REMARKS

ON

INTESTINAL ANASTOMOSIS BY MEANS OF A
NEW PATTERN OF DECALCIFIED BONE RING.*By CHARLES B. BALL, CH.M., F.R.C.S.I.,
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ALTHOUGH many methods of joining intestines end to end after resection have been introduced, it can scarcely be said to be as yet settled which procedure possesses the greatest number of advantages; therefore before making a definite choice of any method it is convenient in the first instance to consider the prominent indications which must be fulfilled in order to obtain the most perfect possible result. These may be briefly summarised as follows:

1. Sufficient surface of each end of divided intestine should be opposed in order to obtain a firm bond of adhesion.
2. No leakage should be possible along the line of union.
3. No great pressure should be made by the appliance used on the gut outside the junction, which might endanger the vitality of the intestinal wall.

4. No undue narrowing of the lumen of the bowel should result from the operation.

5. The method selected should be capable of rapid application; this obviously becomes a question of extreme importance in cases of multiple resection.

6. In cases where the intestine above the obstruction is much dilated, while that below it is contracted, the procedure should allow of as even and uniform adjustment as is possible with tubes of unequal calibre.

I do not propose to discuss in detail the many methods that have been introduced, none of which to my mind fully fulfil all the foregoing indications. The use of extremely fine needles and interrupted sutures after the method of Lembert which at first were almost universal, were extremely tedious to apply, and it was almost impossible by these means alone to effect a watertight joint; the same objections apply in a more or less degree to all the methods of suture alone, including the more recent and ingenious method of Maunsell.

The introduction of Murphy's button must be held to mark an epoch in intestinal surgery, and from the ease and rapidity of its application and perfect avoidance of leakage it is a most attractive method, and has largely popularised the performance of these operations. In my own hands it has been attended with most excellent results, but so many cases have occurred of retention of the button, or of extravasation when it is separating, either from insufficient adhesion together of the ends, or from sloughing due to tension of the gut over the instrument, that I have given up its use.

Following the introduction of Senn's plates for lateral intestinal anastomosis, there soon appeared buttons made of decalcified bone or other absorbable material for the purpose of end-to-end junction, which have been employed with more or less success by many surgeons, but more particularly by Mayo Robson, and his original pattern of decalcified bone button has been frequently modified, one of the best being that by Mr. Hayes of Dublin.

I have made a decalcified ivory or bone ring which differs in such essential points from those already in use, and which to my mind so well fulfils all the indications above enumerated as to justify a special description.

They are made in three sizes, which are sufficient for all ordinary cases; the centre of each is perforated to allow of the passage of intestinal contents, the upper and lower ends are smoothly rounded off, while round the circumference a deep groove is turned, wide enough to allow involution of the cut edges of the intestine while keeping the peritoneal surfaces in tolerably close contact; a considerable undercutting of this groove provides accommodation for any surplus of involution of intestine.¹

The chief feature in the application of this ring, however, is the fact that a continuous lacing suture connecting both portions of intestine is passed loosely through the entire cir-

cumference of the divided ends of bowel before the ring is placed in position.

Fig. 1.—A. Vertical view of ring. B. Lateral view showing groove. C. Ring for connecting intestines of unequal calibre.

This suture must be passed with care, and some practice is necessary to make it run smoothly and evenly; it is passed through all the coats of the bowel about one-eighth of an inch from the cut edge. Commencing with the piece of gut to the surgeon's left hand, the needle is passed through from peritoneum to mucous coat, leaving the free end of the suture hanging from the outside of the bowel. The needle is then entered at the mucous surface of the piece of intestine to the surgeon's right hand; in this way we continue round the entire circumference, always entering the needle at the outside of the left hand piece, and the inside of the right hand piece. (Figs. 2 and 3.) When the circuit is complete the

Fig. 2.—The way to commence the first lacing suture.

Fig. 3.—The lacing suture completed before introduction of the ring.

second free end should protrude from the peritoneal aspect on the right hand side opposite the first free end on the left hand side. If now a couple of the loops are gently separated the ring can be easily slipped into position, and then by gently pulling the suture loop by loop, as you would the lace of a boot, it is gradually tightened into the groove of the ring, at the same time drawing in and involuting the cut edges of the intestine, and bringing their peritoneal surfaces into contact. (Fig. 4.) When all is nicely adjusted the two ends of the suture are firmly tied. It is desirable now to pass a second fine continuous suture round the outside through peritoneum alone, where the two surfaces of this membrane are in apposition. The needle should be passed alternately on each side parallel to the line of union, and

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when the entire circumference is surrounded, the two ends are tied firmly and union is complete. (Fig. 5.) If the

Fig. 4.—Diagram of section showing the ring in position, with involution of the edge of the intestine after tightening the lacing suture.

Fig. 5.—The method of passing the external suture through peritoneal and muscular coats alone.

surgeon clearly understands the way the first suture is to be passed, it is possible to effect a union more rapidly by this method than by any other that I know of, not even excepting Murphy's button, while in accuracy of adjustment and avoidance of leakage it leaves nothing to be desired.

I have had some of these rings made with upper and lower halves of unequal diameter; these permit of the more perfect junction being made between the dilated portion of intestine above the stricture and the contracted portion below, in this way resembling the reducing coupling by which a plumber connects two pipes of unequal diameter. In the majority of cases of obstruction I believe this is the best pattern to employ. While an obvious use of these rings will be to connect the ileum with the ascending colon in cases of excision of the cæcum.

The following four cases in which I have used these rings illustrate their applicability to different portions of the intestinal tract; they all occurred last year.

CASE I.—W. McG., aged 57, admitted to hospital April 2nd, 1896. He had a history of intestinal obstruction for a month, which one week before admission had become complete. He had an extreme amount of meteorism, his abdomen being very tense and hard, while stercoraceous vomiting was constant. His condition obviously precluded immediate laparotomy, so an intestinal drain was made by Greig Smith's method, using only local anaesthesia, and without removing the patient from bed; this gave exit to a large quantity of fluid faeces and flatus, and his condition rapidly improved, his urgent symptoms quickly subsiding. On April 15th (eleven days after the drain had been made) his abdomen was opened and a ring-like stricture of the sigmoid flexure, completely occluding the lumen of the bowel, was found; this was excised, and the ends brought together with a Murphy's button. On the eleventh day subsequently, the button was passed, and except for a fistula at the point of drainage the patient was well. Although the bowels continued to act quite normally, the fistula, contrary to my previous experience of such cases, refused to heal, and a prolapse of mucous membrane through it occurred. Consequently, two months subsequently (June 17th) an attempt was made to close the fistula, but finding the bowel much contracted at the opening, a second resection was performed, the ends on this occasion being brought together by means of the ring that I have described. The remains of the ring passed on the eighth day, and the patient rapidly recovered completely, and remains well and free from any recurrence.

CASE II.—A. W., aged 24, admitted to hospital, May 6th, 1896, suffering from a malignant stricture of the rectum of six months' duration. The stricture was situated high up, being only just within reach of the finger, while its upper limit could not be determined. As, however, it was freely movable, it was excised by removal of the coccyx and last bone of the sacrum, the upper and lower ends of the rectum being brought together by means of one of the rings. The remnants of the ring were found loose, and removed through the anus on the eighth day. A small fistula formed at the posterior portion of the line of junction. This, however, closed spontaneously, and the patient recovered completely with good restoration of the function of the bowel, and was discharged from hospital, July 21st, 1896.

The rectum is the most difficult portion of the intestinal tract in which to obtain end-to-end junction. In the first place, it is not completely surrounded by peritoneum, and so the surfaces are not as adhesive as in other parts. Secondly,

the more solid faeces in the lower bowel put a greater strain on the newly-united tissues, while the very considerable effort necessary to dilate the anus almost certainly forces some of the faeces through the delicate adhesion. This is all the more likely to take place if the usual method of keeping the bowels confined for several days after operation is adopted.

CASE III.—Female, aged 60, had suffered from abdominal symptoms with increasing constipation for about one year. She had lost flesh, and a freely-movable tumour, about the size of a hen's egg, was to be felt in the right hypochondrium. Laparotomy was performed September 26th, 1896, and the tumour was found to be in the transverse colon. A considerable piece of the colon had to be excised, and with it of course the attached great omentum. The divided ends came nicely together, and were attached by means of a ring. The case progressed for a week most favourably with no untoward symptoms whatever. The bowels acted quite naturally on the fifth day, but on the seventh, after the wound had quite healed, she suddenly became collapsed, and died in three hours. Her symptoms being cardiac and not abdominal. As no *post-mortem* examination was obtained, we cannot definitely say what the immediate cause of death was, but I am, however, confident it was not the result of giving way of the united intestine.

CASE IV.—M. B., aged 45, was admitted to hospital on December 21st, 1896. She had a considerable right femoral hernia, which had been strangulated forty-eight hours. As was suspected from her symptoms, we found on opening the sac that the intestine was in a state of gangrene, dark green in colour, with foetid fluid in the sac. Instead of relieving the stricture in the usual way, I incised the tendon of the external oblique muscle of the abdomen directly above the neck of the sac, and then, by cutting through Poupart's ligament, relieved the stricture; the gangrenous intestine was then excised. The intestine above the strangulation was quite twice the diameter of that below, and consequently a ring which fitted nicely the upper part could not be introduced into the lower. I therefore pared away with a knife the lower portion of the decalcified ring until it fitted without strain and completed the junction; after thorough cleansing of the peritoneum, the gangrenous sac was dissected away and the neck stitched to the upper angle of the wound, the divided Poupart's ligature being closed by a suture. As some of these faeces had escaped into the abdominal cavity, I thought it safer to introduce a drainage tube. Recovery was as rapid as in the most ordinary case of strangulated hernia, and the patient is now back in her former situation as a cook as well as ever. She has, however, a slight tendency to hernia along the track of the drainage tube, but Poupart's ligament and the femoral ring are perfectly sound. In this case the difficulty of adjusting the dilated intestine above to the contracted bowel below, suggested the idea of having the rings made with the upper and lower halves of unequal diameter, and I am convinced that this alteration of the pattern is a very great improvement. The method adopted of relieving the stricture by cutting directly through Poupart's ligament instead of incising Gimbernat's ligament is, I believe, the rational way of treating strangulated femoral hernia; I know it is opposed to one of the surgical dogmas we were all taught, but the advantages of dividing a strangulation from without instead of from within are obvious. The division of Poupart's ligament does not weaken the abdominal wall any more than an incision in any other part of the abdomen while the suturing together of the ends of this ligament beneath the neck of the hernia effectually closes the femoral ring in a way that is otherwise impossible. In this particular case, if the old operation has been performed it would have been necessary to have opened the abdomen above as well, to complete the resection, as it would have been impossible to have returned the sutured intestine through the femoral ring without injury.

NOTE.

¹ The rings can be obtained from Messrs. Krohne and Sesemann, London, and Messrs. Fannin and Co., Dublin.

A CASE OF INTESTINAL OBSTRUCTION THROUGH A HOLE IN THE MESENTERY, ASSOCIATED WITH VOLVULUS AND HÆMORRHAGE INTO THE ABDOMINAL CAVITY: OPERATION: RECOVERY.

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The following case seems to be worthy of record on account of the unusual nature of the cause of obstruction, and of the rare accompaniment of the presence of blood extravasated into the peritoneal cavity.

The patient, a delicate boy of 12, was admitted to the Bristol Royal Infirmary on March 3rd, 1897, with symptoms of acute intestinal obstruction. Three weeks previously he had been suddenly seized with acute pain in the right abdomen; vomiting at once set in, and continued a fortnight. The patient was treated by rectal feeding and purgative injections. His temperature rose to 103° F. At the end of a fortnight his condition improved a little, and he was able to keep down some liquid food. On March 1st, however, after eating some solid food, there was a recurrence of the acute