

MAYO (W. J.)

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Observations Upon the Diagnosis  
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Based Upon Personal Experi-  
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*Reprint from the MEDICAL RECORD, June 11, 1898*

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NEW YORK

THE PUBLISHERS' PRINTING COMPANY

32, 34 LAFAYETTE PLACE

1898



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MAR. 19. 1908

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OBSERVATIONS UPON THE DIAGNOSIS AND  
SURGICAL TREATMENT OF CERTAIN DIS-  
EASES OF THE STOMACH, BASED UPON  
PERSONAL EXPERIENCE.<sup>1</sup>

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IN the short paper which I have the honor to present to you this evening I have avoided, as far as possible, reference to the labors of many workers in this field of surgery, especially those whose efforts in this direction have become a matter of history. This is not due to a lack of appreciation of the pioneers in gastric surgery, but rather to the wide extent of territory which I have attempted to cover. The cases which form the basis of this paper have been operated upon by myself and my brother, Dr. C. H. Mayo, with few exceptions in St. Mary's Hospital, Rochester, Minn. Our experience in this field comprises twenty-six cases in which the stomach itself has been the object of attack, and twenty-five operations made for the relief of marked gastric distress, caused either by adhesions between the stomach and the gall bladder, duodenum, or neighboring organs, or to adherent omentum in hernial pouches, or to ventral herniæ. This makes a rather natural division into two general classes:

1st. Those due to causes acting from within the stomach.

2d. Those due to causes acting outside the stomach itself.

<sup>1</sup> Read before the meeting of the Minneapolis Academy of Medicine, at Minneapolis, February 2, 1898.

There are a few facts in regard to the anatomy of the stomach which are of so much importance in its surgical relations that I take the liberty of referring to them. The blood supply is from three principal sources, and the various anastomoses are so complete as to resemble the palmar arch or the circle of Willis.

This enormous blood supply allows free incisions into the stomach walls or resections of any desired amount, and gives a certainty of well-nourished flaps. In this respect it vastly differs from the intestines, in which the utmost care as to nourishment of the bowel periphery is of such importance in dealing with the mesentery.

The smaller vessels lie along the surface of the mucous membrane, and this latter structure is very thick and easily separated from the outer coverings. Independent suture of the mucous coat, therefore, gives firmness and checks oozing.

The gastro-hepatic omentum anchors the stomach well under the ribs, and if this be divided first the pylorus and lesser curvature can be easily delivered and the fingers pass at once behind the stomach and pylorus into the lesser cavity of the peritoneum. In operations upon the living subject, and in a number of cadavers upon which I experimented, the value of this manœuvre was readily apparent.

Volumes have been written about the functions of the stomach, especially by the specialist in internal medicine, but to the surgeon at least the mechanical theories have the greatest attraction. From my standpoint, the stomach represents a combination of the hopper and the silo. The fundus can be compared to the magazine of a coal stove, making it self-feeding, while the great muscular power of the pyloric region, with the aid of a weak solution of pepsin and hydrochloric acid, softens the food masses and slowly passes them into the intestines for digestion and absorption. As Wendt points out, the stomach also absorbs fluids,

prevents intestinal overloading, and corrects the varying temperatures of the ingesta. The gastric juices, while not markedly antiseptic, are hostile to germ growth—a factor of considerable importance.

**Cancer of the Stomach.**—The differential diagnosis of cancer of the stomach, especially the obstructive type, may be difficult, and many an individual has perished because of this too ready opinion based upon insufficient evidence. The history in cancer of the stomach is of the greatest importance. The patients can usually fix a time in which the symptoms became marked; not a definite date, but a period within from one month to three months, in which, they will state, the disease became very noticeable, and from which time the symptoms had been more or less continuous. In cicatricial stenosis the history covers a longer period of time. The not infrequent malignant degeneration of former scars is confusing in this respect.

Vomiting is a symptom of some value. In pyloric obstruction it is usually infrequent, once or twice in twenty-four hours, and a large quantity of material is ejected. This is not materially different in character from the vomiting of cicatricial pyloric obstruction. The obstruction and resulting dilatation of the stomach are in either case easily demonstrated by filling the stomach with air through a stomach tube by the aid of an enema syringe. This procedure is one of great diagnostic value; it also aids in locating the pylorus.

In cancerous disease, even with only a moderate obstruction, vomiting is often met with, and, if the walls of the stomach are extensively infiltrated, vomiting may be both frequent and painful, resembling ulcer. Pain and emaciation are the rule, and I am always suspicious of a person of middle or later life who presents these symptoms, with a cachexia which, while not peculiar to cancer, differs from the pale, bloodless appearance frequently seen in ulcer. The presence of a tumor, while most often noted in cancer,

may be found in cicatricial contraction. I have several times felt masses of this character, which appeared prior to operation to be too well marked for any other disease than malignancy.

Examinations of test meals for the absence of hydrochloric acid and the presence of lactic acid have some diagnostic value. Dr. Christopher Graham has made a great many examinations of this description, and, as a whole, they have been fairly satisfactory; but the tests are of value only when corroborated by better testimony. The tests with iodides for stomach absorption and with salol as to the motor power are essentially laboratory tests and of no great aid in this class of cases.

The gastroscope and gastrodiaphanoscope are of little practical use.

Time will not permit me to refer to the many valuable diagnostic features of cancer of the stomach, and it must be left to the exploratory incision to clear up the doubtful cases if a radical cure is to be attempted.

In such explorations the enlargement covered with dilated veins is easily differentiated from the whitish scars of former ulceration, while the extent of the disease and adhesions to important viscera render the radical treatment more or less feasible.

We have made seven exploratory operations for supposed cancer of the stomach. In one case the tumor proved to be tuberculous omentum, and the patient was benefited by the exploration, as often happens in tuberculous peritonitis. Another case, thought at the time to be cancer, I now believe to have been a benign obstruction, too much attention being given to enlarged glands in the omenta. I have almost always found enlarged glands in pyloric obstruction, whether the disease was cancerous or not, due to chronic sepsis from the absorption of decomposing stomach contents, and, unless microscopical examination is made, such findings are of small value.

In five cases the cancer was inoperable. In one of these five hopeless cases great improvement followed, and the patient, who was a butcher, worked nearly a year at his trade before the growth again became active. Similar cases have been reported by Lawson Tait. J. William White has extensively investigated this and kindred phenomena, in which tumors had disappeared or greatly improved after such exploratory manipulations, and reference to his statistics will show a number of such cases. The relatively large number of such explorations is a confession of failures as to exact diagnosis, either as to the existing condition or as to the stage of the disease; but, as such an exploration is the only way an early diagnosis of the operable cases can be established, it is in my opinion fully justified.

Unfortunately, radical operation upon cancer of the stomach depends upon an early and often, without incision, an impossible diagnosis; as in cancer of the uterus, the large majority of cases will be seen at a time when the diagnosis is only too apparent and the prognosis equally so. I will not discuss the advisability of active interference in this otherwise hopeless malady. I can only say that for myself the results, the nature of the disease being considered, have been satisfactory.

For cancer we have made three gastro-enterostomies and three pylorotomies, one of the gastro-enterostomies proving fatal from broncho-pneumonia on the fourteenth day, due to the aspiration of material vomited into the throat during the manipulations. With the stomach partly out of the abdomen, the elevation gravitated the contents into the dependent œsophagus. This should have been avoided by raising the head and the upper œsophagus. The preliminary emptying and cleansing are often more apparent than real, and it is the rule in my experience that the stomach at the operation will be found containing a considerable quantity of mate-

rial, although emptied and washed through the tube immediately before operation.

The remaining patients upon whom gastro-enterostomy was performed lived for a year or more. One, under the care of Dr. R. C. Dugan, of Eyota, from a state of starvation, not only gained rapidly in flesh and strength, but labored on a farm for more than a year. The second, I was informed by his attending physician nearly a year afterward, was up to that time comfortable and about. In the three cases of pylorectomy all the patients recovered from the operation, and all are now in good condition, though sufficient time has not elapsed to speak of them as cured.

The method of pylorectomy we have followed has been so speedy and satisfactory that I would like to call your attention to it. The ease with which any desired amount of stomach can be excised is especially noticeable—in one case the upper suture angle lying behind the left costal arch in close proximity to the cardiac orifice and passing obliquely downward and to the right more than six inches in length, making a sort of shovel nose to the amputated end. I make no claim to originality, although I know of no method of equal simplicity, and in the cases referred to and also in a number of cadaver operations the details were readily carried out. The steps are as follows:

1st. A median incision above the umbilicus, and, if needed, a cross-cut of the rectus.

2d. Double ligation and division of the necessary amount of gastro-hepatic omentum; this allows the pylorus and lesser curvature to be delivered. The fingers are now in the lesser cavity of the peritoneum, and at once slip under the pylorus and act as a guide to the careful double ligation and division of the gastro-colic omentum attached to the malignant area.

3d. The diseased part is isolated by a piece of gauze drawn under it, and a pair of forceps are caught from each side, separating the diseased from the healthy



stomach and also preventing leakage from below. With a knife a circular cut is made completely around the healthy portion of the stomach to the mucous coat. The muscular and peritoneal coats are stripped back and a few bleeding points caught with forceps. The mucous coat is cut inch by inch and at once closed with a continuous catgut suture; this is cut short and the detached pylorus and tumor are covered and turned out of the way. A second continuous catgut suture of the muscular coat rolls in the mucous, while outside of this a good silk Lembert of the peritoneum and muscular coats protects and rolls in the two first rows of sutures.

4th. The end of the stomach is slipped to the right and the ends of the tied omenta are sutured to each other and to the suture line, not only making further protection, but also anchoring the stomach to the right and preventing undue traction upon the duodenum after it is fastened in place.

5th. The duodenum is cleanly amputated at a healthy point and buttoned with a Murphy button to the anterior lower wall of the stomach.

We have done this operation once in forty-five minutes, once in one hour and five minutes, and once in one hour and twenty-five minutes. I mean by this, from the time the operation was commenced until the dressings were in place, and in each case from four to six and one-half inches of stomach had been excised.

**Benign Obstruction.**—Time forbids remarks on the diagnosis of cicatricial stenosis of the pylorus, if, indeed, they are necessary after what has been said on malignant disease. Valve formation, either with or without scar contraction, I called attention to in papers read before the meeting of the American Medical Association in 1896 and again in 1897. It is undoubtedly a common condition and responsible for many cases of dilated stomach which have been thought to be due to chronic gastritis.

For cicatricial stenosis and valve formation we have made four pyloroplasties on three patients and five gastro-enterostomies. Of the pyloroplasties, two were followed by good results; one relapsed and after a second pyloroplasty eventually required a gastro-enterostomy.

In the last operation for pyloroplasty we made a very long incision, three or four inches in length, and, while it required careful suturing, the opening was of ample and permanent size.

The method of suture employed by Ochsner, of Chicago, and published in the *Journal of the American Medical Association* for October 16, 1897, can be commended in this operation.

Of the five cases of gastro-enterostomy for cicatricial stenosis, one proved fatal from aspiration pneumonia on the eleventh day (this patient was the one upon whom the two pyloroplasties had failed). The four remaining patients made fine and so far permanent recoveries, and I must say that, while I was prejudiced against the operation in this class of cases and was forced in each instance to do it by reason of extensive adhesions or great extent of scar tissue, the ultimate results have been uniformly good, and equally so with pyloroplasty which has been done in easier cases. All of our gastro-enterostomies have been button operations. The muscular walls of the stomach in cicatricial stenosis are always very thick, and, on account of the length of time the obstruction has existed, much more so than in cancerous disease. For this reason the walls of the stomach should be incised to the mucous coat before the button suture is put in, and only a small bit of these tissues included in the grasp of the button, to prevent it hanging too long in place. In all of our cases the jejunum was caught at its origin and a coil formed and united to the anterior wall of the stomach, after such fashion as would not cause traction or kinking; and in the eight gastro-enterostomies of all sorts

performed none of the cases had regurgitant vomiting.

The objection to the Murphy button that it may be retained in the stomach is legitimate, but as no cases have been reported in which such retention has caused harm, and experience has shown that the button may be passed at a very late date after the patient has been discharged as cured, the objections do not overcome its advantages in the way of speed, certainty of approximation, and permanency of opening. Two years ago I advised a kite-tail guide of silk to act as a tractor down the intestine; the value of this is uncertain.

Gastrostomy was performed three times for stomach feeding necessitated by œsophageal obstruction. One operation was by the Fenger method; this case required constant attention on account of leakage. The other two operations, done after the Witsel plan, gave ideal results, and I have not been convinced as to the superiority of the Frank operation, which Meyer and others recommend.

Gastrorrhaphy was done in one case of gunshot wound of the stomach eight hours after the injury, and the large wound of the anterior wall sutured; the case terminated in recovery. The patient was brought into St. Mary's Hospital by Drs. Way and Edgerton, of Claremont, as quickly as possible after the accident, and to their prompt action the good result was undoubtedly due.

**Causes of Stomach Distress Acting from without the Stomach.**—Cases of this description are very common and usually due to well-understood conditions, such as chronic appendicitis, intestinal adhesions, movable kidney, and similar ailments; but in these instances the resulting stomach disturbance is largely through the nervous system.

There are, however, a number of cases in which adhesions of the stomach or pylorus to a neighboring organ, hampering its free action, are sources of more or less disability, and the separation of these adhesive bands will relieve the difficulty.

Of these we have seen three marked instances—one due to an old, adherent gall bladder, without stones, although it had undoubtedly once contained them; one due to a duodenal ulcer, with a mass of adhesions binding the pylorus and limiting its calibre; in the third case I am unable to state the exact cause, but it was probably a recurrent regional peritonitis about a diseased gall bladder. This caption does not include the many instances of gall stones in which stomach symptoms were present.

Such results are also easily understood when the omentum has become adherent to a hernial sac and remains irreducible, causing a certain amount of dragging and interfering with the free action of the stomach. We have seen this happen three times in umbilical hernias, eight times in inguinal hernias, and three times in femoral hernias; and in each instance release of the adherent omentum and radical operation on the hernia gave complete and lasting relief to the gastric symptom. In these cases the patient came complaining of stomach trouble and not of the hernia. The list does not include cases in which the intention of the patient was merely to be rid of the annoyance of the hernia, and in which, as a part of the radical cure, the omentum was freed.

Just why the ventral hernia protrusion through little defects in the median line above the umbilicus should cause gastric distress, I am unable to state; but that such is the fact I feel sure, and recent surgical literature contains many reported cases.

In our earlier operations I believed that the protrusion was always omentum, but careful dissection has shown me that it is often preperitoneal fat, and the constant congestion causes it to become lipomatous—a condition exceedingly common about old femoral hernial sacs. In all these cases of ventral hernia a glove-like protrusion of peritoneum occupies the central part, and this may be empty, although I have seen

omentum and also a part of the fatty contents of the suspensory ligament of the liver in the sac. We have operated upon eight such herniæ, and the results have been very satisfactory.

In closing, I cannot do better than quote a passage from Mayo Robson: "Although difficult to lay down hard-and-fast rules, it is certainly wise, in cases of obscure gastric pain producing invalidism or debility, after medical treatment has been fully tried and failed, to open the abdomen in order to clear up the diagnosis and then adopt that line of treatment which seems indicated."





