ON
ENTERORHAPHY BY INVAGINATION
(MAUNSELL'S OPERATION),
WITH A CASE OF ARTIFICIAL ANUS TREATED BY
THIS METHOD.

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Received February 11th—Read May 23rd, 1893.

As Maunsell's method of performing enterorhaphy may not be familiar to all present, a short account of it will not be out of place. It is not one of the many recent plans which have resulted from the activity excited in this department of surgery by the publication of Senn's valuable and ingenious work. It is more than ten years since Dr. Maunsell, then Lecturer on Surgery in the University of Otago, New Zealand, thought out the details of the method and proved its efficacy, so far as was possible, upon the cadaver. Not until December, 1886, did an opportunity of trying the method upon the living subject occur; then Maunsell performed it upon a child suffering from complete obstruction, due to cancer involving some 4 inches of the small bowel. The resection of this mass and suture of the bowel-ends occupied only

half an hour. The child was much exhausted at the time of operation, and died without obvious cause on the sixth day. The bowel-ends were united, and there had been no leakage.

An account of the method and of the above case was read at the Medical Congress at Adelaide in 1887; but, so far as I have been able to discover, Dr. Maunsell has had no imitators.

The following are the steps of Maunsell's method of performing enterectomy and subsequent enterorhaphy:— (1) Clamps are applied above and below the piece of bowel to be excised. The clamps used are large safety-pins, on to the bent portion of which bits of sponge, just large enough, when moist, to fill up the interval between the fixed and movable parts of the closed pin; thus armed the pins are passed through the mesentery and fastened round the bowel, compressing it gently. (2) The excision having been performed and the bleeding points in the mesentery dealt with, the ends are approximated by two long horsehair sutures passed through the mesenteric and free borders and tied within the bowel (Fig. 1); both

FIG. 1.—Sutures of approximation in free (*a*) and mesenteric (*b*) borders passed, but neither tied.

of these sutures start and end on the mucous surface, and the first is so introduced as to completely close both the mesenteric triangles, and, when tied, to bring together

the outer aspects of the bowel ends covered by peritoneum. (3) In the free border of one end—the larger if there is any difference between them—and 1 inch from the line of section, an incision $1\frac{1}{2}$ inches long is made; the ends of the two sutures just introduced are passed out through this opening (Fig. 2) and gently drawn upon; an invagination

FIG. 2.—Sutures of approximation tied, and their ends (*a* and *b*) passed through a cut in the free margin. *i*. Line of section.

of one end into the other is thus produced, its free end projecting through the cut in the unattached border and the serous surfaces being in contact (Fig. 3). An assistant

FIG. 3.—Traction has been made on *a* and *b*, producing an invagination, the layers of which are visible (dark lines = serosa, wavy = mucosa). *n*. A needle passed through all four layers of bowel.

keeps up gentle traction on the sutures, and thus draws the lumen of the invagination into a long oval form, one side of which is held towards the surgeon. (4) Fine, straight, round sewing needles, threaded with horsehair, are passed through the whole thickness of all four layers of intestinal wall—across the lumen of the invagination—and about a quarter of an inch from their cut edges (Fig. 3). After each of these sutures has been passed, the horsehair is to be drawn up with forceps where it crosses the lumen, divided, and the halves tied as quickly as possible all round the circle of the cut edges. (5) All long ends are cut short, the knots being within the bowel, and the intussusception is reduced. (6) Finally, the longitudinal wound in the free border is closed with a continuous horsehair suture not passing through the mucosa (Fig. 4). (7) The clamps are removed, the protruding bowel is carefully cleansed and returned to the abdomen.

FIG. 4.—Invagination reduced. *i*. Line of union; stitches too evident. *s*. Wound in free margin closed by continuous suture. *m*. Mesenteric V closed by interrupted stitches.

A junction of this kind made in dead intestine will be found to bear a very considerable water-pressure without leaking; it is quickly effected, no extraordinary apparatus is required, no plates, no tubes, which may or may not fit, and which are almost certain not to be at hand when wanted; it may, indeed, be said that the instruments necessary to carry through this operation may be found

in every household. The mesenteric border seems to be securely dealt with ; apertures of different size are readily united. The idea of making an incision in one end of the divided bowel and drawing out through it, back to back, the edges to be united, was derived, Dr. Maunsell has told me, from seeing a tailor unpick the lining of a sleeve in order to mend a hole in the seam between the sleeve and body of a coat. It appears to be well worth bearing in mind, as being capable of wide application. Naturally, Maunsell has extended his method of enterectomy and enterorhaphy to the treatment of irreducible intussusception, and A. E. Barker was led independently to adopt a very similar plan ; F. T. Paul has recently published, with acknowledgments to Dr. Maunsell, a plan of effecting a communication between the duodenum or jejunum and the posterior surface of the stomach by operating through an incision, to be subsequently closed in the anterior surface of the stomach ; and it is likely that the easiest way to the posterior surface of the stomach for the purpose of suturing a perforation or excising an ulcer and suturing the gap would be through the anterior wall.

The points against Maunsell's method seem to be the extra longitudinal incision and the passage of the sutures through all the coats of the bowel. Experience alone can decide the value of the method, but it may be pointed out that it is easy, if there is any doubt about the reliability of the union, to add a few Lembert's stitches in the neighbourhood of the mesenteric border or elsewhere, to render the invagination irreducible by a few stitches round its neck, or to apply an omental graft round the junction and thus render it more secure.

I will now turn to the case in which Maunsell's operation was tried.

Mrs. E. H—, a healthy, well-nourished woman æt. 36, was admitted into the Charing Cross Hospital under my care on November 15th, 1892. She had had a right femoral hernia for about four years ; after unusual efforts it

had sometimes enlarged and become painful, and sometimes it had remained down for a week at a time. But it had never been strangulated until April 28th, 1892, when being in bed and not straining in any way she was seized with pain in the abdomen, vomiting, and constipation. Dr. W. Griffith, of West Angle, to whom I am indebted for these notes, saw Mrs. H— on April 30th, and found a large right femoral hernia, with a slight impulse on coughing, tender and covered by greatly swollen and œdematous tissues. He was unable to reduce it, so ordered Pil. Opii, gr. j, every four hours, and applied cold cloths to the swelling. Next day Dr. Griffith and Dr. Stamper found the patient better, vomiting having ceased. A. C. E. was administered; the swelling, still proving irreducible by taxis, was cut down upon and reduced without opening the sac. Everything went well, and milk was taken freely on May 2nd and 3rd, but on the night of May 3rd the patient vomited a large quantity of yellow fluid, and complained of pain in the right iliac region. On the 4th she was put upon nutrient enemata, the vomiting ceased, and she seemed to be going on well up to the 12th,¹ when a slight discharge began from the wound, which increased and became fecal on the following day. The bowels acted *per viam naturalem* on the 24th, and motions passed this way twice or thrice a week up to the time of admission into hospital, some six months later. An enema was generally required to provoke these actions *per anum*, but the escape of more or less fluid fæces from the groin was practically constant, and took place at first from two openings, of which one, the more external, had closed before admission. The patient stated that abscesses had formed during the healing of the wound in the groin. It will be seen that many points in the above history are most singular, especially when taken in connection with the state of matters found at the operation.

On admission the patient was a healthy, well-nourished

¹ The patient is positive that fæces escaped from the wound on the 7th.

woman, who had lost little or no flesh. In the right groin, roughly parallel to Poupart's ligament, was a depressed and irregular scar, 2—3 inches long, ending internally over the saphenous opening. Through an aperture here, just admitting the forefinger, fluid fæces and mucus escaped, and a short prolapse of mucous membrane occurred. A finger introduced through the opening entered a considerable subcutaneous cavity running in towards the mons; from the deep aspect of this the little finger could be passed through the crural ring—of which the more rigid boundaries were easily recognised—into a large bowel cavity; neither spur nor ileo-cæcal valve could be felt. The skin of the thigh and abdomen round about the prolapse were excoriated for 2—3 inches, and were thick and rigid from inflammatory infiltration.

The balance of evidence seemed to be in favour of the diagnosis of "cæcal fistula." There was only one opening in the groin, and no spur could be felt; there was a history of a second opening, but this had probably been a sinus left by an abscess, and motions had been passed *per anum* up to admission. The points which gave rise to uncertainty were that, although the supposed opening in the cæcum was small, by far the greater part of the fæces came away through it; that the motion escaping was always more fluid than might be expected from the cæcum, and that the ileo-cæcal valve could not be felt.

On November 26th the patient was prepared for operation by the administration of Ol. Ricini, oz. ss, by the use of simple and salicylated enemata, by ordinary washing of the inguinal region, and by the application of wool wrung out of 1 : 1000 perchloride lotion over the area of the groin. As motion flowed continually from the wound up to the time of operation, cleansing was effected, after ether had been administered, by scrubbing the parts well with a nail-brush dipped in 1 : 20 carbolic brought up to the strength of 1 : 500 with solid perchloride. Irriga-

tion with warm iodine lotion was kept up throughout the operation.

The scar and fistula were now included between hemi-elliptical cuts, which were deepened on to the protruding bowel in the interior of which the left forefinger was kept. At first the knife passed through the densest scar tissue, but, once the bowel wall was reached, each touch of the blade caused the piece of gut external to the ring to come well down. Finally the ring was reached, and the adhesions—which, as usual, were limited to its immediate vicinity—were divided; in doing so, however, two small perforating wounds of the bowel below the ring were inflicted. There now slipped out of the abdomen, through the ring—not the cæcum, but an unmistakable piece of small gut, continuous with that which had been dissected from its adhesions outside the ring; evidently a loop of small gut had sloughed and separated, and this was the end of the proximal segment. The distal end was soon found, adherent to the proximal on its hinder and mesial aspect—its free extremity being puckered up as if a thread had been run round it and drawn tight; it was completely closed by scar tissue, but was easily separated from the proximal end. This closed distal end lay entirely above the ring; apparently it had never presented upon the surface, and the second opening described by the patient was a sinus mouth.

Both ends were now drawn well down into the thoroughly cleansed wound and laid upon guards; there was no need for any clamp, as discharge of fæces had ceased.

On examining the parts it was found that between the ends there was a free edge of mesentery one and a half to two inches long, corresponding to a loop of bowel which had sloughed. Nothing was said in the history of the separation of any piece of bowel, yet a considerable bit must have come away. Probably no intestinal contents passed from the lower to the upper segment of the bowel after the reduction of the strangulated loop. The two or three motions a week, passed since the herni-

otomy six months earlier, must have come from a well-filled lower bowel. The discovery of the true state of matters, however, led to more accurate inquiries upon the subject of these motions, and elicited that they had been quite small, loose, pale, and foul-smelling, but the woman had no doubt but that they were fæcal. She passed nothing *per anum* whilst in hospital.

To return to the operation—a piece of the proximal end of the bowel about two inches long was cut off with scissors, including all the part which had been adherent and a little more; and about half an inch of the distal end was similarly removed. The latter end was much smaller than the upper, and was gently dilated by the insertion of the forefinger up to its base. A wedge of mesentery was then excised, the vessels tied, and the edges brought together with fine catgut. One of these sutures passed through a vessel, the bleeding from which was controlled only by another stitch passed nearer the spine and further from the cut edge. The pared edges were united by Maunsell's method, but I departed from the above description in certain points—sometimes with advantage, sometimes with the reverse. The longitudinal incision was made in the *distal* end, and the upper, *larger* end was invaginated—with a little difficulty—into the lower *smaller* end, with the intention of fixing the invagination so as to cover the line of union should it prove weak. This plan was not adopted, for when the invagination was reduced a shallow groove marked the line of union, and the stitches could scarcely be seen crossing the bottom of it. To make doubly sure, two or three Lembert's stitches were added on each side of the mesenteric attachment. At first the finest silk was used for the enterorhaphy, but the wet ends were difficult to pick up and disentangle; horsehair, recommended by Maunsell, was found much pleasanter to work with, and is, no doubt, a safer material for a penetrating stitch.

Some of the needles were passed through all four

walls of the bowel ends and across the lumen of the intestine ; others were passed through only two walls, and the sutures were tied as they were inserted. The latter plan was found to be the more rapid—so much time was lost in drawing up the loops from the lumen of the bowel and in selecting corresponding ends. Great care was necessary to ensure that the cut edges of the peritoneal coats were equally drawn up, and that each stitch passed a good quarter of an inch below them, for the mucous membrane prolapses and conceals the peritoneal edges, which are of chief importance. The longitudinal wound in the distal end was closed by *two* rows of continuous horsehair suture, and this bit of bowel—small at the start—was not of greater circumference, after suture, than an adult little finger at its base. After thorough cleansing, the sutured bowel was reduced into the abdomen by a few minutes of gentle pressure—so little was the size of the bowel increased or its flexibility diminished by this mode of suture. The femoral ring seemed to be of about normal size.

By way of “radical cure,” three fishing-gut sutures were used to approximate the pectineal fascia and the inner end of Poupart’s ligament ; the infiltrated skin and subcutaneous tissue on either side of the wound were raised for some distance, so as to render possible union all along by a continuous suture. The wound and the excoriated skin around it were thickly plastered with a paste of iodoform powder in 1 : 1000 perchloride lotion, and a dressing of alembroth gauze and wool was applied.

The patient was put to bed with the right thigh flexed over a pillow. Flatus was passed *per anum* the same night, and she slept well. Beyond slight pain about the navel just after the operation she had no symptoms. *As to feeding* : at first she was allowed only teaspoonfuls of hot water by mouth ; by rectum she was given 4 oz. of pancreatised milk gruel every four hours. These enemata were continued and retained for about a fortnight, though less and less nourishment was given in this way, while the

quantity of food given by mouth was steadily increased, and the frequency of administration was diminished. Solid Brand's essence was thus given on the 10th, three eggs and the lean of a chop were allowed on the 18th, fish on the 25th, and ordinary full diet on the 31st day. The *bowels* showing no tendency to act, a simple enema was given on the twelfth day without result, another on the fourteenth and daily afterwards. On the fifteenth day a copious fluid motion resulted, and on the sixteenth a large, soft, solid, pale yellow stool was passed; it was not offensive. No blood, slough, or other abnormal constituent was noticed in the stools. After the sixteenth a daily enema kept the bowels regular.

After operation the patient's temperature rose to 100.4° in eighteen hours, then fell gradually to normal on fifth day. The dressing was changed on this day, as it was feared that the wound and its vicinity might not have been perfectly disinfected; but everything seemed normal, and the wound appeared healed. All stitches were removed, and this was no doubt a mistake; for on the sixteenth, though quite sweet and dry, the wound was found to be gaping centrally (where the fistula had been excised), and at the bottom of the small cavity a clot was seen which slowly organised. Not until the fortieth day was healing perfect; the patient had been sitting up previously, and she was now allowed to walk. She left the hospital on January 11th (forty-seventh day) in very good health, eating ordinary food and with regularly acting bowels. When last seen, on January 25th, she was quite well.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' New Series, vol. v, p. 118.)