In fact, in addition to disinfecting the perineum, I always stitch up the anus tightly so as to prevent any escape of material from it during the course of the operation. Further, wherever it is possible I peel down the glands and ligature the bowel in two places, the ligatures being left long, and bring the rectum as far as possible outside the wound before the bowel is divided. This of course is not always possible, but in cases where the lower end has to be taken away the whole lower portion of the rectum can be brought out of the wound in the neighbourhood of the sacrum and dealt with outside, and thus the risk of infection of the wound is very much reduced. In addition to these procedures, I generally employ prophylactic injections of antistreptococcus serum. Although there are many other bacteria than streptococci which may enter the wound, still the chief destructive process, namely, the diffuse cellulitis which extends up in the hollow of the sacrum, and which is the chief cause of the fatal results, is essentially streptococcal in character. Since I have employed these injections I have seen very little of this severe form of cellulitis, but I must say that I have at the same time been dealing with the end of the gut in a different manner to that which I formerly employed, and it is quite possible that the chief success is due to that rather than to the serum.

As regards the method of dealing with the divided end of the bowel, the first point to be determined is whether the proximal end can be united to the distal portion or not. In a considerable number of cases, no doubt, one can unite the two ends; and I observe that Sir Charles Ball, in his recent lectures at the College of Surgeons, speaks of a large number of cases in which he has recently been able to do so; after what he has said, I feel sure that we shall try to bring down the upper end to the anus more frequently than we have done. As regards the method of uniting the ends of the bowel, I do not think that the ordinary end-to-end union, such as one employs in the intestine higher up, is a good procedure, and, as a matter of fact, if I cannot get the ends to overlap more than is necessary to have a single or double row of stitches at the point of junction, I prefer to make a sacral opening. My own experience of end-to-end union of the rectum, where there is tension on the upper portion, is that it is very apt to give way somewhere or other, and thus a severe cellulitis may result, while, if the patient recovers, the convalescence is very prolonged, and fistulae may be left which are very distressing to the patient. I believe that the best method is to draw the proximal end down into the interior of the distal end for at least $\frac{1}{2}$ in. to 1 in. Under such circumstances the mucous membrane is stripped off from the upper part of the distal end for a corresponding extent. The lower end of the proximal portion is then pulled into the tube, which is thus denuded of its mucous membrane, and secured there by stitches passing through the whole remaining thickness of the lower tube and the muscular coat of the upper. In some cases, indeed, the upper portion can be pulled right down to the anus, and the result is then practically perfect, and this should be aimed at as far as possible. In any case, by this procedure the chance of the occurrence of a fistulous opening is very much diminished, as is also that of infection of the wound.

On the other hand, where this procedure is not possible I believe a sacral opening is the proper procedure, but in doing that I do not stitch the open end of the bowel to the skin wound. Before the intestine is divided a double ligature is applied above and below the point of division, and the ligatures are left long. By means of the ligature the divided end of the bowel is kept outside or at the wound and covered by a piece of dressing, and the wound is then stitched up with silkworm gut, a drainage tube being inserted in front where the anus was. The skin around the point of exit of the rectum is then stitched to the muscular coat of the bowel as far above the divided end as possible, and the ligature is left on. In fact, if I can manage it I stitch up the wound and complete the operation before cutting off the lower end of the rectum with the tumour. In the first instance, the ligature of the bowel prevents infection of the wound from that source, and in some cases it does so for a sufficient length of time to allow the large wound to heal by first intention. No doubt gangrene at the seat of ligature commences pretty early, and then there is septic discharge in that situation, but by that time the deeper parts of the wound are often sufficiently sealed. The actual discharge of faeces does not occur in this method until the third or fourth day, when the ligature separates, and by that time the healing of the wound is usually safe. I must say that since I have adopted this plan

I have been extremely pleased with the results, and I have more than once obtained complete healing in from ten to fourteen days. As a rule, however, a certain amount of infection occurs in the immediate neighbourhood of the bowel, but it seldom extends to any depth.

The chief objection to this procedure is that by the ligature the escape of gas from the bowel is completely prevented, and some patients do suffer a good deal from flatulence. At the same time, I have not in any case found it necessary to divide the ligature in order to relieve the patient. That, however, is always a possibility. To meet this objection it may be advisable, especially in feeble patients, to remove the ligature at the time of the operation, after the bowel has been fixed to the margin of the wound and the wound stitched up, and introduce a small Paul's tube into the bowel and tie it in. Under these circumstances there is no trouble with flatulence; but in one instance, which I operated on recently, where I used a fair-sized Paul's tube, it apparently pressed too much on the lower end of the rectum, and led to sloughing and failure of union. I think this plan should be reserved for exceptional cases, and that in most instances retention of the ligature is best.

As regards the subsequent functional result, I think that in cases of sacral anus benefit is derived from Gersuny's suggestion of giving the bowel a half or three-quarter turn before bringing it out, and I always follow that plan now. In one of my cases, where about six years have now elapsed since the operation, the patient, who at first wore an apparatus, has now discarded it, and goes about even without a pad, and he has no trouble from the artificial anus. That, however, is quite an exceptional condition.

THE SURGERY OF THE SIMPLE DISEASES OF THE STOMACH.

By B. G. A. MOYNIHAN, M.S., F.R.C.S.,

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[AFTER thanking the members of the American Surgical Association for the invitation to present a paper at the meeting, Mr. Moynihan discussed the subject of the surgery of the simple diseases of the stomach under the following headings:

1. Perforation of gastric or duodenal ulcers.
2. Haemorrhage from gastric or duodenal ulcers.
3. Chronic ulcer; its various clinical types.
4. Hour-glass stomach.

1. PERFORATION.

The experience derived from 12 operations for perforation, of which six were successful was briefly related.

He then proceeded as follows:]

2. HAEMORRHAGE.

The bleeding from gastric or duodenal ulcers is recognizable either as haematemesis or melaena. In lesser degree these symptoms are seen not infrequently; in their severer forms they are of dire significance, and may be the sole cause of the patient's death. It is but rarely that the surgeon is called upon for so momentous a judgement as is necessary in cases of severe haematemesis or severe melaena. For the condition of the patient is poor, even, at times, desperate. Operative intervention is therefore hazardous, yet a continued bleeding will inevitably end in death.

It is necessary at the outset to emphasize the fact, a fact frequently ignored, that haemorrhage may manifest itself under entirely different circumstances in different patients. In some it is the earliest and for a time the only, symptom of gastric disturbance; in others, it is the last expression in a long and tedious course of symptoms. In other words the haemorrhage may occur from an acute or from a chronic ulcer of the stomach or duodenum. It will be found when the clinical history of a series of cases is examined that whereas in the latter the bleeding varies within the widest limits both as regards quantity and frequency, in the former the clinical history is repeated in case after case in a most remarkable manner.

Haemorrhage from an Acute Ulcer.

Under the term "acute ulcer" of the stomach are probably included several varieties of pathological conditions which are different in causation, different in destiny, but alike in the

single fact that their clinical recognition is due to the bleeding which occurs from them in abundant quantity. There is the ordinary peptic ulcer, there is the minute erosion barely recognizable even on close scrutiny, which yet opens up a vessel, and there are "weeping patches" and "villous areas" and similar indeterminate conditions which have been recognized when the stomach has been explored during life. To the clinician all these conditions are betrayed by their tendency to haemorrhage.

In almost every instance the haemorrhage is the first symptom. Even on close inquiry it is difficult to elicit any history of antecedent gastric discomforts. The vomiting of blood comes unexpectedly and suddenly, a large quantity of blood is lost, and the patient suffers, often in an extreme degree, from the symptoms of haemorrhage; the pulse becomes feeble and fluttering, the face waxen, the breathing rapid and shallow, the body surface cold or clammy. For a time the symptoms may give rise to serious alarm, but a rally is seldom long delayed. The bleeding is checked spontaneously and vomiting is rarely repeated, or if repeated the quantity of blood lost is but small.

In several of my cases a sudden, apparently causeless, haemorrhage has ushered in a long train of symptoms of dyspepsia. The acute ulcer has been the precursor, or rather the earliest stage, of a chronic ulcer.

The characteristics of haemorrhage from an acute gastric ulcer are, therefore, spontaneity, abruptness of onset, the rapid loss of a large quantity of blood, the marked tendency to spontaneous cessation, the infrequency of a repetition of the haemorrhage in anything but trivial quantity, and the transience of the resulting anaemia.

Haemorrhage from a Chronic Ulcer.

The bleeding from a chronic ulcer of the stomach or duodenum may vary within the widest limits both of frequency and of quantity. For convenience of description I should arrange the cases in four groups.

1. In the first the haemorrhages are latent or concealed. The blood is small in quantity, and may be recognized only after minute examination of the stomach contents or of the faeces. The estimates given by various writers as to the occurrence of haemorrhage in ulcer vary between 20 and 80 per cent., and we are entitled to assume that this wide divergence of statement is due not so much to differences in the symptoms of ulcer, but rather to the varying degrees of closeness with which the cases are observed, and to differences in the frequency and minuteness of examinations of the stomach contents or the faeces. It would probably not be rash to assume that all ulcers of the stomach or duodenum bleed at some time or other, but if the bleeding be trivial and infrequently repeated, it is never likely to obtain clinical recognition.

2. In the second group those cases should be included which are characterized by intermittent haemorrhage. The bleeding is copious, but transient, and occurs at intervals of two, three, or more months. An exemplary instance of this class is the following:

A. S., female, aged 28. In May, 1898, the patient had a sudden attack of profuse bleeding from the stomach. She was in bed six weeks. For 18 months after this her health was very poor, indigestion was constant, vomiting was occasional. Constipation was invariable. For six months she was then in fairly good health, and was able to take food much better. In April, 1900, indigestion became severe and a copious haemorrhage again occurred. Treatment was continued for six months with much benefit. In January, 1902, she had a third attack of haematemesis and fainting. After this she was kept in bed for four weeks. In September, 1902, again haematemesis was as severe as before. From then to January, 1903, she was under constant treatment, but improvement was very slow. Anaemia has been a prominent symptom since April, 1900. At the operation a large ulcer was found in the stomach and a second in the duodenum. Gastro-enterostomy was successfully performed.

In all the cases in this group indigestion is a prominent symptom. The haemorrhage often occurs without cause, but at times there may have been noticed an exacerbation of gastric discomfort and uneasiness for a few days. Anaemia is almost constant.

3. In the third group the cases are characterized by haemorrhages which are rapidly repeated and on all occasions abundant. In the majority of patients the symptoms of indigestion which have been noticed for months or years before have undergone an appreciable increase in the recent days. Then suddenly the haemorrhage occurs, a large quantity, a pint or a pint and a-half, of blood is vomited. The patient may faint from loss of blood; he shows, always, the general symptoms of bleeding. For twelve or twenty-four hours the

vomiting ceases, to reappear at the end of this time, without apparent cause and in equal or greater quantity. A second latent period is followed by a further haemorrhage, and so the patient becomes in a condition of the gravest peril.

No better example of this class could be cited than the following:

M. W., female, aged 24. Has suffered from symptoms of gastric ulcer, pain, vomiting, and inability to take solid food for fifteen months. Eleven months before admission to hospital all her symptoms became worse. Vomiting became frequent; pain was almost intolerable. During the five weeks before admission she vomited daily, and on almost all occasions some blood came. While waiting in the hospital she vomited three times in five days, and on each occasion about half a pint of blood came. She was very blanched; pulse 112. The motions were tarry on two occasions. At the operation two old scars and one showing recent inflammation were seen. Gastro-enterostomy led to perfect recovery.

4. The fourth group would comprise those cases in which the haemorrhage occurs in enormous quantity, inundating the patient and leading to almost instant death. The opening of the splenic artery, the aorta, the vena cava, or the pancreaticoduodenal vessels allows of the so rapid escape of blood that the patient dies as surely and as swiftly as if his carotid or femoral vessels were divided. Such cases fortunately are rare. In my own experience only one such example has occurred, a large oval opening being then found in the splenic artery.

If then we accept the classification of cases of haemorrhage from gastric or duodenal ulcer into the four groups suggested we may define their characteristics as follows:

1. The haemorrhage is latent or concealed, is always trivial and often conspicuous.

2. The haemorrhage is intermittent, but in moderate quantity occurring spontaneously and with apparent caprice at infrequent intervals. The life of the patient is never in jeopardy from loss of blood though anaemia is a persisting symptom.

3. The haemorrhage occurs generally, but not always, after a warning exacerbation of chronic symptoms. It is rapidly repeated, is always abundant, its persistence and excess cause grave peril, and will if unchecked be the determining cause of the patient's death.

4. The haemorrhage is instant, overwhelming and lethal.

The Treatment of Haemorrhage.

A. *From an Acute Ulcer.*—If what has been said of the characteristics of haemorrhage from an acute ulcer prove to be true it is clear that the aid of the surgeon will rarely need to be invoked. Medical means alone will suffice in almost every instance to ensure the recovery of the patient. Though the haemorrhage is alarming from its suddenness and intensity it may confidently be predicted that, in the majority of cases, it will not recur; or that if it recur the quantity lost will almost certainly be small.

There are, however, a few cases in which the haemorrhage may be both copious and recurring, and may threaten the life of the patient. Under such circumstances an operation may be required. An examination of the recorded cases has convinced me that wherever surgical treatment is deemed advisable gastro-enterostomy speedily performed will prove the surest means of leading to the arrest of the bleeding. In not a few records one reads that the whole surface of the mucosa seemed to be "weeping blood," that multiple points of oozing appeared scattered irregularly over the stomach wall, or that a definite source of the blood—any point from which the blood chiefly ran—could not be ascertained. The surgeon has then fallen back upon styptics, or the cautery, or the ligaturing of a villous patch in mass. It is difficult to convince one's self that any of these procedures have had the smallest effect for good, and in some the bleeding has recurred after the operation, and has determined the fatal issue. A search for a bleeding point is futile, harmful, and, in my judgement, quite unnecessary. The performance of gastro-enterostomy will prove more effective than any other procedure both in checking the haemorrhage and in preventing its recurrence.

B. *From a Chronic Ulcer.*—It is mainly in regard to the cases included in Group 3 of the classification given above that the question of surgical treatment will arise. If we picture to ourselves the pathological conditions present in such a case, it will be seen that, though the bleeding may be spontaneously checked for a time, it will show a marked tendency to recur. The base of the ulcer is, as a rule, densely hard, and the vessel traverses it like a rigid pipe. The vessel is eaten into, as it were, by the ulcer, which

erodes one side, leaving a ragged hole. Owing to the stiffening by chronic inflammatory deposit the artery is unable to contract or retract, and the bleeding can therefore only be checked by the plugging of the opening by a thrombus. That such a plugging does occur there can be no doubt, for in one case I have seen it during life; on gently detaching the clot, the bleeding began at once with furious onset. The tendency, indeed, even in a chronic ulcer such as I have depicted, must be to spontaneous cessation, for in no other way can the stopping and recurrence of bleeding constantly seen be explained.

There is some condition, as yet uncertain, which is responsible for the detaching of the plug. This condition, I venture to think, is distension of the stomach, whereby the base of the ulcer is stretched and the clot disturbed. For my record of cases shows indisputably that a gastro-enterostomy performed upon a patient suffering from this form of bleeding suffices to check the tendency to further haemorrhage and permits of the speedy healing of the ulcer. In all patients so suffering a prolonged search for the ulcer in the stomach is injudicious, and the ulcer when found may, as the result of firm fusion with an adjacent structure, be irremovable. In two cases I have excised the ulcer. In the first the ulcer was on the posterior surface of the stomach, and to the opening left by its removal I anastomosed a loop of the jejunum; in the second the ulcer lay on the anterior surface, near the lesser curvature towards the cardia. In this I did not perform gastro-enterostomy. In all the other cases that I have operated upon I have not attempted to deal directly with the ulcer, but have hastened to perform gastro-enterostomy. Of all the patients, the one upon whom I did not perform a gastro-enterostomy was the only one I lost; the others recovered speedily and without further sign of haemorrhage.

In some cases an examination of the stomach may reveal two chronic ulcers, or more, from each one of which the blood may be coming. To deal with each would be inadvisable or impossible. Cases, moreover, are recorded in which after an ulcer had been incised or ligatured in mass, the bleeding had recurred and proved fatal.

In all cases, therefore, of haemorrhage from a chronic ulcer an operation ought to be performed at the earliest possible moment. Search for, and local treatment of, the ulcer or ulcers are not necessary. A gastro-enterostomy will, without doubt, prevent a recurrence of haemorrhage and lead to a rapid healing of the ulcer from which the blood has come.

3. CHRONIC ULCER.

Chronic ulcer of the stomach may present itself clinically in a great diversity of form. In some the onset is brusque, a copious haemorrhage from an acute ulcer being the first manifestation of gastric disease; after the lapse of a few days or weeks, however, gastralgia, vomiting, and other symptoms appear and the chronic ulcer is established. In others the onset is latent and the early symptoms subdued. A patient may say that for several months a trivial, vague uneasiness has been experienced, that would have been forgotten but for the later accession of severer symptoms. In still others the course of the disease may present very remarkable intermissions. For several weeks the symptoms may be most marked and disabling, haemorrhage may occur on one or more occasions, but gradually an improvement is observed, and after a time all the distress may rapidly subside, leaving the patient in good health. The appetite may be restored, and the body-weight may increase by a stone or even more. After a few months' interval a recurrence of the symptoms is observed, all the details of the former illness are repeated and fresh haemorrhage may occur. And so the history may be repeated. In these circumstances the symptoms are due, perhaps, to the breaking-down in the scar of a solitary ulcer, or to the fresh outbreak of ulcerated patches in other parts of the organ; of the two possibilities the former is certainly the more frequent. It is not necessary to describe several different varieties of chronic ulcer as is often done; it is probably more correct to say that chronic ulcer may present symptoms of different character in individuals, or in the same individual under differing conditions. Thus an ulcer which is latent in onset may give rise to haematemesis and may become latent again, and so the recurrence may continue for prolonged periods. If the illness caused by chronic ulceration persists for several years the patient may be reduced to the very extremity of weakness. His disease may then show close resemblance to pernicious anaemia or to advanced malignant disease of the stomach.

I have no doubt that many patients who have died from supposed malignant disease of the stomach have suffered from nothing but chronic ulceration. The induration which a persisting ulceration may cause is remarkable both for its extent and for its extraordinary mimicry of the appearances of malignant disease. In some of my own cases, and especially in one case of hour-glass stomach, the mass of inflammatory tissue was, with the knowledge I then possessed, absolutely indistinguishable by inspection and palpation from a malignant growth. Recently, however, I have in doubtful cases been able, I think, to distinguish chronic inflammatory masses by their perfect smoothness of surface. A malignant growth is always irregular, knotted, nodular, or "gritty" on the surface; an inflammatory mass is more smoothly rounded off, and there is often a milky opacity of the peritoneum. The frequency with which carcinoma will develop in chronic ulcer is now generally acknowledged. Hauser estimates the frequency at 6 per cent., a proportion which seems to me to be in excess of the truth. In my own experience only one case has been recognized.

The pathological conditions caused by chronic ulceration in the stomach are of great variety. When marked cicatricial contraction occurs the viscus is narrowed at the site of the ulcer, and an hour-glass stomach, or a trifold stomach, or a dilated stomach due to pyloric or duodenal stenosis results. If the ulcer slowly deepens a perigastritis is produced, and the stomach may become ankylosed to the abdominal wall, or the pancreas, or the liver, or any other neighbouring structure. In all these conditions, and in others where no warping of the stomach can be found, an inveterate dyspepsia is a common symptom.

It has been the immemorial custom to look upon dyspepsia as due, chiefly if not solely, to deficiency in the quantity or quality of the gastric juice, to some lack of adequate power in the stomach as a secreting organ. But dyspepsia of the intractable, constantly-recurring form is more often a matter of physics than of chemistry. In several cases, as my records will show, I have operated for no other symptom than intolerable dyspepsia, when no diagnosis of pyloric obstruction, hour-glass stomach, or other mechanical deviation from the normal could be made. Yet at the operation abundant proof has been obtained that there was obvious distortion, or puckering or adhesion at one part or another of the organ; and that the stomach was crippled in the freedom of its action by these after-effects of ulceration. One observation I have repeatedly made in operating upon cases of chronic gastric and duodenal ulcers is that such ulcers are often multiple. If a well-marked ulcer is found at, say, the pyloric end of the stomach on the anterior surface, a second ulcer may be found, perhaps at an exactly opposing point in the posterior surface, perhaps elsewhere in the stomach. Chronic gastric ulcers are in my experience rarely solitary.

My own records of cases show that a duodenal ulcer very seldom exists without unmistakable evidence of gastric ulcer. Clinical observers have long appreciated the difficulty in the discrimination of gastric from duodenal ulcers. The differentiation, however, is of little moment, for if a duodenal ulcer is present we may be almost certain that a gastric ulcer will also be found. It is indeed not unlikely that the duodenal ulcer is secondary to, and directly caused by, the gastric ulcer. For there are reasons, which need not be repeated, which go to prove that duodenal ulcer is due to the action of the gastric juice on the mucous membrane. The ulcers are formed most frequently at the very beginning of the duodenum, and the further the distance from the pylorus the less likely is an ulcer to be present. May it not be that the digestion of the duodenal mucous membrane is accomplished only, or at the least most easily, when there is an excess of free hydrochloric acid? And this condition of hyperchlorhydria is a common if not a constant factor at some stage in the history of a gastric ulcer. The sequence of events would then be gastric ulcer, hyperchlorhydria, duodenal ulcer. The sensitiveness, as it were, of the duodenal mucosa to acid contact is shown by the fact, demonstrated by Pawlow, that the pylorus does not relax to allow of the passage of food until the duodenal contents are alkaline in reaction. Vomiting is an inconstant symptom of chronic ulcer. In the typical case of dilated stomach the vomiting is copious in quantity, and occurs at intervals of two or three or more days. The stomach fills slowly till its capacity is exhausted, and then an outburst of vomiting empties away the stagnant fluids. In cases of chronic ulcer without dilatation the patient may be rarely troubled with vomiting. On inquiry it will be found that the

abeyance of this symptom is due to self-imposed restrictions in the diet. Indulgence in food will often elicit the latent symptom. In one of my earliest and worst cases of hour-glass stomach, the patient, who was in bed and under observation in the hospital for over a week, never vomited, yet the constriction between the two pouches would barely admit the end of a pair of pressure forceps.

The indications for operation in chronic ulcer of the stomach are of widely different character. When the ulcer is near the pylorus a dilated stomach will probably be the chief clinical sign; when the ulcer is in the body an hour-glass stomach may be caused; when the ulcer is nearer the cardiac end gastralgia and dyspepsia may be the only indications.

I feel sure that, speaking generally, the time of the onset of pain after food is some guide to the position of an ulcer. The nearer an ulcer lies to the pylorus the later will be the period of onset of the pain, and vice versa. Some of the seeming exceptions to this rule are due to the fact, which is commonly overlooked, that multiple ulcer of the stomach and duodenum is the rule. For example, a patient who makes constant complaint of pain within half an hour of food may be found at the operation to have a stenosed pyloric antrum due to ulcer. Yet on examination a second ulcer may be found within 3 or 4 in. of the cardiac orifice, and may at first glance be overlooked. Of such a case I have had personal experience.

The evidences of old ulceration in the stomach are at times difficult to discover. A thin fibrous adhesion, a little crumpling of the surface, or a whitish blot on the serous coat, may be all that is left of a patch of ulceration. When the stomach is pinched up between the fingers a little local thickening may be felt, or the mucous membrane may not, as it should, roll away from the muscular coat on gentle pressure. If in performing gastro-enterostomy the needle has to be passed through the stomach wall at the margin of an old ulcer, the different and greatly increased resistance to its passage is ample evidence of the change that has taken place. Inveterate dyspepsia is in itself an ample warrant for surgical treatment. Cases are within the experience of all in which prolonged medical treatment, most thoroughly and carefully supervised, proves ineffective, or, if temporarily beneficial, is powerless to ward off the recurrence of dyspepsia. In such cases, be the physical signs what they may, an operation is desirable, and in my experience abundant justification for it will almost always be found when the stomach comes to be examined.

[Details were then given of the operative treatment and a full account of the operation of gastro-enterostomy.]

4. HOUR-GLASS STOMACH.

By hour-glass stomach (bilocular stomach, hour-glass contraction of the stomach) is understood that condition in which the stomach is divided into two compartments by the narrowing of the viscus at or near its centre. The two loculi so formed may be almost equal in size, or one—generally the cardiac pouch—may be very much larger than the other. In one instance (Case XIV) I have seen the stomach divided into three pouches, and in another (Case XV) a condition of hour-glass duodenum was associated with hour-glass stomach, so that four pouches—two larger in the stomach, two smaller in the duodenum—were seen. The isthmus connecting the two parts of the stomach is generally found at or near the middle of the viscus, but owing to stasis of the food the cardiac complement becomes dilated, and is then much larger, thicker, and more capacious than the pyloric. The pyloric pouch is, however, not seldom dilated also, and in such circumstances a pyloric or duodenal stenosis will also be found.

Pathogeny.

Hour-glass stomach is usually described as being "congenital" and "acquired." Of these forms, the congenital is said to be the more frequent.

I have carefully considered the question as to the existence of hour-glass stomach as a congenital deformity, examining all the specimens that I could find, and reading carefully the records of, I believe, all the published cases; but I remain confident in my belief, expressed in a paper in the *Lancet* two years ago, that there is no evidence whatever which will establish the claim of those who assert that the disease is often congenital in origin. Since I first threw doubts upon the congenital origin of many of the cases of hour-glass stomach, and showed that in almost all obvious evidence of old ulceration could be found, several investigators have supported my conclusion by observations made during the course

of operation or on necropsy. There is, indeed, no inherent improbability in the existence of congenital hour-glass stomach, but it lacks proof.

Acquired hour-glass stomach may be caused by (1) perigastric adhesions; (2) ulcer, with local perforation and anchoring to the anterior abdominal wall; (3) chronic ulcer generally at or near the middle of the organ; (4) malignant disease.

1. Perigastric adhesions may result from many causes—gastric ulcer, old tuberculous peritonitis, inflammatory affections of the gall bladder, and so forth. In rare instances these adhesions may be the sole cause of the partition of the stomach; in many they are no more than contributing causes. They were well seen in a case related by Cumston.

2. Ulcer, with local perforation and anchoring of the stomach to the anterior abdominal wall; this was the condition I found in my first case. It results from gradual deepening of a chronic ulcer. As the ulcer approaches the serous coat of the stomach a few adhesions form, binding the viscus to the anterior abdominal wall, and preventing the bursting of the ulcer into the general peritoneal cavity. If the ulcer be on the posterior surface, a soldering to the pancreas may result, as in one case I have recently seen. When the stomach is anchored in its middle, the pouches on each side, but more especially on the cardiac side, show a tendency to sagging, and this, with the cicatricial contraction taking place in the ulcer, results in the hour-glass form of the stomach.

In four recorded cases an ulcer at the isthmus of an hour-glass stomach has perforated into the peritoneum and caused death. The first case was related by Siewers, the second by my friend Mr. W. H. Brown, the third by Thomsen, and the fourth by Bidwell.

3. Chronic ulcer. A chronic ulcer of the stomach is characterized by the thickness and induration at its base. In the healing of such an ulcer, especially if large in size or circular, a considerable amount of contraction will necessarily take place and a high degree of narrowing may result.

Symptoms of Hour-glass Stomach.

An hour-glass stomach can be diagnosed with certainty if attention be paid to a certain combination of symptoms. In my first 6 cases only 1 was diagnosed; in my last 9 cases, 7 were diagnosed with certainty; in one of these the diagnosis was made by the medical attendant, Dr. M'Gregor Young, before I was asked by him to see the patient. The symptoms will naturally vary according to the position of the constriction in the stomach; if this lies near the cardiac orifice, the clinical picture will resemble that given by oesophageal obstruction low down; if near the pyloric orifice, the symptoms are those of dilated stomach. But, wherever the narrowing may be, attention to the following signs will, in almost every case, enable a diagnosis to be made with confidence.

1. If the stomach tube be passed, and the stomach washed out with a known quantity of fluid, the loss of a certain quantity will be observed when the return fluid is measured. Thus, if 30 oz. be used, only 24 can be made to return, as in Dr. M'Gregor Young's case already mentioned. Wölfler, who called attention to this sign, said that some of the fluid seemed to disappear "as though it had flowed through a large hole"—as, indeed, it has, in passing from the cardiac to the pyloric pouch (Wölfler's "first sign").

2. If the stomach be washed out until the fluid returns clear, a sudden rush of foul, evil-smelling fluid may occur; or, if the stomach be washed clean, the tube withdrawn and passed again, in a few minutes several ounces of dirty, offensive fluid may escape. The fluid has regurgitated through the connecting channel between the pyloric and cardiac pouches (Wölfler's "second sign").

3. Paradoxical dilatation.—If the stomach be palpated and a succussion splash obtained, the stomach tube passed, and the stomach apparently emptied, palpation will still elicit a distinct splashing sound. This is due to the fact that only the cardiac pouch is drained; the contents of the pyloric pouch remain undisturbed, and cause the splashing sound on palpation. For this phenomenon Jaworski has suggested the appropriate name, "paradoxical dilatation." Jaboulay has pointed out that if the cardiac loculus be filled with water, a splashing sound can still be obtained by palpation over the pyloric pouch. The sign of paradoxical dilatation is best elicited after washing out the stomach in the ordinary manner. When the abdomen is examined at the completion of the washing, and when the stomach has been apparently drained quite dry a splashing sound is readily obtained, for

some of the fluid used has escaped into the pyloric pouch through the connecting channel.

4. Von Eiselsberg observed in one of his cases, that on distending the stomach a bulging of the left side of the epigastrium was produced; after a few moments this gradually subsided and concomitantly there was a gradual filling up and bulging of the right side.

5. Von Eiselsberg also called attention to the bubbling, forcing, "sizzling" sound which can be heard when the stethoscope is applied over the stomach, after distention with CO₂. If the two halves of a seidlitz powder are separately given, and the stomach be normal or dilated, no loud sound is heard anywhere, except at the pylorus; if a constriction is present in the stomach, a loud, forcible, gushing sound can be easily distinguished at a point 2 in. or 3 in. to the left of the middle line.

6. I first called attention two years ago to a sign which I have since found of great service in establishing a diagnosis of hour-glass stomach. The abdomen is carefully examined, and the stomach resonance percussed. A seidlitz powder in two halves is then administered. On percussing, after about twenty or thirty seconds, an enormous increase in the resonance of the upper part of the stomach can be found, while the lower part remains unaltered. If the pyloric pouch can be felt, or seen to be clearly demarcated, the diagnosis is inevitable, for the increase in resonance must be in a distended cardiac segment. If the abdomen be watched for a few minutes, the pyloric pouch may sometimes be seen gradually to fill and become prominent.

7. Schmidt-Monard and Eichorst have both seen a distinct sulcus between the two pouches, inflated with CO₂. In Case XI in my list the two pouches with a hard, as I thought, malignant mass between them could be readily seen. When both pouches were distended with CO₂, alternate pressure upon them showed unmistakably that they communicated through a very narrow orifice, for the one could be emptied slowly into the other, and the fluid could be felt to ripple gently through. The diagnosis in such a case is simplicity itself. In Case VIII a distinct notch was seen at the lower border of the inflated stomach.

8. Ewald has called attention to two signs which he considers of value in establishing a diagnosis. When the stomach is filled with water and examined by gastro-diaphany the transillumination is seen only in the cardiac pouch; the pyloric pouch remains dark.

9. The deglutible indiarubber bag of Turck and Hemmeter is passed and distended; the bulging caused thereby is limited to the cardiac pouch which lies to the left of the middle line.

The two aids to diagnosis of greatest value are, it will be seen, the washing out of the stomach and its formation with gas by the administration of a seidlitz powder in two portions. The fluid used for the washing must be carefully measured before use; the tube is then passed and the stomach emptied, the contents set aside in a separate dish, and the washing commenced. All the fluid now returning is collected in a separate vessel and carefully measured. The two signs of Ewald are of little importance—a correct diagnosis can always be made without them.

Differential Diagnosis.

The two conditions for which an hour-glass stomach is liable to be mistaken are obstruction in the lower part of the oesophagus and pyloric stenosis. If the constriction in the stomach is within an inch or two of the cardiac orifice the upper locus of the stomach will be very small in size, and capable, therefore, of holding only small quantities of food. Food when swallowed may be regurgitated within a few minutes almost unaltered, and the patient may tell the same story of difficulty in "getting the food down" as is told by one whose oesophagus is obstructed. A correct diagnosis can be made by introducing the oesophageal bougie; if the bougie passes over 16 in. from the teeth the obstruction does not lie in the stomach.

If the constriction be near the pylorus, the cardiac complement will be dilated, and will present the same appearances and signs as a dilated stomach. Wolfier's two signs (1 and 2 in the list given) will generally enable a correct diagnosis to be achieved.

If the obstruction should lie at any point between the two mentioned, there should be no difficulty in making a correct diagnosis.

Treatment.

The treatment of hour-glass stomach may be beset with

difficulties. If the stricture is near the cardiac, or if the cardiac complement be bound up in adhesions, there may be great mechanical hindrance to the performance of any operation. When the abdomen is opened, a thorough examination of the whole stomach must first be made. The dilated pyloric sac may so completely resemble the whole stomach as to lead to the performance of a gastro-enterostomy between it and a loop of jejunum. Several cases are recorded in which this mistake has been made, and it is therefore necessary to emphasize the importance of an examination of the whole stomach up to the cardiac orifice in every case, no matter how obvious the diagnosis of "dilated stomach" may have seemed.

In many cases of hour-glass stomach no single operation will suffice to relieve the symptoms. This is due to the fact that where a stricture is present in the body of the stomach, a second stricture near the pylorus may also be found. If there be any dilatation of the pyloric complement, a constriction at the pylorus or in the duodenum will certainly be found. This dual stenosis, which has not received adequate attention from any writer, accounts for the lack of permanent improvement seen in many of the recorded cases. If in such circumstances a gastro-enterostomy is performed between the cardiac pouch and the jejunum, the pyloric pouch becomes a reservoir, incapable of efficient emptying, wherein food lodges and becomes sour. Symptoms of stasis are then observed, acid bitter eructations, occasional vomiting, a sense of heaviness and heat at the epigastrium and distaste for food, and, as in case recorded by Terrier, a second operation is necessary. If a gastropasty is performed the stomach cannot empty itself because of the pyloric stenosis, and the symptoms are unrelieved. Such a condition of double stenosis can therefore only be adequately treated by the performance of two operations at the same time—gastropasty and pyloroplasty—gastropasty and gastro-enterostomy from the pyloric pouch, gastro-gastrostomy and gastro-enterostomy, or a double gastro-enterostomy, a loop of jejunum being opened at two points, at the upper into the cardiac pouch, at the lower into the pyloric.

The following are the operations that may be practised:—(1) Gastropasty; (2) gastro-gastrostomy or gastro-anastomosis; (3) either of the foregoing, with gastro-enterostomy from the pyloric pouch, in cases of dual stenosis; (4) gastro-enterostomy from cardiac pouch, when the pyloric pouch is so small that it can be ignored; (5) gastro-enterostomy from both pouches; (6) partial gastrectomy.

The number of cases upon which this paper is based is as follows:

Perforating gastric or duodenal ulcer—12 cases, of which 6 recovered; gastro-enterostomy for chronic ulcer, etc.—70 cases with 1 death; pyloroplasty—3 cases, of which all recovered; hour-glass stomach—15 cases with 3 deaths; gastroplication—1 case, which recovered; and excision of ulcer for haematemesis—1 case, which died.

CASE OF (SO-CALLED) IDIOPATHIC DILATATION OF THE OESOPHAGUS.

WITH A SUGGESTION AS TO ITS NERVOUS ORIGIN.

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In November, 1901, Professor James Swain published in the BRITISH MEDICAL JOURNAL (p. 1453) a case of idiopathic dilatation of the oesophagus. Last year the same patient was placed under my care by Dr. Forbes Fraser. The various treatments which had been tried had been most unsatisfactory, and it was considered that the time had arrived when it had become justifiable to perform gastrostomy. Professor Swain says that he had considered this question, but did not think the operation was "desirable so long as the patient was keeping up her nutrition." The patient was a single woman, aged 27. It was clear that all the symptoms mentioned in the first account of her case still persisted, and that her life was one of extreme discomfort. The mucus which she swallowed, and likewise her food, lodged in the oesophagus. The first few mouthfuls of food passed onwards into the stomach, but the remainder did not. At first, before the condition was recognized, the food was allowed to remain in the oesophagus until it underwent decomposition, but afterwards it was washed out with an ordinary stomach tube. The presence of food in the oesophagus caused great pain,