

occur. In one of our cases this was done for several days before the occurrence of the hemoptysis, and it was found that a fall in the blood tension preceded the hemorrhage. Ergot was used in this case continuously for several days — as the hemoptysis was recurrent — and with apparently good effect.

I have referred to our experience, which is similar to that of others, that in the majority of cases the hemoptysis occurs at night, or in the early morning hours. In eleven out of sixteen of the reported cases it will be seen that this happened. This fact throws some light upon the cause of the hemorrhage and at the same time gives us a hint as to treatment. It would appear to indicate that the blood pressure and sudden variations in pressure were a causative factor. Lawrason Brown thinks that Howell's theory of sleep offers an explanation of this; this theory being, in brief, that sleep is due to the fatigue of the vaso-constrictor center, and, in consequence, there is a dilatation of the peripheral vessels, when, in the early morning hours, the vaso-constrictor center is regaining its lost tone, variations in blood pressure result. To prevent this variation and equalize the blood pressure, Brown gives morphia and sodium nitrite between midnight and 2 A. M. It will be noticed that calcium lactate or the chloride was employed in several cases, on the coagulation theory. The cases are too few, however, to draw any definite conclusions, but my feeling is that this treatment is of small value.

Epsom salts are frequently used in our service and with apparent benefit, probably, as Babcock says, on account of the favorable effect of a laxative upon the "pulmonary circulation through stimulation of the splanchnic nerves, which are known to regulate blood pressure throughout the body."

Aconite has also been employed, but I need further experience to judge of its value.

In conclusion, from the experience in these reported cases and from our general experience, I would suggest a plan of treatment of hemoptysis somewhat as follows — provided, of course, that any active treatment seems indicated: First, a knowledge of the blood pressure of the patient from previous observations. On the occurrence of the hemorrhage, ice, morphia and atropine subcutaneously, and, depending upon the amount and rapidity of the hemorrhage, the inhalation of nitrite of amyl. A laxative dose of sulphate of magnesia, and, if the bleeding persists, or is recurrent, nitrite of sodium or nitroglycerin if blood pressure is high for the individual, or, if low, ergotin subcutaneously.

I am quite well aware that when I suggest the use of ergot I am uttering heretical doctrine, but in our experience it has apparently proved itself of value in at least a few cases when other remedies have failed.

I have to express my obligations to my resident physicians at the sanatorium, Drs. Dunham and Crane, who have conducted the detail of these observations and to whose experience and suggestions I am greatly indebted.

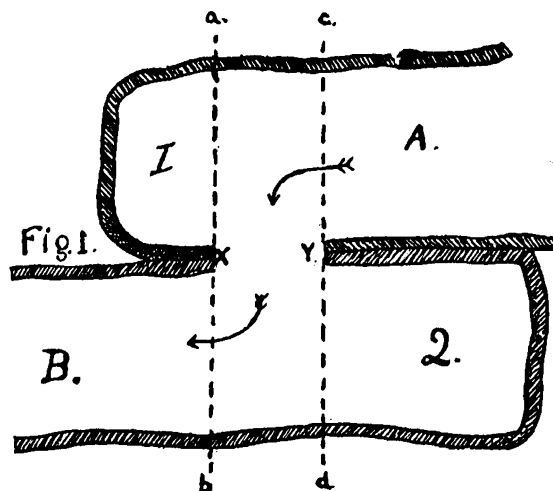
A SOLUBLE BOBBIN FOR INTESTINAL ANASTOMOSIS.

BY JOHN H. CUNNINGHAM, JR., M.D.,
Surgeon to the Long Island Hospital, Boston, Mass.,
AND
HAROLD W. BAKER, M.D.,
House officer at St. Mary's Hospital, Rochester, Minn.

ALTHOUGH intestinal anastomosis has been practised more or less since the fourteenth century, it has only been used with anything like satisfactory results for the last forty years. The introduction of aseptic surgery rather than any new method or device has brought it to its present state of perfection.

All intestinal anastomoses up to the fifteenth century were done with the aid of some mechanical device, *e. g.*, dry goose trachea, cylinders of cardboard, cylinders of fish glue and wood. Employing these devices, the cut edges of the intestines were approximated over the cylinders and sutured with a continuous unsterilized raw gut suture. These operations were not attended with much success, not only on account of the mechanical devices employed, but also on account of the resulting sepsis, although a few cases are recorded in which the patient survived.¹

We find the surgeons of the eighteenth century speaking of all wounds of the small intestine as fatal, but saying that all wounds of the large intestine should be sutured. Until the middle of the nineteenth century very few satisfactory re-



sults were obtained. The feeling in regard to intestinal anastomosis at this time is very well expressed by Weinn's article in 1818, in which he says that "the process of intestinal suturing is a very dangerous undertaking and the mortality following this procedure is much greater than where the process of repair is left to nature's resources."

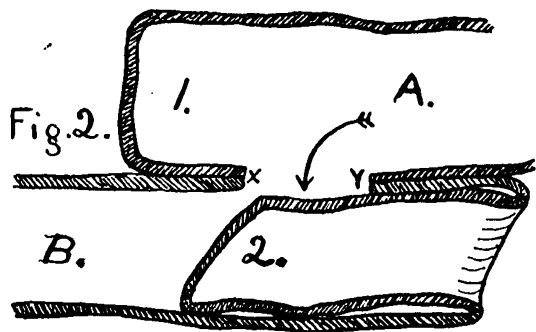
With the introduction of aseptic surgery began a new epoch of intestinal anastomosis. The subject received the attention of many surgeons from this time until the present day and many different mechanical devices have been advocated both for lateral and end-to-end anastomosis.

Until recently there has been no valuable data

as to the relative efficiency of lateral and end-to-end anastomosis,—a most important point.

Lately it has been proven by the experimental work of Cannon and Murphy¹⁸ that in lateral anastomosis we get the following results (see Fig. 1): It will be observed that the circular muscular fibers cut at x, y, paralyzes the peristaltic movement between the lines a, b,—c, d; the food, however, is carried through this dead space, a, x, y, c, by the force of the stream behind. The food stream coming down the approximal portion of the intestine A is forced against the blind end I, and is not pushed through the opening x, y, until the pressure in part A is enough to overcome the obstruction between points x, y. After this blind end of gut has become filled the force behind pushes the food through the opening x, y, into intestine B. The food having gone through the opening x, y, is forced against the opposite intestinal wall b, d. As all the circular fibers are cut in the area x, y, there is another dead space at x, b, d, y. There are no peristaltic movements in this area to carry the food on, and when the food stream behind cannot force it, we get a stasis of food at this area. By feeding animals with food containing bismuth and studying their peristaltic movements by means of the Roentgen rays, Cannon and Murphy have proved that a stasis resulted in this area, and in a few cases in which indigestible food stuffs, *e. g.*, hay and hair are fed, an absolute obstruction occurred.

They found out further that another disadvantage of lateral anastomosis is that frequently in their experiments the peristaltic movement of the distal end 2 of intestine B, produced invagination of the blind end 1, closing the opening x, y, and thus resulting in complete obstruction. (See Fig. 2.)



In comparing the lateral method with the end-to-end method it can readily be seen that practically none of the circular fibers are cut and that the uninterrupted peristaltic wave forces the food by the line of incision x, y, into the distal portion of intestine B. (See Fig. 3.)

Thus in comparing these two procedures, we find that in the lateral method, stasis, subsequent dilatation and obstruction may result, while none of these factors arise in the employment of the end-to-end method. It is evident, therefore, that wherever it is possible the end-to-end method should be employed.

The technique of performing the end-to-end anastomosis is the next important question. Shall we simply suture the cut ends of intestine together, or shall we use a mechanical device to aid in the performance of this procedure? There is such a diversity of opinion in this matter that no definite statement can be made. The essentials in an end-to-end anastomosis are to complete the anastomosis quickly and to place the sutures accurately in order to prevent leakage and obviate a constriction at the site of the anastomosis. Operators familiar with intestinal work may

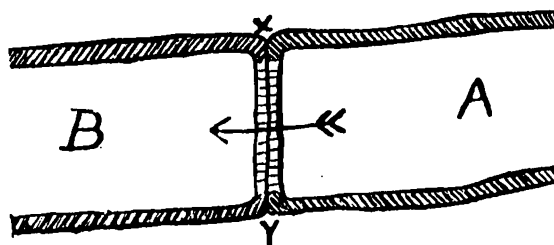


Fig. 3.

perform an end-to-end anastomosis as quickly and as accurately without as with a mechanical device, but it is fair to say that an operator doing an anastomosis for the first time can perform the operation quicker and more accurately with than without a mechanical device. It is very much the same problem as to whether one can darn a stocking quicker and better with or without a bobbin to sew over.

Without condemning anastomosis by simple nature, the rapidity and technique of placing the sutures is greatly facilitated when done over a bobbin of some other mechanical device. With a mechanical device we have the serous surfaces held in a position in which they are sutured. The device further serves as a conduit, thus minimizing any chance for leakage, as well as keeping the intestinal lumen patent. There is a class of instruments the sole purpose of which is to prevent the escape of intestinal contents during the anastomosis.

These are applied to the intestines a short distance above the point of the incision and are not of actual service in performing the approximation. As it is the object of this paper to deal with only the latter class, they will not be considered here.

Mechanical devices of service in performing the anastomosis are best considered in three classes as follows:

1. DEVICES WHICH AID IN PLACING THE SUTURES BUT WHICH ARE NOT LEFT IN THE INTESTINE.

Mudd's, Grant's, Lee's, O'Hara's,⁷ Lepace's and Cabut's forceps. Wackerhagen's tube, Halsted's,¹⁴ Prayer's and Doron's bulbs.

2. UNABSORBABLE MECHANICAL DEVICES.

Murphy's,³ Graberini's, Juvara's and Jarborle's metallic buttons. Hayes's, Boari's,⁹ and Ball's ivory buttons. Harrington's⁴ and Granpazzi's segmented rings. Brochaw's and Caput's rubber rings. Collier's rubber tube. Clark's rubber bulb. Cazzini-Duplay's metal cylinder and Allingham's ivory tube.

3. ABSORBABLE MECHANICAL DEVICES.

Neuber's,¹⁰ Bonnier's, Robson's⁹ and Littlewood's decalcified bobbins. Bull's, Hayes's and Collier's decalcified bone buttons. Senn's² decalcified bone plates. Bailey's and Allingham's decalcified bone tubes. Jones's decalcified bone cones. Gill's decalcified ivory button. Abbe's catgut rings. Alexander's and Andrier's potato cylinders. Wackerhagen's¹ wafer cylinder. Metcalf's¹² sugar cylinder. Hohenhausen's bread cylinder, and Bell's tallow cylinder. Cunningham's maccaroni bobbin.

Of the first class (*devices which aid in placing the sutures, but which are not left in the intestine*) the most prominent are the forceps invented by O'Hara, and Halsted's inflatable rubber bulb. All forms of forceps present certain technical difficulties in their application. Further, they aid simply in placing the sutures and furnish no support to the sutured area. Coffey claims that in three-quarters of his experiments with O'Hara's forceps there resulted complete obstruction of the gut, which was produced by injury to the bowel in the application of the blades and therefore considers them unsafe.

Besides these forceps there are numerous rubber bulbs, tubes and balloons, which may be objected to on the ground that having been introduced into the intestine sepsis may result by contaminating the surrounding area during their removal.

Of the second class (*unabsorbable mechanical devices*) Murphy's button, a most ingenious device as well as a most delicate piece of mechanism, stands out first and foremost and may be taken as the type. This button has been used most extensively and has yielded good results. The main objection to it, as well as to the other devices of this class, is that there is a heavy foreign body left in the intestinal canal, which may remain *in situ* and cause obstruction either by its lumen, which is small, becoming plugged, or by its weight, causing a sag or kink of the intestines. Another disadvantage of this button is the fact that its liberation depends upon the sloughing of the intestinal walls, which are clasped within the opposing edges, and that this sloughing may not stop at a point inside of the adherent surfaces, but may extend beyond and a perforation result. Numerous cases are on record in which the button has been found subsequently in the abdominal cavity. Moreover, the raw unhealed surfaces left within the bowel may become adherent or by contraction partially occlude the lumen.

Of the third class (*absorbable mechanical devices*) Neuber, in 1884, was the first to use one of these devices for intestinal anastomosis. He devised a bobbin of decalcified bone, which was inserted into the lumen of the intestine, the severed ends being drawn over the bobbin and a purse-string suture passed around each end to be approximated. While Neuber was the first to introduce the absorbable device, Mayo Robson's decalcified bone bobbin is the best known member of this class.

These absorbable devices have all the advantages of the unabsorbable ones and by their absorption can produce no after complications, disappearing, as they do, by the natural processes of digestion.

An ideal mechanical device to be used in end-to-end anastomosis is one which will insure the normal passage onward of the intestinal contents, one which can be easily inserted which will facilitate the rapid and accurate placing of the sutures, keep the lumen patent, hold the serous surfaces in position until they have become firmly adherent and then be digested or dissolved and pass off in the intestinal stream without producing any intestinal injury or after complications.

The idea of employing a maccaroni bobbin occurred to one of the writers (Cunningham) several years ago. Maccaroni recommends itself, because it is easily digested in the intestine, is cheap, and may be made sterile in its preparation. During the past four years it was employed experimentally with success, but no detailed observations recorded. A few months ago the writers, aided by Dr. W. E. Ladd, undertook a series of experiments to determine how long the bobbin remained undigested in the intestine, with the following results:

The maccaroni used was a large size commercial maccaroni, cut into cylinders 3 inches long by $\frac{7}{8}$ of an inch in diameter and bobbins of special design. (See Fig. 4.) These were sterilized by

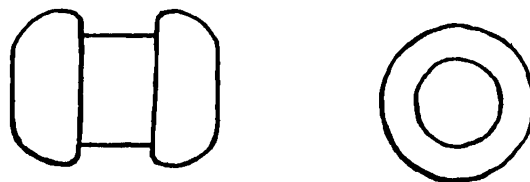


Fig. 4

dry heat. The experiments were performed upon cats, dogs and sheep. The observation in the latter class of animals, being more accurate, are given in detail as follows:

Experiment 1. A sheep was anesthetized and intestine exposed through a median abdominal incision. The jejunum was incised to the mesentery and the maccaroni bobbin inserted. The ends of the inserted intestine were brought over the bobbin and sutured by interrupted Pagenstecher sutures, which were reinforced by continuous suture. Three such operations were done at different places in the small intestine. Three hours after operation the animal was standing and five hours after was feeding on hay.

Thirty-six hours after operation, animal (in good condition and feeding) was killed and all three of the intestinal wounds were found to be healed, or at least to be firmly adherent. There was no leakage or sepsis. The maccaroni cylinders were completely disintegrated and no traces of them could be found in the intestinal tract.

Experiment 2. Operation same as Experiment 1. Three end-to-end intestinal anastomoses were performed over bobbins of sterile maccaroni, placed in different parts of the intestine. The edges were approximated as before.

Twenty-four hours after operation animal (in good condition and feeding) was killed. Intestinal wounds firmly adherent. No leakage or sepsis. The maccaroni bobbins had disappeared from the original site, but small pieces soft and partially digested were found in the intestinal tract beyond the points of suture.

Experiment 3. Operation. Two end-to-end anastomoses with macaroni bobbin. Edges being sutured with only one continuous suture through all the layers of the intestine. Gastro-enterostomy was also performed with macaroni as a mechanical device.

Twelve hours after operation animal (in good condition and feeding) was killed. The bobbin used in the gastro-enterostomy was found to have slipped into the stomach and was considerably softened although in no way disintegrated. The wound was clean but not as firmly adherent or in as good condition as the intestinal wounds. The bobbins in the intestine were found to be in position, considerably softened but not disintegrated. The serous surfaces were adherent and no leakage or sepsis was present.

These experiments tend to show that in the macaroni bobbin we have a device which, besides facilitating intestinal suturing and holding the sutured ends in position until firmly adherent, serves as a conduit for the intestinal contents and at a period of time not under twelve hours or later than thirty-six hours, is digested and absorbed.

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Clinical Department.

VICARIOUS MENSTRUATION WITH A REPORT OF TWO CASES.

BY RALPH C. LARRABEE, M.D., BOSTON.

VICARIOUS menstruation is such a rare condition that some have denied its existence. A study of the literature certainly leads to the conclusion that many of the reported cases are spurious. Still there are many others that hardly admit of a doubt, cases, for example, where vicarious bleeding has occurred regularly for years, but has always ceased during pregnancy. The condition has occurred at all ages from the first menstrual period to the menopause. Some patients show pelvic abnormalities obstructing the flow, while in others the pelvic conditions have been normal. There is great variability in the site of hemorrhage, some bleeding from the nose, some from the lungs, stomach, rectum, eyes, ears, gums, bladder, nipples or umbilicus. In some the bleeding has been confined to a nevus, a scar, a fistula or a leg ulcer. Usually the hemor-

rhage occurs from but one site, but a few cases have occurred in which at regular intervals corresponding to the menses there has developed a tendency to bleed in various if not in all situations. Such a case is the following:

CASE I. Mrs. F. F., aged thirty-six, applied for treatment at the Medical Out-Patient Department of the Boston City Hospital on Dec. 1, 1903. There was nothing of importance in the family history, particularly no hemophilia. She had two children, a boy and a girl, neither of them bleeders. The patient was born in England and came to America in 1898. Apart from an indefinite history of an attack of "inflammation of the bowels" she had always been well. She used liquor freely, frequently to the point of intoxication. The menstrual history was, up to the onset of her final trouble, normal.

In the summer of 1902 she began to suffer from menstrual irregularity and in December of the same year normal, uterine menstruation ceased wholly only to be replaced by the phenomena for which she sought relief. At more or less regular intervals, averaging somewhat less than four weeks, a dark colored rash would appear on the legs and more sparsely over the rest of the body. At the same time she would have nose-bleed and "blood-blisters" would appear on the lips, gums and tongue. Each attack lasted but a few days. Each attack left her paler and weaker than before, and in the intervals she did not regain her previous health. She complained also of headache, dyspnea, puffiness of the face and swelling of the feet. The bowels moved daily and the appetite was good. Her diet was ample in amount and mixed in character, including an abundance of fresh fruit. When first seen she was recovering from a severe attack.

Physical examination showed a well-developed and well-nourished woman in good general condition, but very pale. The area of cardiac dullness was slightly increased and there was a systolic murmur at the apex transmitted a short distance towards the axilla. The lungs, abdomen and abdominal viscera were normal. There was a fading hemorrhagic eruption, most marked on the legs, a large ecchymosis on the back of one hand and several small, hemorrhagic vesicles on the tongue and lips. The urine was normal.

The blood was as follows:

Hemoglobin, 45%; red corpuscles, 1,520,000; white corpuscles, 5,400.

A differential count of white corpuscles showed nothing abnormal. The most marked features of the smear were the achromia and the small number of platelets. No nucleated reds were seen. The coagulation-time was not studied, but the bleeding from minute punctures was unusually free and clotting appeared to be much retarded.

She was given iron, arsenic and calcium chloride and instructed to take in her food as much gelatin as possible. She steadily improved and at the end of a week there remained no evidence of the hemorrhages, except for the rapidly diminishing anemia.

The patient had prophesied her next attack for December 20, and as this date approached she was observed with both interest and skepticism. On the 21st she presented herself at the clinic in a condition that removed all doubts. There was a purpuric eruption on the legs and fore-arms, with a few spots on the trunk. There was slight bleeding from the mucous membranes of the nose and mouth. On the whole the severity of the attack was much less than before. She was not seen again until March 7 when she returned to the hospital in the midst of a very severe attack. She stated that in the interval she had had two others.