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ENTERORRAPHY.

BY

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ENTERORRAPHY.

ENTERORRAPHY cannot be considered a trivial subject, when the names of those who have interested themselves in it are remembered; nor, indeed, is the subject without intense interest to all surgeons who may find themselves face to face with a case of gangrenous hernia, some intestinal stenosis, or some foreign body occluding the lumen of the gut. To all such there comes an anxious moment, when an attempt to cure the artificial anus resulting in the one case having to be made, or the obstruction being removed in the other, the question presents itself, "How can I best secure this intestine so that its contents will not escape into the general peritoneal cavity when I have replaced it, and when its future behaviour will be, short of a severe and dangerous operation to recover it, beyond my control?"

In order more thoroughly to render clear the advantages of the suture which I venture to recommend, I have carefully sought for all the sutures of which I can find any record, and the result is given below. These, some thirty-three, embrace, I believe, all the known methods, and form a sufficiently formidable array. They are arranged, as far as possible, so as to indicate the progress made in appreciating the elements of success in the elucidation of the problem enunciated, elements which may perhaps be formulated thus:—

1. Of the coats of the intestine, it is the serous one alone that pours out the plastic lymph, which, becoming organised, is the true and permanent connection between the parts,—*ergo*, in all successful enterorraphy, the serous coats must be brought into contact.[1]

[1] Travers. "An enquiry into the processes of nature in repairing injuries of the intestines." Lond., 1812, p. 121. Jobert. "Maladies du Canal Intestinal." 1829. Vol. I., p. 86-7. Spencer Wells. "Ovarian Tumors," 1882, p. 198. Dieffenbach. "Die Operat. Chirurgie," 1848. Vol. II., p. 460.

2. All sutures, unless absorbed *in situ*, tend to find their way into the lumen of the gut, and so to be passed by the stools.[2]

3. A ligature acts upon the intestine exactly as it would do upon an artery; the inner and middle coats are cut through, and the ligature holds by the outer one. Should the bowel be inflamed, this also will be severed by the ligature.[3]

It was observed by most of the earlier writers that directly the bowel of an animal was completely divided there was retraction of both ends, and also contraction, so that at the time little or no escape of fæcal matter took place, unless the bowel happened to be much distended; but this contraction passes off after a while—according to Jobert within half-an-hour—and then extravasation may take place. This, however, is denied by Travers, who represents[4] the ends as filled by a plug of chylous matter (*sic*), unless blood has escaped in quantity into the cavity at the time of injury. If during this period of contraction, adhesions form between the wounded intestine and the epiplöon, a kind of tube is formed, by which the course of its contents is again permitted, as in Shipton's expériments.[5]

This method was regarded as so risky, depending as it did upon the behaviour of a membrane which might or might not happen to be in contact with the wounded intestine, that it is no wonder that most surgeons preferred to do something by means of which the actual wound should be kept more directly under their own control, and so the *méthode de Palfin* or *méthode d'affrontement*, came into use. A thread was passed once through the mesentery; twice, forming a loop, through the same membrane; or, merely through the edges of the intestine, so keeping the ends of the bowels in apposition to the borders of the abdominal wound, and forming an artificial anus. This plan was recommended by John Bell.[6]

Although such a method of treatment, so far as it went, was undoubtedly safe, after adhesions were formed, and had the great advan-

[2] Travers. *loc. cit.*, p. 132. Thompson. Reg. Prof., Edin., quoted by Travers, p. 25. Benjamin Bell. "Syst. Surgery." 1787. Vol. V., p. 277. Dupuytren. "Médicine Opératoire." Nouv. Edit. Paris, 1822. Vol. II., p. 138.

[3] Jobert, *loc. cit.* Vol. I., p. 74. Larrey.

[4] *Loc. cit.* Plate ii., fig. 2.

[5] Philos. Trans. Vol. XXII., 1703.

[6] John Bell. "Syst. of Surgery." Edit. by Sir Chas. Bell, 1826. Vol. I., p. 534.

tage, in those days when the laws governing the application of a suture were not understood, of keeping the wounded gut always under the eye of the surgeon, there was an uncomfortable period before such adhesions were ready. This danger is illustrated in some experiments by Smith, of Philadelphia, reported by Travers,[7] upon a dog, which he treated by John Bell's method, with a fatal result on the sixth day, and on inspection, *post mortem*, a considerable quantity of fæces and water was found in the peritoneal cavity. Experiments were also made by Travers upon two dogs; one of them died in twenty-four hours, the other in four days, both with fæcal extravasation into the peritoneal cavity. Moreover, the after results, in the shape of an artificial anus, with its disgusting concomitants, were so unbearable to the patient, that no one felt that such a state of things could be considered as final, and another step was made. The bowel was now sewn up by long threads, which were fastened outside, so that the bowel should still be prevented from slipping out of sight. Besides, it was considered imperative that these threads should be carefully removed as soon as the wound in the bowel had healed. As instances of this method may be mentioned those of Le Dran and Larrey.[8]

The next type of suture originally bore the name of *sutura quatuor magistrorum*, and its essential peculiarity was the use of a cylinder of some kind, upon which the two ends were drawn and upon which they were stitched. Thus, the original substance employed was the trachea of some animal; then oiled cardboard, by Ritch, Sabatier, Chopart and Desault[9]; Benjamin Bell[10] recommended a roll of tallow; Hohenhausen[11] uses a plug of dough; Neuber,[12] a tube of decalcified bone; Guy de Chauliac[9] preferred a piece of dry gut; Watson,[9] a rod made of isinglass; Th. Walther,[13] a roll of gum resin; and some time since Treves[14] suggested the use of an ingenious sausage-shaped balloon of gutta percha, which, distended by air whilst *in situ*, could, the suture being made,

[7] *Loc. cit.*, p. 119.

[8] Le Dran. "Traité des Operations," p. 80. Paris, 1742.

[9] "Nouv. Dict. de Med. et de Chir.," Vol. XIX., p. 237.

[10] "Syst. of Surg.," Vol. II., p. 134.

[11] *Deutsche Med. Woch.*, Sep. 5, 1883.

[12] *Central. für Chir.*, No. 23, 1884.

[13] Dieffenbach. "Oper. Chir.," 1848, Vol. II., p. 462.

[14] *Med. Chir. Trans.*, Vol. LXVI, p. 55.

be withdrawn through a small opening left for its exit, and subsequently closed by a last stitch. On these supports various stitches, usually interrupted ones, were used; but the main idea, with the exception of Treves', was to bring the bowel *edges* together: the supports becoming loose, as the stitches ulcerated through, and so passing downwards and out per rectum. No special attempt was made to bring serous surfaces in contact.

The next method, that of invagination, was first practised by Ramdohr in 1780 and was known by his name. Louis, Richerand, Boyle, Chopart, and Desault introduced modifications of this method. It was practised thus: One end, if possible the upper, was invaginated into the lower, so that the outer serous surface of the first was in contact with the inner mucous surface of the latter end. A great deal of care was taken to ascertain which was the male and which the female of this conjugation, as certain death was supposed to follow a mistake. As the primary error of opposing heterogeneous surfaces was already committed, it would appear that the number of successes in any case must have been small (Jaffé says there was not one), and those due to the tendency of the omentum to apply itself around the injured part.

Both of the two last methods were sometimes conjoined, as in Benjamin Bell's, the description of which I extract: "A piece of tallow, nearly equal to the diameter of the intestine, should be inserted into the end of the upper portion of the gut, and being afterwards passed into the other, to the extent of an inch or thereby, the two portions should now be stitched together with a small round needle armed with a fine thread. The stitches should be carried completely round the gut, and in order to give them as great a chance as possible of succeeding, they might even go twice round, first at the edge of the under portion of the gut, and afterwards about an inch beneath, near to where the upper part of it terminates."[15] This, which he calls "the elegant invention of the roll of tallow," is amusingly derided by John Bell.[16]

The tendency of any suture tied round the intestine to gradually find its way through the coats of the bowel into its interior, suggested a method, which appears to have been practised by Amussat[17]

[15] B. Bell, *loc. cit.*, p. 134.

[16] *Loc. cit.*

[17] "Nouv. Dict. de Med. et de Chir.," Vol. XIX., p. 237.

in 1853, and consisted in an invagination of one end of the bowel, into which a cork had been passed, into the other; the two ends were then firmly bound together by a ligature, which, slowly ulcerating through, was believed to determine the union of the two ends in the line of the ligature. When the ligature became loose, cork, ligature, and internal distal end passed downwards and were expelled per rectum. Who shall say what became of the external distal ring? A similar ligature, minus the cork, was practised by Beclard.[17]

Of course, to us it is evident that these latter methods imported into the case a very serious additional danger, that of possible obstruction by the foreign body used as a support, especially if the bowel affected were part of the small intestine, and the substance used had therefore to pass the ileo-cœcal valve, to say nothing of the inflammation certain to be set up by the presence of a comparatively large foreign body in contact with living tissues. It is sufficient, however, to point out that these methods failed to comply with the primary necessity, the apposition of serous surfaces. Later, it will be seen that the method of invagination has been again attempted by Jobert, in such a way as to accord with this rule.

As a curiosity, for there is no record of its ever having been tried, I will mention, as the last of this group, the method of Henroz.[18] The mucous surfaces, which naturally turn outwards, on division of the gut, were approximated and held together by two rings furnished with spikes and holes, which fitted into one another—so compressing the mucous membranes between them. Had it been possible for these to unite, was it intended that the patient should ever afterwards wear this curious wedding ring?

The preceding paragraphs include all the typical methods which were devised before or in spite of the discovery of the main laws laid down.

Turning now to those in conformity with them, quite as great a diversity is found. But, in order to judge of their relative value, I would first of all suggest certain points which will, I think, commend themselves to most surgeons.

1. The coats of the intestine, when divided, retract, the mucous coat

[18] Dieffenbach's "Operat. Chirurgie," Vol. II., p. 462.

least, the serous next, the muscular coat most of all, nor can the amount of retractation of the latter coat be absolutely judged whilst the patient is under the influence of chloroform. It is only when, the bowel reduced, the abdominal wall sewn up, and the patient recovered from his state of insensibility—in a word, when the future behaviour of the bowel is out of our hands—that the maximum of such retracting force will be reached. So with a suture which holds the intestine only at points, although when the intestine is reduced the two ends may appear to be in a straight line together, when this retractile force comes into play, the straight line will become crenate, "so that each stitch becomes the extremity of an aperture, the area of which is determined by the distance of the stitches." (Travers. *loc. cit.*) I am speaking, of course, of cases in which the section has been made by the surgeon himself whilst the patient is anæsthetised.

2. The presence of a suture is a necessary evil, but still an evil, especially when, as in most sutures, the knot is on the peritoneal surface; inasmuch as each thread, and, *a fortiori*, each knot, is a possible source of irritation to the surrounding peritoneal surfaces, determining the formation of bands of adhesion, &c.; for, whilst aseptic sutures may be trusted not to produce suppurative peritonitis, plastic peritonitis is certain to be caused by them. This, indeed, is the condition aimed at by their use, but it is only in the line of union that it is desired; all beyond this is harmful, inasmuch as the adhesions produced, if closely uniting the bowel to its surroundings, must interfere with peristalsis; and, if loosely, may later become a cause of "obstruction by bands." Moreover, when the threads ulcerate through, as they will unless absorbable, if adhesion is not absolute, the openings through which such sutures pass may form avenues by which fæcal matters may reach the peritoneal cavity.

3. Since it is convenient, if not necessary, that sutures should pass away from the part sutured, after their temporary purpose is served, a suture which simply penetrates the serous membrane alone will find more difficulty in reaching its destination than will one that traverses the entire wall. Of course, in the case of unabsorbable materials, such passage is not merely convenient, but essential, and as a matter of fact, catgut ligatures are not nearly so easy to manipulate in sewing the gut as silk or Chinese twist, &c. Moreover, Baum (*Berliner klin. Woch.*,

1881, No. 20, p. 279), condemns catgut emphatically in such cases, as yielding too quickly to the influence of heat, moisture, &c.

4. A continuous suture is only firm so long as each part of it remains so. If, therefore, in one part the suture has ulcerated through, adhesion behind being complete, the pressure exercised upon the rest of the bowel wall is decreased by so much, and should adhesion be insufficient at any other point, the contents of the bowel may escape at that point, and the whole purpose of the suture be defeated. Moreover, the presence of this long thread, no part of which can be carried away until the whole is loose, with part of it free in the midst of putrefactive matter in the intestinal lumen, must create a constant risk of septic material being conveyed to those parts of the wall from which it is not yet free.

5. All internal supports which are intended to pass down the bowel after having served in securing it are objectionable as exposing the patient to unnecessary secondary danger.

Keeping these considerations in view, it will be seen that of all the methods now in use none are free from objection. They are enumerated below :—

[19] Lembert, 1825, turns in the serous coats of each end, and unites them by a suture which passes twice through each, the first puncture being $1\frac{1}{2}$ line from the edge, and the second $2\frac{1}{2}$ lines, the thread lying beneath the serous coat, or in the substance of the muscular coat. Each suture is about 1 line from its fellow on each side. It is an interrupted suture, the knot is outside, and it is parallel to the longitudinal plane of the intestine.

[19] Czerny makes the same stitch, with the addition of a second row uniting the mucous membranes. Both are interrupted, the knots of the outer row look towards the peritoneum, and are parallel to the longitudinal plane of the intestine.

[20] Dupuytren, 1822. "The edges of the wound are to be thrust inwards . . . a threaded needle is then to be passed through the back of each fold from the one to the other, so that each time the thread

[19] *Sammlung klin. Vorträge,* 1881, No. 201, p. 1697; and Bourgery's *Plates,* Tom. VII., Pl. 31, Figs. 3 and 4.

[20] Dupuytren. "Méd. Operat." Nouv. Edit. Paris, 1822. Vol. II., p. 138.

is brought back again over the lips of the wound, as in the glover's stitch, but is always introduced from the same side. . . . By this plan the edges of the wound are brought together not merely by the stitches, but also by the pressure of the thread repeatedly drawn back obliquely or spirally . . . the gut is returned into the abdomen . . the ends . . . may be cut off, and the spiral thread left, which then falls into the intestine, and is discharged by stool."

[21] Denans, 1826. Two light rings are passed into the two bowel ends which are then reversed over them in such a way that each ring lies in an angle lined by mucous membrane, the serous coat looking inwards into the calibre of the gut. Both are then brought together over a third, of which the two springs retain the external rings. The included ends of the intestine mortify, and the rings thereby becoming unfastened, are discharged by stool, after they have united the serous surfaces.

[22] Baudens, 1836, passes a ring, of which the outside is grooved, into one end of the intestine; into the other an elastic ring is passed, and the end reversed over it, so as to turn the serous membrane downwards. This end is then drawn over the end which contains the grooved ring, the groove of which retains the elastic, and between the two the bowel ends are held with the serous coats in contact.

[23] Breidenbach makes a stitch similar to Lembert's, but with the knot inside.

[22] Gély, 1844. A waxed thread is armed at each end with a straight needle slightly thicker than itself. One of these is entered parallel to the wound, outside and a little behind one of its angles, to a distance of 4—5 millimetres in the intestine. The other needle is made to execute the same manœuvre on the opposite side. The threads are then crossed, the left needle passing to the right and *vice versâ*. Each then makes a new stitch exactly as before, taking care that the needle enters the opening which the opposite needle had made with the previous stitch. This is repeated as often as may be necessary to close the entire wound. Before knotting the threads, each transverse thread is drawn tight by a dissecting forceps, using sufficient force to depress the

[21] *Recueil de la Société Royale de Méd. de Marseille*, I. An, No. 1; and Bourgery's *Plates*, Tom. VII., Pl. 31, Figs. 5—8.

[22] "Nouv. Dict. de Med. et de Chir.," Vol. XIX., p. 237.

[23] Froriep. "Chir. Kupfert," Heft 76, No. 383.

lips of the wound. When this is done, the threads can no longer be seen. The two opposite threads are then knotted, cut off close, and the bowel replaced.

[23] Blatin's suture is simply the above, using only one needle, and going over the corresponding points a second time, returning towards the end at which it was commenced.

[23] Vesien makes a suture similar to that of Gély, but with knots inside the bowel. Despres says of it that it could only be used for small wounds, and has never been tried on the living animal. He thinks it would favour approximation of the mucous rather than the serous surfaces. From the drawing he gives, it would appear to be a continuous suture; the thread armed at each end by a needle, and the two ends twisted together after each puncture. Moreover, the needle always pierces the gut from the outside.

[19] Gussenbauer makes an eight-shaped suture like a combined Lembert and Czerny, the mucous surfaces being united by the same stitch as that which unites the serous membranes. It is interrupted, the knot is outside, and it lies parallel to the longitudinal plane of the bowel.

[22 and 24] Jobert, 1827, modified by Cloquet, has three steps.

1. Detach the mesentery for $\frac{1}{2}$ cm. on each side, and tie all bleeding mesenteric branches.

2. Two or four threads are passed through the superior ends of the intestine in such a manner that a loop is left inside belonging to each.

3. The edge of the inferior end is turned inwards, so that the serous surface looks in and the fold produced is pierced from within outwards. It is knotted outside. Jobert brought the ends of the threads outside the abdomen, but J. Cloquet cuts them off at the knot and reduces the intestine.

[22] Bouisson, 1850, has a marvellous method. He passes insect pins along each border of the wound, the pin passing in and out of the wall of the intestine several times. These two pins are drawn together by a twisted suture, passing loops of thread around each free portion of the pin. The pins are withdrawn on the fourth day by threads attached to them, the twisted threads coming away at the same time. This, except for the approximation of the serous surfaces, reads like a method of the middle ages.

[24] Bourgery's *Plates*, Tom. VII., Pl. 31, Fig. 1 2.

It will be seen that of all these sutures two are complicated with foreign bodies, the rest may be divided into two classes: the first only approximates the bowel at points, the other has a continuous thread.

The method I suggest to obviate these objections is as follows: the loop of intestine being secured in the clamp I had the honour of showing in Liverpool, in 1883, and which I find invaluable, that portion which it is necessary to remove is cut out by scissors, along with a triangular piece of the mesentery, and the mesenteric arteries ligatured; this is carefully done over a flat sponge; the ends left are then thoroughly cleansed and approximated, and a fresh sponge having been placed beneath, the mesentery is brought together by a few catgut sutures. A small round straight needle, Bartleet's No. 12, is then threaded with fine Chinese twist or silk. This is found preferable to catgut, which has a great tendency to kink and curl, while, as will be seen, there is no advantage in its use. Besides, see remarks by Baum ([25]) upon the results of catgut suture. The needle is placed exactly in the centre of the thread, which when double, should be about 80 cms. long. Then, with dressing forceps, the lower edge of both sides is seized, and the needle passed from right to left, and through the base of the fold thus formed, as near to the mesentery as possible; the double thread is then drawn through until 6 cms. remain on the right side. One of the threads on the left side is to be cut 6 cms. long; the needle is then passed from left to right through the same fold, at a distance of 20 mm. from the first puncture. Two free ends and a loop remain on the left side, two ends free and two connected with the needle on the right. By gently drawing upon the loop, one of each of the two last pairs are seen to move; these are then drawn up so as to bury the loop in the mucous membrane on the left side, and are reef-knotted on the right; the two ends are then cut off close to the knot. The free thread left in the first puncture is now drawn under the free extremities of the upper bars of the clamp so as to be out of the way, and is reserved for the latter part of the operation. The needle is now carried back again from right to left through the base of the fold, and a similar loop is thus formed, this time on the right, and knotted on the left. In this way, as the suture progresses, a series of loops consisting each of a single thread

[25] *Berlin. klin. Woch.*, 1881, No. 20, p. 279.

tied alternately on the right and left sides is formed, the threads of each loop passing through the same punctures as those of its neighbours on each side. It is thus impossible that any part of the intestinal circumference shall be unguarded, except the minute openings made by the needle, and filled by the threads. As every one knows, the mucous membrane swells so easily on injury, that it may safely be trusted to prevent any extravasation at these points. Besides, as the stitch is made, it draws in the serous membrane, so that when finished, the threads are really inside the restored lumen of the intestine. Moreover, the knots are all inside.

I prefer, when half the circumference of the bowel is united, and having finished the floor, so to speak, to take a fresh needle and thread, and tying one end to one of the free ends of the first thread, which it will be remembered was left behind, to commence again from the mesenteric border, and begin the roof from that point, so always working towards oneself. In drawing up the loop which this forms, care must be taken to bring the knot in its centre directly opposite the middle of the portion of wall included.

On finishing the floor, too, a free thread will always be left: this is taken advantage of in finishing the entire suture, for the last loop is made by tying the two free ends on one side together: the loop thus formed is then drawn up on the other side, folding in the serous coats of both sides, and the knot being made, the two threads left are cut off close, the bowel becoming absolutely closed.

Now, then, I considered that I had found a stitch which absolutely commanded every portion of the wall of the intestine, which was an interrupted one, and of which the knots were inside: the loops too were placed so that they might with the greatest ease, when loose, drop into the lumen of the gut. At the same time, it perfectly approximated the serous surfaces, and appeared likely, by an écraseur-like action, to remove the internal fold which was necessarily made at the time of the suture as soon as its purpose was served.

But theory and practice are not always the same, and after gaining some manipulative skill upon pieces of dead intestine, I was confronted in any attempt to go further, as every one else in England is, by our friends the Anti-vivisectionists. Not being as cruel as they, nor daring,

had I met with a patient requiring suture of the bowel, to expose a human being in his direst extremity to the risk of an experiment, the result of which I could only guess, I went over to Paris, and experimented there. And, here, I wish to express my sincere thanks and my great indebtedness to the French surgeons, especially Dr. Aigré, of Boulogne, Dr. Poirier, prosecteur à la Faculté de Paris, and Professor Rochefontaine, of the Hôtel Dieu, Paris, who, whilst condoling with me upon the idiotic restrictions which had forced me to leave England at very great inconvenience to myself, went considerably out of their way to provide me with a laboratory, assistants, animals, &c.

These experiments were perfectly successful. The animals passed normal stools within four days: there were no symptoms of peritonitis. One animal, a dog, died on the fifteenth day from pneumonia, due to a tracheotomy performed in order to obviate spasm of the glottis during curarisation.

I think any one who examines the specimen, the portion of bowel sutured,[26] will agree that the apposition has been perfect, the threads being entirely enclosed within the lumen of the gut, and that from the outside it is at first difficult to locate the suture. Inside, all the stages through which such a suture passes are well shown. At one point the ridge formed by the inturned edges, and the sutures still in position; at another, the sutures working their way loose; and, further on, no sign of ridge or suture, but a plain mucous surface, with no trace of the previous division. Six inches of ileum were excised in this case.

Another animal, a rabbit, operated upon in the same way, I have had sent over from Paris. It is in splendid health, having borne the journey from Paris to Manchester, and another from Manchester to Cardiff—where it was shown to the Surgical Section of the British Medical Association—and back, without any ill effects. I intend to keep it alive as long as possible in order to note any signs of after constriction should such occur. The portion of bowel excised and resutured in this case was taken from the ascending colon.

In conclusion, I would quote from Armand Despres. "The healing of intestinal wounds by suture is rapid, when the suture does not provoke

[26] Now in the Ancoats Hospital Museum. F. 4.

peritonitis. But it should be understood that it is not the suture itself which is the cause of the peritonitis, it is rather the default of union by the suture which is the true origin, because of the escape of fæcal matters. With this belief, we ought to choose the sutures which assure most exactly the union of the wound."[22]

Since the above was written, a paper in the *Comptes Rendus Hebdomadaire de la Société de Boulogne*, No. 23, Juin 26, 1885, by MM. Assaki and Duplay, has appeared, describing a new suture devised by them. It is as follows: After invaginating the superior end into the inferior, so that the serous surface of the former is directly opposed to the mucous surface of the latter, the authors say: "Les choses étant en place, on traverse avec une aiguille munie d'un fil doublee les deux conduits invaginés à égale distance du bord libre et du bord adhérant; l'aiguille est enlevée, le fil coupé, et on procède à la ligature isolée de chacun des moitiés de l'intestin. L'un des fils à ligature enserre la moitié qui correspond au bord libre, l'autre la moitié à laquelle se rend le mésentère. Pour opérer cette double hemistriction, on exerce sur les fils une forte traction. . . . Il s'agit là bien plus d'une ligature de l'intestin que d'une entérorraphie proprement dite. Il peut être utile pour assurer un contact plus parfait, d'ajouter quelques points de suture superficielle, et ici les choses sont disposées de telle façon que trois points de Lembert suffisent à affronter circulairement les séreuses des deux bouts, on en place un sur le bord convexe et les deux autres à égale distance du bord libre et du mésentère."

It will be seen at once that this is Beclard's method, with the sole modification that in his one ligature surrounds the whole invaginated portion, whilst in MM. Assaki and Duplay's suture the bowel is transfixed and the two halves tied separately. Moreover, Beclard trusted entirely to his method, whilst Lembert's sutures are used to supplement this.

[My thanks are also due to Mr. Harry Scott, M.B., late House Surgeon, Ancoats Hospital, who kindly took charge of the animals after I left Paris, and supplied me with notes of their condition.]

[22] *Loc. cit.*

John Heywood, Excelsior Steam Printing and Bookbinding Works, Hulme Hall Road, Manchester.