

tected from free access to air, either by being placed under water or by being folded carefully in paper, they, like every other rubber article, deteriorate and lose both their elasticity and their strength. It does not appear that the life of an elastic ligature exceeds six weeks or two months, and under unfavorable conditions, this period may even be reduced. Furthermore, the twine is much easier to introduce than the elastic, this fact being evinced by the varieties of complicated needles which have been made to facilitate the passing of the



Fig. 4.—Gastroenterostomy in dog. Twine triangular stitch. Shows mucosa of gut and serosa of stomach.

elastic ligature. Any large needle will carry the twine.

It may reasonably be felt by some that enough work has not yet been done in an experimental line to demonstrate positively the efficacy of the twine ligature. This may be true, but I beg to state that there are at the scientific exhibit the stomachs of two dogs operated on during the afternoon of June 2 in the presence of Dr. Powers and Professor Weir. Three and one-half days

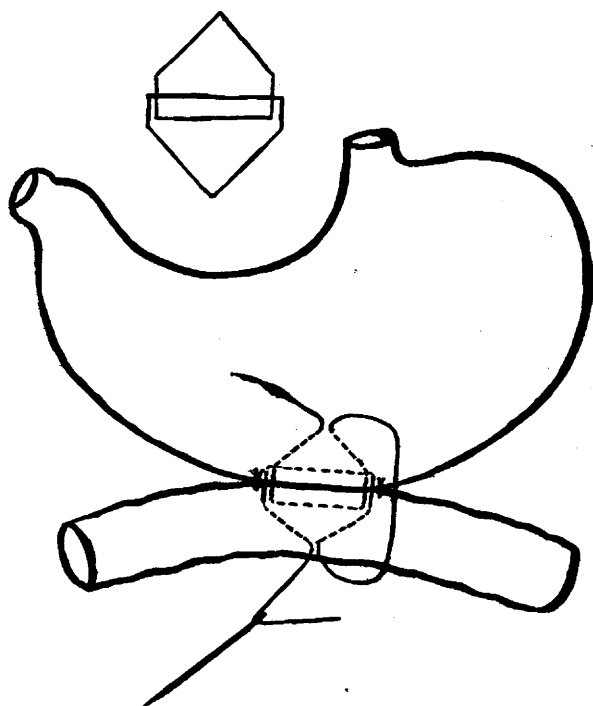


Fig. 5.—Showing plan of twine triangular stitch.

later these dogs were killed, and the openings were found to be complete. The twine had cut through as rapidly as if it had been elastic. In one the stitch had sloughed out and was detached. In the other it was barely adherent to the margin of the fistula. In point of time, then, and in certainty of action, if anything may be judged by a small but consecutive series, the twine is at least the equal of the elastic.

The method of inserting the twine in triangular form will now be described in detail. Figure 5 shows the outline of an intestine and a stomach. This chart is one that Dr. Weir has had made, and has kindly lent to me. Two Lembert stitches are placed to mark two angles of the triangle. The third stitch, or apex, is represented on the stomach above and on the gut below. In the lower right-hand corner of the diagram, the stitch has been represented without the viscera. It is to be noticed that it looks like two little houses, one right side up and the other upside down, placed on each other. This fanciful relation is, of course, changed as soon as the apices are brought together. The dotted lines in the diagram mark the area of twine which is within the lumen, and show how the Lembert stitches guide in inserting it. There is no difficulty at all in putting this stitch in if one simply remembers to weave the twine from one viscus to the other, completing first one triangle in the gut and stomach, then *vice versa*.

We have not followed Dr. McGraw's technic in placing a posterior row of Lembert stitches to unite the stomach and the gut, because all our gastroenterostomies have been done on the anterior surface of the stomach, and the reinforcing stitches have been put in later. Lembert stitches are certainly necessary in this technic. It does not appear to matter whether they be interrupted or continuous, although we have usually employed the former. It has been shown to be practical to make the triangle in the stomach somewhat larger than that in the gut.

As previously intimated, no complicated needle is necessary to introduce the twine. The one in use at the laboratory has been made from an ordinary steel bobbin, which was broken off at the required length and ground to a point.

After the insertion of the twine, which always should be too strong to break with the hands (braided fish line serves the purpose well, although we have used the ordinary white commercial twine), a row of Lembert stitches is so placed as to encircle the region of the triangle. The stitches first introduced serve again as guides for this procedure.

The introduction of the twine can be accomplished in less than a minute and a half. Like every other stitch, it requires a little study and practice, but it is not a complex technic.

It is a pleasure to state that without the untiring assistance of Mr. Gordon, the student assistant at the laboratory, this work could not have been brought to its present stage, and I take this opportunity to thank him for many invaluable suggestions.

264 West Fifty-Seventh Street.

THE DEFECTS OF THE MURPHY BUTTON, WITH SUGGESTIONS OF IMPROVE- MENTS IN THE OPERATION OF GASTROENTEROSTOMY.*

ROBERT F. WEIR, M.D., F.R.C.S. (HON.).
NEW YORK.

It is not proposed in this article at all to decry the merits of the well-known Murphy button, for it is conceded by everyone that by this admirable mechanical device, abdominal surgery has been largely advanced in the

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last decade. Since its introduction by its distinguished inventor, however, an enormous experience as to its value as well as to its demerits has been acquired, of which it is well from time to time to take stock.

In the earlier anastomoses between intestine and intestine or intestine and stomach, or between the gall bladder and intestine or stomach, the usually employed incision demanded in its best digested form an opening which experience showed in a gastroenterostomy and in an enterocenterostomy should be at least two and one-half inches long to prevent its subsequent closure, and to complete the operation it was requisite that the edges of the applied gut and stomach, as in a gastroenterostomy, for instance, should first be sewn together and then the opening was to be rendered more secure by a second outer row of special sutures to bring and to keep together the apposing peritoneal surfaces. This took considerable time, and the mechanical button much simplified the technic and materially diminished the duration of the operation, and particularly so, if one avoided, as Murphy said should be done, using any sutures of safety to hold together the peritoneal surfaces peripheral to the button. Many surgeons even now, however, do not trust entirely to the button itself for peritoneal union, but resort to the employment of these additional safety sutures; indeed, I may say from personal experience and from observation, that the majority of surgeons known to me resort more or less frequently to these safety sutures, and naturally with a corresponding sacrifice of rapidity of the operation. These safety sutures are from time to time found to be of additional necessity by virtue of the tendency of the puckered-up intestine or stomach, when tied to the cylinder end of each half of the button, to protrude beyond the button edge when the halves of the button are crowded together. This puckering-up and surplusage of tissue is much obviated, I have found, by using Carle's method, who, after the introduction of the button halves, sutures the extra long part of the intestinal or gastric incision with one or two Lembert sutures and leaves thus a smooth edge about the button shaft.

All the earlier mechanical devices used in a gastroenterostomy, beginning with Senn's plates and Abbe's rings, and other contrivances continued along that same line, up to and including the Murphy button, had one merit of some little moment attached to them, and this was that until dissolved, if they were soluble, or dislodged, if they were not—they held the stomach and intestine in a more or less broad splint that protected the intestine from hanging so dependently from traction or from gravity action that kinkage at the suture point would likely ensue. This kinkage, with the tendency of the spur on the other side of the intestine to act as a valve, as Keppler has shown, accounts for many cases of obstruction of the biliary and pancreatic secretion at the gastroenterostomy opening, which in turn produced the so-called vicious circle, with its upward regurgitation of these secretions into the stomach. In this kinking, let me make it clear, that not only does the intestine take part in its production, but also the stomach, particularly if it is dilated, hence the various suggestions of suturing adjacent portions of the small intestine to the stomach is of little or no avail in obviating this difficulty. Furthermore, the circularly punched-out opening in the anastomosed parts when a Murphy button of 27 mm. in diameter has been used in a gastroenterostomy, has, in my judgment, very materially aided in preventing the closure of the artificial opening thus made, and in some seventy cases in which I have em-

ployed the button, in only one have I known this closure of a gastroenterostomy opening to have taken place. Mayo and others have recorded a few instances, but compared with the multiple employment of the button this closure is but seldom encountered.

There is another mishap of more frequent occurrence in using the button, and that is the occasional escape of the button into the stomach, where it may be recognized by an x-ray picture and yet be borne without distress by the patient, or it may beget symptoms demanding a gastrotomy for its relief. To prevent this complication, I several years ago, as may be known to you, suggested the addition of $\frac{1}{8}$ -inch to $\frac{1}{4}$ -inch flanges to be placed on two sides of the intestinal half of the button. This has worked well, for in some thirty-three cases where it has been employed by me, in but one, and that quite recently, did the button slip into the stomach.

All who have had some experience in gastric surgery must admit that comparatively often the button does not come out in spite of long waiting and patient and thorough investigation of the fecal discharges. Carle estimated that about 78 per cent. of the buttons were retained in the intestinal canal and were probably harmlessly lodged in the sulci of the large intestine. Of late the x-ray has aided the surgeon in tracing the missing machine.

Another disadvantage to which I will now refer is a somewhat unexpected one, and is due to the inevitable possibility of imperfection in the manufacture of the button. It has been well emphasized by Murphy himself that the button should be well made. I have seen the pawls, or the little projections that hold the telescoped buttons together, made of separate pieces and simply riveted or soldered to the main cylinder. This is an error, and the best manufacturers make this part and the cylinder itself out of one piece of metal; but even this does not always protect the button from separating unduly. Furthermore, the coiled spring contained in one of the halves of the button, and which is thought to be of service in keeping up the pressure as the tissues progress in their sloughing, may, rarely it is true, escape from its attachment and get loose, making an intestinal puncture possible. I have had three instances in the last two years of such accidents; one when the catches became loosened, having been soldered, probably; in the other two the wire escaped its fastening. In the latter case the buttons were made by manufacturers endorsed by Dr. Murphy himself as proficient in their make.

An additional defect is worth calling attention to, as it may explain some of these mishaps. The corroding action of the gastrointestinal secretions on the metal of the button, is nearly always seen on all buttons, retained more than, say, three weeks. The nickel-plating will be found to be gone, and if one uses—as at one time we did at the Roosevelt Hospital for economy's sake—the button several times after it has been cleaned, polished and renickled by the maker, decided evidences of corrosion will be seen about the openings of the button. This is fairly well exhibited in the accompanying Figure 1. The button in this instance having been used three times. This corrosion may account in some cases for the slipping of the catches and the escape of the wires. In my first case, when the button, made by a noted surgical instrument maker in New York, was used in a gastroenterostomy, some nine months later the patient underwent gastrotomy for persistent painful gastric symptoms, and the button was found in the stomach separated into its two halves; no pawls or catches were to be found. The second case was a gastroenterostomy with a button

made by an endorsed manufacturer in Chicago, with my flange added to it. The operation was done in a state neighboring to New York, and the patient wrote me later that on the twenty-ninth day the lower half of the large button came away. On the thirtieth day a small spring was passed in a defecation. On the sixty-seventh day the intact enteroenterostomy button passed; but up to 144 days, when last reported on by him, the other half of the large button had not appeared, and an x-ray examination failed to detect it. He, however, did not have from this supposed retention any untoward symptoms. He said his stools had been carefully watched.

A third case has recently occurred where the button was passed the thirty-fifth day after a gastroenterostomy, in a complete form, but the wire spring had become loosened at one end, though still held by the grip of the button.

A lesser accident, that only impairs the technic and does not affect the patient, is one that can be easily avoided. Twice I found after suturing each half of the button in the intestine and in the stomach respectively, that I could not force the male into the female cylinder, and that I had to rip out the imperfect half and put in a better one in one case, and in the second I had to take out both halves and put in other ones. The imperfection in the buttons in these cases had been brought about by the pressure of a rather wide-holding forceps flattening out the round of the cylinders, so that they would

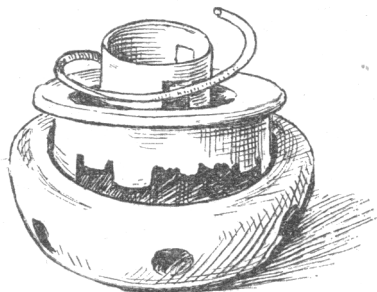


Fig. 1.—Showing corrosion of button and loosening of the wire spring.

not telescope. Care in employing finely-pointed catch forceps has prevented any recurrence of the difficulty.

With the objection that both surgeon and patient feel at leaving within the body a metallic device with the imperfections that are inseparable from any mechanical contrivance, it is not to be wondered at that many surgeons of distinction here and abroad have recently reverted to the previously cast-off simple method of incision and suture, or that others have tentatively tried to create new procedures of operation. For my own part, I confess I am yet on the fence. While the button has served me well in many cases, yet I feel uneasy in longer using it, and have in four cases lately tried to overcome still further its tendency to escape into the stomach by attaching in each of these instances the smaller enteroenterostomy button (which I always use to prevent the establishment of the vicious circle) to the flanged gastroenterostomy button by means of a stout but loose piece of silk, or preferably braided silk and linen fishing line, leaving the ends of the knot three or four inches long to hand down in the intestine. By this procedure I hoped to secure, by the intestinal peristaltic action, a certain amount of tugging or traction by the lower button, which usually separates first, on the upper one. I have resorted to this expedient in five instances; one of them was operated on four days ago¹; in one, death resulted in forty-

1. On the sixteenth day both buttons were discharged with the silk attachment unimpaired.

eight hours from pneumonia, but in the other three everything went on happily, though I noticed that in one case, where the buttons were retained nearly forty days, that the silk had become quite friable: Asbestos thread or fine rubber cord—not taut, however—might be employed. Fishing line worked well in one instance. See Figure 2.

The use of the oblong button has lately been applied to gastroenterostomy by Murphy and by Blake, but it does not appeal to me. It gains a larger opening, with the greater risk of lodgment in the stomach and increased amount and variety of mechanical contrivance. I look with more hope to the elastic ligature suggested by McGraw of Detroit. I have not used this procedure, for, as given to us by him, the resulting opening is not longer than that made by the incision and not wide enough in my judgment to be sufficient guard against closure.

I had determined to imitate the punching-out of the Murphy button by cutting out a round piece of the stomach and intestine and then completing the gastroenterostomy by the usual suture, when I made a suggestion to Dr. Maury of the surgical research department of the

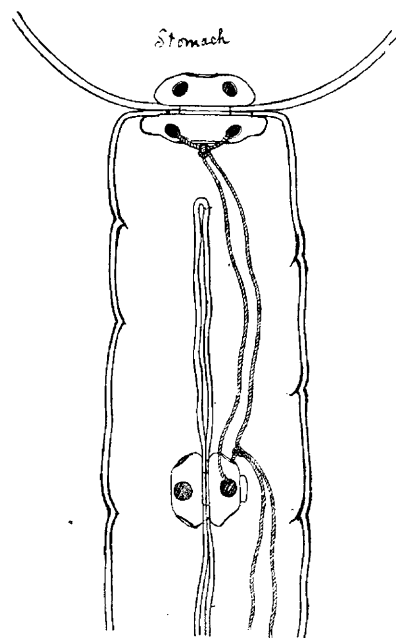


Fig. 2.—Showing the flanged button and thread tractor attached to the enteroenterostomy button.

College of Physicians and Surgeons of New York, to see if he could, on animals, contrive an elastic suture so as to bring about a decidedly large opening in all diameters. This he has been able to effect, at first making a quadrilateral opening, and more lately a satisfactorily-sized triangular opening by a rapidly-introduced suture of twine applied by a technic even simpler than that presented by Dr. McGraw.² I believe we may anticipate a useful result to abdominal surgery from his investigations. I shall certainly try the method in an early case.

2. As described and illustrated in the preceding paper.

Identity of Meat Poisoning and Paratyphus.—The clinical course of poisoning from meat and of paratyphoid varies, as the former is more acute, the latter subacute, but otherwise Trau'mann announces that they are merely varying forms of an etiologically single infectious disease. His communication issues from the Hamburg Institute of Hygiene and is published in the *Zeitschrift f. Hyg. und Infkr.*, xlv, No. 1.