PYLOROPLASTY.

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No surgical operation has ever been followed by more brilliant results than pyloroplasty. The first case on which I performed the operation was a female, aged 48. The day before the operation (15th Oct. 1894) she weighed only 5 st. 4 lb., her stomach required daily washing out, and would retain only the smallest quantity of liquid nutriment. She was dependent almost entirely on nutrient enemata, and, to cut a long story short, was within a few days of death. The operation of pyloroplasty was done for her on 16th Oct. 1894.

In March 1899, in response to my inquiry, she writes to say: "I weigh 10 st. 12 lb., can eat anything, and never felt better."

The only exceptional feature in this case is the fact that the patient has more than doubled her weight since the operation, otherwise the result is such as my experience has led me to expect after operation on suitable cases.

In the Lancet, London, of 26th Feb. 1898, I published an abstract of eleven consecutive cases, and there and elsewhere, almost in season and out of season, I have written and spoken on pyloroplasty. The operation was introduced by Professor Mikulicz of Breslau for stricture of the pylorus, but my knowledge of it was derived from a short note by Professor Senn of Chicago, to whom the English-speaking surgical world is more indebted than to any other author.

The diagnosis of pyloric stricture is based upon the history of the illness which is given by the patient, and the physical signs which are discovered by the doctor.

The history given by the patient is of long-standing dyspeptic symptoms, frequently commencing with those which are characteristic of gastric ulcer, namely, pain aggravated by taking food and relieved by vomiting, or less definite symptoms, such as are common to all dyspeptics, namely, vertigo, pronounced constipation, depression of spirits, marked emaciation, and loss of appetite. The most suggestive point in the history, however, is the story which the patient tells as to vomiting. Such a patient will frequently remark that he vomits so large a quantity that he does not know where it all comes from. He will also perhaps say that a portion of cabbage leaf or orange, or other recognisable substance, came up undigested more than twenty-four hours after it had been eaten, or he will describe the vomited matter as having a bad smell, and, in addition, having a scum or froth floating on it, which is like yeast. This story is almost conclusive evidence of a dilated stomach.
The physical signs are two. One of these is constant, the other is frequently found if carefully looked for.

The sign constantly present is the evidence of dilatation of the stomach. To seek for this, the patient should be laid flat on his back, and the abdomen fully exposed and carefully watched for a few minutes. In this way the most definite evidence of dilated stomach may be obtained. Owing, I suppose, to the exposure of the skin covering the abdomen to the cool air, contractions of the stomach walls are set up, and the outline of the stomach can be plainly discerned through the thin abdominal wall. In one case I examined in this way it was easily seen that the stomach reached the pubic bone. This, however, was an unusual amount of dilatation. It is more common to see the outline of the greater curvature of the stomach in the neighbourhood of the umbilicus. During the time of the contraction the patient will sometimes groan with pain, and will blame the swelling for all his trouble. He is likely to say that this same swelling frequently comes in the evening and causes great pain, till it produces vomiting, when he is quite comfortable till food is partaken of again. A distinct peristaltic wave may be seen to pass from left to right in this swelling before its subsidence. This suggests that the swelling is stomach and not colon, in which the peristaltic wave would pass from right to left. Sometimes, though rarely, I have felt the stomach walls become firm to the overlying hand. A very strong contraction like that of a pregnant uterus, so far as I know, does not occur in the stomach in chronic cases, because the dilatation is in excess of the hypertrophy at this time; but such strong contraction can occur in the intestine, so that this observation may be of considerable diagnostic service. If this condition of painful contracting and enlarged stomach be present, there is positive knowledge that the outlet is obstructed and that the cavity is dilated. If no swelling becomes visible on exposure, the epigastric region should be rubbed and ballotted, after which visible peristalsis should again be looked for. By the ballottement over the stomach further evidence of stomach dilatation will be obtained; the splashing of fluid contents will be heard with each movement of the hand or hands, and that over a larger area than usual, and continuing for a longer time than occurs in normal states of the stomach. If these methods fail to demonstrate the dilatation, which from the symptoms should be assumed to exist until the contrary is proved, the two halves of a large seidlitz powder may be administered separately, when the gas generated in the stomach will distend it and make its outline visible. If the patient, as is not infrequently the case, has been in the habit of washing out his stomach, the same result will be more readily obtained by blowing up the stomach with a bicycle pump, through the stomach tube, and at the same time the quantity of water which the stomach will hold may be ascertained by accurate measurement. The
normal stomach will not tolerate more than 1 quart. Additional evidence may be obtained from careful percussion, by which the area occupied by the stomach may be mapped out, and this is still more certainly done by combining auscultation with the percussion. This combined method is of considerable value when properly applied, and is not sufficiently practised. A binaural stethoscope is essential. This is placed over an area under which the stomach is certainly lying, and whilst listening over this area the examiner gently flips the abdominal wall with his finger, commencing at a part removed from the stomach and gradually approaching it. As soon as the percussing finger strikes over the stomach area, the sound conveyed to the stethoscope is so loud and characteristic as to be unmistakable. By marking the outline gradually all round, the presence or absence of dilatation may be determined with certainty. Unless dilatation is present, the case is not a surgical one. The fact of dilatation being settled, further useful information may be obtained. The other sign mentioned as frequently to be found is to be carefully looked for.

A large number of pyloric strictures are due to cicatricial contraction of pyloric ulcers, and when the ulcer heals, a hard nodule is left. Through the thin abdominal wall, it is surprising how small a thickening can be discovered by careful examination. The nodule is generally to be found a little to the right of the middle line and above the umbilicus, but usually not far removed from it. As a rule it is tender when pressed upon, and once touched the patient is able to say when it has been arrived at, on subsequent examinations. In addition to making out the presence of this nodule, the examiner should ascertain its mobility. This can be done by getting the patient to draw long breaths, when, if the nodule is not fixed, it will ascend and descend with the respiratory movements. Also, on turning the patient on to one or the other side, its mobility or otherwise may be determined. The presence of a movable nodule, in addition to making the diagnosis complete, is of great practical importance, for it means that an operation is demanded, and that it is likely to be an easy and successful one.

A patient comes with the history of long-standing stomach trouble, tells a story of foul vomitings, especially towards night, is very thin, has a largely dilated stomach, and a nodule which is movable at the pylorus. The diagnosis is cicatricial stricture of the pylorus, with secondary dilatation of the stomach. What is the treatment, and what is the prognosis? Treatment by medicine and by diet, if it has not already been proved a failure, can promise nothing but at the best slight palliation of the symptoms. A semi-starvation diet of easily digested fluid foods may enable the patient to live in comparative comfort for some time longer, so may regular washing out of the stomach, but to regain good health an operation is essential. The pyloric stricture cannot be
cured by medicine, or by diet, or by lavage, and it is unusual to find now a patient object to operation, when the facts are fairly laid before him. A patient sent to me by Dr. Kimpster of Gateshead, gave a history which illustrates remarkably well the course of such cases. For eight years he had been a martyr to dyspepsia, and had tried all sorts of treatment. For a time he had usually obtained a certain amount of relief from each new form of treatment tried. During the eight years of his illness, in spite of periods of improvement, he had made sure progress downhill. He had been a very big, strong man, originally weighing over 16 st., and leading the healthy life of a sporting country gentleman. When Dr. Kimpster saw him he had been an invalid almost entirely confined to the house for several months, and was only able to exist by limiting his diet to peptonised milk and by frequently washing his stomach out. Notwithstanding the fact that the patient had been advised in London that an operation was unlikely to benefit him, and would be attended with grave risks, he willingly listened to Dr. Kimpster's suggestion that pyloroplasty should be done. Three months after the operation this gentleman was able to enjoy and digest a beefsteak and porter, and had returned to his active life.

The gravity of pyloroplasty has, I think, been over-estimated, for I published¹ eleven consecutive cases, all of which recovered, and I have now operated on ten other cases, making twenty-one consecutive cases without any death. I feel confident that no other grave abdominal operation could have been performed with no mortality on patients so feeble and reduced as most of those were.

The preparation of the patient.—The same preparation for this operation is needed as for an ordinary abdominal case. In my article on wound treatment I have given in full detail the methods I employ to insure surgical purity of the skin of operator, assistant, and patient, and the manner of preparing instruments, etc., and the dressings I advocate. The only special preparation relates to the intestinal tract. Many of these patients cannot be properly evacuated by ordinary measures, so that, in addition to the usual purgative, I like to insure that their colons shall be thoroughly emptied by ordering a large enema (3 to 4 quarts) of salt water hot (1 dram of salt to 1 pint water) to be slowly administered through a long tube and funnel, in the knee-chest position, for two or three consecutive days before the operation. The cleanliness of the colon allows full use of nutrient enemata after the operation, should they be needed.

It is usual to wash out the stomach in these cases before operating, and the chief reason advanced in favour of this measure is that the stomach cavity is cleansed before the operation, and that there is consequently less risk of wound infection from its

¹ Lancet, London, 26th February 1898.
contents. I doubt all this. It is too mechanical and theoretical a view to commend itself to me, nor do I think the possibility of it being correct sufficient to induce me to ask the patient to suffer grave discomfort and some risk to uphold it, and in my cases the stomach is not washed out. If the patient is exceptionally feeble, I order a small dose of spirit to be taken half an hour before operation, and a nutrient enema of 3 oz. of beef-tea and milk to be administered. Before commencing the operation, all instruments which may possibly be required should be prepared and ready for use. It is important, in greater degree than in almost any other operation, to keep the patient as short a time as possible exposed on the operating table, so that no trouble should be avoided which will help to shorten the operation. The room in which the operation is to be performed should be well warmed (not less than 65° F.) before the patient is brought into it. The patient should be well protected from chill by bandaging small blankets on arms and legs, by sufficient woollen clothing, and on the table should be surrounded by hot bottles. I prefer in this, as in most of my operations, to have chloroform given first, till the patient is well under, then to continue the anaesthesia with ether, on an Ormesby's inhaler, unless the ether causes strong abdominal respiratory movements, when chloroform is readministered.

*The operation.*—The abdomen is opened between the sensiform cartilage and the umbilicus, and almost from one to the other point. In this, just as in every other operation, the external incision should be large enough to allow of favourable inspection and of unfettered manipulation. It has to be borne in mind that the patients are thinner here than at any other part normally, and that the emaciation of the patient added to this makes it easy for a careless operator to get through before he knows, and possibly wound the liver. There is usually no difficulty in finding the pylorus. It is recognisable in the normal condition by the appearance of a constriction over it, and the thickened ring-like feeling that it gives when grasped between the finger and thumb. These characters are usually made more distinct in stricture cases. If any difficulty should be met with in finding the pylorus with certainty, it is best to draw a portion of the stomach wall to the surface and follow the lesser curvature to it. Cicatrices on or near the pylorus confirm the diagnosis of stricture, so do the presence of adhesions. The absence of either gives negative information. A strictured pylorus is usually thickened, and this thickening can be felt as an addition to the normal resistance.

When found, the pylorus is drawn well forward into the abdominal opening, and all around it, boiled gauze wrung out of sterile normal saline is carefully packed into the abdominal cavity and over the parietal wound. If more than one piece of gauze is used, the nurse in charge of the sponges must keep account, and
have the number of pieces as well as the sponges written down on a slate or a piece of paper for reference.

When the pylorus has been completely isolated, the stomach is opened 1½ in. above it. The easiest and safest way to make the opening is to pinch up a transverse fold (see Fig. 1), and give one side to an assistant to hold, whilst the operator himself holds the other, and to make the opening with scissors in the centre. A finger should then be introduced into the stomach, to examine the pylorus from the inside. In cases of great dilatation, the antrum pylori participates in the general enlargement, and forms a big pouch into which the finger readily passes. An operator not knowing this will sometimes lose valuable time in looking for the pylorus at the bottom of this cavity, when it is at the top.

The lesser curvature of the stomach should be taken as the guide, and followed up to the pylorus. The stricture is next measured, and a guide is passed on through it into the duodenum. A large blunt director makes a good guide (see Fig. 2); and if this be kept as near the centre of the pylorus as possible, and projected against the anterior wall of the duodenum about an inch down, and the stomach wall, pylorus, and duodenum be slit up with scissors from the first opening to the point of the director, a proper and safe incision will have been made. The director must on no account be moved until the whole incision has been satisfactorily completed, for the exact position of the duodenum may be difficult to recognise, if definite landmarks are once lost. As soon as this part of the operation is satisfactorily completed, a threaded catgut
suture is passed through each divided surface of the pylorus, and
the suture is tied with a long end which carries the needle, and a
short end which is clamped in forceps (Fig. 3). By drawing the
forceps apart, the longitudinal wound is converted into a transverse
one, and is to be sutured in that position. The centre of the now
transverse wound may be grasped with haemostatic forceps on
each side before commencing this suture. These serve as a useful
guide until one-half of the first suture is complete. This first

Fig. 4.—Catgut sutures complete.

suture is of catgut, and the needles are Hagedorn's. It goes
through all the coats of both stomach and duodenum, is continuous,
and secures water-tight firm closure, and arrests all bleeding.
For several years I have used
this method of closing open-
ings in the stomach and in-
testine, and would like to
draw special attention to it
as the most simple and
satisfactory one. The suture,
as will be seen by a refer-
ence to the figures, is not
a simple overhand one. The
first turn after the knot is
looped, and this loop is put
in every second or third turn
after. The looping closes the angles well and prevents any puckering,
such as is apt to occur with the ordinary continuous stitch. No
trouble is taken to enfold any protruding mucous membrane, and
the line of suture does not look very pretty. It is meant to
serve only a temporary purpose and act solely, as previously
stated. The first line of suture is buried by an interrupted one
of fine silk Lembert sutures. (A continuous overhand suture
should never be used for the purpose of securing permanent union,
because of its interference with a proper blood supply.) The best

Fig. 5.—Lembert's sutures complete.
(a) Temporary sutures to be cut off.
needle for this purpose that I know of is the intestinal needle made for me by Downs, London. The outer line of suture should be applied at and tuck in each angle first, leaving the centre portion to be dealt with last, and the aim should be to get the stomach, which is lax and thick-walled, drawn well down over the thinner duodenum. No further interference with the stomach is necessary. The dilatation soon gets well when its cause, the stricture, is removed. The simple operation described is in six cases out of ten that required, and any ordinarily careful surgeon who will perform it three times on the corpse, can do it in twenty minutes. Regarding the difficulties in diagnosis and operation met with, I shall say nothing at present. Most of them are described in the paper previously referred to.¹

After-treatment.—This has nothing special about it. At the end of twelve hours, as in an ordinary abdominal case, small quantities of a mixture of equal parts of milk and barley-water may be given, and the doses of this are gradually increased during the next three days, when some thin arrowroot and milk may be added, and milk pudding at the end of the week. A 5-gr. dose of calomel on the third day, followed by a soap and water enema in eight hours, will move the bowels.

Recurrence of the stricture does not occur after this operation.

SOME RECENT APPLICATIONS OF BACTERIOLOGY TO CLINICAL MEDICINE.²

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Twenty years ago it was frequently noticed that our best students, after distinguishing themselves in medicine, when the time came for them to decide on their special course in the profession, turned aside from physic to what seemed the more attractive paths of surgery. This was the commencement of the Listerian era, and already enthusiasts in the art had foretold the practical abolition of sepsis. Results of treatment were already much more certain, and there was some sure ground for scientific forecasting of operative results. Medicine, on the other hand, seemed barren of promise. The causes of disease were vaguely discussed and guessed at, and our expectations of advance in therapeutics were in correlation with our ignorance on this head. We sought for new remedies among the products of organic chemistry on the lines of the old specifics, like mercury and quinine. Pathology, as taught to us, consisted of a mass of isolated observations in

¹ Lancet, London, 26th February 1898.
² Read at the April meeting of the Bath and Bristol Branch of the British Medical Association.