the condition was unchanged, except that there had been some faecal vomiting; temperature normal, pulse 120. He had borne the journey well. Mr. Wallace suggested obstruction by Meckel's diverticulum as a possible cause for the condition.

He operated at once, and opened the abdomen first in the middle line, for the above reason. Some serous fluid escaped, and distended and congested bowel presented. A mass was felt in the right iliac fossa. An incision was then made over the appendix, which was with difficulty brought into the wound. It was then found that the appendix, which was $3\frac{1}{2}$ in. long, was gangrenous in all but the proximal $\frac{1}{2}$ in. of its length. It was not perforated. It had been twisted on itself so that $\frac{1}{2}$ in. from its base it was very thin, and its lumen was completely obliterated (see Fig. 1). It was firmly adherent by its tip to the mesentery close to its attachment, and through the ring thus formed a loop of small intestine, $10\frac{1}{2}$ in. in length, and close to the ileo-caecal valve, had passed (Fig. 2). Its base was constricted, and it was much distended and congested, with some fibrinous exudation on its surface. Slight adhesions had formed round the appendix, but when this was snipped through they were easily freed. The gangrenous portion of the appendix had some faecal contents; the cut ends were treated with pure carbolic acid. There was a distinct ring on the surface of the intestine from pressure. The appendix was removed in the usual way, and the wounds stitched up.

Fig. 1.

Fig. 2.—Diagrammatic.

The pulse rather improved under chloroform and after operation, and the patient seemed better. During the night, however, vomiting returned, and persisted, and he died about 1.30 p.m. on the following day. At the necropsy next day no new facts were ascertained. The peritonitis was not great in amount, and no pus or lymph was found; but the constricted loop of bowel had not recovered its tone, and this was probably the cause of the continued vomiting.

As far as one can follow them the sequence of events was probably that as the result of some long past inflammation the tip of the appendix had become adherent. The diarrhoea with which the illness commenced had given rise to a greatly increased peristalsis, by which a loop of bowel had been forced through the ring formed by the appendix. This had given rise to the pain, vomiting, and obstruction, and to a gradually increasing strangulation of the bowel. But the intestine, in its passage through the ring of the appendix, had apparently twisted the latter on its axis, so that its blood supply was cut off at the base, its lumen was obliterated, and it became gangrenous. The comparatively slight amount of peritonitis was probably due to the fact that no perforation had occurred in the appendix, so that only the organisms which made their way through its walls reached the peritoneum. To this fact, also, and to the fact that the loop of

bowel though tightly constricted was not strangulated, we may ascribe the freedom from pain, and the apparent wellness of the patient. The only marked symptoms were the constipation and the vomiting.

FOUR CASES OF DUODENAL ULCER PERFORATING ACUTELY.

By D'ARCY POWER, F.R.C.S.ENG.,

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THE records of perforated duodenal ulcer are less full at present than those of perforated gastric ulcer, and details of the following cases upon which I have operated during the last year may be of interest to others besides myself. Cases I and II are quoted very shortly, because I have published a fuller account of them in the *St. Bartholomew's Hospital Reports*, vol. xxxvii, 1901, pp. 46-50.

CASE I.—A porter, aged 41, was admitted to St. Bartholomew's Hospital on May 23rd, 1901, saying that he was at work and quite well until 11 a.m., when he was suddenly attacked with pain in his epigastrium. The pain continued, and he vomited several times before coming to the hospital. He had passed no flatus since the pain began; his bowels were well open on the previous day. He was a temperate man, and there was no history of indigestion. At 2 p.m. the patient was reported to be a well-nourished man in obvious pain. His tongue was clean and moist; his respirations were very shallow, and 60 in the minute; his pulse was of fair volume and tension, regular, and beating 100 per minute. The pain in the abdomen was not localized, but it was sharpest in the upper half and down the right side. The abdomen was held rigid, and though it moved only slightly with respiration the movement was equal; it was not distended. It was tender all over, and was tympanitic everywhere, but the liver dullness was present. In the chest the percussion note was impaired at the right base, and the entry of air at the right base was weaker than on the left. No definite diagnosis was made, but the patient was thought to be suffering from pulmonary rather than from abdominal trouble. The patient remained in much the same condition, except that his pulse increased from 100 to 120 per minute until at 1 a.m. the abdomen became distended, the patient showed signs of collapse, and his pulse was 144. I saw him for the first time at 2 a.m., when he appeared to be so ill that I determined to explore his abdominal cavity. I therefore opened his abdomen in the middle line above the umbilicus. Liquid contents escaped as soon as the peritoneal cavity was opened, and a perforation was found apparently on the posterior wall of the stomach. The hole was large enough to admit a full-sized probe, and there was a considerable deposit of lymph around it. An attempt was made to close the perforation with Lembert sutures, but the operation was very difficult, owing partly to the awkward position of the ulcer and partly to the rotten state of the neighbouring tissues. Four sutures were passed, and it seemed as though the opening had been successfully closed. During the suture large quantities of a thin transparent fluid kept welling up from the perforation until the last suture was inserted, when it ceased. The patient bore the operation badly, and his pulse was almost imperceptible at the end of it. At 4 a.m. he was transfused with 3 pints of saline solution, and at 7.30 a.m. he died.

A necropsy at 3 p.m. on the same day showed that the whole peritoneum was acutely inflamed, its endothelial aspect being covered with a layer of fibrino-purulent lymph. There were collections of purulent matter at the bottom of the recto-vesical pouch, in the lumbar region and in the right subphrenic space, this space being almost completely shut off from the rest of the peritoneal cavity. The beginning of the duodenum at the upper and posterior part was the seat of a conical ulcer which measured $\frac{1}{2}$ in. in diameter. It had sharply-cut edges, but there was no infiltration at the margins. The floor of the ulcer had perforated, but the sutures were not accurately applied, as water and intestinal contents easily passed through.

The particular interest of this case lay in the fact that the localized peritonitis must have lasted a much longer time than the sudden onset of the symptoms would have led one to suppose, whilst the symptoms, when they appeared were so obscure as to make it seem, even to competent observers, that the patient was suffering from pneumonia rather than from an acute peritonitis.

CASE II.—The second case of perforated ulcer of the duodenum occurred in the person of a fat and cheery cabman, aged 47, who was admitted at 8.30 p.m. on July 15th, 1901, suffering from intense pain in his abdomen. He awoke apparently in the usual health on the morning of this day, and whilst he was eating his breakfast of tea and bread and butter at 9 o'clock he was suddenly doubled up with stomach-ache. He passed neither faeces or flatus all day, and though he was not collapsed on his admission to the hospital in the evening he was in great and constant pain which he referred to the epigastric region. He was quite clear that he had never suffered from indigestion and that he had never vomited blood, but he admitted that he had drunk much beer. His temperature was 99.8° F., his pulse was 104, and his respirations 24. His abdomen was full but not distended. It moved slightly but equally during respiration, and any deep tenderness, more marked in the epigastric region, and the abdominal muscles were held rigid. The abdomen was everywhere resonant, and there was an absence of liver dullness in the nipple line. I opened the abdomen at 10.45 p.m. in the middle line above the umbilicus, gas and fluid escaping as soon as the peritoneum was divided. The stomach was carefully examined, and after a short search the pylorus, in all probability in the first part of the duodenum. The hole was circular, accurately defined, and just large enough to admit the end of a probe. Nothing escaped from it whilst it was being sewn up, but fluid kept welling up from beneath the liver. I was particularly careful to close this perforation completely, as I remembered the fate of

the previous case. I therefore put in two tiers of Lembert sutures, the first row closing the ulcer and the second bringing a piece of omentum over it. The abdominal wound was closed completely after the area of operation had been sponged. The patient bore the operation well, and there was no subsequent vomiting. On the following day he was given nothing but a little hot water by the mouth. He had a nutrient enema of three ounces of beef-tea and an ounce of peptonized milk at noon. On July 15th, his bowels were opened thrice, his abdomen was moving well, there was no distension, and his progress would have been perfectly satisfactory if his pulse had not remained unduly quick. The patient began to fall on the 20th, and the abdominal wound, which had hitherto been healing kindly, now reopened and discharged pus. Three stitches were therefore removed, and a large drainage tube was inserted. The patient became more and more collapsed, and died on July 21st, eight days after the operation.

The necropsy showed that the peritoneal cavity contained about a pint of foul pus. The abscess was situated above the stomach and first part of the duodenum, below the right lobe of the liver and behind a portion of the great omentum. It was strictly localized, and there was no general peritonitis. There was a perforation in the upper portion of the first part of the duodenum just below the foramen of Winslow, and beyond the pyloric constriction. The perforation communicated with the abscess cavity. It was noticed that the ulcer was much larger than at the time of the operation, and that several of the sutures had cut their way through the softened tissues.

The result of this case was particularly disappointing, for the patient had felt so well after the operation that he was constantly inquiring when he might get up. The continued rapidity of the pulse, however, warned us not to be too sanguine of the result, and the lesson I learned from the case was to drain the abdominal cavity much more freely, and especially the portion which lies on the under surface of the liver.

CASE III.—A clerk, aged 37, was admitted into St. Bartholomew's Hospital suffering from severe pain in the abdomen. He said that for the last six months he had often suffered from stomach-ache about half an hour after taking food. On May 19th, 1902, the day of his admission, he was suddenly attacked at 12 o'clock midday with such severe pain that he was brought to the surgery in a cab. He referred the pain to the neighbourhood of the umbilicus and to the right side of the abdomen beneath the ribs.

On admission, he appeared to be a strong man in a state of extreme collapse. His pulse was 120 and his temperature 97.4°. His abdomen was contracted, but moved freely and equally during respiration. The abdominal walls were somewhat rigid, and the liver dullness was decreased. I saw the patient at 6 p.m. and decided to explore his abdominal cavity. The abdomen was opened above the umbilicus and in the middle line. Free gas and a quantity of bile-stained fluid escaped as soon as the peritoneum was divided, but considerable difficulty was experienced in locating the perforation as adhesions had formed in front of it. A circular hole was eventually found in the peritoneum, which measured about an eighth of an inch across. The outline of the ulcer was sharply defined, and a quantity of bile-coloured fluid was pouring out of it. The perforation was closed with two layers of Lembert sutures, and an incision was made in the right iliac region. A long rubber drainage tube was passed from this wound, its end being brought out at the first incision and a second drainage tube was passed beneath the liver. The patient never rallied from his state of collapse, and died on the following day at 1.55 p.m.

The necropsy showed that the patient had a suppurative peritonitis, with 2 oz. of turbid fluid in the pelvis. The stomach was much dilated and contained a dark fluid like "coffee grounds." There was a deep ulcer on the anterior wall of the duodenum, just beyond the pyloric orifice. The ulcer would have lodged a pea; its edges and surrounding parts were hard from cicatricial tissue, which had caused considerable stenosis of the pylorus. The ulcer had perforated externally into the peritoneal cavity, but it had been effectively closed by a series of interrupted silk sutures.

CASE IV.—A well-nourished man, aged 26, was admitted to the hospital at 7.30 a.m. on July 26th, 1902, suffering from acute abdominal pain and sickness. He said that he had suffered previously from attacks of stomach-ache, but that he was quite well until 7 p.m. on the previous evening, when the pain and sickness commenced suddenly. On admission his temperature was 97.2° F. and his pulse 112; the abdomen was hard and tense, and appeared to be tender everywhere. I did not see the patient until 10.30 a.m. on the day of his admission, and he then seemed to me to be suffering from an attack of acute perforative appendicitis, for he localized his pain entirely to the right flank, and the abdomen was more rigid in the right iliac region than elsewhere. I opened his abdomen at once by an incision carried through McBurney's point, and as soon as the peritoneal cavity was opened, gas rushed out with a large quantity of thin fluid which was sticky, odourless, and light yellow in colour. The large intestine and the appendix were found to be normal, but the small intestine was greatly inflamed, especially in the neighbourhood of each Peyer's patch. I therefore closed the opening, and made a second incision into the peritoneal cavity in the middle line. The small intestine was then systematically examined until a perforation was found on the anterior surface of the first part of the duodenum. The hole was small and well circumscribed. It was closed with Lembert sutures and the peritoneal cavity was drained by inserting very large rubber tubes into the space below the liver, into the recto-vesical pouch and into both flanks. The fluid contents of the tubes were pipetted away daily until August 4th, when the tubes were replaced with a light plugging of iodoform gauze. The patient made an uninterrupted good recovery, and was discharged to the convalescent home at Swanley on September 2nd.

The feeding of patients with a sutured ulcer of the alimentary canal is of the greatest importance, and Miss Bryan, Sister Kenton, has kindly given me the following account of the method we adopted in this case. The operation was performed at 10.30 a.m. and nothing at all was given by the mouth until after 8 p.m. when a drachm of water was given occasionally. Nutrient enemata were administered every four hours for ten days after the operation, the first one being given at 6 p.m. on the day of the operation. Each enema

consisted of peptonized milk with plasmon 3 oz.; beef essence, 1 oz.; salt, $\frac{1}{2}$ drachm. All the nutrients were retained, and the bowel was washed out with plain water twice every twenty-four hours. The patient began to complain of thirst after the first twenty-four hours, but it was relieved by constantly washing out his mouth with water and by an occasional rectal injection of half a pint or a pint of warm water. A soap and water enema was given on the sixth day and the bowels were relieved by similar means every other day from this date. Three grains of calomel given by the mouth on the eighth day were without effect in causing a motion. For the first five nights the patient received an injection of one-fifth of a grain of morphine hypodermically, and for the first two days morphine was injected twice a day. The food given by the mouth was as follows: During the first twenty-four hours a teaspoonful of water occasionally, amounting in all to about an ounce, and during the second twenty-four hours to about 3 oz. On the third day a little lemon juice was added to the water, and 4 oz. were given. On the fourth day a drachm of Benger's food was administered every two hours, with a drachm of lemon juice and water occasionally, and the same quantities were given on the fifth day. On the sixth day a drachm of Benger's food and a drachm of beef essence were given every hour alternately, the amount being increased to $\frac{1}{2}$ oz. on the seventh day. The patient felt some discomfort after the fifth hour, and was inclined to be sick, so 1 oz. of whey was given every hour instead of the Benger and essence, and this amount was increased to 2 oz. hourly on the eighth day. On the ninth day the patient was given 2 oz. of peptonized milk every hour, and at 4 p.m. he had some tea; thereafter on the ninth, tenth, and eleventh days he had beef essence or tea every two hours, and each time 2 oz. On the eleventh day he had some baked custard at midday, and on the thirteenth day this feeding was supplemented by a slice of thin bread and butter for tea and some bread and milk for supper. On the fourteenth day some jelly and sponge cake were added to the diet, and on the eighteenth day he was placed upon the ordinary half diet of the hospital, advancing to full diet on the twenty-fifth day after the operation.

The following lessons, I think, are taught by the four cases here recorded: (1) Duodenal ulcers occur more often in men than in women. (2) The extravasated fluid trickles into the iliac fossae, and causes a local peritonitis which may be mistaken for an acute appendicitis. (3) The transparent or bile-stained succus entericus found in the peritoneal cavity is diagnostic of a perforated duodenal ulcer. It is quite different from the astric contents escaping at a perforated ulcer of the stomach. (4) The prognosis of a duodenal ulcer is worse than that of a perforated gastric ulcer on account of the greater difficulty in closing it satisfactorily. (5) The prognosis should not be too sanguine until after the lapse of the eighth day, and it is always bad, however well the patient may appear, if the pulse-rate continues rapid. The pulse is a much better guide than the temperature. (6) Free drainage is imperative, both iliac fossae, the recto-vesical pouch, and the space below the liver more particularly need tubes. It is better that the patient should recover with a scarred belly than that he should die with an abdomen full of pus. (7) The feeding of the patient is a matter of great importance. Small quantities of food should be given frequently, and if the patient feels sick the amount must be reduced at once. It is better to give nutrient enemata for some days after the operation than to administer food by the mouth.

A Clinical Lecture

ON

RESECTION OF THE LARGE INTESTINE FOR CARCINOMA.

Delivered at the Bristol Royal Infirmary,

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CANCEROUS growths of the intestine are almost always found in the large bowel; the sigmoid flexure, the caecum, and the descending colon being the parts most usually affected, if the rectum is excluded.

The disease commences in the mucous membrane, columnar epithelioma being the most common type of cancer found in