

hoped for when the foregoing measures have failed is abdominal section. If, when the abdomen is opened, the reduction cannot be accomplished, the whole mass ought to be excised and an artificial anus established.

In some cases in which the intussusception is low down and chronic, it may be temporarily relieved by the performance of a right inguinal colotomy.

Foreign Bodies.—The cases of obstruction caused by foreign bodies are not common. Gall stones are most frequently the foreign bodies found. Free doses of opium should be given, followed by aperients, and, when complete obstruction exists, laparotomy should be performed, the intestine incised, and the bowel returned with a Czerny-Lembert suture and the bowel returned. Gibson has collected 40 cases of gall stones which were operated upon because of the obstruction produced; of these 21 were fatal (57 per cent.). Lange²² reports a case of obstruction caused by impacted gall stones and general peritonitis. Laparotomy was performed, but the patient died in eight hours. Dr. H. F. Beam²⁴ relates a case of intestinal obstruction caused by a calculus in the ileum the size of a walnut; it could be felt through the abdominal walls. An incision was made over the spot and the calculus removed. The patient made a rapid recovery. In incising the intestine to remove a gall stone it is better not to incise directly over the stone, for at this point the intestine may be injured by pressure of the stone.

P. J. Wisning²⁵ in recognized cases of ileus from gall stone, recommends first the employment of purgatives; if these fail, then copious enemata of water. Simple enemata, he holds, are perfectly harmless, but those of an irritating character should be avoided. Opiates should be given, and the strength of the patient sustained by nutrient enemata. He does not advise early laparotomy, but says that, when everything else fails, it should be undertaken.

Faecal Accumulation.—Obstruction due to faecal accumulation is of occasional occurrence. The point of obstruction is generally in the rectum, which is filled with a hard, immovable mass, above which the bowel is much distended with semi-fluid faeces. The best means of relief are afforded by copious enemata of warm water administered in the knee-and-elbow position. Continuous irrigation by the siphon syringe is very efficacious, and, if employed for half an hour at a time, the hardest mass softens and gradually becomes disintegrated. The stream of water should be directed against the obstructing mass by means of a rectal tube. Before enemata are commenced it is often advisable to inject a few ounces of olive oil. Some physicians recommend copious injections of sweet oil with spirits of turpentine in the proportion of one drachm to the pint of oil. Metallic mercury was a favorite remedy with the old physicians, and has been strongly advocated by Matignon, of Paris. Occasionally, when low down, the faecal mass may be removed by scoop or spoon.

Colotomy has been performed in cases of obstruction due to faecal accumulation. In most of these cases, however, there has been a mistake in diagnosis. It can be only rarely required in faecal obstruction, and should not be resorted to till all other means of relief have failed.

Stricture.—The treatment of obstruction due to stricture is considered under Chronic Obstruction.

Francis J. Shepherd.

¹ British Medical Journal, April 18th, 1885.
² Intestinal Obstruction, p. 420.
³ American Journal of the Medical Sciences, January, 1886.
⁴ Lancet, December 13th, 1884, p. 1065.
⁵ J. K. Fowler: London Lancet, June 30th, 1883.
⁶ Bull. de Thérapie, May 15th, 1870.
⁷ London Lancet, vol. ii., 1885, p. 570.
⁸ Intestinal Obstruction, p. 449.
⁹ Annals of Surgery, vol. xxii., 1900.
¹⁰ British Med. Jour., August 24th, 1885.
¹¹ *Ibid.*
¹² See case of Mr. Lawson, London Lancet, vol. i., 1879, p. 87.
¹³ Gaz. Méd. de Paris, April 25th, 1886.
¹⁴ John Syer Bristowe, in Reynolds' System of Medicine, vol. iii., p. 89.
¹⁵ New York Medical Journal, February 20th, 1886.
¹⁶ Medico-Chirurgical Transactions, vol. lvii.
¹⁷ London Lancet, January 16th, 1886.
¹⁸ *Ibid.*, 1869, vol. ii., p. 609.

¹⁹ *Loc. cit.*
²⁰ Quoted in La Semaine Médicale, April 7th, 1886.
²¹ La Semaine Médicale, April 7th, 1886.
²² Fuller in New York Medical Record, October 14th, 1882.
²³ Medical News, January 16th, 1886.
²⁴ New York Medical Record, October 17th, 1885.
²⁵ Nord. Med. Ark., Bd. xvii., No. 18 (quoted in Centralblatt f. Chir., No. 20, 1886).

INTESTINAL SURGERY.—This field of surgical work differs slightly from others in certain essentials affecting natural repair of serous surfaces—and in the understanding of a few mechanical aids which are necessary to successful healing of intraperitoneal wounds.

The peritoneal cavity is so susceptible to contamination and so quick to yield fatal results if soiled, that it was considered a forbidden field of invasion prior to the present generation of surgeons. Through accumulated and vast experience, however, it has now become possible to deal with it with perfect safety if established principles are recognized.

First in importance is recognition of the fact that no solution should be used in the peritoneal cavity but boiled water, to which a little salt has been added (3 iss. to O ij.—“decinormal salt solution”). This is entirely non-irritating to a healthy peritoneum and, for an infected one, is mechanically cleansing as well as destructive to the life of colon bacilli. Considerable quantities of it may, under certain circumstances, be left in the cavity with advantage, and in any event with safety.

The second underlying principle—which applies here as elsewhere—is, that nothing but aseptic gauze pads are to be used for sponging, and that aseptic ligatures, instruments, and hands (preferably covered by rubber gloves, boiled and dry-sterilized and free from punctures) can be relied on to insure safe work.

The third principle covers the understanding of repair by lymph exudate, the process being peculiar to this field, and of the mechanical aids which the surgeon may employ to bring it about. Under the latter are included the use of suture material and various ingenious mechanisms.

The student will understand that under favorable circumstances a firm lymph or gluey exudate, which is a natural means for repair, is promptly thrown out and spread around and upon any wound of the peritoneum, either visceral or parietal. It often begins to appear, firm and available to hold surfaces together, within two hours. The usual time, however, when it may be expected to afford efficient support, is after at least six hours have elapsed. In some cases a still longer period—one or even two days—may be required. Such a protracted delay depends on the poor disease-resisting power of the patient (feeble leucocytosis?), or, in certain cases, on the solvent action of bacteria in excess.

The presence of mechanical substances, or of chemical irritants, provokes a quicker formation of an exudate. Thus, the suture thread is, if it is aseptic, speedily buried in firm lymph—the first step in nature's effort to incarcerate it as a foreign body.

If, however, an impure suture material is used, one will see the parts speedily fall asunder owing to the solvent action of bacterial secretions.

The best suture material, it is universally conceded, is fine silk, sterilized by boiling, and black by preference, so that each stitch may more easily catch the eye of the operator.

The best needle is the ordinary round one, though with care an operator may use any variety. For much of the careful work necessary, it is better to have also a sharp-pointed needle, curved one-third of a circle, which, while having cutting edges, has a flat surface on the convexity (like an eye needle), and is not more likely than a round one to wound small veins and produce subserous hematomata. The spear-pointed, or Hagedorn, needle often causes troublesome bleeding.

Thus, with simple expedients and a recognition of the few simple principles enumerated, one may accomplish all that skill can do in effecting the repair of peritoneal wounds.

A knowledge of certain stitches is essential to the technique of intestinal surgery. There are four varieties which deserve to be remembered, as they are competent to fulfil all the requirements of perfect work. These four methods, which are to be carried out on the peritoneal surface, are known as (1) the Lembert interrupted, (2) the Halsted interrupted, (3) the Lembert continuous, (4) the Cushing continuous.

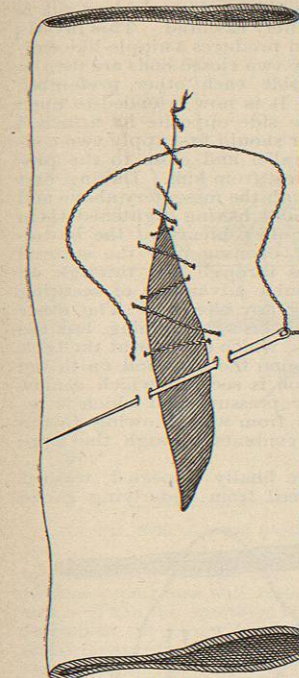


Fig. 2916.—Continuous Suture. (Lembert.)

When the edges of mucous membrane are to be united, a through-and-through stitch is now conceded to be the best. It was long regarded as essential that this stitch should penetrate only the mucous and submucous coats so as not to contaminate the peritoneum. Hence we hear of the Czerny-Lembert combined suture. But it was demonstrated many years ago by Gross and others that the stitch which penetrates all through each cut edge of united bowel secures them with inevitable firmness because it holds the fibrous layers of both, and no peritoneal contamination results because the bacteria follow the thread from one mucous surface through and out of the other, hence draining the puncture both ways.

It would be idle to say that many operators do not use other varieties of stitching—such as are depicted in all older works on surgery—but it is gratifying to find that those of largest experience are now agreed in using with confidence those just described. What one must have is absolute reliability coupled with simplicity.

The demonstration by Halsted that there is a tough subserous fibrous layer which resists the point of the needle more than any other layer in the intestinal wall, and which can be picked up and pierced reliably by the threaded needle, is a discovery of decided practical value in the treatment of intestinal wounds.

It is certainly true that if the needle unites only the peritoneal coats the stitch will inevitably tear away and leakage occur. If one stitch gives, the entire work is vitiated. A little experience soon enables the operator to penetrate and raise the right thickness of intestinal wall on the needle, though he must ever be alert to the fact that the bowel wall is extremely thin in some places and thick in others. Nevertheless, I believe it would be less perilous to the patient if the puncture went into the mucous coat than if only a feeble hold on the peritoneal layer allowed separation of the edges, because a very slow and insignificant contamination working along the thread toward the cavity of the peritoneum would probably be taken care of by a quick exudation of reparative lymph, whereas an escape of gas and fluid through the gap of a loosened suture might be confidently expected to excite a peritonitis.

There are few surgeons probably who would be satisfied to unite most wounds of the bowel with a single row of sutures. Hence, whether a through-and-through stitch of the bowel edge is employed, or one which pene-

trates only through the peritoneal coat, the operator usually reinforces it by a second row of stitches placed as close as possible to the first, thus not inverting so much as to narrow the lumen of the bowel. This second row of stitches are of either the interrupted or the continuous variety, and of either the Lembert, or the Halsted, or the Cushing type. My own preference is for the Halsted type, because I believe it to be more firm and enduring and because it requires half as many knots as the Lembert for a given line of repair.

The author is very strongly impressed, after much experience, with the value of the circular purse-string suture applied to the peritoneal surface and inverting such part as it is desired to close. A small punctured wound, for example, or, better still, the cut-off end of intestine—if it be desired to close it absolutely, as when lateral anastomosis is intended—can be best and quickest closed by a running stitch about the opening, applied to the peritoneal coat and tightened as the edge is inverted. The writer first used such a purse-string suture in 1884 in experiments upon animals, and he has since uniformly resorted to it in securing tubes in the alimentary canal for drainage or irrigation, or in closing small defects.

Before speaking of the various conditions under which intestinal surgery is demanded, we may well consider the various devices, more intricate than stitching, which are available and which have stood the test of active surgery during fifteen years past.

Thus, Jobert and Senn fastened a flat ring inside the end of the upper segment of the bowel by a few stitches inserted at its edge, and then, pushing this into the lower, inverted the latter so that two serous surfaces came together. When these were secured by a row of stitches uniting the two and keeping their surfaces in contact (throughout a width of one inch), the upper part discharged into the lower without leakage while union was taking place. Eventually the artificial ring was shed and discharged into the bowel.

This is a practical means of repair but lacks the neatness of other methods, owing to the necessary dragging in of some of the mesentery of the inverted bowel, thus affording chance of leakage unless most carefully guarded against. Moreover, it is contended that an intussusception thus initiated has a risk of progressing.

In the lateral implantation of small intestine into colon the procedure forms a satisfactory mode of repair.

Somewhat after the same idea is the much admired method of Maunsell, by which the two ends of bowel of the same calibre are united. In this method four silk

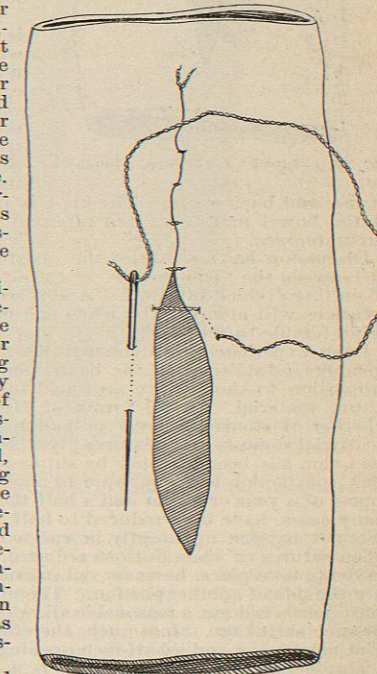


Fig. 2917.—Continuous Suture. (Cushing.)

stitches passed through and through both edges at four equidistant points are drawn into the bowel and out of a long slit, cut lengthwise, a finger's length below the end. By the aid of these stitches both cut edges are

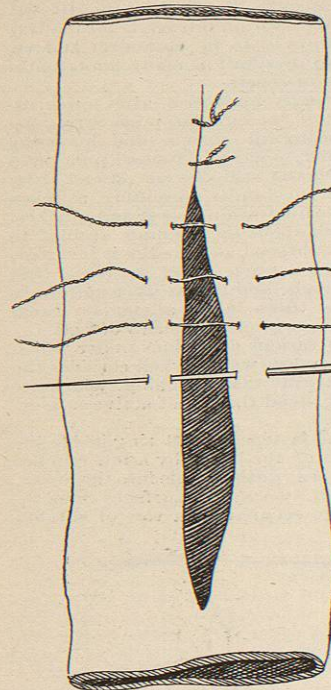


FIG. 2918.—Interrupted Suture. (Lembert.)

thrust, and back again. The knot is tied on the entire circumference.

Discussion has not settled the question of preference as between the "end-to-end" and the "lateral" methods of uniting divided intestine. And it seems probable that occasions will always exist when one method appears to be preferable to the other.

Long experience has demonstrated that most sutured openings established in the bowel tend to contract in proportion to the surface area held in the grasp of the suture material. In all forms of lateral anastomosis, whether of stomach, bowel, or gall bladder, the law of cicatricial stenosis prevails strongly. No matter whether the union has been effected by sutures or by metal buttons, contraction is always sure to take place, and in the course of a year or a year and a half the aperture will, in many cases, have been reduced to half its calibre. This does not happen apparently in end-to-end union, either when sutures or when buttons are used. It has been observed to take place, however, when one end is implanted into the side of another portion. Therefore, when lateral anastomosis is done, a reasonable allowance must be made for such shrinkage. Inasmuch, therefore, as a one-inch, or at most a one-and-a-half-inch opening between bowels is ample for perfect function, it is necessary that the operator should cut a slit from two to three inches in length. Fortunately, it is so easy to suture the smooth side of one piece to another that the extra length makes little difference in time consumed, if continuous suturing is applied.

As an instance of the actual conditions under which the operation of lateral anastomosis is performed let us suppose that a portion of bowel has been cut away for can-

cer. The successive steps for remedying the defect thus created would be, first, to close the open end of each segment by a purse-string suture, which is to pass only through the serous coat and is to be tightened in such a manner as to produce inversion of the edge of mucous membrane. A second purse-string suture of black silk is always desirable but not entirely essential. This inverts the first knot still further and produces a nipple-like eminence inside the bowel. The two closed ends are then to be cleansed and laid alongside each other, preferably pointing in opposite ways. It is now intended to open a long slit in each, on the side opposite its attached mesentery, but the operator should first apply two continuous lines of sutures, parallel and close to the proposed cut on the side farthest from him. Having first passed iodoform tapes through the mesentery above and below the operated parts, and having tightened them just enough to hold the liquid contents of the bowel, he now cuts the intestinal opening near the sutured line and stitches both edges through and through on one side. This has the double advantage of securing firmer fixation and arresting any bleeding. The other edge needs no through-and-through stitching, but the two parallel rows of sutures, which are now at the back of the cut, are continued round the ends and on to the opposite side. Thus a union is secured which cannot leak under even hydrostatic pressure, and which is indeed subject to little strain from within, owing to the very free transit of liquid contents through the large opening thus established.

The parts operated on are finally inspected, washed with sterile salt solution, freed from underlying gauze

protective pads, and dropped back fearlessly into the abdominal cavity, to assume whatever position the force of gravity and their surroundings may permit.

In adopting this method the operator has no fear that the weighty metal button will drag the bowel into a kink, or, in the case of the large intestine, that fecal matter will choke the calibre of the canal. Nor is there any delay in the free and prompt transit of all intestinal contents.

The time required for the performance of this operation is from twenty to thirty minutes.

There are times when, in the presence of a perforating ulcer of the bowel, or of a small gangrenous patch such as is often found under the sharp edge of a strangulating hernial ring, the operator must choose between resection of a portion of the whole tube of the bowel, or inversion of the small defect by stitch. If the perforation is quite small, a purse-string, or two Lembert or Halsted stitches,

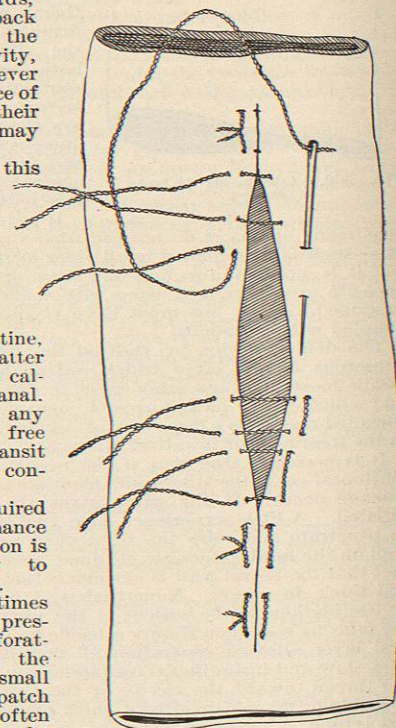


FIG. 2919.—Interrupted Suture. (Halsted.)

will suffice. But when, as in the case of a gangrenous area, the patch to be removed is larger, the stitches will narrow the calibre of the bowel too much and cause obstruction by kinking. It is then that a method of stitch-

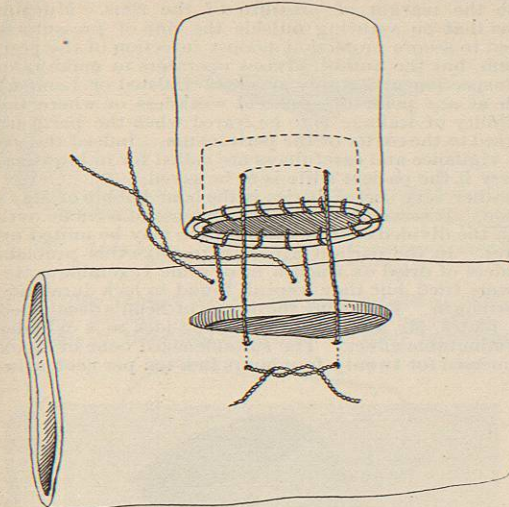


FIG. 2920.—Lateral Implantation Suture. (Senn.)

ing illustrated in Figs. 2922, 2923, and 2924, will make a perfect repair and will restore the bowel to its amplest size. When the operation is completed, the repaired part resembles the elbow-joint of a stove-pipe, and can be easily comprehended by supposing a hole in the crease at the elbow of one's coat sleeve. Now, if one closes the opening by stitches, thus drawing the elbow to a right angle, the calibre of the sleeve will be shut tightly; but if a cut is made lengthwise of the sleeve through the rent, and is extended up and down where the bent sleeve comes together and then these cut edges are sewed together as shown in the illustrations, there will be established, at the point of bending, an opening of larger

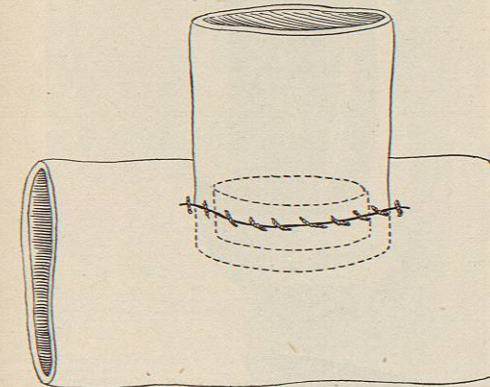


FIG. 2921.—Completed Lateral Implantation Suture. (Senn.)

diameter than that of the intestinal canal itself, and all contents will readily pass without straining the stitches or meeting obstruction.

In certain emergencies, such as impending perforation or small surface gangrene, or even when perforating ulcer has already penetrated the peritoneum, it has been

proposed (Chaput) to suture this defect against the nearest adjacent bowel and let reparative lymph seal the two surfaces together. Then, if leakage does occur, the fluid cannot escape into the peritoneal cavity but is thrown back into the bowel; or, if the opposite wall gives way, the fluid contents are discharged into the adjacent intestinal canal and the small fistula between two contiguous bowels soon heals. This method of Chaput is well worth keeping prominently in mind as an operative resort which can be quickly done when time is of much importance and numerous lesions need repair. It might readily be used in gunshot perforations. The margin of the opening might be speedily sewed to the nearest piece of intestine, thus avoiding a long resection and anastomosis. Still another plan would be to resort to a kinking of the bowel by inverting a considerable portion of its surface.

Among the many devices for joining the resected bowel by mechanical aids I shall describe but three as competent to meet the operative emergency successfully. The

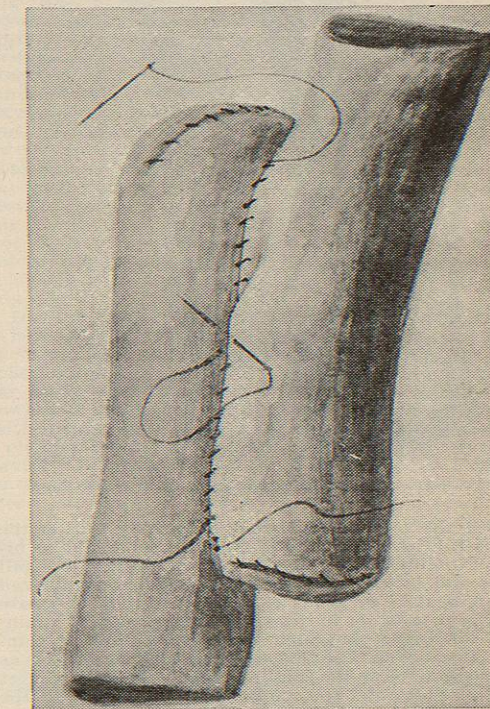


FIG. 2922.—Suturing Intestines in Apposition before Incision. Lateral anastomosis by suture (Abbe). Suturing by two rows, before incision.

first, par excellence, is that which is based upon the employment of the metal button devised by Dr. Murphy, of Chicago, and which has received recognition throughout the surgical world for its ingenuity and efficiency. It serves certain purposes better than does any other device. Thus, for example, it can be adjusted very quickly and the proper mode of using it is easily learned. It also creates an ample opening between bowels, with a narrower margin of adhesion and hence relatively little cicatricial stenosis follows its use. It has some disadvantages. Its weight has been known to drag the anastomosed loop so as to form a kink. Its hard edges have frequently produced gangrene of the wall of the bowel and temporary fistula with occasional discharge of the button through this. Occasionally the button is retained for months in the alimentary canal, but this seems to be