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## Original Articles.

### SURGERY OF THE STOMACH.

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It is the intention of this paper to present a brief review of the history and the present status of the surgery of the stomach.

Although gastrotomy for the removal of a swallowed knife was done as early as 1602 by Matthis of Brandenburg, and gastrostomy for stricture of the esophagus was done by Sedillot in 1849, the surgery of the stomach can very properly be said to date from Billroth's successful pylorotomy made in February of 1881. Stomach surgery, therefore, has reached its majority; it is twenty-one years old. It has reached a stage in its development which enables us to estimate its present value and draw conclusions probably approximating the truth. Let us very briefly sketch its history.

#### A BRIEF HISTORY OF STOMACH SURGERY.

Billroth's successful pylorotomy of 1881 was preceded by an unsuccessful attempt by Pean in 1879, and by Rydygier in 1880. In September of 1881 Wölfler suggested and performed the first gastroenterostomy by making an anastomosis between the anterior stomach wall and the jejunum. This is known as the Wölfler method. In 1882 Loretta introduced digital divulsion of the pylorus for benign stricture. In 1885 Von Hacker performed gastroenterostomy by making an anastomosis between the posterior wall of the stomach and the jejunum. Although Courvoisier had made a posterior anastomosis in 1883, the operation is known as the Von Hacker method.

In 1884 Charles T. Parkes of Chicago made a series of experiments on dogs, showing the feasibility of operative repair of both intestinal and stomach wounds, and this valuable knowledge was almost at once put to practical use. A short time after this Nicholas Senn introduced his decalcified bone plates for intestinal anastomosis, and these were used for a short period quite extensively in doing gastroenterostomy. In 1886 Heineke, and in 1887 Mikulicz, independently of each other, introduced pyloroplasty, which has since been known by their name, the Heineke-Mikulicz operation of pyloroplasty. In 1890 Bircher introduced the operation of gastroplication.

In 1892 Murphy introduced his anastomosis button, which has since then been very extensively used in stomach surgery, both here and abroad. In 1893 Frank introduced the now most generally employed method for gastrotomy. In 1894 Wölfler introduced gastroplasty

and gastroanastomosis for hour-glass stomach. In 1894 Jaboulay performed the first gastroduodenostomy.

In 1897 Schlatter performed the first successful complete gastrectomy, although as early as 1883 Connor of Cincinnati had planned and unsuccessfully performed the operation. Comparatively recently Maydl has introduced the operation of jejunostomy as a palliative procedure in stomach carcinoma otherwise inoperable.

In 1880 Mikulicz, then an assistant of Billroth's, operated, but unsuccessfully, for perforating stomach ulcer. In 1892 Heusner operated for the first time successfully for perforating ulcer. Rydygier made the first successful excision of a gastric ulcer as early as 1881. Naturally in the early history of stomach surgery in the eighties and early nineties, the number of operations performed was small, but in the last five years especially this number has increased very rapidly, and we can now find a number of clinics where more than twenty-five stomach operations are done each year. My statements in this paper are based on a study of results of the work in these clinics where stomach surgery has been cultivated and my own rather limited work.

I desire to acknowledge my indebtedness to the reports from the clinics of Czerny, Mikulicz, Wölfler, Von Eiselsberg, on the Continent, the work of Mayo Robson in Great Britain, and W. J. Mayo, Nicholas Senn, John B. Murphy and E. Wylyes Andrews in this country, and for the medical aspects to Hemmeter, Osler and Fütterer. I am also indebted to the very instructive symposium on the surgery of the stomach presented at the American Surgical Association meeting of 1900.

In discussing stomach surgery let us do so under four heads:

1. Operations for malignant disease:
  - a. Pylorotomy.
  - b. Partial or complete gastrectomy.
  - c. Gastroenterostomy.
  - d. Jejunostomy.
  - e. Gastrotomy for malignant stricture of esophagus.
2. Operations for benign pathologic conditions, especially ulcer and its consequences:
  - a. Gastroenterostomy.
  - b. Partial gastrectomy; excision of an ulcer.
  - c. Repair of perforation.
  - d. Pyloroplasty.
  - e. Gastroplasty.
3. Operative treatment of:
  - a. Perforative wound of stomach.
  - b. Subcutaneous rupture.
4. Operative removal of foreign bodies. Gastrotomy.

#### OPERATIONS FOR MALIGNANT DISEASE.

*Pylorotomy and Gastrectomy.*—An analysis of results, both immediate and final, of operations done for malignant disease makes mournful reading, although

our improvement in technic has vastly bettered the immediate results as compared with those first obtained; the mortality is still large and the final results in gastroenterostomy and pylorotomy and partial and complete gastrectomy are such as to almost warrant the statement that all operations for malignant disease of the stomach are but palliative, and not curative in character. In view of this fact one is not surprised at the conclusions reached by Reginald Fitz in a recent paper on "Some Surgical Tendencies," in which he practically condemns operative treatment for malignant diseases of the stomach. One may, in the face of the facts, ask himself the question, is it worth while—the short questionable prolongation of life offered to these sufferers? Death is, after all, not always such a dreadful thing; may it not come to these poor victims of carcinoma as a blessing and relieve them from their sufferings? I have often asked myself in watching some of these cases, when I had prolonged the life for three or four months, have I not prolonged, not life worth living, but suffering for that period, and would it not have been better if I had not postponed the inevitable for the few months, but had let the patient pass away earlier with the euthanasia which morphin affords?

And yet, on the other hand, when I have had a patient who, after a pylorotomy for carcinoma, is relieved entirely of her symptoms and gains thirty pounds in weight, and beams with apparent restored health and the happy hope of cure, as I look at that patient I can not doubt that the surgeon's work was in that case worth the while. Following somewhat this line of thought, I have concluded that the hope of the future of stomach surgery for carcinoma lies either in some means to establish a diagnosis sufficiently early to enable the operator to remove widely and completely the disease, or more probably the cure of carcinoma by yet undiscovered means, and that for the present, aside from the necessary exploratory operation, to confirm or make the diagnosis, that operations for carcinoma of the stomach should be limited to such cases as permit of apparent entire removal of the disease, and these cases are at present few in number, and also that in a few well-selected cases a gastroenterostomy is warranted, cases where radical removal is not impossible and still where marked relief for a considerable period may, with some confidence, be expected. As a type of such a condition one might mention a case where there was marked obstruction of pylorus with invasion of surrounding organs preventing radical removal, and still with little invasion of the stomach tissue and with fair general condition of the patient.

*Gastroenterostomy.*—W. J. Mayo, of Rochester, Minn., who has probably done more work in stomach surgery than any other American surgeon, on analyzing his own results in 21 cases of gastroenterostomy done for carcinoma, says: "I regret to say that, with few exceptions, the palliation has been of such short duration as to hardly justify the operation," and he adds, "The hope of the future for cancer of the stomach is early exploration and extirpation."

Mayo Robson, the recognized authority in Great Britain on surgery of the stomach, in his excellent monograph on surgical treatment of diseases of the stomach, reports 23 gastroenterostomies for malignant disease; of these 10 died and 13 recovered; of these 13 5 are stated as living less than four months. In 8 cases the exact date of death was either not given, or is greater than four months; the longest period stated is nine

months, and the reports from the Czerny, Mikulicz and other German clinics give about the same results. My own results in gastroenterostomy for malignant disease have given a large immediate mortality, and unsatisfactory palliation of short duration. Three deaths in eight cases, and short and unsatisfactory palliation in the other five. Chlumsky's statistics give a mortality of 41.6 in gastroenterostomy for malignant disease. When we turn to an examination of the results of pylorotomy and partial and complete gastrectomy for carcinoma, we again meet with discouragement, but with less discouragement possibly than in the results of gastroenterostomy for the same condition.

Analyzing the results of Krönlein, Maydl, Kocher, Rydygier, Czerny, Morrison and Mayo and my own, we find 190 cases, with 50 deaths, about 26 per cent.; 140 recoveries, about 74 per cent., and 17 cases who lived more than three years, about 8 per cent. Some of these, however, already presented recurrences, and some had died later than three years of recurrence, these facts cutting down the cases which we could accept as cured of carcinoma to about 5 per cent., or one in each twenty submitted to radical operation, and even here again comes the doubt as to diagnosis in some of the successful cases. Surely such a showing is one which must make the conscientious surgeon hesitate to urge surgical treatment to a patient suffering from carcinoma, on the ground that such treatment offered much hope of radical cure. The palliation, however, furnished by radical removal is more marked, more satisfactory and more lasting than that furnished by gastroenterostomy, and without doubt the operation produces in a small per cent. of cases a radical cure. Inasmuch, therefore, as the condition calling for relief is necessarily fatal, we are warranted in performing it, and we should not hesitate to advise it in the few carcinoma cases early diagnosed. We are forced to admit that the present-day surgical treatment of carcinoma of the stomach is not satisfactory, and leaves much to be desired; this statement applies, however, with almost equal force to carcinoma in general, and surely one of the greatest discoveries, let us hope that it will come soon, will be that of a successful treatment of malignant disease, and probably when it does come it will be on other than our present surgical lines.

Before leaving the subject of carcinoma, let me emphasize the fact that it is in early carcinoma very difficult for the surgeon, macroscopically, and at the time of operation, to make a differential diagnosis between this and other lesions, such as scar tissue and tuberculosis, and this fact adds sometimes to the difficulties of selecting the proper operative procedure, and also throws doubt on some of our statistics. Both Fütterer and Billings have recently emphasized the fact that carcinoma very often develops in an ulcer, and these cases naturally give a confusing picture, both to the medical diagnostician, as here we are apt to find free hydrochloric acid even in excess, and to the surgeon at the time of the exploratory operation. In some cases the surgeon at the time of operation may find no way of determining conclusively whether he has ulcer or carcinoma to deal with. Even the enlargement of the mesenteric glands can not be relied on as pointing to carcinoma, as Mayo and others have pointed out that we can and do have enlargement of these glands in simple ulcer and other benign lesions.

That mistakes are frequently made is demonstrated by the fact that not infrequently supposed benign obstructions which have been relieved by gastroenterostomy

die later of carcinoma, and, on the other hand, supposed malignant cases which have been supposedly merely palliated by a gastroenterostomy go on to permanent recovery, demonstrating conclusively the benign nature of the lesion.

The operation of complete gastrectomy has now been done a number of times since Schlatter's successful case. Mayo Robson collected from the literature 12 cases; of these 4 died as a result of the operation, and the earliest death of the other 8 was eleven months after operation. These results must be regarded as encouraging, and yet too much confidence should not be placed on these statistics, because without question many unsuccessful cases have not been reported. The operation has to-day a very limited field, and must be regarded as being still in the experimental stage.

*Jejunostomy.*—This procedure, which was advocated as a rival to gastroenterostomy, has little to recommend it. It certainly should not be employed where a gastroenterostomy would meet the indications, and the cases where the palliation of a jejunostomy is to be preferred to the palliation of morphin and rectal feeding must be extremely rare.

*Gastrostomy.*—A word in regard to gastrostomy for malignant disease of the esophagus and esophageal end of the stomach. From a limited experience and from an analysis of the literature, I believe that gastrostomy for malignant disease is seldom worth the while, and that the patient, if he could know both the palliation of rectal feeding, dilatation with a soft bougie and morphin on the one hand, and the dangers of the operation, with its almost equally short palliation and unsatisfactory existence, with the feeding through a gastrostomy fistula, on the other, would decide almost invariably against an operation.

#### OPERATION FOR BENIGN CONDITIONS.

Let us turn now from this glimpse of the distressing picture of carcinoma before which we have confessed the limitations of surgery, to the brighter picture of the surgical treatment of benign lesions of the stomach, and here we find one of the greatest triumphs of modern surgery.

*Treatment of Ulcer.*—*Gastroenterostomy.*—Let us review, in the brief time at our disposal, the surgical treatment of ulcer and its complications. Ulcer of the stomach occurs in from 2 to 5 per cent. of the population. The treatment of uncomplicated ulcer is distinctly medical, and probably 80 per cent. will recover under the modern rational medical treatment of rest and rectal feeding. In probably 20 per cent. the ulcer will persist in spite of treatment, or complications occur, either obstruction of pylorus, hour-glass contraction, hemorrhage or perforation. In this 20 per cent. surgical interference should be or must be employed. Uncomplicated ulcer of the stomach which resists properly employed medical treatment should be treated by a gastroenterostomy. The results are very satisfactory, both from the small immediate mortality, which is less than that to be expected from the uninterfered with lesion. Heydenreich states that the mortality from gastroenterostomy in these cases is 16 per cent., and the mortality from the disease 25 per cent. And, again, the patient is usually permanently cured by the procedure.

An argument in favor of the gastroenterostomy is advanced by Fütterer, in a recent article on the origin of carcinoma of the stomach, from chronic round ulcer, where he states that the dangers of a carcinoma developing in chronic ulcers are considerable, and this might be

avoided by early gastroenterostomy with cure of the ulcer.

It would appear, at first glance, that a partial gastrectomy, removal of the diseased wall containing the ulcer, should be the operation of choice in these cases. Clinical experience, however, argues quite forcibly for gastroenterostomy; first, because excision of the ulcer gives a higher mortality, and, second, because the gastroenterostomy gives a higher percentage of cures so far as the relief of symptoms is concerned.

*Pyloric Obstruction.*—Of the three common complications of ulcer demanding surgical interference, obstruction of the pylorus with resulting dilation and often compensatory hypertrophy is the most important and frequent. An analysis of the literature demonstrates that here, again, gastroenterostomy has won for itself the position of the operation of choice. It has supplanted Loretta's divulsion, the Heineke-Mikulicz pyloroplasty and pylorotomy. The Loretta divulsion gave rather brilliant results, but they were but temporary, and such as we might expect; for just as a stricture of the urethra is temporarily relieved by the single passage of a sound and subsequent contraction occurs, so here the divulsion of the strictured pylorus was followed by relief of but short duration, and in almost all cases by subsequent recurrence. In the same way the Heineke-Mikulicz pyloroplasty has been largely discarded because in a considerable per cent. of the cases recurrence follows the rather brief relief of symptoms. The pylorotomy gives a larger mortality and not as good symptomatic cures as gastroenterostomy for benign obstruction of the pylorus, and is not to be employed except to meet some special indication.

*Hemorrhage.*—The second common complication of ulcer which demands sometimes surgical interference is hemorrhage. Hemorrhage, at the time of its occurrence, is to be treated medically by rest, both general and local, and the use of injections of normal salt solution and possibly combined with chlorid of calcium, with the idea that this may hasten the time of coagulation of the blood, which, in many of these patients, is distinctly slower than normal, and in this way aid in checking the bleeding. The shock present during and immediately following severe stomach hemorrhages is, as a rule, a clear contraindication against immediate operation, and clinical experience seems to show that the medical treatment offers the patient greater chances of recovery than surgical interference. However, a few surgeons advise immediate operation in severe hemorrhages. The choice of operative procedures lies between excision of the ulcer, ligation of the ulcer *en masse*, ligation of the bleeding vessel or vessels, cauterizing the ulcer and a gastroenterostomy. Of these, rather strange to relate, simple gastroenterostomy has given the best clinical results. The excision of the bleeding ulcer has given a high mortality. The ligation of the ulcer *en masse*, with the strengthening of the stomach walls at point of ulcer by Lembert suture, as advised by Andrews, seems a rational procedure, and one which has given fair results in the few cases in which it has been employed.

Rodman collected 13 gastroenterostomies for hemorrhage, with 3 deaths, or 23 per cent. mortality. The analysis of the reported cases would seem to favor the following procedure in cases of hemorrhage demanding an immediate operation: First, a gastrotomy utilized for locating and cauterizing the ulcer. As suggested by E. Wyllys Andrews, in *Annals of Surgery*, 1899, the greater part of the stomach can be passed in review be

fore the anterior gastrotomy incision by passing two fingers through the gastrocolic omentum and invaginating the stomach wall into the incision. Then the gastrotomy can be utilized in making a gastroenterostomy. In by far the greater number of cases of hemorrhage, inasmuch as Rodman's statistics show that but 8 per cent. of the cases which bleed die, the treatment of election would seem to be a gastroenterostomy, done in the interval between attacks, when the patient was free from shock. When done at this time, the operation gives very satisfactory results, both immediate and permanent, inasmuch as the gastroenterostomy is usually followed by the healing of the ulcer. Some of these patients suffer from profound secondary anemia. I have had one such case, where the hemoglobin find was but 19 per cent. In such cases a preliminary treatment by rest and rectal feeding, salt solution and iron and chlorid of calcium should be employed for three or four weeks, bringing, if possible, the hemoglobin find above 35 per cent. before operation.

*Repair of Perforation.*—The third complication of gastric ulcer which I shall discuss is that of perforation. This is a rare complication as compared with stenosis and hemorrhage. Finney has collected 268 cases in the literature which have been operated on; of these 139 recovered and 129 died, giving a mortality of 48 per cent., and of the 21 more recent cases 13 recovered and 8 died, a mortality of but 38 per cent. Tinker's statistics give a mortality of but 16 per cent. in the cases operated on early within twelve hours, and reported within the last three years. This must be regarded as a most brilliant showing, when we remember that without surgical relief perforating gastric ulcer gives a mortality approaching 100 per cent., and that practically we are entitled to regard each case recovering under surgical operation as a life saved by the procedure. The picture of perforation is, as a rule, one easily recognized, both by the competent internist and the competent surgeon, and if it is confusing, it is only to be mistaken with other serious lesions, such as acute pancreatitis and rupture of the bile tracts, which also call for immediate operation. A careful analysis of the facts demands an immediate exploratory operation in cases of suspected perforation of stomach ulcer. Frequently this can best be done under infiltration anesthesia. In the single case of stomach perforation on which I have operated I employed a general anesthetic, ether. I operated within five hours after perforation, and, in spite of the fact that the patient was in extreme shock and that the general peritoneal cavity contained at least a quart of stomach contents and peritoneal fluid, the patient made an uninterrupted recovery. The method of procedure will vary with the conditions found, but as a general proposition will consist of locating the perforation and closing the opening, without resection of the ulcer, with a double row of Lembert sutures, and then, if the condition of the patient warrants, a gastroenterostomy is made with the purpose of permanently curing the lesion. The escaped fluids are removed by irrigation of the peritoneal cavity with warm salt solution, and closure of the abdominal wall with, as a rule, provision for drainage down to the point of closure in the stomach wall, and often of the general peritoneal cavity. A discussion of the many complications of perforating gastric ulcer, such as perigastric abscess and subphrenic abscess, empyema, phlebitis, etc., would require more time than we have at our disposal. I would refer you to Mayo Robson's paper, read last year by invitation before the American Surgical Society, for a clear exposition of these subjects.

*Hour-Glass Contraction of the Stomach.*—*Gastroplasty.*—This condition may be congenital or the result of contraction following ulcer or other lesion. The condition is one usually not diagnosed before operation, as the symptoms resemble closely those of obstruction of the pylorus. I have operated on but one such case, and am rather inclined to believe that in that case I had to deal with a simple ulcer occurring in a case of congenital hour-glass stomach. Where hour-glass stomach produces symptoms warranting surgical interference, a gastroplasty or gastroanastomosis establishing a very free communication between the two stomach pouches, combined with gastroenterostomy, where we find evidences of obstruction of the pylorus also present, is the procedure indicated. Watson has collected from the literature 20 cases of congenital hour-glass stomach; 20 cases of hour-glass stomach of the acquired type not operated on, and 29 cases of hour-glass stomach submitted to operation. Of these, 3 were handled by a gastroenterostomy, no deaths; 17 gastroplasty, with 3 deaths; 6 cases, a gastroanastomosis, 1 death; inversion of ulcer, 1 case, 1 death; establishing gastric fistula, 1 case, 1 death. The gastroplasties referred to are practically made on the same principle as the operation of pyloroplasty, and the gastroanastomoses are practically lateral anastomoses between the two pouches. After a careful analysis of the reported cases, including his own, Watson concludes that gastroanastomosis should be the operation of choice.

#### OPERATION FOR WOUNDS AND RUPTURE.

Let us now turn to the surgery of perforating wounds of the stomach and subcutaneous rupture of the stomach.

*Perforating Wounds.*—Immediately following the experimental work of Charles T. Parkes, in 1884, and the work of Nicholas Senn, which shortly followed, surgeons generally accepted the dictum that all perforating stomach wounds should be immediately submitted to operative repair, and for some years little exception was taken to this opinion. An analysis of this subject, especially in view of the experience obtained by military surgeons in our late Spanish war and in the present South African war, has compelled us to adopt a somewhat different view of these cases. We were for a while working under the mistaken view that penetrating wounds of the stomach were so generally fatal that the cases recovering under operative procedures were to be regarded as cases saved. The Spanish and South African wars have shown conclusively the fallacy of this reasoning, because the perforating stomach wounds made by the modern military rifle, carrying a small-calibered bullet with great velocity, have not been very fatal; when left alone, the large majority of the cases recovered, but when operated on the large majority died. We can, therefore, no longer accept the dictum that penetrating wounds of the stomach must be immediately operated on. At least, this rule can not be applied to military practice. In civil practice, as a rule, bullet wounds of the stomach are made with revolver bullets, made of soft lead and of low velocity; these produce a more ragged wound with greater danger of leakage than the metal-jacketed, small-calibered, high velocity bullet of the modern military rifle, and from this fact most of the surgeons, who have studied closely the facts, still advise an immediate exploration in penetrating wounds occurring in civil practice. Personally, I am inclined to accept the same views, and yet we must admit that the treatment of penetrating wounds of the stomach can no longer be regarded as a closed chapter,

and that it is quite possible that a wider experience will limit still further operative treatment in these cases.

*Subcutaneous Rupture of the Stomach.*—This is a condition which calls for immediate operative repair, provided that the traumatism causing the rupture has not produced other serious lesions which make any interference hopeless. A few cases of rupture of the stomach from over-distention are reported, most of them found at postmortem; if diagnosed the indications for operation are, of course, imperative. A few cases of acute ulcer following trauma have been noted. Rupture of the stomach may be limited to one or more of the layers of the stomach walls, and occur without extravasation of the stomach contents. An interesting case of this kind was recently reported at the Chicago Surgical Society by Carl Beck, where, as a result of trauma, a cicatricial stenosis of the pylorus demanded a gastroenterostomy.

#### OPERATION FOR FOREIGN BODIES.

Lastly, perforations of the stomach may be caused by the passage of esophageal bougies, sword-swallowing, and from the accidental or intentional swallowing of knives, nails, screws, pieces of glass, etc., as has occurred in the insane and among the museum performers who make a business of swallowing such articles. In this same connection should be mentioned the operative removal of swallowed and retained foreign bodies which give rise to symptoms. My own experience has been limited to a single case of this kind, where a gastrotomy for the removal of a swallowed hat-pin was easily performed. It is in such cases that the *x*-ray can be employed with great advantage in making a diagnosis. In my own case I tried to convince the parents of a three-year-old child that it was impossible for the little patient to swallow a rigid steel hat-pin six and a half inches in length. The *x*-ray, however, showed the pin clearly, the head being in the stomach and the shaft in the esophagus. The experience with the Murphy button has taught us one interesting fact in regard to foreign bodies in the stomach, and that is that they may be tolerated for years without producing any injury or any symptoms. A large proportion, from one-fourth to one-half, of the Murphy buttons used in performing gastroenterostomy fall back into the stomach and remain there permanently; out of the now hundreds of cases in which this has occurred, very few have given rise to any disturbance or symptoms. In view of this fact we should hesitate to urge a gastrotomy for a foreign body, such as a tin whistle, or coin, or other body of smooth contour, which was not giving rise to symptoms. However, the operation of gastrotomy for the removal of a foreign body, where no complications exist, can be done with but slight risk to the patient.

#### THE OPERATIVE PROCEDURES DESCRIBED.

The technic of the operative procedures employed in stomach work has reached a stage of development which, although not perfect, is very satisfactory; so satisfactory, indeed, that the old great danger of this work, i. e., peritonitis, has been largely eliminated. Let us describe the purely surgical management of these cases under the following heads:

1. Preliminary preparation of the patient.
2. Question of anesthesia.
3. Operative technic.
4. After-treatment.
5. Complications.
6. Causes of death.

*Preparation of the Patient.*—The preliminary prep-

aration of the patient involves, in addition to that necessary for other laparotomies, two special points. First, the point already referred to, that many patients demanding stomach operations are the victims of severe secondary anemia, and in these cases, where the hemoglobin find is below 35 per cent., if there is any possibility of increasing it to this point, or above, by three or four weeks of iron feeding and rest, this should be done before attempting the operation. In cases of benign disease this is usually possible. In cases of malignant disease, such secondary anemia usually shows that the case is inoperable, and when it is still operable, such attempt to correct the secondary anemia means usually valuable time wasted.

The second point in preliminary preparation is most important, and it is the complete emptying of the stomach immediately before operation. This must never be omitted, if possible, and must be most thoroughly carried out by competent hands. I have lost one case on the operating table because this step in the preparation, although attempted, had not been successfully performed. While the patient was being anesthetized she vomited large quantities of material from a greatly distended stomach, and drowned herself in spite of every effort to resuscitate her. A number of similar cases are reported, and this must be regarded as a quite possible accident, and must be most carefully guarded against. In addition to the dangers of drowning, a considerable amount of fluid in the stomach at the time of operation adds to the difficulty of keeping the peritoneal cavity clean and to the dangers of peritonitis.

*The Question of Anesthesia.*—Shall we employ a general or a local anesthetic? For a time a number of surgeons were rather enthusiastic over the use of infiltration anesthesia in stomach surgery, and some still are. There can be no question but that it is fairly satisfactory, and can fairly claim a certain limited field for itself. However, the special reason advanced for its employment in stomach surgery has been shown by trial to be erroneous, i. e., that it would eliminate the occurrence of one of the chief causes of death after stomach operations—pneumonia. Surgeons were inclined to regard these pneumonias as aspiration, chloroform and ether pneumonias. A considerable trial with the local anesthetic has shown, however, that fully as many pneumonias develop after operations done with cocaine as after operations done under general anesthesia. This is certainly a very interesting fact, and leads one to the conclusion that these pneumonias are to be regarded as terminal infection pneumonias, made possible by the lowered resisting powers of the patient, and not to the use of a general anesthetic.

The operative technic can be fairly fully presented if we describe the technic of gastroenterostomy, pylorotomy, gastrostomy and gastrotomy.

*Technic of Gastroenterostomy.*—In gastroenterostomy the questions to be answered are, shall we use suture or button, and shall we make an anterior or posterior operation? I quite agree with Mayo, it does not make much difference, provided the operation is well done, whether we use button or suture, or whether we make an anterior or a posterior operation. My own preference, however, is an anterior operation with suture, and for these reasons: First, the anterior operation is the simpler and easier, and, as has been so well emphasized by Mayo, if we make the anastomosis at the lowest point of the anterior wall of the stomach, close to the greater curvature, the opening will be at about the same point as

a properly made posterior anastomosis, and will be at the lowest point of the stomach, thus securing the best drainage. I employ suture because, in spite of the fact that such excellent results have been obtained with the button, my analysis of the literature shows that now equally good results are being obtained with the suture. Again, in spite of the fact that a button retained in the stomach seldom gives rise to symptoms or complications, it nevertheless does sometimes do so, and as stated we know that from 25 to 50 per cent. are permanently retained. Again, the argument of saving time by the use of the button no longer carries very much weight, as with a little practice the anastomosis with suture can be made in about fifteen minutes. The argument that an anterior anastomosis is more apt to be complicated with the development of a "vicious circle" does not seem to be borne out by the comparison of cases of anterior anastomosis made at the lowest point with posterior anastomosis. In the early history of gastroenterostomy, when most of the cases were anterior operations, the mistake was made of making the anastomosis about midway between the lesser and greater curvatures, and as we might now expect a considerable number of cases develop vicious circle.

Taking all the facts into consideration, the simplest and best method of making a gastroenterostomy is to make the anastomosis between the lowest anterior point of the stomach and the jejunum, about eighteen to twenty inches from its beginning; unite three and a half inches of the bowel to the stomach; this prevents angulation and spur formation; make the opening one and a half to two inches in length; unite with two layers of continuous suture, the first layer including all the coats of the bowel, the second a continuous Lembert suture; silk, not too fine, seems preferable, although I can see no objection to using fine catgut for the Lembert suture. The two rows of simple continuous sutures, the first including all coats, the second a Lembert, to my mind, have solved the problem of all stomach and intestinal wound closure. Such continuous sutures are very easily applied; they effectually guard against leakage, and they bring all the layers into accurate approximation. The interrupted suture has no place in stomach work. It is difficult to employ it. It does not guard against leakage effectually, and, as often used, does not approximate the mucosa accurately, and the clinical results obtained are distinctly bad as compared with the results secured by the continuous suture. Whether an enteroanastomosis should be made is a question which has been answered in the affirmative by the Wölfler clinic. Personally, I have not employed it. Mayo says on this point: "In the future we will make an enteroanastomosis in every case in which gastroenterostomy is performed, if there is no obstruction to the pylorus." He comes to this conclusion from an analysis of his own cases, which showed that "vicious circle" developed only in those cases where the pylorus was not obstructed, and did not occur in any case of distinct obstruction. I am inclined to believe that his point is well taken, and shall give his advice a trial. The Y-shaped gastroenterostomy of Roux is anatomically the more perfect operation; it has, however, the great disadvantage of being long and tedious and is not therefore to be generally recommended.

*Technic of Pylorotomy.*—In making a pylorotomy we have practically the choice between the Kocher and the second Billroth method. I regard the second Billroth method as the operation of choice, because it enables us to remove the lesion as extensively as we may

desire, and is easy of performance. After ligating off the omentum above and below the pylorus to the desired extent the portion to be removed is included between clamps and the duodenum and stomach beyond are closed with clamps. The duodenum is closed by invagination with a purse-string suture, and the stomach closed with the double layer of continuous suture above described. The simple anterior gastroenterostomy is then made, completing the operation. The Kocher pylorotomy has given excellent results, but it can not well be employed where a great amount of stomach tissue is removed. In the Kocher operation the diseased pylorus and portions of duodenum and stomach are removed, the stomach wound closed by two rows of sutures and the duodenum approximated to the posterior wall of the stomach, making an end-to-side anastomosis.

*Technic of Gastrostomy.*—The gastrostomy of Frank, made by pulling up a nipple-like process of the stomach through an opening in the split rectus, suturing the base of the process to the peritoneum and sheath, and bringing the apex out through a small opening in the integument an inch removed from the original incision, gives excellent results, both from the standpoint of immediate mortality and from the standpoint of obtaining a fistula lined by epithelium, and one which will not leak. It is the operation of choice. In some cases, however, it can not be used, as the stomach is too small and contracted. Here either the Senn method or Witzel method of obtaining a competent fistula should be employed.

*Technic of Gastrotomy.*—Little need be said of the technic of gastrotomy, but I think that little of importance; it is simply the advice to use the double row of continuous sutures in the closure.

*After-Treatment.*—The after-treatment to be employed in all cases of stomach surgery, except gastrostomy, should be rest to the stomach, obtained by rectal feeding for, if possible, six or seven days. Four ounces of peptonized milk every four hours and twelve ounces of salt solution every four hours, alternating injections therefore every two hours. As a rule, these are well borne. If they are not, however, liquid diet in small quantities can be begun earlier. I am inclined to believe this is the safer plan, although some surgeons begin feeding as soon as they recover from the effects of the anesthetic. The recumbent position is to be maintained, as a rule, for twelve days. Some surgeons adopt a semi-recumbent position, with the idea that it will reduce the dangers of pneumonia. The point is well worth consideration. Mayo uses buried silk in closing the abdominal wound in malignant cases, and allows the patient to sit up within a day or two and leave the hospital within a week.

The most frequent causes of death in stomach surgery are pneumonia, vicious circle, peritonitis, perforation of carcinoma or ulcer, shock and drowning from vomited stomach contents. Our time will hardly permit an analysis of these conditions, an example of each of which has occurred in my own work. Let me here merely call attention to this surprising and interesting fact, that in clinics where stomach surgery is extensively practiced peritonitis is no longer the common cause of death, but is, in fact, an unusual accident. This fact shows clearly the high degree of efficiency against leakage reached by our present methods of closure of stomach and intestinal wounds.

#### CONCLUSION.

Permit me, in closing, to make a plea for a wider application of surgical procedures to lesions of the stom-

ach. Disappointing as is the surgery for malignant disease, yet it is to-day our only ray of hope in these cases. Certainly the surgery of benign lesions has given us brilliant results and accomplished much good. It is capable of doing much more good than it is doing to-day. In almost every community cases of ulcer of the stomach die from obstruction, perforation or hemorrhage, which could be saved by timely operative procedure. These cases are entitled to the benefits of modern surgery, and they can obtain it if the surgeon can convince the general practitioner of the possibilities for good in such radical treatment. These cases are on the borderland between medication and surgery, and the best results, the greatest good can be obtained only by the helpful co-operation of the surgeon and physician; not by indiscriminate operating, nor by protracted routine medical treatment, but by the judicious selection of the treatment required to cure the individual case.

ACUTE ARTICULAR RHEUMATISM.

THE STATISTICS OF A SERIES OF 270 CASES FROM THE SERVICE OF DR. OSLER IN THE JOHNS HOPKINS HOSPITAL.\*

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BALTIMORE.

The cases in this series are those of acute articular rheumatism which have been admitted to the medical service of the Johns Hopkins Hospital during a period of thirteen years (1889-1902). During this period the total medical admissions were 14,567, and of these 294 were for acute rheumatism, which equals practically 2 per cent. These 294 admissions represent 270 patients, some of them being admitted several times in different attacks. During the same period there were 54 cases diagnosed as subacute rheumatism, 39 as chronic rheumatism, 35 as gout, and 86 as arthritis deformans. The figures from the Montreal General Hospital have been sent me by Dr. Campbell Howard. In a period of 10 years (1891-1901) among 9,992 medical admissions there were 388 for acute articular rheumatism, which equals 3.8 per cent. During the same time there were 154 cases of subacute rheumatism. A comparison with the figures of some of the London hospitals is interesting. In St. Thomas' Hospital, during a period of ten years (1890-1899), there were 18,998 medical admissions, of which 997 were for acute rheumatism, which equals 5.2 per cent. In St. Bartholomew's Hospital, for a period of thirteen years (1888-1901), there were 31,085 medical admissions, of which 1,241 were for acute rheumatism, nearly 4 per cent. Church<sup>1</sup> gives figures for various London hospitals which give the proportion of acute rheumatism as being from 3.5 to 7 per cent. of the total admissions. There is probably little doubt that this disease occurs less frequently with us than it does in England. It may be said that in this series any doubtful case has been classified as subacute rheumatism.

INCIDENCE.

*Sex.*—Among the 270 cases there were 198 males and 72 females, a proportion of 2.7 to 1. This is almost exactly the proportion of males to females in the medical admissions.

*Color.*—There were 223 white and 47 colored, a ratio

of 4.8 to 1. The proportion in all admissions of white to colored is about 7 to 1.

*Age.*—The number of cases and percentage in each decade are as follows:

Age.	Cases.	Percent.	Age.	Cases.	Percent.
1-10	7	2.6	41-50	36	13
11-20	70	26	51-60	15	5
21-30	93	34	61-70	3	1
31-40	46	17			

It has to be kept in mind that we have a comparatively small number of children admitted to the wards. Nearly 20 per cent. of the patients were over 40 years of age. The oldest patient was aged 66 years.

*Occupation.*—Only 93, or 36 per cent., worked out of doors and were therefore usually exposed to weather. This group comprises laborers, drivers, stevedores, etc. Of the others, 25 per cent. of the total were engaged in house work, 11 per cent. were mechanics, carpenters, etc., 10 per cent. were attending school, 10 per cent. were barbers, tailors, etc., and only 8 per cent. were in the higher walks of life, merchants, etc.

*Time of Year.*—The incidence in the various months is as follows:

Month.	Cases.	Percent.	Month.	Cases.	Percent.
January	23	8.5	July	19	7
February	38	13.3	August	11	4
March	35	12.9	September	8	3
April	38	14	October	11	4
May	39	14.4	November	11	4
June	22	8	December	17	6

It will be noted that 55 per cent. of the cases occurred in the four months, February, March, April and May, and that three-quarters of the total number were in the first six months of the year. This is in direct contrast to the figures from the London hospitals, where, as Church points out, the maximum is in the autumn months, September, October and November. Prevalence in the spring months has been noted in Montreal by Howard.<sup>2</sup>

*Family History.*—A family history of rheumatism was given in 69 cases, which equals 25.5 per cent. It was about equal on the father's side, mother's side and in the immediate family. No special relationship between a family history of rheumatism and an especially severe attack could be made out. There was a family history of tuberculosis in 39 cases, which equals 14.5 per cent. Rheumatism and tuberculosis were associated in the family history in 12 cases. There was a family history of gout in 2 only. Of course, it is to be kept in mind that a family history of "rheumatism" might be more correctly termed one of arthritis. Other than true rheumatic arthritis is usually included by patients under the general heading of rheumatism.

*Previous History.*—This was practically negative in 66, or 25 per cent. There was a history of previous acute articular rheumatism in 121, or 45 per cent. Patients had tonsillitis previously in only 10 instances, which equals 3.7 per cent., and gave a history of chorea in only 7 instances, which equals 2.6 per cent. There was a previous history of both tonsillitis and chorea in only one instance. These figures appear to be rather small when we consider the generally accepted view that tonsillitis and chorea are so intimately associated with rheumatism. There was a previous history of lues in 12 cases. Fairly marked alcoholic history was given in a rather large number, nearly 39 per cent., all of whom had been moderate or heavy drinkers. It is of interest to note that a very much larger percentage of all our cases of gout gave a marked alcoholic history. The number of the attack with which the patient was first admitted is given as follows:

2. Howard: Pepper's System of Practical Medicine, vol. II.

\* Read at the Fifty-third Annual Meeting of the American Medical Association, in the Section on Practice of Medicine, and approved for publication by the Executive Committee: Drs. Frank A. Jones, George Dock and J. M. Anders.

1. Church: Allbutt's System of Medicine, vol. III.