HYPERCHLORHYDRIA.

Hyperchlorhydria is frequently a symptom of organic disease of the stomach, and is not uncommonly associated with stasis and pyloric stenosis or spasm. Wherever stasis is present gastro-enterostomy is indicated, but it may be a pure neurosis unassociated with stasis, in which case surgical interference is uncalled-for, and not likely to do good.

CHRONIC GASTRITIS, ATONIC DYSPESIA, AND GASTRALGIA.

None of these conditions in themselves requires surgical treatment, nor is surgery likely to afford relief unless they are complicated by pyloric stenosis or spasm giving rise to stasis. All cases of chronic intractable stomach trouble should be submitted to systematic examination, and the presence or absence of stasis in particular must be determined. It is not a very difficult proceeding, while it is of chief importance as the cardinal indication for surgical interference.

CANCER.

The grounds for operating in most cases of stomach cancer fall under the heading already given of "a tumour in the region of the stomach with vomiting and other symptoms of pyloric obstruction." But the subject is not wholly included in this definition and is of sufficient importance to deserve separate consideration. As we have seen, Doyen in 1895 excluded cancer from the sphere of useful stomach surgery. "L'intervention chirurgicale pour les affections de l'estomac n'a d'avenir, jusqu'à nouvel ordre, que lorsqu'il ne s'agit pas de cancer,"¹⁷ were his words written at that time. Nevertheless, successful operations for stomach cancer are among the most brilliant achievements of modern surgery.

Mayo Robson and Moynihan, in the last edition of their work on *Surgery of the Stomach*, give the following questions as determining the propriety and nature of the operations to be performed in cases of cancer of the stomach: (1) Will a palliative operation upon the stomach prolong life? (2) Will it make the remnant of life more tolerable? Will it make the patient feel that the ordeal of operation is justified in the greater comfort of his latter days? (3) Will resection give a reasonable prospect of cure? (4) Will resection if followed by recurrence give increased length of days and better health? They quote Kroenlein for the following conclusions: (1) That carcinoma of the stomach, without operation, has a fatal termination in about a year; (2) that gastro-enterostomy prolongs the life of the patient suffering from this disease for about three months on the average; (3) that gastrectomy so far as it is followed by recurrence prolongs life on an average about fourteen months.¹⁸

The presence of cancer of the stomach affords a clear indication for surgical interference. The real difficulty is that of early diagnosis, the nature of the case being too often recognized only when the patient's general condition has become very serious. A large proportion of the surgical mortality has not been due to those especial dangers against which surgeons must guard their patients, but to want of strength to support the operation.

Krecke gives the following as the results of the two operations for cancer. Of gastro-enterostomy he has collected from Chlumsky, Mikulicz, Kuemmel, and Kroenlein 563 cases with 216 deaths, being a mortality of 38.37 per cent.; while of pylorotomy from the same surgeons, with the addition of 24 from Kocher, he has collected 325 cases with 104 deaths, giving a mortality of 32 per cent.¹⁹

Mr. Barling pleads for the earlier performance of gastro-stomy in malignant disease of the oesophagus before inanition has sapped the patient's strength—that is, before the obstruction has become so great as to seriously limit the quantity of nutriment entering the stomach. Many cases of cancer of the oesophagus, however, do not reach this degree of obstruction, and death is due to the wasting of the cancer cachexia and not to starvation. The operation may be forced on the surgeon in the last stage as a forlorn hope, without the indication of inability to swallow; but under these circumstances the results can only be disheartening.

CONCLUSION.

In conclusion, may I urge the importance of the assistance to be derived from surgery in the treatment of stomach diseases, the need for seeking surgical aid before our patient's strength is undermined by the duration of the disease, and the value of the simple means of diagnosis to which I have called attention. I hope that surgeons may reconsider the claim to operate in every chronic ailment of the stomach which has not been relieved by medical means, to select their cases by

studying the indications which justify operative interference, and to avoid as far as possible operating upon patients who are the subjects of general neurasthenia. Finally, it is greatly to be desired that the questions now raised may be thoroughly discussed, and that the two branches of the profession may come to some definite agreement as to the grounds upon which these operations should be undertaken.

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An Address

ON

THE DIAGNOSIS AND SURGICAL TREATMENT OF CERTAIN CASES OF CHRONIC INDIGESTION.

Delivered to the Newport (Mon.) Medical Society.

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The treatment of digestive derangements in general has been, and will, in the main, still be, most properly left in the hands of the physician. There is, however, a certain group of cases in which medical treatment fails to relieve, or is speedily followed by relapse, if not by a worse calamity. The patients are the subject of ulcer in the stomach, or duodenum, which cannot be soundly healed, or healing is followed by contraction and mechanical changes which are as bad or worse than the ulcer which preceded them. Closely allied is the condition of hyperchlorhydria with associated pyloric spasm, eventuating in pyloric stenosis.

The patient who gets gastric catarrh from exposure or unsuitable food, the overstrained professional or business man whose poor gastric juice, the result of exhausted nervous force, fails to digest the food placed in the stomach, the poor drudge who has no masticating teeth and is always drinking stewed tea—these are not the people to be treated by surgical operations. If gastro-jejunostomy were a means by which the greedy could escape the penalties of overeating, or of the eating of food which is wisely prohibited by the physician, what a vista of surgical interference would be opened up! No, gentlemen, the surgeon's province here is a limited one, the boundaries of which are as yet not very well defined; and I purpose this afternoon to place before you the reasons which I think justify surgical treatment when the physician fails, and the methods by which relief is to be attained.

I will first briefly classify the conditions for which surgical treatment may be required, excluding perforation, with which I have not time to deal. They fall into four groups:

1. Chronic gastric ulcer, frequently relapsing despite proper dieting and rest.
2. Haemorrhage from gastric ulcer under certain conditions.
3. Mechanical obstruction to the emptying of the stomach from pyloric stenosis, hourglass contraction, or external adhesions.
4. Ulcer or stenosis of the duodenum.

I should abuse your patience if I entered upon a discussion of the causation and diagnosis of gastric ulcer, but I should like to offer some brief observations on one or two points.

Haemorrhage is sometimes regarded as the criterion of gastric ulcer, but any one who has at all closely followed the subject will readily agree that cases of gastric ulcer may be entirely free from bleeding—occasionally, indeed, may be practically latent, and perforation may be the first incident which calls attention to the presence of an ulcer. Conversely, apart from diseases such as hepatic cirrhosis, haemorrhage from the stomach may occur without the presence of a definite lesion such as a distinct ulcer, and from more than one point, the sources of the bleeding being only demonstrable by careful search. This uncertainty as to the meaning of haematemesis when it does occur, and its absence in some cases in which it might reasonably be expected, add to the

difficulties of diagnosis and treatment. Operations have been performed to control haematemesis, and instead of a definite ulcer being found perhaps nothing, or multiple bleeding points unsatisfactory to deal with.

The absence of haematemesis in patients assumed to be suffering from gastric ulcer may in part be explained by the existence of hyperchlorhydria and pyloric spasm instead of ulcer. This condition was, I believe, first emphasized by French observers, who laid stress upon it as an efficient cause of pyloric stenosis in the absence of ulcer. My own observations lead me to accept the view that pyloric stenosis, even of marked degree, may be produced without evidence of tissue destruction either in mucous membrane or in the peritoneum. One then finds a narrow ring with a sharply-defined edge encircling the orifice, quite unlike the denser unsymmetrical scar of a healed ulcer. Such a condition may, I believe, be the result of constant pyloric spasm due merely to the presence of excess of free hydrochloric acid. Gastric ulcer at a distance from the pylorus may be found associated with these conditions, but ulcer may be entirely absent. I turn now to my classification.

GROUP I.—CHRONIC RELAPSING GASTRIC ULCER.

Relapse after apparently successful treatment of gastric ulcer by medical means is extremely common, and may be repeated time after time. I do not know that a very high percentage of these patients die of their ulcers, but some do, and most of the others lead a life of chronic invalidism, constantly in discomfort, unable to discharge their duties in life, a burden on, and worry to, their friends. Many of these unfortunates are eventually the subjects of stenosis of the pylorus or hourglass stomach, and will be dealt with in Group III; a few fall into Group II. What have we to offer those who remain in Group I, and who are not suffering either from stricture or bleeding, but in whom the ulcer does not heal? In such the first step is to complete the diagnosis of ulcer by opening the abdomen. An ulcer being found, two courses are open to the surgeon, according to its position and extent. If the area of ulceration is fairly well limited, and is on one of the more accessible parts of the stomach, excision should be practised with the usual precautions against soiling the belly, and for closing the wound of the stomach. If, on the contrary, the area of ulceration is extensive, if it is on the less accessible parts of the organ, and especially if it is adherent to parts like the pancreas and the great vessels in its neighbourhood, excision is out of the question, and gastro-jejunostomy should be practised instead. Occasionally, as in ulcer about the pylorus, where excision may leave the stomach cavity much narrowed, the removal of the ulcer may with advantage be combined with gastro-anastomosis. More experience is needed as to the future of these patients after gastro-anastomosis. The purpose of the operation, when the ulcer cannot be excised, is to give an easy exit from the stomach, to prevent overdistension of the organ and vomiting, to prevent stretching of the ulcer. The existence of pyloric spasm in the presence of ulcer, even though the latter be not situate at the pylorus, is probably a factor in the sore not healing, and the substitution of a passive anastomotic opening of free extent, for the spasmodically contracted pylorus seems to me to be based on sound reasoning.

GROUP II.—HAEMORRHAGE FROM GASTRIC ULCER.

This is a frequent accident and often very alarming, yet few patients come directly to the surgeon's hands because of this complication. The few who do, fall mainly into two classes, those in whom the bleeding is profuse and quickly repeated, and those in whom there is never a great loss, but one which is often repeated. Only a few cases have been recorded of operative interference in the fulminating haemorrhages. The conditions are so very unfavourable for operative intervention, and so many patients eventually scrape through without it, that medical means are likely still to be the chief resources. If in any particular case operation seems the least of the grave risks, when the abdomen is opened a speedy examination of the interior of the stomach should be made to locate the ulcer, and, this failing, the organ should be opened and the ulcer sought. A vessel of some size may be found and ligatured or closed by undersuturing. If no ulcer is found, the blood may come from a single or multiple abrasions in the mucous membrane, which should be ligatured bodily, or a still further resource may be found in the actual cautery. Anastomosis of stomach to jejunum would be the next step if the

patient's condition and surroundings permit, for the same reasons which justify it in Group I.

In the patients with repeated but smaller bleedings, an interval of quiet should be chosen and operation unhesitatingly resorted to. When the abdomen is opened, it will often be found that in addition to ulcer there is pyloric stenosis, or the ulcer itself may be located on that part of the stomach. For such patients gastro-jejunostomy is the remedy, though with it may be combined with advantage excision of the ulcer, if the local conditions and the patient's general state are favourable. Care must be taken, however, not to let those patients drift on into a hopelessly feeble condition before surgical aid is sought. Here is an example of this too late operation, the record of which is far more eloquent than anything I can urge.

A male, aged 58, was admitted to hospital under my care, March 26th, 1904, with a history of repeated haematemesis, occasional melaena, and of severe pain in the epigastrium.

History.

In October, 1901, the first attack of pain and vomiting occurred, with severe haematemesis, estimated at 3 quarts. During the next two months there was frequent return of these symptoms, and in January, 1902, the patient was treated in hospital for ten weeks, resuming his work the following June. In November, 1903, the epigastric pain returned, with great loss of appetite. In March, 1904, there was diarrhoea, with melaena, and between March 6th and the date of admission to hospital several attacks of haematemesis occurred, and melaena was also present; pain in the epigastrium was severe, and was partly relieved by vomiting. For some weeks the patient had been entirely on rectal feeding.

Condition on Admission.

The patient was very emaciated, anaemic, and feeble; his weight had fallen to 8 st. 8 lb., whereas in health his ordinary weight was about 13 st.; the voice was little more than a whisper. There was a certain amount of tenderness over the right epigastric region, and the lower margin of the dilated stomach could be traced half-way between the umbilicus and the pubes; slight waves of peristalsis could be seen travelling from left to right.

Operation.

March 28th. Posterior gastro-jejunostomy by two rows of sutures was performed, and the patient put back to bed in fair condition considering his prior feeble state. In the evening he quite held his ground, but at 10 p.m. vomited some ounces of blood and again the following morning. Despite careful rectal feeding and stimulation he became feebler, and died thirty-six hours after operation.

Necropsy.

The following is a report of the pathologist, Dr. Wynne:

"Stomach: Pylorus and the neighbouring 1 in. of the lesser curvature is adherent to the under surface of the liver, and the posterior wall of the pylorus is firmly adherent to the head of the pancreas. The pylorus is pulled upwards by these adhesions, some kinking being thus produced. A posterior gastro-jejunostomy had been performed, the opening being on the posterior surface of the stomach 3 in. from the pylorus and 1 in. above the greater curvature.

"Measurements of the stomach: Greatest length from cardiac to pyloric end 8 in.; distance between the pyloric and cardiac openings 5½ in.; greatest breadth 5½ in.

"The stomach contains 9 oz. of dark tarry liquid. The pyloric opening is much stenosed and only admits a No. 12 catheter. There is not much thickening of the pylorus anteriorly, but posteriorly it is bound down by fibrous tissue situated at the lesser curvature and extending on to the posterior surface; the right edge of the ulcer just involves the pylorus; its floor is composed of dense cicatricial fibrous tissue. The actual site of the pylorus is difficult to determine, a ridge produced by the fibrous contraction being about one-third of an inch internal to the true site and forming a false pylorus, separated by a cavity, in which the ulcer is situated, from the true pylorus.

"The general mucous membrane of the stomach is catarrhal, and shows superficial erosions and worm-eaten patches involving the mucous membrane only. The haemorrhage appears to have come from these eroded areas, some of which show small venules crossing their floor. No open vessel could be found, and apparently the bleeding was more of the character of a general oozing.

"The ulcer had perforated through the wall of the stomach, but the perforation had evidently been subacute only, and had become healed by fibrous adhesions posteriorly."

Death in this case was due to the further loss of blood following the operation, part of which was vomited and part remained in the stomach. This blood appears to have exuded from the numerous superficial abrasions in the mucous membrane rather than from the original ulcer. This fresh bleeding was very probably the direct result of the operative proceedings, and emphasizes the necessity of earlier operation, so that too narrow a margin of vitality shall not be left to the patient before he is sent to the surgeon.

GROUP III.—MECHANICAL OBSTRUCTION.

Groups I and II comprise only an inconsiderable number of cases, but in Group III we have most of the patients with

gastric ulcer for whom surgical aid is needed, not so much for the ulcer itself as for pyloric stenosis or hourglass stomach, perhaps both, produced either by healing of the ulcer and contraction, or by pyloric spasm dependent on ulcer and hyperchlorhydria. Occasionally external adhesions over an ulcer may tie down and embarrass the stomach and call also for operative relief.

The frequency with which stenosis or stricture occurs requires that I should devote some time to discussing the diagnosis. To aid us, we have the patient's symptoms and the results of physical and chemical examinations. Dealing with the symptoms first, we find a history extending over months or years, complaint at first of heaviness and discomfort after food with flatulence, or of actual severe pain in the epigastrium or back, followed by vomiting, which gives relief, and there may be a history of haematemesis, and perhaps of melaena. Acid eructations may take the place of vomiting. With careful dieting the symptoms pass off, to recur at intervals, often with increased severity; as time goes on the intervals of well-being are shortened until there is almost constant misery; the vomiting takes place it may be only every two or three days, but the vomited matter becomes larger in amount, and food remnants, taken a day or even longer beforehand, may be recognised in the vomit. Rest in bed generally gives relief, and, indeed, if the patient stays in bed and diets carefully, there appears to be little the matter, but when active life is resumed the old troubles return. Loss of weight comes on sooner or later, it may be of only a stone or two, or the loss may approximate to half the body weight.

Examination of the patient in bed reveals splashing in the stomach some time after food taking, and the organ can often be felt or percussed, showing that it exceeds its normal limits. If the case is an advanced one, palpation of the abdomen will often elicit peristaltic waves, passing from left to right across the stomach—conclusive proof of a mechanical obstacle to its emptying.

The hand may detect a tumour either in the neighbourhood of the pylorus or elsewhere. Whilst this will always excite suspicion that a growth is present, it must be remembered that dense and extensive thickening may occur round a chronic ulcer. I have myself seen such a condition reaching to the size of one's fist, which proved to be innocent.

Examination of the vomited matters and of the motions should be made for blood; old food remnants should also be looked for to show whether gastric stasis exists or not. I have found portions of meat and the seeds of fruits taken several days before they were vomited back again.

The next step is to demonstrate with certainty the existence of dilatation of the stomach. The simplest method is, I think, to distend the organ with CO₂. This may be effected by dissolving in a half-tumbler of water 120 gr. of sodium bicarbonate, and in another 90 gr. of tartaric acid. The patient being recumbent, drinks the two solutions one quickly after the other; the stomach speedily becomes distended, and its outline may be palpated and percussed with exactitude. The dilatation may extend the organ to any point between the umbilicus and the pubes; but if the inferior margin does not reach below the umbilicus, I hesitate to speak of dilatation, as we have no precise knowledge as to what is the normal size of the individual's stomach. With dilatation there is always some dropping or proptosis of the stomach due to the stretching of its ligaments by the weight of contents, and it may be difficult to say whether dilatation or proptosis is the main factor in displacing the lower border of the stomach. Movable kidney is often found to coexist, and the three conditions own to a considerable extent a common cause in the lax abdominal walls and feeble muscular condition of the patient. I believe it is with the stomach as with other hollow viscera, muscular hypertrophy often compensates for a time the mechanical obstruction, but through some acute illness or from mental worry or from an acute overdistension by food, dilatation advances more rapidly than hypertrophy, and the patient, hitherto able to manage fairly well, now rapidly loses ground and is constantly in difficulty. Is dilatation always present with stenosis? The answer is in the negative; in one patient upon whom I operated for my colleague, Dr. Saundby, there was no dilatation, as demonstrated by distension with CO₂, and confirmed at the time of operation. In another case under my care at hospital the stomach was not only undilated, but was so small that I had to divide the left rectus to enable me to make an anastomosis between stomach and jejunum. Is dilatation always the result of mechanical obstruction to the emptying of the stomach? Again the answer is negative; dilatation may be

due to atony of the organ, though this is much less common than obstructive dilatation.

The question may not unnaturally be asked, Is it not a grave thing to distend the stomach in the way suggested? I can only say I have done this, and seen it done scores of times without any bad results: discomfort may be complained of, but it passes off in a few minutes. I would certainly not employ the method in any case where there had been a recent haemorrhage or symptoms suggestive of perforation or other acute condition, and in a very nervous or sensitive person I might reduce the charge by a third, though I have regretted doing this on occasion as the lesser quantity has given insufficient distension; however, that is a matter which can be remedied at a future examination, if desirable. Precaution should be taken not to use distension soon after taking food.

The next point to be determined is the presence or absence of free HCl. A meal of three or four ounces of toast and half a pint or so of tea, without milk or sugar, is given at breakfast-time, and an hour later the stomach is emptied with a tube, and the material withdrawn is reserved for examination. Gunsberg's test is then applied as follows:

One drop of fluid from the stomach is placed on a white porcelain dish, and to it is added a drop of phloroglucin and vanillin, and the dish is gently heated over a flame. The presence of free HCl is shown by the formation of a rose red colour where the stomach contents are in contact with the reagents used.

If free HCl is present, the stenosis is probably simple, that is cicatricial; if free HCl is absent, the obstruction is more likely to be due to a malignant growth; further than this the test does not carry us. The tendency at first was to regard this test as absolute, but this I am satisfied is pressing it too far; all the same, the indication obtained is often of value.

We have now to investigate a matter of greater importance—namely, whether there is "gastric stasis" or not. By "gastric stasis" is meant the presence of food remnants in the stomach at such time after a meal as the organ should be entirely free from food, all particles after gastric digestion having been passed on through the pylorus.

My friend and colleague, Dr. Saundby, has spent much time and thought in investigating this subject, and I am much indebted to him for information obtained from cases we have studied together. The method is based upon the fact that a few hours—certainly in six—after a meal has been taken all remnants of it should have passed from the stomach to the intestine. A meal of meat, bread, and milk, with a few currants or raisins, is given about 8 p.m., the patient being in bed; twelve hours later the stomach is emptied with a tube, and is washed out, all the material thus obtained is carefully collected. Any food remnants indicate "gastric stasis," or incomplete emptying of the stomach, due to an obstruction, innocent or malignant, which prevents the passage onwards of food from stomach to small intestine. The addition of currants or raisins makes the test a more complete one, as they are notoriously rather tough objects for the gastric juice to deal with, and they cannot easily get through a much-narrowed pylorus. If positive evidence is thus obtained, I regard the result as conclusive of stasis; if, however, the evidence is negative and other indications are in conflict with it, the meal should be repeated, and the stomach emptied nine hours after. Food remnants then being entirely absent, the patient should be relegated to medical treatment until time has given further guidance.

Summing up these points, I would lay stress on: (a) the use of CO₂ expansion to show the presence of dilatation, (b) the existence of "gastric stasis" as evidence of mechanical interference with the emptying of the stomach, (c) the presence of free HCl as giving great hope that the obstruction is an innocent one. If we wait for pronounced emaciation, for portions of long-retained food in the vomit, for marked peristaltic waves in the stomach, visible through the abdominal walls, we subject our patients to unnecessary distress and disability and do an injustice to the operation for their relief. I am perfectly satisfied that gastro-jejunostomy early performed is attended with little risk to life, and that the late cases are those which give almost the whole of the mortality following surgical intervention.

GROUP IV.—ULCER OR STENOSIS OF THE DUODENUM.

This is a small group; in it are comprised cases of duodenal ulcer or stenosis; its boundaries might be extended if we were able always to differentiate between diseases of the stomach and those of the duodenum, but this is hardly possible. They have in common the pain after food taking,

frequent vomiting which relieves the pain, perhaps old food residuum in the vomit; there may be dilatation of the stomach in either case; haematemesis or melaena may be present in either. As strongly suggestive of duodenal rather than gastric ulcer I would lay stress on the tenderness and pain being localized lower down and to the right of the vertebral column—in fact, in front and behind the curve of the duodenum—and the presence of repeated melaena when there is no haematemesis. The age and sex of the patient may afford some guidance. Duodenal ulcer chiefly affects males, and most often between 20 and 30 years of age. Here is a typical case in which I ventured to diagnose duodenal ulcer:

J. M., aged 32, was admitted to the General Hospital on January 20th, 1904, complaining of severe and persistent pain in his back, of vomiting, and loss of weight.

History.

The history extended over about six years, although four years earlier still vomiting of blood had given rise to a suspicion of gastric ulcer. In the earlier part of this time the symptoms were intermittent, and the patient was generally able to work, but for some months prior to admission he had been much worse, especially in regard to pain, and had been entirely disabled from work.

Condition when First Seen.

The pain was experienced chiefly to the right of the lumbar spine, passing occasionally round to the umbilicus; it was often worse when lying down. To the right of and some 2 in. above the umbilicus there was a persistently tender spot, but no tumour was palpable, nor was there any unusual pulsation. The urine was normal, as was the function of micturition; there was nothing in the history suggestive of biliary colic; the patient had never been jaundiced. Vomiting occurred at irregular intervals, and gave some relief to the pain, but the pain and vomiting appeared to be independent of food taking. The patient denied any haematemesis for some years, but the guaiacum test showed the presence of blood in the vomited matters, and examination of the stools showed that a considerable quantity of blood escaped by the bowel. The patient was very anaemic; he was neurasthenic, and presented the appearance of a man who was gravely ill; morphine was required at night to procure any rest.

Operation.

Duodenal ulcer was diagnosed, and at the operation a thickening over an area of about an inch in diameter was felt in the second portion of the duodenum, mainly in the posterior surface, but encroaching somewhat on the outer wall. Posterior gastro-jejunostomy was performed, and a very good recovery followed. Pain has ceased, digestion is easy, weight has been gained, and power of work (November, 1904).

Of this patient's future I do not like to promise too much, as I have notes of one very similar case in which the immediate result of gastro-jejunostomy was excellent, but the patient some two years later died of haemorrhage, the duodenal ulcer again becoming active. Whilst the future of such cases remains in doubt, the great immediate benefit cannot be disputed.

Stenosis in the duodenum is much more rarely found than in the stomach, and I have only met with one case, from which I show you the specimen. The first part of the duodenum is hugely dilated, and its walls are thinned until in places they are not thicker than tissue paper. The cause of the dilatation is seen in the presence of three valve-like flaps of mucous membrane at the junction of the first and second parts of the duodenum. Pressure of the incoming stomach contents appears to have almost closed these flaps, and the part of the duodenum behind them, as well as the stomach, had undergone extreme dilatation. The specimen is taken from a man, aged 31, who had suffered from indigestion since childhood, but during the last four years of his life his sufferings had been extreme. His great complaint was of pain, flatulence, and vomiting; the pain had required the frequent use of morphine for its relief, the eructations of gas had this peculiar feature, that on occasions they had ignited when the patient was lighting a cigarette; the vomited matters showed gastric stasis, for materials taken twenty-four hours or more previously were vomited back at times. An exploratory opening of the abdomen had been made by another surgeon before I saw the patient, but nothing else was done, and I determined therefore to endeavour to relieve him by gastro-jejunostomy, which, as the specimen shows, was an anterior anastomosis made by suture. All went well until the fifth day, when a quickly-advancing peritonitis killed the patient. This was due to giving way of the thinned duodenal walls above the obstruction before the anastomotic opening had become thoroughly established, and the case must be recorded as amongst the "too-late" operations.

OPERATION APPROPRIATE IN THE SEVERAL GROUPS.

The operative measures required for the relief of the various conditions I have described may be:

1. *Excision of ulcer.*
2. *Pylorodiosis or stretching of a narrowed pylorus.*
3. *Pyloroplasty or gastropasty*, division of the stricture and its widening by a special method of suturing.
4. *Gastroanastomosis*, or the formation of a junction between stomach and jejunum, stomach and duodenum, or between the distal part of the stomach and the proximal in certain cases of hourglass contraction of the organ.

1. *Excision of the Ulcer.*

This may be practised for frequently-relapsing ulcer which does not soundly and permanently heal, or for haemorrhage, but as I have already dealt with these conditions I do not propose here to say more about them.

2. *Pylorodiosis.*

Pylorodiosis, or stretching of a narrowed pylorus, involves incision of the stomach and the forcible stretching of the narrowing by the fingers or other suitable dilators. It is an operation which should, I think, fall into disuse for two reasons—the stretching is apt to be insufficient, on the one hand, and early relapse occurs, as in strictures of other parts; or the dilatation is carried too far, the peritoneal coat over the stricture may be split at a point where it is not recognized, with resulting fatal peritonitis.

3. *Pyloroplasty or Gastropasty.*

These operations have a limited application, and should be reserved for cases of strictured pylorus or hourglass contraction of the stomach when the local conditions are favourable. There should be little thickening of the tissues where the division is to take place, the enlargement of the narrowed part by transverse suturing of a longitudinal wound should be easily effected, and there should be freedom from ulceration at the seat of operation. Given these conditions, the operations above mentioned may have their place, but I have not had such good results from pyloroplasty as from gastro-jejunostomy, and I now practise the latter almost to the exclusion of the former. Pyloroplasty fails to give complete relief for two reasons, I believe. One is that the enlarged pylorus is far from being at a dependent part of the stomach, and the enfeebled muscular walls of the organ are insufficient to cause early and complete emptying. The second reason is found in a ridge of thickening still left at the pylorus. The circular constriction is only divided in its anterior aspect; and, when the wound is sutured in its new axis, a sickle-shaped fold is apt to be left on the posterior wall of the narrowed orifice—a matter of some importance in an already disabled stomach.

4. *Gastro-jejunostomy.*

This is the operation of election in the large majority of cases. If the case is one of hourglass stomach, the junction may be made between the two cavities of the stomach instead of between the proximal cavity and the jejunum. Very occasionally the stomach may be united to the duodenum instead of to the jejunum; but, as I have already said, gastro-jejunostomy is the chief resource.

Of the methods by which a junction may be effected between stomach and jejunum there is no end. After considerable experience, I have no hesitation in recommending as a routine method the junction of the jejunum to the posterior surface of the stomach by two rows of suture. This operation is not always feasible owing to adhesions or to some anatomical condition, such as a short mesocolon to the transverse colon. Under these circumstances, the jejunum should be joined to the anterior wall of the stomach by suture or by Murphy's button if there is insufficient room for safe suturing, as occasionally happens.

Briefly, the operation I recommend is carried out as follows: Any aperient thought necessary should be given thirty-six hours antecedent to, and the colon should be emptied by an enema shortly before, operation. Nourishment by the mouth should be restricted to milk or some fluid diet for twenty-four hours prior to operation, and mouth feeding should be prohibited for twelve hours; the use of the stomach tube for lavage I regard as unnecessary.

The abdomen is opened in the middle line, and the condition of the stomach as to stenosis is determined. If gastro-jejunostomy is regarded as the remedy the transverse colon and great omentum are turned upwards, and the stomach is projected against the transverse mesocolon by an assistant's fingers. A point is selected in the mesocolon where it can be divided without injuring any considerable vessel, and an incision is made on to the posterior surface of the stomach, opening up of course the cavity of the lesser sac. The opening thus made is carefully enlarged by cutting and

stretching until a good-sized pouch of the posterior wall of the stomach can be brought through it. Search is now made for the junction of the duodenum and jejunum, close to the root of the transverse mesocolon and just to the left of the vertebral column. A portion of the stomach, as near as possible to the greater curvature and at the most dependent part of the organ, is now clamped in forceps, the blades of which are covered with rubber tubing, the portion thus seized should give plenty of room for the application of sutures over a length of approximately 3 in. A portion of the jejunum some 12 in. or so from its commencement is emptied of its contents and similarly clamped, and the two clamps are brought side by side and held by an assistant in convenient position for suturing the two viscera together; the clamps not only restrain haemorrhage and the visceral contents from escape, but are very useful means of manipulating the parts in the process of suturing. The loop of jejunum should be so arranged that its contents pass onwards from left to right, and not in the opposite direction. For the purpose of suturing I use a curved needle, about 1½ in. long, with a slight cutting edge—that is, not a rounded needle—and a continuous thread suture of No. 70 calibre, 32 in. long. In the first or exterior row of suturing the needle picks up only the peritoneal and muscular coats, and it is entered about five times in 2 in.; each stitch is drawn fairly tight, and held by an assistant, and avoids all visible blood vessels. The line of suturing is semilunar, and should extend for about 3 in., a knot being tied at the first point of suture, and an end of 2 or 3 in. in length left. The suture is knotted again when the semilunar line is complete, and the end is left threaded with its needle for future use. The two viscera are now opened for a length of nearly 2 in., and some of the redundant mucous membrane is removed from each, so as to leave the anastomotic opening quite patent. If the clamps have been efficiently applied, there is complete control of visceral contents and of bleeding. The second row of suturing is now made with a similar suture to that used in the first, but now the whole thickness of stomach and bowel wall is penetrated by the needle, the stitches are rather more frequently inserted and are drawn quite tight; there is no interruption in the continuity of this line, which runs right round the anastomotic opening. When this is finished the clamps are removed, and the first row of suturing is completed with the suture previously laid on one side. Each row of sutures has a definite purpose: the inner row unites the margin of the opening, and at the same time is haemostatic; the second row is put in to segregate the first.

Whilst I prefer this method of performing the operation to any other, I recognize that occasionally the use of the Murphy button is distinctly advantageous, chiefly where from presence of adhesions it is difficult to expose a sufficient area of the stomach wall to ensure a safe suturing. I have had two cases of this kind where gastro-jejunostomy was required for pyloric stenosis after the patients had recovered from perforation of the stomach. Surgeons who are only called upon to perform this anastomosis occasionally may well find that the safest method is to employ the Murphy button, being prepared, like myself, with increasing experience to discard it for suture.

Mortality.

What is the mortality of the operation? To answer this fairly the innocent cases must be separated from the malignant ones, and as I have not treated of malignant disease in my remarks hitherto, what I am now about to say applies only to innocent strictures, and in these I think the death-rate will prove to be, in the hands of those accustomed to the operation, about 5 per cent. There is no doubt whatever, though, that the extent of the mortality will be materially influenced by the time at which operation is performed. Given patients in moderately good condition, not worn out by years of malnutrition and extreme loss of weight, I think the mortality of the operation will be less than 5 per cent.; but if the cases are such as may be described as "late" ones, then the mortality will be distinctly higher than the figure at which I have placed it. Another important question is, To what extent are the patients who survive operation benefited? Happily, the answer is that they are enormously benefited; they gain weight, they regain the power of work, and have a power of digestion which they have been strangers to for years. They are able generally to take an ordinary mixed diet without pain or any other inconvenience. At one time the fear of contraction of the new opening loomed large, but time has proved this to be unfounded; at all events, contraction takes place very rarely, if at all, and I believe this to be

true whether the operation is by suture or by some of the other methods in vogue.

After-treatment.

For twelve hours nothing is given by the mouth, then small sips of water are permitted, and at the end of thirty-six hours 3ss of diluted or of peptonized milk is given hourly. The quantity of milk is increased every few hours, until at the end of the fourth day 1½ pints of milk are being disposed of. Benger's food, custard, and similar foods are now added, and about a week after the operation minced chicken or mutton is permitted. At the end of a fortnight a varied diet of toast, vegetables, milk, meat, etc., is being consumed. For the first few days after operation nutrient enemata are administered every four to six hours. Some vomiting occurs in a majority of cases, probably due as a rule to the anaesthetic, but speedily subsides. Some patients do not vomit at all, others a good deal, owing to regurgitation of the duodenal contents into the stomach. This regurgitation may occasionally give rise to real anxiety, but I think I may say that with increasing experience of the operation, regurgitant vomiting becomes less common and of less importance.

The patients should be kept in bed for at least three weeks after operation, and an extra week of recumbency is often advantageous. At least another month is required for the recovery of lost weight and condition before work is attempted, and if circumstances allow, this period of convalescence should be prolonged.

DUODENAL ULCER AND ITS TREATMENT.

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THE subject of duodenal ulcer has not yet received adequate attention, though its onset is severe and the sequelae may be dangerous. It is usually thought to be of rare occurrence, but during the last few years I have myself operated upon seven cases, and I have had the opportunity of seeing others which have been under the care of my colleagues at St. Bartholomew's Hospital. From these cases I have learnt so much that I propose to bring some of the facts before you this evening that you may the better recognize the condition and give it appropriate treatment.

I have thrown my seven cases into a tabular form, and you will see that they group themselves sharply into two classes, those in which the duodenal ulcer had perforated, and those where there was no perforation. The cases which perforated required immediate surgical treatment, and were sutured with more or less success. Those which did not perforate were either treated at once on account of haemorrhage, or came for treatment many years afterwards in consequence of duodenal narrowing due to cicatrization of the ulcer. The non-perforating cases were treated by retro-colic gastro-jejunostomy.

I do not want to weary you with lengthy and uninteresting details of the cases, so perhaps I may be permitted to draw composite pictures of the two classes of cases, premising that every case of duodenal ulcer which has come under my observation has occurred in a man, so that duodenal ulceration is probably more common in men than women.

The subject of a perforating duodenal ulcer is usually a man in the prime of life who has hitherto considered himself in perfect health, or who has suffered, if at all, from only the slightest symptoms of indigestion. Without warning he is suddenly seized with a stomachache of such severity that he becomes collapsed and sends at once for assistance. He may vomit, but from the onset of the pain he passes neither flatus nor faeces. Examination within an hour or two of the attack shows him lying on his back, afraid to move, his breathing shallow and very rapid; his pulse small, regular, and quick, but not nearly so much accelerated as his respiration. Temperature normal. He looks pinched and anxious. The patient cannot localize his pain, but complains that it is worse along the upper half and down the right side of the abdomen. The abdomen is not distended and is not motionless, though it moves less freely during respiration than it should do. It is held rigid, and the muscles on the right side are somewhat more tonically contracted than those on the left. It is everywhere tender and tympanitic. The area of liver dullness may or may not be altered, and sometimes