

In order to deepen the renal fossa and at the same time to support and fasten the lower end of the kidney, raise a broad thin flap from the anterior surface of the quadratus lumborum muscle and suture it to the lower end of the kidney (Fig. 2). The two nerves, iliohypogastric and ilioinguinal, are guarded from injury. Close the wound in the usual manner and leave room for a small cigarette drain at the upper angle of the wound.

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ULCER OF THE DUODENUM,

WITH REPORT OF TWO HUNDRED AND SEVENTY-TWO OPERATIONS.*

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The surgical invasion of the upper abdominal region has gradually enabled us to replace theory with facts, and fallacious clinical observations have given way before actual demonstration of diseased conditions.

One of the most striking illustrations of this newer knowledge is the discovery that three-fifths of all gastric and duodenal ulcers are situated in the duodenum. Until within recent years gastric ulcer has been considered the chief lesion, while reference to a duodenal location has been infrequent.

In a paper read before the American Surgical Association, May, 1904, I was able to report 58 operations for duodenal ulcer, which at that time was 27 per cent. of all the ulcers of the stomach and duodenum on which we had operated.

Two years later, in a paper read before the Surgical Section of the British Medical Association, August, 1906, on "Duodenal Ulcers," our statistics showed about 40 per cent. of ulcers in the duodenum. Since that time more careful investigation places the proportion at above 60 per cent.

In 1906-7 the total number of gastric and duodenal ulcers operated on by us (C. H. and W. J. Mayo) was 193. Of these, 119, or 61.7 per cent., were duodenal, 60, or 31 per cent., gastric, and 14, or 7.3 per cent. of the patients had a separate ulcer on the stomach and on the duodenum.

This does not prove that duodenal ulcers are more frequent now than in the past, but rather that they have been confused with gastric ulcer. In other words, we have in the majority of instances been talking about gastric ulcer, writing about gastric ulcer, and treating patients for gastric ulcer, when the trouble was primarily in the duodenum and not in the stomach.

There are several reasons why the facts in regard to the relative frequency of gastric and duodenal ulcer have not been brought to light. Until of late our most important source of information was derived from post-mortem examinations, but such data are often misleading, since by the time the lesion had caused death terminal infections and secondary complications had so obscured the field that the situation of the ulcer could not be accurately determined and it was taken for granted that its location was in the stomach.

The greater number of patients with ulcer of the stomach and duodenum do not die from the disorder it-

self, but become a prey to intercurrent disease to which their underfeeding and consequent anemia renders them peculiarly liable.

In our earlier work even surgical exploration did not always reveal the truth, and often the location of the ulcer was not accurately established at the time of operation. This is accounted for by the fact that nearly all duodenal ulcers exist in the first inch and a half (ascending part) of the duodenum and more than one-half extend up to or within three-fourths of an inch of the pylorus, while 20 per cent. of them involve the margin of the stomach at the pyloric ring. Many duodenal ulcers, therefore, were formerly put down as pyloric and consequently classed with the gastric.

Differential diagnosis at the operating table between ulcers of the duodenum and those of the stomach near the pylorus may be difficult, but if careful search is made for the pyloric veins (Fig. 1), their exact location can be quickly detected.

Multiple ulcers of the stomach and duodenum are rare. In only 8.2 per cent. were there separate and distinct ulcers of each organ, although on the mucous membrane opposite an ulcer a second ulcer is often found at the point of contact, which we have, therefore, called the *contact ulcer*.

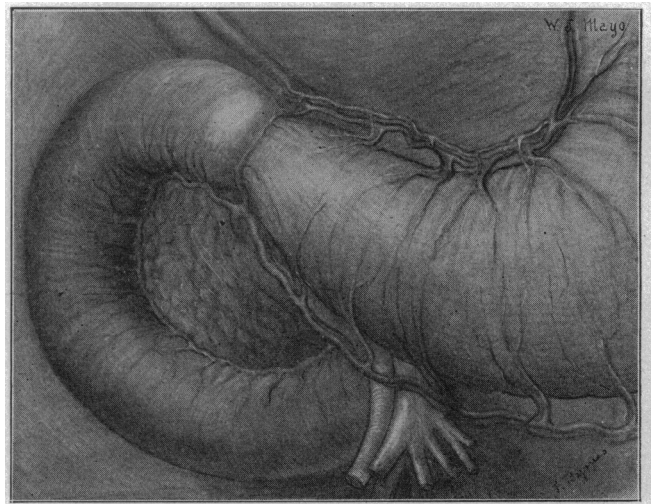


Fig. 1.—The anatomy of the duodenum with special reference (1) to the pyloric veins which accurately locate the pylorus; (2) note the light colored spot on the duodenum just below the pylorus, which may be mistaken for an ulcer when rendered anemic by traction; (3) crossing of the third portion of the duodenum by the superior mesenteric vessels.

The total number of operations for duodenal ulcer is 272, made on 261 patients. Of these 77 per cent. were males and 23 per cent. females. The preponderance of male over female is hard to explain and is somewhat greater in duodenal than of gastric ulcers.

During 1906-7 60 patients with gastric ulcers were operated on, of whom 36, or 61 per cent., were males, and 24, or 39 per cent., females. In this connection it is worthy of note that, while nearly four patients out of five with duodenal ulcer were men, the opposite was true in gallstone disease, in which more than four out of five patients were women.

A somewhat careful examination of the living subject leads us to believe that, so far as duodenal ulcer is concerned, mechanics may play a part. The first, or ascending, portion of the duodenum in man seems to ascend a little higher than the average first portion in woman; consequently the alkaline, biliary and pan-

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creatic secretions may rise higher and more readily neutralize the acid chyme in the first portion of the duodenum in women than in men.

In an early state of fetal existence the duodenum above the common duct is a part of the pyloric end of the stomach. Coming from the primitive foregut, it is associated with the stomach in its physiology and pathology and is not a part of the small intestine, which comes from the midgut. The embryonic stomach is rotated on its right side, and its original posterior wall becomes the greater curvature. The primitive anterior wall, which has become the lesser curvature, retains its normal shape, but a pouch is formed by an expansion or dilation of the primitive posterior wall (greater curvature), and this becomes the fundus or storage end of the stomach. The pyloric end retains its intestine-like appearance but develops a high muscular potentiality. The embryonic duodenum is rotated about the head of the pancreas and becomes more or less fixed by the loss of some of its posterior peritoneum in the lower portion. The duodenum is U-shaped, with its concavity directed toward the left and upward. Its outlet is within an inch and a half of its pyloric entrance. The large caliber-fixed position and trap-like shape of the duodenum make it an admirable mixing receptacle, and syphonage

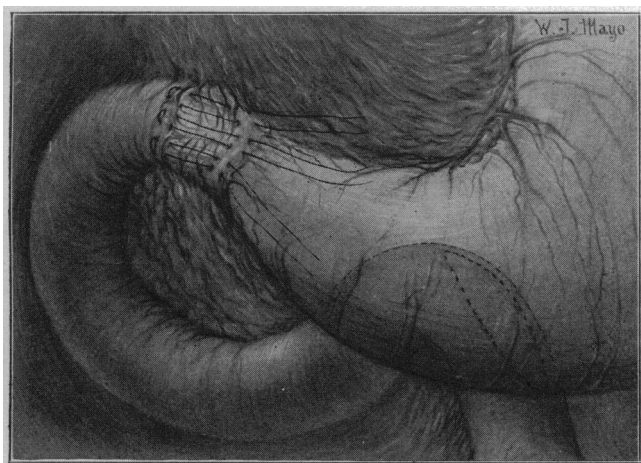


Fig. 2.—Ulcer of the duodenum with sutures in place for the purpose of enfolding. Posterior no-loop gastroenterostomy indicated.

plays almost as important a part as muscular action in emptying it.

In many animals the entrance to the pyloric end of the stomach is controlled by a true sphincter which does not exist in man, although physiologic contraction graphically marks its situation. The terminal three-fourths of an inch of the pyloric end of the stomach, the so-called "pyloric canal of Jónnesco," may be considered a part of the sphincter apparatus of the pylorus, serving as a passageway only. It is not subjected in the same manner to the traumatism and contact with acid gastric secretions which constitute so potent a factor in the production of ulcer both in the pyloric end of the stomach and the upper duodenum; therefore, primary ulcers in the pylorus and pyloric canal are rare.

Ninety per cent. of gastric ulcers are to be found in the pyloric end, which contains but one-sixth of the gastric mucosa, while the beginning of most duodenal ulcers will be detected at the point of impact where the acid chyme is forcibly ejected through the pylorus against the duodenal wall.

Physiologically the acid chyme in the pyloric end of the stomach stimulates the gastric motor and secretory functions. In the upper duodenum it controls the pyloric apparatus, and the rate of the gastric outflow is regulated by the rapidity with which this acidity is neutralized by the alkaline, biliary and pancreatic secretions.

Pathologically the acid stomach juices, either because of perverted secretion or through lack of local resistance, or both, become the most important factor in the development of ulcers, and largely confines their ravages to these two embryologically associated structures, the duodenum and the pyloric end of the stomach.

The first notable contribution to the subject of duodenal ulcer and its surgical treatment was the presidential address before the American Surgical Association in 1900 by Dr. Robert F. Weir. The total number of cases reported at that time was small, and nearly all of them were acute perforations into the free peritoneal cavity.

Perforation is comparatively common, but fortunately the contents of the duodenum are relatively sterile and small in amount, which favors plastic protection. In the 272 operations (up to June 1, 1908) perforation was found 66 times: 16 acute, with three deaths; 13 subacute, with abscess, no deaths, and 37 chronic protected, with one death.

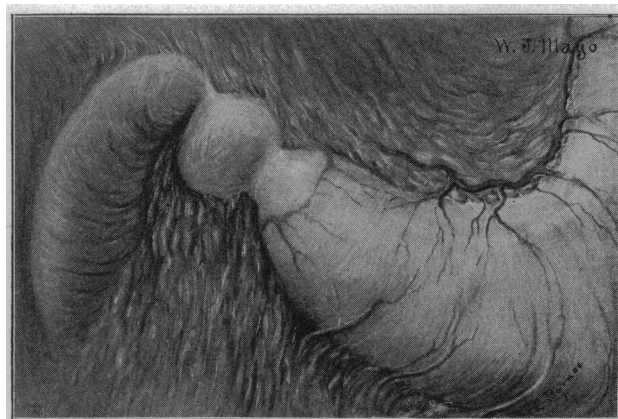


Fig. 3.—Hour-glass duodenum which was treated by excision with end-to-end union between the duodenum and the stomach.

Acute perforation of the duodenum is sometimes diagnosed as perforative appendicitis, and, as remarked by Codman, it is probable that a number of such acute perforations are not differentiated even at the operating table, and a careful examination of the appendix in some cases of septic peritonitis from supposed appendiceal perforation would show that its peritoneal surface only was involved and that the lesion was in the duodenum.

Out of 27 cases of acute perforation of the stomach and duodenum in which we have operated, 16 were duodenal. In 3 suture of the opening and gastrojejunostomy was done, in 13 suture without gastrojejunostomy, and of these only one required secondary gastrojejunostomy. In addition, 12 subacute perforations were walled off with encapsulation of infected material which had escaped from the perforation and caused a secondary abscess to form, such as described by Lund. All but one of the patients with acute and subacute perforations have remained well, the perforation having seemingly put an end to the disease. In this one exception, although the ulcer was healed, a second-

any obstruction rendered gastrojejunostomy necessary at a later period.

Acting on this observation, we have four times produced the condition of perforation by cutting out the crater of the ulcer and closing the defect by suture. The results have been good, but sufficient time has not elapsed to know if it will be permanent; but it is a much easier and safer operation than the excision of the entire indurated and cicatricial area about the ulcer which we have heretofore practiced. The extensive operation, however, would be indicated if there was any evidence of malignancy, which, as we have already pointed out, is less liable to take place in ulcer of the duodenum than in ulcer of the stomach.

Chronic protected perforation occurred 37 times. In the chronic form, unlike the acute form, incomplete perforations with adhesions protecting the base of the ulcer seemed to act as an aggravation to the condition, and recurring attacks of local peritonitis were the rule, often producing symptoms resembling those of gallstone disease, for which the manifestations were sometimes mistaken.

A marked peculiarity of duodenal ulcer is the periodicity of the attack, beginning as a rule in early adult life. The subject, usually a male, has an attack of stomach trouble, of which acidity is a prominent feature. This lasts a few days or weeks and is followed by an "almost well" periods of weeks or months. These symptoms recur with increasing frequency, the patient finding some relief from a restricted diet. In the later stages mechanical obstruction often appears. Hemorrhage occurs in about one-half of the cases.

A differential diagnosis between gastric and duodenal ulcer can usually be made. In duodenal ulcer the pain and tenderness, as a rule, extends from the mid-line to the right; aggravation induced by food comes on several hours after a meal, and the patients suffer from a peculiar "hunger pain" when fasting.

Unlike gastric ulcer, duodenal ulcer rarely undergoes carcinomatous degeneration. We have seen but four apparently primary carcinomas of the duodenum. In two of these the origin was uncertain, and in but one did it seem probable that the cancer had developed on ulcer. In five cases, however, we have known gastric cancer to develop on the edge of a duodenal ulcer which involved the stomach at the pyloric ring.

The surgical treatment of chronic duodenal ulcer will usually consist of gastrojejunostomy, preferably by the "no loop" method.

We have made 311 gastrojejunostomies for ulcer of the stomach and duodenum by this particular method, with a mortality of less than 1 per cent., and but three patients have required a secondary operation on the stomach or duodenum for any cause.

If the ulcer has caused hemorrhages we tie the blood vessels leading into it, and with sutures cover with sound tissue (Fig. 2). Should there appear to be any danger of perforation, the site of the ulcer is covered in the same manner as recommended by Mr. Moynihan, who calls attention to the possibility of secondary perforation.

In four cases we have excised the ulcer with direct union to the stomach. This did not prove a very satisfactory procedure, as in two of them we were compelled to do gastrojejunostomy later. In several of the cases, however, we were able to excise the ulcer and close by plastic repair after the Finney plan with good results.

In one case an obstructing ulcer of the duodenum an

inch and a half below the pylorus so angulated the duodenum on itself that it was comparatively easy to do duodeno-duodenostomy between the first and second portions of the duodenum. Figure 3 is from a drawing of an hour-glass duodenum, the result of ulcer, which was cured by resection with end-to-end union.

In this connection I wish to again call attention to Figure 1. The arrangement of the blood vessels of the duodenum just below the pylorus are such that if the pyloric end of the stomach is pulled upward rather firmly, as one must often do to obtain a view of the parts, an anemic spot will appear in the duodenum just below the pyloric ring. This appearance is at times very striking and may closely resemble an ulcer. On one or two occasions we were obliged to incise the duodenum at this point before we could be certain that no ulcer existed. The tissues apparently involved are normal to the feel and do not have the milky appearance of the peritoneum of true ulcer, and there are neither adhesions nor other abnormality. If the traction is taken off, it will be seen at once that no ulcer exists.

There has been much discussion as to the curative value of operation for ulcer. From our own experience we can say that the surgical treatment has been most satisfactory. The small esteem in which surgery of the stomach and duodenum is held by many professional men, and the bad results reported, have been largely due to mistakes in diagnosis and unnecessary operations performed where no ulcer existed.

We have, as far as possible, traced our patients with duodenal ulcers operated on in 1906-7. These two years were chosen because this choice eliminated some of the early operations in which the diagnosis was doubtful and the technic imperfect, and it prevented the inclusion of the recent cases that the shortness of time since operation would render valueless to statistics from the standpoint of cure.

Of the 119 patients operated on in 1906-7, we have information of 106. Of these 87, or 82 per cent., were cured; 10, or 9.5 per cent., improved; and 6, or 5.7 per cent., unimproved, making cured and improved 91.5 per cent. The operative mortality in the whole number of cases was 2.8 per cent.

THE DIAGNOSIS AT OPERATION BETWEEN CHRONIC ULCER AND CANCER OF THE STOMACH.*

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In my experience with gastric surgery, although not extensive, I have been confronted with difficulty in deciding in certain cases between the presence of benign and malignant disease, a decision so important and at the same time so difficult that the subject seemed to me worthy of consideration.

The past decade has been one of great activity in the surgery of the stomach. The work has been prosecuted with marked interest and zeal, and, on the whole, with commendable sanity and judgment. Nevertheless, it can not be denied that, as has been inevitable in any new department of surgical endeavor, we have had to feel our way by constant experiment and modification. Mistaken methods have been tried and found wanting; ex-

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