region of the appendix. These attacks had been severe and the patient very ill during them. Altogether there had been five or six attacks during nearly as many months, and he had been invalided home. His medical attendant could feel what appeared to be a thickened appendix, which remained when all the symptoms had subsided, and operation was



consequently advised. To this the patient—who was in danger of being retired from the service, had suffered greatly from the attacks, and went in constant fear of another—readily consented. The question submitted to me was—If the operation was performed, could I guarantee that no weakness of the abdominal wall would remain, as it was essential that there should be no hernial protrusion nor anything to prevent the patient from taking a command, which involved the ability to ride well? The usual incision through the abdominal wall for removal of the diseased appendix in cases of relapsing appendicitis had not, according to my experience of the operation as performed by other surgeons, given that uniformly good result to enable me to express confidence in it, and a consideration of the anatomical arrangements of the region led me to suggest and carry out a plan which has invariably produced the desired effect in my hands. Indeed, it is not easy to imagine how it can possibly fail in its object if performed with ordinary care.

An oblique incision is made in the right iliac region with its centre corresponding to the point which, in the opinion of the surgeon, is probably that of the attachment of the appendix, and its length varies with the size of the patient and the fatness of the abdominal wall. The direction of the incision is that of the *linea semilunaris*, and is usually about midway between the anterior superior spine of the ilium and the umbilicus. After division of the skin and subcutaneous tissue, the incision is continued through the aponeurosis of the external oblique and the outer part of the sheath of the right rectus muscle, this part of the incision is placed about an inch from the external margin of the sheath. The rectus muscle is then drawn towards the middle line, having been separated from the inner surface of the sheath with the forefinger. When the edges of the wound are retracted, the deep epigastric artery will be seen lying on the posterior layer of the sheath running from below upwards. The artery is easily avoided, and the posterior layer of the sheath (or the *transversalis fascia*) the subperitoneal tissue, and the peritoneum divided to the full extent of the wound. The use of retractors will bring the area of operation well within reach. The small intestines can now be pushed towards the middle of the abdomen, the region affected isolated, the appendix amputated by the coatsleeve method, and the peritoneum closed over it with Lembert's sutures.



On the completion of the operation, the wound is closed by interrupted silk sutures in three layers from behind forward. The posterior part of the sheath and the structures behind the muscle are brought together with one line of sutures, and the rectus itself allowed to return to its normal position. The anterior part of the sheath and the external oblique aponeurosis are then sutured, and afterwards the skin and subcutaneous tissues. By this method of operating, the uninjured rectus muscle is interposed between carefully-united layers, which do not accurately correspond with one another, and the risk of hernial protrusion is done away with.

There is one point to be remembered when applying the sutures, and that is an anatomical one; it is that the tendinous expansion of the external oblique is apt to become displaced during the manipulations of the wound, and escape notice in the suturing: this would not in all probability produce any weakness of the part of moment, but it should be sutured in order to render the part as strong as possible. It has been urged against this method (1) that it takes a longer time to perform the operation, especially when the sutures are being inserted than when the operation is performed in other ways; (2) that it is difficult to get at the appendix through the wound.

As regards the first of these, I grant that it does take a longer time to do the operation, but consider that the gain to the patient amply compensates for a slight prolongation of the operation. As regards the second objection, I have experienced no difficulty in removing the appendix through a wound which has been made in the way indicated, and have used it on several occasions both in hospital and private practice. One patient was shown to the Clinical Society only last year. A wound in the position described comes much nearer the usual position of the appendix than would be thought from a superficial consideration of the parts.

Some of my colleagues have tried this method on my recommendation, and report favourably of it. My results have been uniformly good; the only drawback in one case was a localised suppuration about some of the stitches, but as two other abdominal operations performed by me the same afternoon under similar circumstances also suppurated, this must be ascribed to the imperfect sterilisation of the silk sutures, and not to the operation.



For the removal of the appendix vermiformis this operation has fulfilled all my expectations ; it has also proved valuable in my hands for purposes of exploration, the freedom from danger of subsequent hernia being such a manifest gain.

Writing as to the advisability of removal of the appendix after a first attack of perityphlitis, on the ground of preventing the slight loss of life and the immense waste of time associated with a recurrence of attacks, Dr. Hawkins<sup>1</sup> continues : "The only point remaining which can make me hesitate to accept this conclusion is one of which I am not qualified to speak. It is the question of the subsequent yielding of the scar and the formation of a hernial protrusion. If this is likely to be a common and troublesome event, it must candidly be taken into consideration." It is evident, therefore, that such an operation as this fulfils a manifest want. The question as to the time at which the appendix should be removed, and the removing of it, in these cases of relapsing disease are very ably dealt with by Dr. Hawkins,<sup>2</sup> and it is unnecessary to discuss them now.

The second point to which I would ask attention is the necessity for early treatment of suppurative peritonitis, usually having its origin in disease of the appendix. I have more than once been asked to see a patient with a view to operation in a late stage of peritonitis, when the clinical signs were present, and the sunken face, failing pulse, distended abdomen, and constant vomiting made it evident that in all probability the case was in the last stage of exhaustion, and it was doubtful if the simple administration of an anæsthetic would not prove too much for the patient. I fear this is an experience too common to many of us. In several of these there had been an interval of some two or three days, or even more, between the onset of the pain and the first act of vomiting, and the amount of pus in the peritoneal cavity must have given evidence of its presence long before the consultation with the surgeon. But no examination had been made to ascertain whether dulness was present, much less an attempt made to determine its earliest appearance or amount. It is true

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<sup>1</sup> "Diseases of the Vermiform Appendix," p. 133.

<sup>2</sup> *Loc. cit.*



that success has been obtained in some apparently hopeless cases of the kind, but to obtain anything like a uniformity of success, operation must be done early.

Light percussion can be borne even in the most tender abdomen, and it should never be omitted in cases of severe abdominal pain of obscure origin, but unless one has frequently practised abdominal percussion it may be difficult to appreciate the varying conditions of the abdominal contents even in health.

I had a most striking example of this recently when the dulness due to purulent fluid was ascribed to a full colon, until it was pointed out that the dulness extended across the lower part of the abdomen as well as along the flanks.

That it should be possible to operate in some cases before vomiting comes on, and that purulent peritonitis is not necessarily accompanied by vomiting in its earlier stages is conclusively shown by the following case. The performance of abdominal section in the absence of this most important symptom has been called rash, but was fully justified by the condition which was disclosed on opening the peritoneum. That the patient was much relieved is very evident, and that success was so nearly attained redounds greatly to the credit of Mr. Wallace and Mr. Thurston, who saw the man on admission and recognised the urgency of his symptoms:

The patient, a waiter, aged 25, was admitted to the Albert Ward, St. Thomas's Hospital, on November 17, 1895, in the evening, complaining of severe abdominal pain. About November 7 he began to feel shooting pains in the head, and also a dull pain in the stomach. These continued on and off till Tuesday, November 14. On that day he had been opening a door which resisted his efforts for a time, and then yielded rather suddenly, so that he was struck on the right hip and fell heavily to the ground. On the following day he had a dull aching pain in the abdomen, which at times became very sharp, and used to double him up. He went on with his work, however, until Friday, the 16th, at 2 o'clock, when the pain in the stomach became so bad that he had to return home and go to bed. It was worse on the following day, and a medical man who saw him recognised the serious nature of the illness, and sent him to the hospital at once.

On admission he appeared a well-nourished man, with a somewhat anxious expression and sunken face. His mind



was quite clear, and he talked intelligently, being frequently interrupted in his replies to questions by paroxysms of pain in the abdomen, which caused him to throw back his head, hold his breath for a few moments, and grind his teeth. He was lying on his back with his legs and thighs flexed, and complained only of the constant pain in the abdomen, which at times became much worse. Examination of the abdomen showed no movement of the abdominal wall, respiration being entirely thoracic. The skin was reddened as the result of the former application of hot fomentations. There was no fulness in any particular part of the abdomen, which was slightly distended. The muscles were held very rigidly, so that the abdominal wall was very hard; it was so excessively tender that he complained of the slightest touch; this tenderness was not localised, but extended all over the abdomen. On percussion there was resonance, with the exception of a small area above the pubes; this was about an inch and a half in extent from below upwards in the middle line, did not extend far to the left, and gradually diminished towards the right, until it ceased about the middle of Poupart's ligament. There was no fluid thrill. The hepatic and splenic regions were normal. The urine was clear and contained no blood. His tongue was dry and furred. Pulse 125. Temperature  $102.2^{\circ}$ . There had been no vomiting. The bowels had acted normally.

Mr. Thurston, the house surgeon, and Mr. C. S. Wallace, who was on duty for the resident assistant surgeon, recognised the condition as one of acute purulent peritonitis, and sent for me to see the patient. We thought the cause was disease of the appendix vermiformis.

As soon as possible operation was undertaken. The abdomen was opened in the middle line, above the pubes after the surface had been thoroughly cleansed. On incision of the peritoneum a quantity of offensive pus escaped, and when the finger was introduced the pelvis was felt to be full of thick pus. The intestines were slightly matted together, but easily separated on touch. A small quantity of lymph came away, and a small area of one coil of intestine had some lymph adherent to it, but generally the peritoneal coat of the bowel was very little changed. No gut protruded through the wound. The abdomen was well washed out with sterilised water, passed through the Berkfeldt filter, and search made for the



appendix, which could not be identified. It was not considered advisable to make any prolonged search. A glass drainage tube was inserted through the lower angle of the wound into the pelvis, the upper part of the wound closed with sutures, and a dressing of cyanide gauze applied with a many tailed bandage. Later in the day he was fairly comfortable and complained less of pain, which was no longer paroxysmal. The abdomen was not so full; it was, however, still tender on pressure, but much less so. He had vomited once after the anæsthetic. His pulse was 100, and temperature  $99.2^{\circ}$ .

On November 19 there was not much discharge from the tube, and it was less offensive. The pulse was 84, and temperature normal. The bowels had acted twice, the motions were loose but otherwise normal.

On November 20 the glass tube was replaced by a smaller sized rubber tube, as there was but little discharge. The abdomen was only slightly tender on pressure. The drainage tube was removed altogether on November 23, as the amount of discharge was trifling and not offensive. Strapping was applied across the lower part of the abdomen on November 27 to prevent gaping of the wound, which was dressed with boracic ointment. His temperature was normal, he was taking solid food, and was now apparently convalescent.

On December 6 he complained of pain in the left side of the chest, and the temperature was  $101^{\circ}$ ; it had risen the previous evening to  $99.6^{\circ}$ . The pain was increased by deep inspiration but was not very severe. As no improvement followed the treatment prescribed, on December 11 Dr. Toller was requested to examine the patient with me. There was considerable tenderness over the splenic region, and the ninth intercostal space appeared fuller than normal. Splenic dulness was increased upwards, forwards, and backwards. There was absence of local fremitus, whilst the breath sounds over the upper part of this area were harsh and tubular. The pain was referred to the side and not to the abdomen, which presented no abnormal signs. His temperature was  $102^{\circ}$ , pulse and respiration were increased in rapidity, and the man again had a look of anxiety. We agreed that the symptoms pointed to a collection of pus in the abdominal cavity below the diaphragm and to the inner side of the spleen. The complete absence of abnormal signs below the costal margin



made it improbable that abdominal incision would enable one to get at the pus in a satisfactory manner, and the more direct route through the chest wall was chosen. A piece of the tenth rib over the splenic area was excised, the pleura opened, and, after the incision of the part of the pleura covering the diaphragm, the costal and the diaphragmatic layers were stitched together. A director was then passed through the remaining thickness of the diaphragm, the opening thus made enlarged, and further search made. The director soon entered the spleen, which was intimately adherent to the diaphragm, and was partially separated, with difficulty, by the finger. A bent bullet probe was passed as far as possible along the under surface of the diaphragm without meeting with pus. A drainage tube was inserted and a gauze dressing applied, the external wound being partly closed with sutures.

No improvement followed this operation, no pus escaped from the wound ; he became restless, and emaciated visibly. The temperature fell for a few hours to  $98^{\circ}$ , then rose to  $100^{\circ}$ , and remained at that height. His complaint was still of pain in the splenic region. There was no apparent change in resonance in other parts of the abdomen ; the lower part was perhaps rather more bulging than normal, but the granulating surface of the wound made at the first operation looked healthy. He had now (December 13) developed another symptom—vomiting—which was regarded as very important. As the attempt made to reach the collection of pus which was supposed to be present in the splenic region had not been successful, and it was evident that he could not live long unless he did obtain relief, I made an incision in the left linea semilunaris and carefully explored the abdomen from the wound. The spleen was adherent to the diaphragm, but no abnormal swelling of any kind could be felt in the upper part of the abdomen, either by myself or Mr. Abbott, who ably assisted me ; but in the lower abdomen a distended coil of small bowel could be felt, which gave the impression that it was possibly obstructed in consequence of partial fixation to the median wound. Mr. Abbott passed his finger from the wound in the linea semilunaris to the upper part of the old median wound, and cut down on it. When the peritoneum was reached there was a gush of gas and offensive purulent material mixed with some blood. This came from the pelvis, and the abscess cavity extended



across towards the right iliac fossa, in the situation of the first purulent collection. This was washed out and drainage provided for. The wound in the linea semilunaris was closed and that in the side redressed, the drainage tube not being replaced.

The day following this, December 14, he was better, for the vomiting had ceased and the temperature fallen, but he still looked very ill, and had a rapid, weak pulse. There was much discharge from the wound. At 4.30 a.m. of the 15th he pulled out the glass drainage tube, being only partially conscious of his action, and restless. He afterwards gradually sank and died at 7.30, four weeks after admission.

Dr. Mackenzie, who made the *post-mortem* examination, reported as follows:—The intestines were distended and were adherent to one another, and to the abdominal wall in front. The adhesions, however, could be easily broken down. In making the central incision the intestine was slightly injured in two places, but there was no evidence that any perforation had existed during life. In the splenic region a collection of pus was found, amounting to about 10 ounces. This was contained in a pocket of the peritoneum, bounded by the diaphragm above, the spleen to the left, the stomach below and to the right. This pocket was completely separated by adhesions from the general peritoneal cavity. The spleen was flattened, and was closely adherent to the diaphragm posteriorly. It was of a slaty-black colour. The peritoneal cavity had not been opened by the incision which had been made in the splenic region. On placing the finger in the wound, one came on the spleen in one direction, while above there was only the peritoneum separating the finger from the abscess cavity. The liver was very firmly adherent all over. Careful examination failed to discover a cause for the peritonitis. The vermiform appendix looked suspicious externally, but when opened up there was no sign of perforation or of ulceration. The intestinal tract was examined from end to end without discovering anything abnormal. The liver and kidneys were normal. The pericardium contained about 6 ounces of serum. The heart was normal. The right lung was adherent nearly all over, and there were a few slight adhesions at the left apex. There was no effusion or inflammation in either pleura. The lungs were normal.



In the previous history there were complaints of vague abdominal pains and occasional *malaise* with headache, not sufficient to make the patient give up work as a waiter, but it is noteworthy that he mentioned a date on which this change in his health commenced. It is not uncommon to get a history like this in cases of appendicular disease.

When admitted, the patient was seriously ill, and suffering acutely from paroxysmal pain in the abdomen. The diagnosis of peritonitis was made without much difficulty, the face, the attitude of the man, the thoracic respiration, and the hard, tender, fixed abdomen pointed to this, especially when the high temperature, rapid pulse, and dry mouth were taken into consideration. Although the severity of the pain, muscular rigidity, and temperature would have argued the presence of a commencing purulent peritonitis, the extension of the dulness to the left of the middle line and its outline showed, in our opinion, the presence of a considerable collection of pus, whilst its extension more to the right suggested its possible origin in the region of the appendix. We came, therefore, to the conclusion that the case was one of acute septic peritonitis, and that an immediate operation would give the patient the best chance of recovery.

The absence of vomiting was regarded as favourable to the success of operation, for he was less exhausted than he would have been, whilst he could take food and stimulants as might be required.

Most classifications of the causes of septic peritonitis give cold as one, or perhaps speak of "idiopathic peritonitis," in other words, the origin of the disease as in this case was not explained by the *post-mortem* examination, although it was carried out by a careful expert.

Septic peritonitis is caused, as we know, by the escape into the peritoneal cavity of the bacterium coli commune, which is present in all parts of the intestinal tract, and in cases similar to this, but which have proved fatal at an earlier stage, this bacillus has been found passing through the wall of the appendix, without the aid of any ulcerative process. Dr. Hawkins has illustrated this very clearly. It is very probable that the disease started in this manner, but improbable that microscopical examination, so long after the invasion of the peritonium, would have proved it. To the naked eye, the appearance of the appendix was normal when opened up.



It is generally recognised that an injury of the intestinal canal in any part of its course may, by lowering its vitality, or by some disturbance of the local circulation, so alter the normal resistance that the bacterium coli commune can get out by passing through the wall of the bowel. This bacterium is found throughout the intestinal tract and always in the appendix. It is probable that the jar of the fall which the patient experienced the day before the onset of symptoms was primarily responsible for their unusual activity, having acted on the appendix in the way indicated.



