or subsequent to it, and in each of these three cases the guinea-pigs became tuberculous. In the other cases no tubercle bacilli were even found in the expectoration, and in no case did the animals become tuberculous.

I think these experiments will show how reliable such experiments are in guinea-pigs if carefully performed, and that if expectoration from a human being which is not affected with tuberculosis is inoculated into guinea-pigs, and precautions are taken in the experiment to prevent contamination, the animals so inoculated do not develop tuberculosis, and that further a specimen of expectoration from a tuberculous pulmonary case in which tubercle bacilli cannot be found, even by observers accustomed to such an examination, when inoculated into guinea-pigs may, and frequently does, produce tuberculosis in the inoculated animal, and so allow us to diagnose, with greater accuracy than we could otherwise do, the accuracy of the case.* The experiments also lend support to the view, that we do occasionally meet with fibroid conditions of the lung of a simple pneumonic nature which in their physical signs closely resemble tubercle, but which are nevertheless of a non-tuberculous nature.

In conclusion I must express my indebtedness to Professor Sheridan Delépine for the use of the Pathological Department at the Owens College for making the above experiments, and for his kind help and advice in connection with the subject.

A RAPID METHOD OF PERFORMING ENTERECTOMY WITHOUT THE AID OF ANY SPECIAL APPARATUS.

By LEONARD ROGERS, M.B., B.S.LOND., F.R.C.S.ENG.,
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THE suggestion of Mr. Greig Smith, in his paper entitled *Is the Apposition of Peritoneum to Peritoneum a Surgical Error?* in the *BRITISH MEDICAL JOURNAL*, 1895, vol. i, p. 1, that the principle of sero-fibrous union might possibly be applied to the operation of enterectomy, seemed to me of especial importance to those working abroad, who are very unlikely to have at hand such appliances as Senn's plates, Murphy's buttons, or Mayo Robson's bobbins. I consequently devised the following method in January, 1895, but now (November, 1895) I have been able to prove its practicability. The method consists in turning back the peritoneal coat off one end of the small intestine, after resecting a portion of the gut, suturing the muscular coat thus exposed to the peritoneal coat of the other end of the intestine, subsequently turning down the reflected portion of peritoneum over the first row of sutures, which are thus completely buried, and suturing its deep fibrous surface to the outer serous surface of the unreflected end of the intestine. Thus a double sero-fibrous union is obtained which will unite both quickly and firmly. The inner sutures are passed through the muscular coat of one end and the muscular and peritoneal coats of the

Fig. 1.

Fig. 2.

* In this connection one should say, however, that like all negative observations they are open to one possible fallacy. I think it is quite probable, although it has never occurred in my experience, that the sputum from a case of tuberculous phthisis may occasionally fail from some reason or other to produce tuberculous disease in the inoculated animal.

other end of the bowel, which afford ample material for holding, whilst the outer sutures include the peritoneal coats only. The accompanying diagrams show the method of passing the sutures, and the parts brought into apposition. The inner wavy lines represent the mucous membrane, the thick lines the muscular, and the thin straight lines the peritoneal coats of the small intestine. Fig. 1 represents on the left hand side the peritoneal coat turned back from one end of the bowel, and on the right the method of passing the inner suture. Fig. 2 shows on the left side the parts brought into apposition on tightening of the inner suture, and on the right side the second suture is also shown in position, completing the junction.

If the usual method of numerous interrupted sutures be employed, the method thus briefly described does not appear to have any special advantages except the firmness of the union obtained, and would have the counterbalancing disadvantage of adding to the length of the operation the time taken in reflecting the peritoneum, whilst in the class of cases for which enterectomy is employed a reduction in the time taken in performing it is the goal of all modern improvements in the operation. The firmness of the union to be expected from this method, however, led me to hope that both the inner and outer sutures might be continuous ones, and thus the length of the operation could be materially reduced. The question of the possibility of turning back the peritoneum and the feasibility of obtaining a watertight junction by means of continuous sutures remained to be decided.

In July, 1895, I had an opportunity of trying the operation on a dead body. I found that by beginning at the mesenteric attachment the peritoneum could easily be peeled back from the divided end of the small intestine as far as was desired, the fingers being used for this purpose after a start had once been obtained by the aid of a pair of dissecting forceps. A common sewing needle and thread were used, and the intestine was united without difficulty in the manner above described. Owing to the sutures having been inserted too far apart, the union was not quite watertight, but the possibility of turning back the peritoneum and of using it to bury the first row of sutures was demonstrated. On a subsequent occasion I succeeded in resecting the intestine by this method *post mortem* and in making the union quite watertight when two feet of the gut above the junction was filled with water and hung up, the whole operation having been completed in twenty minutes in this instance. This result was highly encouraging, and about the same time I performed the operation on the dead body of a dog. Here a difficulty in reflecting the peritoneum was encountered, as this coat of a dog's intestine was found to be thicker, more tightly adherent, and more brittle than that of man; but a watertight junction was effected in twenty-five minutes, whilst the calibre of the gut was not materially constricted, and the junction of the mucous surface was only visible as a slightly raised line internally. It now remained to be determined if the method could be carried out on a living animal with success. The dog was chosen for convenience, and the difficulties of the method being greater in the case of the dog's than in the human intestine, it was evident that if it could be successfully performed in the dog it could certainly be done in the human subject with even greater facility.

A large, healthy, though somewhat old, pariah dog having been obtained, chloroform was given, and was taken very well. The abdomen having been opened, and a loop of small intestine having been drawn out, it was clamped in two places by means of a thin flat piece of wood pointed at one end, and having a slit in each end, through which a piece of tape could be passed. The tape, knotted at one end, having been passed through the slit in the blunt end, the sharp end of the piece of wood was passed through the mesentery close to the bowel, and the tape, passed over the bowel and through the other slit, was pulled sufficiently tightly to compress the bowel between the piece of wood and the tape to the desired degree and then fixed with a pair of artery forceps. This simple and easily improvised piece of apparatus worked very efficiently. On cutting through the bowel its lumen was found to be full of tape worms. After several feet of these had been removed the operation was proceeded with. There

was some difficulty in detaching the peritoneum from the upper end of the intestine, but when denuded the muscular coat was easily approximated to the peritoneal coat of the lower end by a continuous suture, which was laced up so as to bring the surfaces into intimate contact without being sufficiently tight to be likely to cut through the included coats of the intestine. A second continuous suture was now used to unite the triangular gap in the mesentery beginning at apex. When the bowel was reached the suture was continued around the gut to draw the piece of reflected peritoneum down over the first row of sutures, and to attach its deep fibrous surface to the serous surface of the peritoneum of the lower portion of the gut. This was successfully accomplished, except over a small portion, where the reflected peritoneum had curled up and could not be brought down quite as far as was wished.

This partial failure of the method in the dog cannot be held to prejudice the operation in man, because, as already stated, there is not the same difficulty in the reflection and reapposition of the peritoneum of the human intestine that there is in that of the dog. Moreover, it served to show that one sero-fibrous apposition by a continuous suture was in this instance sufficient, and therefore the double sero-fibrous apposition which can easily be obtained in the human intestines should be doubly efficient.

The clamps having been removed and the hole in the mesentery sutured, the intestine was returned, the abdominal wound united, and the dressings strapped on. The whole operation lasted under thirty-five minutes. The animal rallied well, but was sick once on the following day. He made an uninterrupted recovery, passed a dark motion on the fourth day, and well-formed normal motions subsequently. On the seventh day the abdominal wound was found to be united, and the stitches were removed and ordinary food given. He seemed little worse for the operation, and showed evident signs of gratitude when I visited him, apparently on account of the removal of his tapeworms. On the fifteenth day after the operation the dog was killed under chloroform, and the body examined. The abdominal wound was soundly healed. The great omentum was adherent to the outer side of the junction in the intestine, which was thickened at this point. The gut was very firmly united, and no stitches could be seen. A current of water flowed freely through it. On passing the little finger into the bowel above the junction the first joint could be passed through the union, although the little finger fitted closely into the normal intestine of this animal, showing that there was no material constriction at the seat of the resection. In short, the operation had proved a complete success, and I should not have the slightest hesitation in performing it in the human subject if a case requiring enterectomy presented itself.

The advantages of this mode of operating are: (1) That it can be done with the aid of the instruments in a pocket case, ordinary round sewing needles being used (although curved intestinal needles are to be preferred), and with very little assistance, and is therefore likely to be of special service in military surgery. Yet (2) it can be completed in about half an hour, or only a little longer than the time required with the aid of such special appliances as plates, buttons, and bobbins. (3) The junction is a double sero-fibrous one, and hence, as Greig Smith has shown, will unite the maximum of rapidity and firmness. (4) The mesenteric side can be made very firm by the apposition of the muscular coat of one end to the peritoneum of the other, and the subsequent covering up of this suture by the reflected peritoneum. When special appliances are at hand their use will probably be preferred to the method which I have described, but in country and foreign practice, where these luxuries are seldom likely to be at hand when the occasion arises for their use, I venture to think that my method will be materially quicker and more efficient than the ordinary one of suturing with interrupted Lembert's sutures, in which both Jacobson and Treves are agreed that from twenty-five to forty sutures are required, and even then the mesenteric junction gives cause for anxiety. As it may not fall to my lot to perform an enterectomy for a long time to come, I have thought it best to describe this method of operating in order that others may give it a trial. Anyone who will take the trouble to practise it on the dead body will, I am sure, very soon become convinced of the ease

and rapidity with which it can be performed. The same principle can also be applied to some of the other intestinal operations which do not fall within the scope of this communication.

TRANSPERITONEAL LIGATION OF THE EXTERNAL ILIAC ARTERY FOR ANEURYSM;

SECONDARY CÆLIOTOMY FOR INTESTINAL OBSTRUCTION; RECOVERY.¹

By JOHN C. DAVIE, M.D.

F. E. W., a labourer, aged 32, a powerful man, with a syphilitic history, was admitted into the Jubilee Hospital, Victoria, British Columbia, on December 9th, 1890, suffering from aneurysm of the left external iliac artery. The tumour extended from Poupart's ligament to a point half-way between the ribs and the anterior iliac spine; laterally it extended well over towards the median line.

All usual aseptic precautions having been taken, under ether anaesthesia, on January 9th the abdominal cavity was opened in the median line, by an incision extending from 2 inches above the umbilicus to within 1 inch of the pubes. The lower end of the operating table was then elevated a foot, and the intestines pushed up out of the pelvis. The external iliac was found lying alongside the aneurysm to about the centre of the tumour; the peritoneum over the vessel was carefully divided, the artery isolated, and ligatured with ox aorta. Pulsation in the tumour immediately ceased. The intestines having been replaced, the abdominal wound was closed with a single row of silver wire sutures and dressed with aseptic gauze. The leg was encased in cotton wool, and the man put in bed.

The patient stood the operation well, and had no vomiting. He slept for an hour the following night. On the morning of January 10th, while his temperature was normal, his pulse was 114. At 10 A.M. he commenced to vomit, and continued to do so at intervals all day and night. The abdomen also became distended. On January 11th the temperature was still normal, and the pulse 106. He vomited in the morning; after enemata of turpentine, etc., the vomiting ceased, and he passed a fair night.

On January 12th, the thermometer in the mouth registered 96.4° and the pulse was 100. He rested well in the morning. Nutritive enemata were ordered. He vomited once or twice during the day. In the afternoon the enemata were rejected and flatus was passed, and the patient vomiting slightly in the evening, 10 grains of compound extract of colocynth, with half a grain of belladonna, was ordered.

On January 13th, the temperature in the morning was 97°, the pulse 108. No movement of the bowels had followed the purgative administered the night before. He was then ordered large enemata containing turpentine, with no effect. He vomited slightly in the morning and evening. The abdomen was still distended.

On January 14th the temperature in the morning was 96.5°, and the pulse 105. He vomited in the afternoon. Purgative enemata were repeated, with no effect. In the evening, nutritive enemata were rejected, and a considerable quantity of flatus passed. He slept well. Since the operation he had had practically nothing by the mouth, as any attempt at this brought on vomiting. He had been fed entirely by nutritive enemata, and he naturally suffered much from thirst. At 8 P.M. on the evening of January 14th, during the absence of the nurse from his room, he got out of bed, walked to the dresser and drank a pint of cold water which he found there. He vomited after this every few minutes until 1 A.M., when he passed some flatus. I saw him at this time, and on entering his room found that the vomited matter had a distinctly faecal odour. I gave him 10 ounces of brandy and soda, which he enjoyed and retained.

On consultation, it was determined to reopen the abdomen, to relieve his intestinal obstruction. Accordingly, on the morning of January 15th, under ether anaesthesia, the silver wire stitches were taken out; the wound having lost this support,

¹ Read before the British Columbia Branch of the British Medical Association