dition, whatever it may be, remains untouched, the dilatation will probably be reproduced.

5. *Gastrotomy.*—Gastrotomy means the making of an incision into the stomach and closing the incision at the termination of the operation. Gastrotomy is employed for exploration, for the removal of a foreign body from the stomach, for the arrest of hemorrhage, to permit of the dilatation of a stricture of the œsophagus or of a stricture of the pylorus, or to facilitate the removal of a foreign body from the œsophagus. This operation was performed now and then even in ancient times. In 1532 Matthias, of Brandenburg, successfully removed a knife from the interior of the stomach. The stomach is opened in the following manner:

The abdominal incision is usually made in the median line above the umbilicus. If we are operating for a foreign body in the stomach, when the organ is exposed the foreign body should be located by palpation; and if the body is sharp, every precaution should be taken to prevent injury during the manipulation. Jacobson gives us the sound advice that in dealing with a sharp body with one blunt end, the blunt end should be located first.

The portion of the stomach to be incised is then brought out of the wound and surrounded with gauze. An incision transverse to the long axis is now made, preferably with scissors. Any bleeding vessels are caught with forceps, the foreign body is removed, mucus and blood are eliminated from the interior of the viscus by gentle sponging, its wall is inspected to see that it has not been seriously damaged, bleeding vessels are ligated, the stomach wound is sutured in accordance with the directions given under the heading of gastrorrhaphy, the stomach is restored to its proper position, a small piece of gauze is carried down to the stitch line for drainage, and the abdominal wound is closed.

If operating for the arrest of hemorrhage from the stomach, after the anterior wall has been incised the interior of the stomach is explored with an electric-lighted endoscopic tube and the bleeding point is located. If it is in the anterior wall, it is treated through this incision. If it is in the posterior wall, an opening is torn through the gastrocolic omentum; a finger is passed up into the lesser peritoneal cavity, and the portion of the posterior wall at which the bleeding point is located is inverted with the finger, so that it may be readily recognized through the anterior incision. Then the vessel is ligated or sutured, as the surgeon may elect. After ligating a bleeding point or suturing it with a portion of the stom-

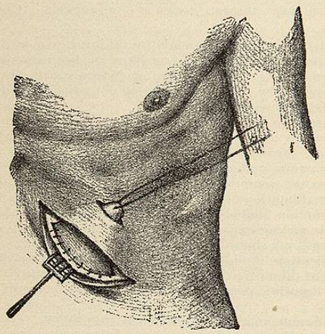

FIG. 4524.—The Ssabanejew-Franck Method of Gastrostomy. (Meyer.)

ach wall, apply several inversion sutures to the overlying part of the stomach surface. The operation as employed for the removal of a foreign body in the œsophagus is described in the section on the œsophagus.

The operation of gastrotomy is the antecedent to the performance of Abbe's string-saw operation for stricture of the œsophagus—a procedure that will be found described under the heading "Cicatricial Stricture, etc.," on page 477. The operation of gastrotomy is likewise a necessary antecedent to the performance of Loreta's operation of digital divulsion of a stricture of the pylorus. If gastrotomy has been employed for the arrest of hemorrhage, it should usually be associated with gastroenterostomy, which latter operation will put the stomach at rest after the hemorrhage has been checked.

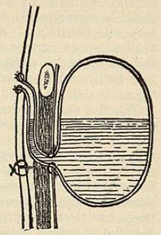

FIG. 4525.—Section to show the Line of the Stomach Wall after the Performance of Gastrostomy by the Ssabanejew-Franck Method. (Meyer.)

6. *Gastrostomy.* — Gastrostomy means the making of a permanent opening into the stomach. This opening is used for the introduction of food. The operation was first performed by Sedillot in 1849. It is usually employed in cases of malignant stricture of the œsophagus, is occasionally used in cases of very marked fibrous stricture of the œsophagus, and has been employed on persons suffering from obstructing cancer of the pharynx, on the victims of œsophageal diverticula, and on individuals who have swallowed corrosive liquids and to whom swallowing is difficult or impossible and in whom stricture is certain to arise. At the present time it would scarcely be used in œsophageal diverticula. In only one instance have I ever employed the operation for anything except malignant disease. That case was one of fibrous stricture of the œsophagus associated with great spasm. The stomach was opened with the intention of distending the stricture from below, or of cutting it by the Abbe string-saw method. This was, however, found to be impossible; therefore the operation of gastrostomy was performed. The results in this case were remarkable. In a few weeks it became possible to pass bougies from above; and subsequently, when the stricture was well dilated, the gastrostomy opening was allowed to close. In such a case as the above, gastrostomy is of benefit, not only by enabling the patient to take sufficient food to maintain his strength, but also by giving complete rest to the strictured area and thus relieving spasm and promoting the absorption of inflammatory exudate.

The operation of gastrostomy has been condemned by many surgeons on the ground that it is extremely fatal; and, as a matter of fact, when performed late in a case of malignant disease, it is very fatal. At this late period the patient is already exhausted, the shock of the operation may be profound, the wound heals badly, and the patient's tissue resistance is at such a low ebb that infection is quite likely to occur. Gastrostomy should not be reserved for cases *in extremis*. When a man is nearly dead, the operation is almost sure to be fatal; and even if passed through successfully, it will prolong the sufferer's life for but a short time. It ought to be performed much earlier, or not at all. As J. B. Murphy says, gastrostomy has no place as a last resort and should only be used in cases without pronounced constitutional symptoms (Chicago *Medical Recorder*, June 15th, 1902). When done at an earlier period, it gives the greatest possible ease and comfort, and may prolong the life of a cancer patient for weeks or months. Mikulicz's rule appeals to us as being a sound one; *i.e.*, when the patient shows a progressive loss of weight and when he begins to develop difficulty in swallowing semisolids and liquids, then the operation should be performed. Then it can be done with the greatest safety, and then it will give the greatest relief and the greatest prolongation of life. When the operation is done at this time, it usually relieves the patient of much distress and uneasiness; it enables him to take plenty of food, thus counteracting weakness

and depression; and, in fact, after an early gastrostomy there is, as a rule, a very distinct gain in weight.

When cases are operated upon early it is usually safe to give a general anæsthetic; but when the case is at all advanced or when the patient is weak, a local anæsthetic should be used. I have done the operation with ease and safety under local anæsthesia; in fact, when the hæmoglobin of the blood is distinctly below fifty per cent., I always elect to do it under local anæsthesia.

In performing this operation the surgeon must so do it as to prevent subsequent leakage of the gastric contents. If the fistula leaks, the fluid, as it flows over the surface, will produce irritation and inflammation of the skin and harassing annoyance to the patient. When gastrostomy was performed according to the old methods, leakage inevitably happened. By all of these old methods the stomach was fixed to the abdominal wall and opened a few days later. A large opening was made; the fistula thus formed enlarged, rather than contracted, and leakage took place.

Modern operations are much more satisfactory. The operation that is the most satisfactory in the majority of cases is the one known as the Ssabanejew-Franck method. Ssabanejew devised this operation in the year 1890; and some three years later Franck practised the same method, without being aware of his predecessor's labors. In order to perform this operation an incision is made at the border of the left ribs, and a cone of the stomach is drawn out through this incision. This cone should be at least an inch and a half in length. About an inch above the rib borders a second incision is made through the skin, and the bridge of skin between the two cuts is undermined with a blunt instrument. The base of the stomach cone is sutured to the parietal peritoneum, and the apex is caught with forceps, pulled under the undermined skin, made to emerge through the second opening above the border of the ribs, and sutured there. The incision in the abdomen is then closed. The apex of the cone may be opened at once; and whenever it is desired to feed the patient, a tube may be introduced. This fistula does not leak; it has no tendency to contract, and it is not necessary to wear a tube permanently. It is an admirable operation; it can be very easily and quickly performed; there is no danger of sepsis from the escape of the contents of the stomach, and no buried sutures are employed. It is not, however, applicable to all cases. When the stomach is shrunken and contracted, or when it is very adherent at some portion, one will not be able to pull out a cone an inch and a half long; and if a cone of this length cannot be obtained, one should not do the operation. In two cases I have taken the cone beneath the muscles, as well as beneath the skin; but I question the necessity of this modification.

A. W. Mayo Robson declares himself eminently satisfied with Franck's operation. He, however, employs it in a

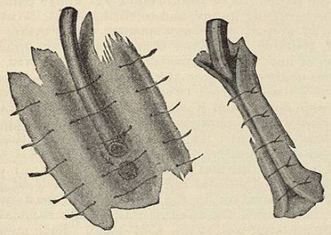

FIG. 4526.—Witzel's Gastrostomy. (Esmarch and Kowalzig.)

somewhat modified form. He makes a vertical incision, an inch and a half in length, over the outer third of the left rectus muscle. This incision commences three-quarters of an inch below the costal margin. He then separates the fibres of the rectus, by blunt dissection, to the same extent as the external incision, and afterward divides the posterior portion of the rectus sheath and the peritoneum by an incision an inch in length. He brings a cone from the cardiac end of the stomach up through the wound, and has it held upward by an assistant while the base of the cone is sutured to the parietal peritoneum. He next makes a transverse incision, half an inch in length, through the skin, one inch above the upper end of the

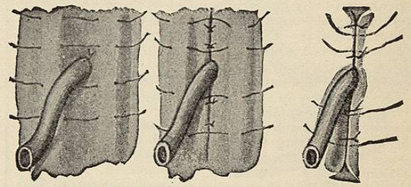

FIG. 4527.—Kader's Gastrostomy. (Esmarch and Kowalzig.)

first incision; undermines the skin between the two openings; introduces a pair of forceps through the upper incision; catches the cone of stomach, and draws it to and a little beyond the second opening, where it is retained between two harelip pins. This portion of the cone completely fills the second opening, and no stitches are necessary. The lower opening is then sutured.

Unless early opening of the stomach is necessary, the surgeon should wait twenty-four hours, in order that a protective barrier of lymph may be thrown out. When the stomach is opened it is done by passing a tenotome between the pins. After the opening is made, a soft-rubber catheter—from No. 8 to No. 12—is inserted, and is retained for a few days. When it is desired to feed the patient a funnel is attached to the catheter. After a few days the catheter is removed, and is then introduced temporarily whenever food is required.

In Witzel's method of gastrostomy (Fig. 4526) a cone of the stomach wall protrudes into the lumen of this viscus, and leaking is thus antagonized. The operation is performed as follows:

The preferable incision is a vertical one through the rectus muscle of the left side. The cardiac end of the stomach is exposed and drawn out, and a very small opening is made, into which a rubber tube about the size of a lead-pencil is introduced. A part of this tube, where it lies upon the wall of the stomach, is buried in the stomach wall by stitching two folds of this wall over the tube with Lembert sutures. The free end of the tube emerges from the wound, and the surface of the stomach about the tube is sutured to the parietal peritoneum. The abdominal wound is then closed. The end of the external portion of the tube is now clamped and the dressings are applied. Food may be administered immediately after the operation, if it is desirable.

I do not like this method as well as Franck's operation. In the first place, it is necessary to use intra-abdominal sutures. There is also some danger of leakage; and the fact that the tube crosses the surface of the stomach may, as it did in one case, cause the formation of an hour-glass constriction.

Kader's operation is employed when, because of the small size of the stomach or of adhesions of this viscus, it is impossible to obtain a sufficiently large cone to perform the Franck operation. I have used Kader's method with great satisfaction. It may be regarded as a modification of Witzel's operation, and is performed as follows:

A three-inch incision is made two fingers' breadths below and parallel with the border of the left lower ribs; or, which is preferable, a vertical incision is made through the left rectus muscle. A fold of the wall of the stomach is drawn forward; a small incision is made, as in Witzel's operation; and the tube is pushed into the stomach for a distance of two inches (Fig. 4527). This

tube is then fastened to the stomach wall with a single catgut suture; and a Lembert suture is placed on each side of the tube, each suture raising and uniting a fold about half an inch in width and making a groove about three-quarters of an inch in width. When the sutures are tied, longitudinal folds are formed. A portion of the stomach wall is turned inward and surrounds the tube. Over this first fold other folds are made, usually two in number. Then the stomach is stitched to the parietal peritoneum and to the posterior portion of the rectus sheath. The abdominal wound is closed, the other end of the tube emerging from it. In cases in which the stomach is very much contracted it may be necessary to open the viscus within the abdomen, because it will be found impossible to pull it up sufficiently to open it extraperitoneally.

The operation of the younger Senn, of Chicago, is advocated by a number of surgeons. He, too, makes a valve of the stomach wall; and the opening thus formed does not leak during the digestion of food, and may be opened by the passage of a tube when we wish to administer food.

I regard the Franck operation as the easiest, safest, and most satisfactory when it can be performed; when it cannot, I prefer the method of Kader.

7. *Gastro-enterostomy.*—Gastro-enterostomy is the operation of making an anastomosis between a portion of the small intestine and the stomach. It was first suggested in 1881 by Nicoladoni, and was first performed by Wölfler, in the same year (Fig. 4528). The anastomosis may be, and usually is, made between the stomach and the jejunum, and then the correct name of the procedure is gastrojejunostomy. It may, however, be made between the stomach and the duodenum, and is then known as gastroduodenostomy. We shall consider particularly gastrojejunostomy.

The operation of *gastrojejunostomy* may be performed when there is pyloric obstruction, malignant or non-malignant in character; when there is ulceration of the stomach, especially if associated with hemorrhage; when perigastric adhesions produce adhesion dyspepsia; when there is dilatation of the stomach from any cause; when there is grave indigestion that is unamended by ordinary means; and when there is congenital hypertrophy of the pylorus. In dilatation due to simple muscular atony, the operation, as we have previously stated, is of no value. When dilatation and hypertrophy are associated with spasm of the pylorus, the operation is not indicated. Its employment in uncorrectable indigestions has been suggested by Hartmann and warmly advocated by Keen. When the surgeon is dealing with cancer of the pylorus he must choose between pylorectomy and gastro-enterostomy. When he is dealing with non-malignant stricture of the pylorus, he must frequently choose between pyloroplasty and gastro-enterostomy. In a case of non-malignant stricture of the pylorus, if the pylorus is accessible and if the plastic operation is possible, we should prefer pyloroplasty, as it keeps the parts in a natural condition and saves the patient from some not improbable post-operative complication.

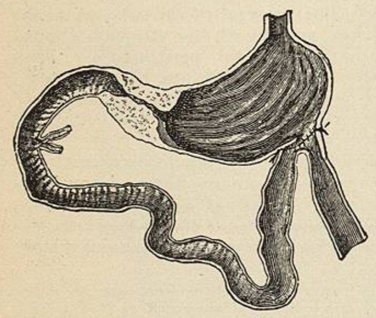

FIG. 4528.—Wölfler's First Method of Gastro-enterostomy. (Esmarch and Kowalzig.)

In cancer, if the adhesions are not too extensive, if the growth is not disseminated into near-by or distant viscera, and if it is found possible to remove the associated lymphatic glands, pylorectomy is usually performed in preference to gastro-enterostomy; in fact, we may say that in early cases of cancer of the pylorus pylorectomy is to be preferred, and that in very advanced cases gastro-enterostomy is of no use. It is rather in the medium type of cases that gastro-enterostomy should be employed; *i.e.*, in persons in whom the growth from the pylorus is irremovable, but who have not yet passed into advanced cachexia and exhaustion.

In a non-malignant case of stricture of the pylorus gastro-enterostomy may produce a permanent cure. It frequently relieves the acidity; it enables the stomach to empty itself more rapidly, and thus prevents fermentation and gives rest to the organ. After the operation the motor power of the stomach usually increases, the secretory power often improves, and some stomach digestion usually occurs. As a rule, a certain amount of bile flows into the stomach after the performance of gastro-enterostomy. This was noted in most of Weir's cases. It seems, however, to do no particular harm unless it is present in quantity, or unless it has difficulty in flowing out again. If hyperacidity exists the operation commonly has the effect of causing a lessening or a disappearance of free hydrochloric acid. Of course, even in non-malignant cases the operation sometimes fails of effect.

One of the most valuable effects produced by gastro-enterostomy in either malignant or non-malignant obstruction is the return of regular bowel movements. The operation is, of course, infinitely more serviceable in non-malignant than in malignant cases. In a malignant case it may be followed by a rapid gain in weight; but this gain is only temporary. If, after the performance of gastro-enterostomy, there be marked and prolonged gain in weight, we should be justified in concluding that the disease was not cancer.

The mortality of the operation has been regarded as very high; but when we analyze the figures, we find that it is very high in malignant and not very high in non-malignant cases. In cases of malignant disease the mortality is frequently in the neighborhood of forty per cent.; even in the hands of Mikulicz it has been thirty-two per cent. The Mayos (William and Charles) report ninety-eight gastro-enterostomies with nine deaths, the mortality in malignant cases having been twenty per cent. and in non-malignant cases six per cent. This high mortality in malignant disease is due to the fact that the operation is frequently done too late, when the patient is exhausted and near to death. It should not be done on cases *in extremis*, and, as before stated, should be employed when the case is too far advanced for pylorectomy, but is not very cachectic or much exhausted.

The period of prolongation of life produced by the operation in malignant disease is doubtful. It may be a few weeks, a few months, or a year or more. It is, however, rarely more than a few months. Because of the short prolongation of life and the very high mortality, many surgeons have questioned the value of gastro-enterostomy in malignant disease; but it undoubtedly makes the patient more comfortable. It allays pain; it stops the harassing hunger and torturing thirst; it causes a return of normal bowel movements; and it makes life at least bearable. As Keen says, it is not so much a question of how long a patient lives as how he lives.

In non-malignant cases the mortality is very low. Karle, of Turin, reported twenty-three operations without a single death; and Karle and Fantine estimate that the mortality from operations in non-malignant cases is under four per cent. In such cases the operation is often positively curative; and in nearly all cases it will, at least, give definite and prolonged relief.

There is a fundamental difference in methods of performing this operation, in the fact that the anastomosis may be made upon the anterior wall of the stomach or upon the posterior wall (Figs. 4534–4536). Each method has its advocates. The anterior operation may be performed more readily and quickly; and its advocates maintain that, if it is properly performed, it is safer and more satisfactory than the posterior. In some cases the anterior operation must be performed because the posterior wall cannot be reached. The advocates of the posterior operation maintain that the anterior operation is

more liable to be followed by a vicious circle; that the cone of stomach pulled down occasionally compresses the large intestine and produces obstruction; that the posterior operation has very little tendency to be followed by a vicious circle; and that, whereas it takes somewhat longer to do, it is a question whether the mortality is distinctly higher. Further, it is well known that if a button is used in the anterior operation, this mechanical appliance is far more apt to remain in the stomach than if the posterior operation is performed.

Whichever operation is selected, the stomach should be washed out daily for several days preceding its performance. The abdomen should be cleansed at least forty-eight hours before the operation; and during the operation the patient must be carefully protected from cold by being wrapped in blankets and being surrounded with hot-water bottles.

The first incision in the abdominal wall should be small, in order to permit of exploration, so that the surgeon may determine whether gastro-enterostomy is to be performed at all and what method is to be employed. The abdominal incision is then enlarged. If speed is not a vital point in the case, the simple suture without mechanical aid should be selected; if speed is a vital element, one should use a Murphy button, bearing in mind that there is a possibility that this button may be retained. I would do no operation by means of the forceps of La Place or O'Hara, because forceps turn in a very large septum after previously bruising it, and consequently expose a large bruised, raw surface to infection. I am persuaded that operations by means of forceps are more apt than are operations by other methods to be followed by sloughing or by obstruction of the anastomosis opening. Personally, I perform, in most cases, a posterior gastro-enterostomy, effected by a simple suture if the patient's condition is good, and by a Murphy button if haste is imperatively necessary.

A great many operations have been devised, but only a few of the most valuable will be mentioned here.

After-effects of Gastro-enterostomy.—The effects of this operation upon the motor power, the secretory function, and the digestive capacity of the stomach have been referred to previously. Certain pernicious conditions may also ensue; for instance, in a few cases ulcer has formed in the intestine, being apparently due to the extreme acidity of the gastric juice. Neumann suggests that this complication may be cured by making a temporary fistula, and keeping it open until the excessive acidity of the gastric juice has disappeared.

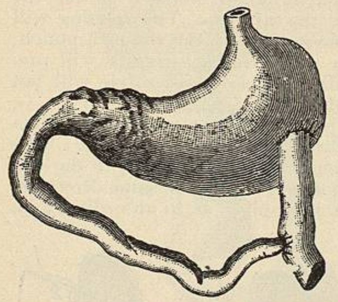

FIG. 4529.—Wölfler's Second Method of Gastro-enterostomy. (Esmarch and Kowalzig.)

The most common ill-consequences of gastro-enterostomy are constriction of the new opening, and vomiting, due to regurgitation from the duodenum or to the establishment of what is known as a vicious circle. In every case the new opening contracts to some extent, and occasionally it absolutely closes. The lesson to be drawn from this is that the opening made should be of considerable size. When the stomach is very much dilated at the time of operation, the contraction of the opening is sure to be notable as the viscus shrinks; hence the greater the dilatation, the larger should be the opening. Contraction of the opening is indicated by burning pain, nausea, and it may be regurgitation of small quantities of bile (Mayo).

In some patients, after gastro-enterostomy the fluid from the stomach passes into the proximal loop of intestine and distends it, and the distal loop undergoes collapse. The collection of fluid in the proximal loop may be due to the retention of the secretions that normally enter into that loop, with the addition, it may be, of the passage of a certain amount of material from the stomach through the strictured pylorus. Such a condition may be brought about by the abolition of peristaltic movement in the proximal loop; by the constriction of the distal loop, through an adhesion, a twist, or a kink; or by the formation of a spur, which prevents the passage of material from the proximal into the distal loop.

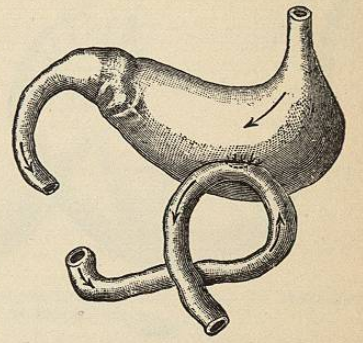

FIG. 4530.—Lücke's Method of Gastro-enterostomy. (Esmarch and Kowalzig.)

The term vicious circle means that the contents of the stomach enter into the duodenal loop and are then returned to the stomach, with bile, pancreatic juice, and other contents of the duodenum. George Ryerson Fowler (*Annals of Surgery*, November, 1902) opposes the use of the term vicious circle, and prefers to say regurgitation, or, better still, reflux, when he wishes to indicate the passage of bile and pancreatic secretion, as well as that of the contents of the jejunum, into the stomach. As previously stated, after every operation of this sort some bile enters into the stomach; but if only a small amount enters, it produces no harm, and the condition will practically amend itself; and even if a considerable quantity enters the stomach it causes little trouble if it readily passes from the stomach into the distal loop. Sometimes there is slight and temporary vomiting, which after a time passes away. At other times the vomiting is extremely serious, and may even hurry the patient to death. Because the vomited matter seemed to be chiefly composed of bile, the trouble has been attributed purely to the presence of bile; but A. W. Mayo Robson maintains that the presence of bile alone is not sufficient cause for the vomiting, and neither is the presence of pancreatic juice. He says that the real cause of the vomiting is not definitely understood. If this vomiting is trivial, it may often be controlled by frequently washing out the stomach and by temporarily abandoning mouth-feeding; but if the vomiting is severe, it is usually met by performing an additional anastomosis between the portion of the duodenal loop above the anastomotic opening and a portion of the jejunal loop below this opening. In the older operations of gastro-enterostomy, the contents of the duodenum inevitably passed into the stomach through the anastomotic opening. They then mixed with the other stomach contents and entered the distal loop. In the perfecting of the modern operations of gastro-enterostomy, the constant effort has been to avoid this complication; for instance, Wölfler, in his second method, cut the jejunum across, implanted the end in the stomach, and fixed the end of the duodenal portion into the efferent portion (Fig. 4529). Lücke so arranged the loop for anastomosis that the peristaltic wave would be in the same direction in the stomach and in the distal portion of the loop (Fig. 4530). The following methods will be described: anterior gastro-enterostomy as practised by Mayo, of Rochester, Minn.; and von Hacker's method of posterior gastro-enterostomy.

In regard to the use of simple sutures or of some mechanical appliance, each operation must be considered on its own merits. The operation with the Murphy button can be done in about fifteen minutes. The surgeon should be certain that the two halves of the button are tightly forced together, and supplementary sutures will then not be necessary. The button may pass during the second

week, but rarely does so until the third. In one of my cases of posterior gastro-enterostomy it did not pass until the ninetieth day. Sometimes it does not pass at all, and this complication is said to be particularly apt to occur after anterior gastro-enterostomy; although, strange to say, the retention of the button seems rarely to produce harm. The opening made by the button is sometimes scarcely large enough, and is particularly apt to contract to an unfortunately small size if the stomach is very much dilated. In using the button, we may employ the purse-string suture around the central tube, as Murphy does, or follow the plan of Karle, which is to make a small incision, insert the button, and put a small stitch on each side of the central tube, thus saving time and handling. I do not believe that the button operation is desirable if the anterior gastro-enterostomy is employed. Mayo Robson advocates the use of a bone bobbin. If the anterior operation is employed, I believe that simple suturing is desirable or that Robson's bone bobbin should be used.

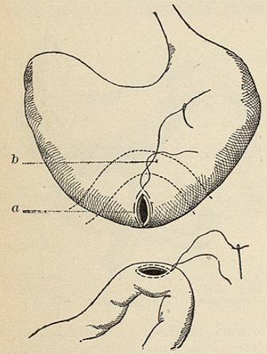

FIG. 4531.—Showing Proper and Improper Locations of the Opening in Gastro-enterostomy. (From Dr. William J. Mayo, in *Annals of Surgery*, August, 1902.) *a*, Proper position, which leaves no pouch; *b*, usual position, which leads to the formation of an intragastric pouch.

Anterior Gastro-enterostomy.—Mayo says that the anterior method has certain distinct advantages. It does not open the lesser peritoneal cavity, as does the posterior operation; it can be done with a smaller incision and less exposure; and, hence, it is safer and simpler. Mayo prefers it to the posterior, and says that a careful examination of literature does not show the frequency of the ill-effects so often attributed to it. As a matter of fact, the reports of the Breslau Clinic show the best results from the anterior operation. Mayo employs the anterior operation if the mesentery is short or contains much fat, or if the vascular loop running to the transverse colon from the superior mesenteric artery is small, "bringing the opening in the posterior layer of the gastrocolic omentum in close proximity to it" (*Annals of Surgery*, August, 1902). Some operators maintain that as the stomach shrinks the transverse colon will be pressed upon or constricted, but this will not happen if there is plenty of slack. That regurgitant vomiting is not common even after the anterior operation is shown by the fact that Czerny had but one fatal case out of sixty-five operations. Mayo had two cases of vomiting in thirty-one gastro-enterostomies, each case having been controlled by lavage. In twenty non-malignant cases he did not have a single instance of vomiting.

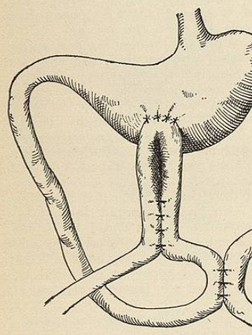

FIG. 4532.—Braune's Method of Combined Gastro-enterostomy and Entero-enterostomy.

The operation should be done without a button, if the condition of the patient is good; with a button, if haste is necessary. The button is probably more apt to be retained in the anterior than in the posterior operation.

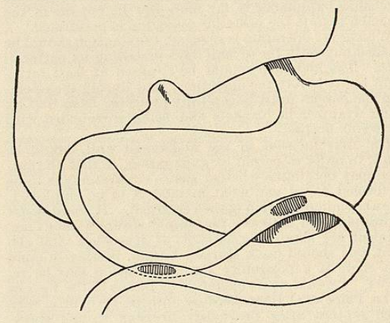

FIG. 4533.—Jaboulay's Method of Combined Gastro-enterostomy and Entero-enterostomy.

A portion of the anterior wall of the stomach toward the pylorus is selected. Mayo tells us not to go too near the pylorus, because to do so means early invasion by cancer. The opening must be as near the pylorus as it is safe to go without the apprehension of involvement. Mayo's rule is, place the opening near the greater curvature, one inch above the inferior border. When it is so placed, traction will draw down the stomach so that the anterior surface becomes the inferior. The opening will be at the most dependent portion of the stomach pouch, the stomach will empty itself readily, gravity will prevent the entrance of bile, and a vicious circle will not be established (Fig. 4531).

The origin of the jejunum is next sought for, and a coil about fourteen inches in length is obtained. This is so attached to the stomach that peristalsis in the coil and peristalsis in the stomach run in the same direction. If the button is used, it is applied as in an ordinary intestinal anastomosis; if simple suturing is employed, it is done as Halsted directs.

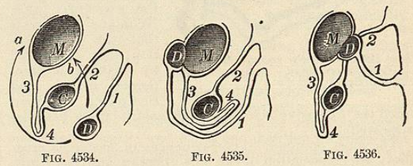

FIG. 4534. FIG. 4535. FIG. 4536.

Diagrams of Gastro-Enterostomy.

FIG. 4534.—*M*, Stomach; *C*, colon and small intestine in normal position; *1*, mesentery; *2*, mesocolon; *3*, gastrocolic ligament; *4*, great omentum; *a*, Wölfler's procedure; *b*, von Hacker's procedure. (Esmarch and Kowalzig.)

FIG. 4535.—Wölfler's Antecolic Gastro-enterostomy. (Esmarch and Kowalzig.)

FIG. 4536.—Von Hacker's Retrocolic Gastro-enterostomy. (Esmarch and Kowalzig.)

Weir is a believer in the plan of Braune and Jaboulay, *i.e.*, the performing of entero-anastomosis, as well as gastro-enterostomy. He performs anastomosis, by means of a Murphy button, between the efferent and the afferent coils. Rutkowski associates a temporary gastrostomy with gastro-enterostomy, carrying a small tube from the stomach incision well into the jejunum. The gastric juice at once passes from the stomach, alongside of the tube, into the bowel; and the patient can be fed without danger. Ten days after the operation the gastrostomy wound is allowed to heal.

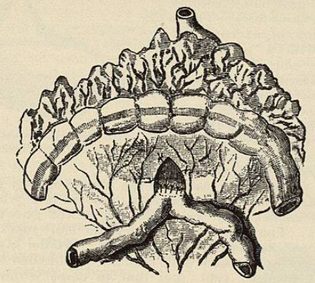

FIG. 4537.—Von Hacker's Method of Posterior Gastro-enterostomy. (Esmarch and Kowalzig.)

Posterior Gastro-enterostomy (von Hacker's Operation).—This operation was first devised by von Hacker. It is the preferable operation when the posterior wall of the stomach can be readily reached. Mayo prefers the posterior method for a thin subject with a long mesocolon.

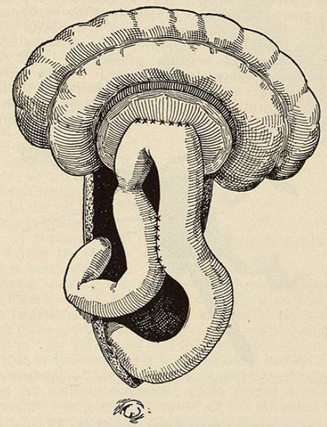

FIG. 4538.—Gastro-enterostomy; Method of Dr. George Ryerson Fowler. (*Annals of Surgery*, November, 1902.)

The bowel is attached to the part of the stomach that is the most dependent when the patient is recumbent. There is less probability of regurgitation of bile than in the anterior operation, and there is a ready passage of food. The bowel is not apt to kink, and if a button is used it is more certain to be passed.

In this operation the great omentum and the transverse colon are lifted upward, a small opening is torn through the transverse mesocolon, and the posterior wall of the stomach is thus reached. A cone of the stomach should be sutured to the margins of the opening in the transverse mesocolon (Fig. 4537). The point in the jejunum at which the anastomosis opening is to be situated is about twelve inches from the beginning of the jejunum.

If we have plenty of time the simple suture is used to effect the union; but if it is necessary to hasten, we should use the Murphy button. If the button is used, it is not necessary to stitch the stomach to the opening in the transverse mesocolon. George Ryerson Fowler associates posterior gastro-enterostomy with entero-anastomosis, and cuts off absolutely communication between the stomach and afferent loop by circumclusion

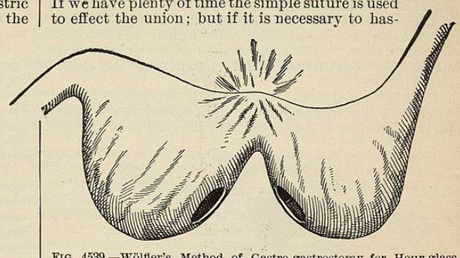

FIG. 4539.—Wölfler's Method of Gastro-gastrostomy for Hour-glass Stomach. (Keen.)

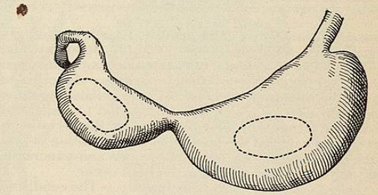

FIG. 4540.—Watson's Method of Gastro-gastrostomy.

of the afferent limb of the jejunum between the anastomotic openings by a silver-wire ligature (*Annals of Surgery*, November, 1902). (Fig. 4538.)

An ingenious method of gastro-enterostomy is that by the elastic ligature. It was devised by Dr. Theodore A. McGraw and has been practised successfully by him and by others. Dr. McGraw says that this method "is unequalled in the rapidity of its execution, its efficiency, and its safety, although it does not accomplish its purpose until after the lapse of two or three days" (New York *Medical Journal*, January 26th, 1901). The material used is rubber cord 2 mm. in diameter. One end is shaved thin and passed through the eye of a worsted needle. The intestine and the stomach wall are brought

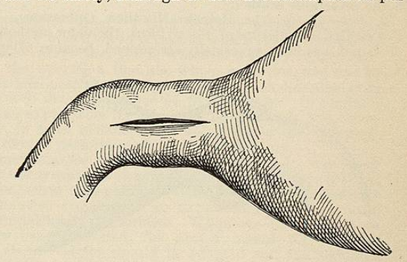

FIG. 4541.—The Heineke-Mikulicz Method of Pyloroplasty. The longitudinal incision. (Keen.)