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THE SURGERY OF PEPTIC ULCERATION*

BY

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All the best people have peptic ulcers. According to estimates based on post-mortem statistics and on industrial surveys, one in every ten adults in Britain is so afflicted. These sufferers are, on the whole, the ablest, the most hard-working, and the most conscientious members of the community. Their lives are made miserable and their working efficiency is diminished by pain and indigestion, and they come to us for relief.

Peptic ulceration is disabling but not necessarily fatal, and it is therefore our duty to advise that treatment which is most safe, simple, and satisfactory. Medical treatment, which has, or rather which admits of, no mortality, is therefore the first choice. It is still the first choice, but since the end of the war there has been a notable swing of opinion towards surgery, a tendency to resort to it more often and earlier. The reason for this change is twofold—that medical treatment, though simple and safe, has not proved particularly satisfactory, and that surgical treatment, though it is less simple than formerly, is very much safer and more satisfactory than it used to be.

Published statistics are the basis of all unsound teaching, for they never present average results, but only those so much better than the average that they induce the doctor to collect them and the editor to give them space. Those I give you are from a good non-teaching hospital; they were prepared six years ago by one of my registrars, who is now a professor of surgery, and they are truthful.

1,000 Consecutive Admissions for Peptic Ulceration

For perforation	60 cases
For haemorrhage	215 "
For jejunal ulcer	65 "
For uncomplicated peptic ulcer	660 "

Analysis of the 660 Uncomplicated Cases

<i>Treated medically</i>	400 cases
Died under treatment	1%
Satisfactory after 5 to 10 years ..	34%
Unsatisfactory after 5 to 10 years ..	56%
Died between discharge and 10th year	10%

<i>Treated surgically</i>	260 cases
Died under treatment	7%
Satisfactory after 5 to 10 years ..	70%
Unsatisfactory after 5 to 10 years ..	20%
Died between discharge and 10th year	10%

These results are poorer than the average, for the hospital concerned is one that admits a large number of old and infirm patients, and the surgical treatment was not in accord with modern ideas—for instance, 48% of the operations performed were gastro-jejunostomies; nevertheless they emphasize the difference between

medical and surgical treatment. Medical treatment has a low primary mortality, but the late results are unsatisfactory; surgical treatment has a higher hospital mortality, but of those who survive the majority are relieved of their symptoms.

Rational treatment of any disease depends on a knowledge of its cause. We know nothing of the cause of peptic ulceration. We know, it is true, that peptic ulcers are found only on surfaces exposed to the action of gastric juice containing free hydrochloric acid, that in ordinary circumstances they are limited to the district between the cardia and the bile papilla, but that they may be found in any organ or structure which is brought into contact with gastric juice by sphincteric deficiency, ectopic secretion, or surgical anastomosis—in the oesophagus, in Meckel's diverticulum, or in the jejunum, the colon, the gall-bladder, or the skin after short-circuit operations or gastrostomy. But we know also that acid is part of the normal mechanism of gastric digestion, and that it does not attack the walls of its compartment unless it is secreted in amounts and at times that have no relation to the needs of digestion or unless those walls are already damaged. Acid is the cause of persistence rather than the cause of origin of peptic ulcer.

Gastric and Duodenal Ulcers

We are agreed that the treatment of peptic ulceration is medical in the first place. In discussing the surgery of peptic ulcer, therefore, we must attempt to define at what point the physician retires and the surgeon steps in. We cannot do this without first breaking down the peptic ulcer group into the gastric ulcers and the duodenal ulcers. These two lesions have certain features in common: they are found in the acid-containing portions of the alimentary tract, and their leading symptom is pain related to the taking of a meal (Fig. 1). In all other respects they are different. Gastric ulcer is rarer than duodenal ulcer but equally common in both sexes; duodenal ulcer preponderates in males. Gastric ulcer starts at from 35 to 40 years of age, duodenal ulcer some ten years earlier. Gastric ulcer is usually associated with a long stomach of poor tone emptying slowly and with a level of acid secretion below the average, duodenal ulcer with a high stomach emptying rapidly and a high acid curve.

Gastric ulcer seems to be commoner in the underprivileged and underfed, though the wealthy gourmet is not immune, but its cause is quite unknown; duodenal ulcer is definitely associated with a certain physical and psychological type, the lean, wiry, ambitious, worrying, conscientious, heavy-smoking intellectual, and the

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first onset and subsequent relapses are usually associated with periods of stress, with anxiety, frustration, and over-smoking. A gastric ulcer yields well to medical treatment when it is small and shallow, but after several relapses it becomes fibrous, adheres to surrounding structures, and deforms the stomach wall, so that it tends to relapse as soon as normal diet is resumed.

FIG. 1.—The pain of peptic ulcer.

A duodenal ulcer reacts equally well to treatment in the early stages, and will remain healed if the stress and the smoking can be permanently eliminated; in healing it may leave a scar, but a scarred duodenum can carry out its functions with complete satisfaction to its owner so long as the scar has not narrowed the lumen enough to obstruct the onward passage of a meal. Gastric ulcers may become malignant, duodenal ulcers never.

To sum up: in gastric ulcer the cause of origin is unknown, but the cause of persistence is in the stomach itself; in duodenal ulcer, the cause of origin and of persistence are in the patient, in his psychological make-up, his job, and his habits, and in the reaction of each upon the others. Therefore in gastric ulcer medical treatment should be abandoned as soon as it is clear that it has not produced permanent healing; in duodenal ulcer medical treatment should be persisted in until it is clear that it cannot succeed. Put in another way, gastric ulcers should be taken from the physician after twelve months if he has failed to heal them, or earlier if there is any reason to doubt their innocence; duodenal ulcers should be kept away from the surgeon till the patient is 45, or till some complication has arisen that can be treated only by operation.

Malignancy

We operate on gastric ulcers early and with enthusiasm because the prospect without operation is one of increasing misery. The stomach is a reservoir that expands to contain whatever the oesophagus brings it and that sinks lower in the abdomen as it fills; it is also a muscular mill that churns up the food and mixes it with the digestive juices. When an ulcer has produced sufficient scarring to prevent free movement and smooth peristalsis, the stomach can function painlessly only when its owner is in bed and taking frequent small meals that do not need churning—that is, during periods of medical treatment; as soon as an ambulant life and normal meals are resumed the ulcer is dragged upon and becomes active and pain returns. A gastric ulcer is under suspicion of malignancy if it is an inch or more in diameter and does not rapidly shrink under medical treatment, if it is in the prepyloric inch or on the anterior wall or the greater curve, or if it is accompanied by loss of appetite. Whether a true peptic ulcer ever becomes malignant is open to question, and the estimates of the frequency of such a change vary from the 50% of some American writers to Newcomb's 3%.

I myself have never seen an undoubtedly innocent peptic ulcer change to a cancer, but in about 10% of my gastrectomies for gastric ulcer I am told by the pathologist that the specimen shows an ulcer-cancer, meaning an ulcer with cancer cells on one edge and the typical histological appearances of a chronic peptic ulcer at the other. I am, however, unable to accept spatial propinquity as proof of causal relationship, and if there is a relationship I believe it is the cancer that caused the ulcer rather than the ulcer that caused the cancer. When we go back from the pathologist's report to study the clinical history

of the case we find that it is never typical of an innocent peptic ulcer. The age of onset has been unusually late, the pain has been more constant and more irregular in its relation to meals, the response to treatment has been unsatisfactory, and the remissions have been brief. I believe that all, or the great majority, of these ulcer-cancers are scirrhus cancers which have been attacked by the gastric juice and have undergone the usual process of healing in those parts where all malignant cells have been digested away, just as the scirrhus cancer of the breast may heal over after it has been burnt by the caustics of the cancer quack.

For our present purpose it is sufficient to emphasize that the distinction between an innocent and a malignant gastric ulcer cannot be made on clinical or radiological evidence, and that many of those that appear for the first time after the age of 40 are really wolves in sheep's clothing. The only safe course is to advise gastrectomy in all gastric ulcers that are not rapidly and permanently healed by rest and diet. We can do this without hesitation because we know that the patient will live happily ever afterwards. The failures of gastric surgery are all after operations for duodenal ulcer.

Duodenal Ulcer

In duodenal ulcer we are dealing with a lesion that is not necessarily progressive. The duodenum seems to be a passage-way and a mixer of enzymic cocktails for the second phase of digestion which is to follow, rather than part of the digestive laboratory, and it can carry on this function even though it be scarred, provided the ulcer is not active.

In discussing the cause of duodenal ulceration I speak only of the ulcers that I know. The duodenal ulcers of Madras—extensive lesions besides which the ulcers of the London stockbroker seem trivial—occur in peasants who do not smoke and do not worry, and they may be due to the liberal use of red pepper. The duodenal ulcers of the United States and of my native land, to judge from the writings of American and Scottish surgeons, differ in some respects from those of England and Wales, which seem to be manifestations of the stress syndrome or, to use a more modern term, of the adaptation syndrome. Duodenal ulcers as we see them occur in those who are trying to "fill the unforgiving minute with 60 seconds' worth of distance run"; they start at peak periods of stress, they tend to become quiescent when stress is relieved and to flare up again when it is renewed, and they can heal and remain healed permanently if the stress is removed by domestic adjustment, by worldly success, or by the philosophy that comes with advancing years.

If a duodenal ulcer is, as we believe, a local manifestation of a general disease—the symptom of a turmoil that affects alike the cerebrum, the mid-brain, the autonomic system, and the hormones which they control—the treatment is primarily that of the patient and only incidentally that of the lesion. The physician, the psychiatrist, the wife, the business associate, the trusted friend, all have their part to play, and the surgeon should be right out of sight in the wings awaiting his cue to come on. The cue comes when certain complications arise—perforation, stenosis, or major haemorrhage—or when it is clear that medical treatment is failing or is bound to fail. The difficulty lies in determining when, in the absence of danger signals, the orange light that precedes the red has begun to show.

Indications for Operation

Perforation cannot be anticipated; in many cases the ulcers that perforate are acute ones with no previous history. Stenosis can, however, be anticipated, and if in an old-standing ulcer there is radiological proof of delay in emptying or of failure in gastric tone at a time when the ulcer is clinically quiescent, it is wiser to anticipate the inevitable by operating before the patient has started to lose weight and strength. A single major haemorrhage—that is, one in which two or more pints of blood have been lost within an hour or so—is an absolute indication for operation in a man of 50 or over with a known duodenal ulcer; but lesser

haemorrhages in younger men, if they have been repeated more than twice within the space of two years, are a call for surgery rather than optimism. The greatest difficulty lies in giving exact definition to that commonly cited indication, "the failure of medical treatment," for it may not be the treatment that has failed, but the patient that has failed the treatment. Those poor fish who have not the moral fibre to obey instructions to re-order their lives or to curtail their indulgences are the physician's headache; handed over to the surgeon they provide the majority of the dumping syndromes.

I work on three criteria. The first of these is age. When a man has reached 50 and must still govern his life and restrict his pleasures in order to keep his ulcer quiet the time has come for surgery. He has some 20 years to live, and they are perhaps the most important ones, for the goal towards which he has been striving is now within reach and the leisure for which he has worked so long is his to enjoy. After gastrectomy he will enjoy it. Once again he can work and sleep without fear of pain. Once again he can run his eye down the menu and select whatever takes his fancy. So uniformly good are the results of gastrectomy that I have recently dropped the minimum age for elective operation from 50 to 45, and I shall probably bring it down to 40. My second criterion is loss of earnings, and my third is loss of weight. If a man who is following instructions conscientiously has nevertheless lost 10% of working time or 10% of weight within the previous 12 months I should advise operation.

Aims of Surgery

The aims of surgery, in the most general terms, are to relieve the patient permanently of the symptoms of which he is complaining. The patient suffering from peptic ulceration complains of pain and indigestion; to relieve these permanently we must do three things: first, we must remove the ulcer or at any rate remove it from the acid pathway; secondly, we must overcome the effects the ulcer has produced, chiefly those due to scar tissue; and, thirdly, we must remove the cause of ulceration or at any rate remove the likelihood of further ulceration. We do not know the cause of peptic ulceration, but we do know that chronic ulcers occur only in the presence of free hydrochloric acid. Any operation for the treatment of ulcer must therefore have as one of its objects the permanent reduction of acid secretion to a level at which fresh ulceration is unlikely.

Papers on the causes of peptic ulceration, for the most part based on experiments on animals whose dietetic habits have no resemblance to those of man, are by now innumerable. Each year a fresh crop descends on us like leaves in autumn. As a group they are self-cancelling, for it is possible by selection among them to support any pathological theory, however improbable, and any operation, however bizarre. Very few surgeons can resist for long the temptation to tell their fellows how to repair the inguinal canal and how to cure peptic ulcers. Among the operations that have been described, many of which betray the influence of Heath Robinson rather than that of John Hunter, we need discuss three groups only, all of which have as their purpose the reduction of acid: short-circuiting operations; vagotomy, alone or combined with other procedures; and gastrectomy.

Short-circuiting Operations

The short-circuiting operations—the various gastro-jejunosomies, pyloroplasties, and gastro-duodenostomies—attempt to neutralize the gastric acid by the alkaline contents of the duodenum, and they were first proposed in the belief that such neutralization is part of the normal mechanism of digestion. We now know that in man digestion is carried out in four distinct departments, separated by the pharyngo-oesophageal sphincter, the pyloric sphincter, and the ileo-caecal sphincter, and that normally nothing which has once passed any sphincter is allowed to return. Gastric digestion is brought to a close, when the meal is in a state to pass onwards, by the shutting down of acid

secretion and the neutralization of any free acid that remains by the alkaline gastric secretion, and reflux from the duodenum occurs in appreciable amounts only when there is some distal obstruction. The short-circuiting operations are therefore wrong in theory, and in practice it is found that many are failures from the start and few give relief for more than four to five years.

The passing of gastro-jejunosomy marks the end of an epoch. No operation has in its time done more for surgery. No other operation has been so polished and perfected by generations of surgeons that it has become a standardized technical masterpiece, performed in much the same manner by surgeons in all parts of the world. But it stands condemned, both on theory and on its own results. Gastro-jejunosomy was claimed to reduce acid "by Nature's method," the pouring of duodenal contents into the stomach, and it was shown to do so by post-operative test meals. We now know that duodenal regurgitation is not a natural process, and we know that the drop in acid which follows a short-circuit is merely one indication of the general inhibition of gastric function that any recent trauma will produce, and that a test meal done a year later will show an acid secretion back to its pre-operative level or higher. Gastro-jejunosomy will heal a duodenal ulcer by diverting the acid chyme from the ulcer site, but in doing so it transfers the factors that caused that ulcer to another site in an intensified form. In normal digestion acid is secreted only while food is in the stomach, first by vagal secretion, and later, when appetite is sated, by the action of a hormone secreted in the pyloric antrum as the products of digestion reach it (Fig. 2).

FIG. 2.—Secretion of hydrochloric acid under various conditions. (This diagram makes no claim to accuracy or to indicate definite values, but is merely meant to illustrate the views expressed in the text.)

After gastro-jejunostomy the food leaves the stomach in 20 minutes to half an hour, and for the next hour the second hormonal tide of unwanted and harmful acid is poured into an empty stomach and out over an empty stoma. In practice stomal ulceration of some degree is found in at least 20% of gastro-jejunostomies done for duodenal ulcer and observed for more than three years, and the number thereafter increases yearly, so that in post-mortem series over half the patients with short-circuits can be shown to have had ulceration at the stoma. It used to be thought that gastro-jejunostomy was a safe operation in pyloric stenosis with hypochlorhydria or achlorhydria; unfortunately this is not so. The reduction in acid is evidence of gastritis, and the gastritis usually recovers rapidly once the stasis that caused it is overcome. Gastro-jejunostomy still has a place as a palliative operation in cancer of the stomach, and as a simple expedient to overcome stenosis in those so old and feeble that they cannot be expected to survive for three years. As a leading operation for the treatment of peptic ulceration it must go, displaced but not discredited, as is the unhappy fate of discarded political leaders.

But yesterday the word of Caesar might
Have stood against the world; now lies he there,
And none so poor to do him reverence.

Vagotomy

Several surgeons have divided the vagi for gastric pain. Lester Dragstedt deserves the credit for some outstanding experimental work on the effects of vagal section in animals. He isolated the stomach with its vascular and nervous supply intact, restoring the food channel by anastomosing the oesophagus to the duodenum, and demonstrated that in the stomach so isolated division of the vagi reduced the quantity and acid level of the gastric secretion by about one-half. He advocated vagotomy as a reasoned and safe procedure for the treatment of peptic ulceration. In the safety of vagotomy lies its chief danger, for it is eagerly practised by surgeons who should not be allowed to operate at all. I believe vagotomy to be dead but not yet safely buried. Fifteen years ago it shot up like a rocket into the gastro-enterological sky; it blazed into a cluster of stars and we all said, "Ooh!"; then the stars died and the stick came down. It only remains to burn the stick.

It is possibly significant that of Dragstedt's recent publications as many are in defence of vagotomy against its attackers as in praise of its merits. It is equally significant that the surgeons of the Mayo Clinic, who have never been known to say an unkind word against anybody or anything, are receiving the failures of vagotomy in increasing numbers, and have practically dropped it from their repertory. In the last annual report of the Mayo Clinic, under "Surgery of the Stomach and Duodenum," the following comments are made about vagotomy. "The relative percentage of vagotomy with and without associated gastric operations to the percentage of various operations used in the surgical treatment of duodenal ulcer has decreased steadily since 1947 (6% in 1950 as compared with 15% in 1947). Only one factor can be accepted as an explanation for this sharp

decrease, and that is the gradually increasing dissatisfaction with this procedure in the primary surgical treatment of a patient who has a duodenal ulcer except in relatively unusual circumstances."

Vagotomy is unsound, in the way that any procedure based chiefly on animal experiments is apt to be unsound (Fig. 3). It is unsound in that it cuts out the nervous secretion of acid, which is harmless because it is produced in response to the sight and taste of food and is therefore buffered by food, while it leaves untouched the hormonal secretion. It is still unknown whether the unwanted secretion of acid which is so characteristic of ulcer diathesis is vagal or hormonal in origin, but most stress diseases are characterized by hormone overaction. Vagal section cuts out early acid secretion, but it also cuts out gastric motility, and in most cases some form of short-circuit is necessary to overcome the resultant stasis. When the stasis is thus relieved by gravity emptying, the stomach and the stoma, unprotected by food, are at the mercy of the hormone-induced acid secretion. The hormone secretion can be abolished by pylorotomy, but the patient is then reduced to a state of complete and permanent achlorhydria, with all its attendant risks of repeated infection and of cancer. In my view gastro-jejunostomy still has a small but recognized place in the surgical programme, but vagotomy has none.

Gastrectomy

Gastrectomy is at present the operation of choice for the treatment of peptic ulceration, whether gastric or duodenal. It is based on sounder reasoning and can show far better results than any alternative procedure, and it will therefore remain until something that can be shown to be better comes to replace it. Gastrectomy, properly planned and executed, lowers the acid secretion to a safe level without abolishing it and restricts that secretion to the time that the meal is in the stomach; it thus retains gastric secretion but abolishes the risk of re-ulceration. A gastrectomy for the treatment of peptic ulceration must satisfy five criteria:

1. The whole of the pyloric mucous membrane must be removed to abolish hormonal secretion, the chief factor in primary and recurrent ulceration.
2. The body of the stomach, carrying the highly convoluted areas of acid-forming mucous membrane, must be removed, but enough stomach should be left to make a cavity that will contain a pint, a test it will often be called upon to perform when the enjoyment of life returns.
3. The perigastric tissues on the lesser curve, but not necessarily the muscle coats, must be divided at the level of the cardia in order to divide the leash of vagal branches that spray along the lesser curve, and in order to release the stomach from the tethering of the left gastric artery and to give to the reduced cavity that free motility which all functioning organs should possess.
4. The stoma should not exceed the size of a two-shilling piece, that of the normal jejunum when fully distended.
5. The stoma should be so arranged that the meal, on leaving the stomach, can pass in an onward direction only.

FIG. 3.—The conclusions derived from animal experiments are not necessarily applicable to the study or treatment of disease in man. (By courtesy of King Features Syndicate and the *Daily Graphic*.)

These requirements can be met in gastrectomy of two types—in the Billroth I, in which the reduced stomach is anastomosed to the duodenum, and in the Billroth II, in which the stomach is joined to the jejunum, with a Lake-Finsterer valve to prevent regurgitation and a reduced stoma to prevent dumping.

FIG. 4.—The Billroth I operation.

The Billroth I (Fig. 4) is an excellent operation. Its advantages are that the infracolic compartment of the abdomen is not interfered with in any way, that the food on leaving the stomach can go no other way but onwards (Fig. 5), and that the gastric contents are poured into a part of the intestine protected by Brunner's glands against acid damage. The operation, however, is uniformly successful only when the duodenum is normal—that is, when the ulcer is in the stomach. So good are the results in gastric ulcer that surgeons are sometimes tempted to use it in the treatment of duodenal ulcer. A skilful technician can manage to dissect a scarred duodenum right down to the bile papilla and afterwards anastomose the stomach to the duodenal stump, and he takes pride in doing so. But the duodenum he uses has few Brunner's glands left, and the stoma he fashions, joined to a short duodenum and laid in the bed of an ulcer or the raw areas of a dissected pancreas, has none of the mobility which a happy stoma should possess. There are some good results, but there are too many bad ones to justify the continued use of this operation for duodenal ulcer when the Billroth II (Figs. 6 and 7) is so satisfactory.

FIG. 5.—The Billroth I operation; post-operative skiagram.

Such difficulties as there are in the performance of the Billroth II gastrectomy are entirely concerned with the closure of the duodenal stump. In most cases this is easy, in some it is difficult, in a few it is impossible; and he is a wise surgeon who recognizes the impossible task before it is too late. Two devices are recommended to circumvent the difficulties of the fixed oedematous and adherent duodenum. The first is Bancroft's operation—division of the muscular coats of the pyloric antrum, dissection of the mucous coat down to the pyloric ring, division and suture of the mucous membrane at this level, and closure of the sero-muscular coats over the stump. This device has the disadvantage that the ligation of the vessels in the submucous layer damages to some extent the blood supply of the outer coats, and healing is not always uneventful. In London, at any rate, Bancroft's operation is in disfavour. The second alternative is to divide and close the pyloric antrum 2½ in. (6.3 cm.) proximal to the pylorus and then perform a standard high gastrectomy; six to eight weeks later the abdomen is

reopened, when the oedema will be found to have disappeared, the adhesions to have become avascular, and the dissection and closure of the duodenum to be a simple matter (Fig. 8). The second operation is essential, for, while the pyloric mucous membrane remains, recurrence at the stoma is always possible.

I have spoken of gastrectomy as a uniformly successful operation. I have found it so. My friends have found it so. Their patients and mine are a happy crowd and are never tired of saying so. The unhappy ones are equally vocal, but they are so rare that they hardly cloud the picture. I have therefore come to believe that the bad results of gastrectomy are the results of bad gastrectomy. Recurrent ulceration at the stoma was seen in 9 out of 30 gastrectomies done by me in 1936 at a time when I believed that the pyloric antrum, since it secreted alkali, could safely be left; I have seen no instances in the 10 years before I advocated this heresy or in the 18 years since I abandoned it.

FIG. 6.—The Billroth II operation.

Dumping Syndrome

The dumping syndrome is in the news. Some centres speak of it as a matter of everyday occurrence, while others seldom see it, and such variation from clinic to clinic suggests that the cause is technical rather than inherent in the operation. So many disabilities are included under "dumping" that the more general term "post-gastrectomy syndrome" is preferable. Among the many possible causes are:

1. Operation on the wrong patients, on men with a small lesion of the duodenum and a large lesion of the mind. I have three times been persuaded against my better judgment to operate on such patients by physicians who had come to the end of their resources. In each case I regretted it. The first of these patients went on complaining till I lost sight of him at the beginning of the war. The second, a nurse, had a series of further operations (vagotomy, splanchnicectomy, and so on) by other surgeons, and finally died. The third, who had been "dumping" for two years, came running after me in Oxford Street a month ago, saying, "You will be glad to know I am perfectly well and can eat anything." "How did it happen?" I said. "Oh," he replied, "my mother died and I got a new job that I like."

FIG. 7.—The Billroth II operation; post-operative skiagram.

2. Too high gastrectomy. An operation that leaves only an inch or two of stomach on each curvature may be safe against further ulceration, but it is most unsuccessful functionally.

3. A full-width anastomosis—the old-fashioned Polya. This operation may have two unhappy sequelae; filling of the proximal loop giving a sense of postprandial distension, and stretching

FIG. 8.—Two-stage gastrectomy for adherent duodenal ulcer. (Figs. 4 to 8 suggest a resection much more conservative than is actually performed, because the stomach elongates greatly when its vessels are ligated, and as the branches of the left gastro-epiploic artery are tied the fundus comes right away from the spleen. Estimates of the level of gastric resection by reference to the spleen are meaningless, because the size of the spleen and its attachments to the stomach are quite inconstant. The most disastrous mistake in peptic ulcer surgery, because it is irremediable, is to remove too much stomach, and unless the surgeon lifts up the left costal margin from time to time to see how much is left before he divides the stomach, he is apt to make this mistake. The size of a pint mug is right.)

of the vascular pedicles. The reduced stomach and the new stoma occupy quite different positions from the normal stomach and pylorus which they replace, but they should be just as free to distend and to empty, and to move about as they do so.

Conclusion

I believe that to-day, and till something better appears, the treatment of peptic ulceration that has proved resistant to medical treatment is by gastrectomy—Billroth I gastrectomy for gastric ulcer, Billroth II gastrectomy for duodenal ulcer. I know my own results till 1935. Since that time I have suffered the interruption of five years in the Army, the greater part overseas, and the destruction of my house with all my records. Secretaries, since my return, have been characterized by their impermanence, and those patients whom I should like to follow are scattered over four continents. I cannot therefore give accurate figures of my own, and, when asked to write on peptic ulceration for Butterworth's *Encyclopaedia*, I gave the aggregate figures of four surgeons whose work is well known to me.

Total number of operations	..	..	..	1,456
Death rate	..	..	..	2.7%
State of survivors:				
Satisfactory	..	..	93%	
Better but not symptom-free	..	..	5.6%	
Worse (including re-ulceration)	..	..	1.4%	

The causes of death after gastrectomy are shock, infection, chest complications, and leakage from the duodenal stump. Shock has been eliminated by transfusion, infection by chemotherapy, chest complications by preparation before operation and early movement afterwards. Duodenal leakage does not happen to the surgeon who realizes that discretion is the better part of valour where it is the patient rather than himself that needs the valour. There should be no mortality, and there would be none if gastric surgeons were afforded the same privileges as are demanded as a right by their prima-donna colleagues—special theatres, new apparatus as soon as it is invented, theatre sisters who are left in the job long enough to become really expert, and anaesthetists and first assistants who work for years on the same team.

of the mesentery of the jejunum where it forms part of the stomach wall, with the inevitable symptoms of fainting, sweating, and nausea that are part of the vaso-vagal mesenteric reflex.

4. Anastomosis anterior to the colon, an operation that is successful when the colon behaves but is entirely at the mercy of its vagaries.

5. Fixity of the stomach and the stoma owing to adhesions or to insufficient division

In 1935 my total mortality in operation for uncomplicated ulcer was 4.5%. In 1935 transfusion was used seldom and with caution, physiotherapy was reserved for elderly arthritics, and chemotherapy had not yet been invented. I do not know my mortality to-day, but I have certain pointers. No patient with a primary peptic ulcer has died in my wards at Guy's Hospital since 1938. Of my Service patients, only one has died, from sloughing of the stump of a Bancroft's operation, since which disaster I have discarded this device. Of 115 private patients operated on since my return to civil life, in Nuffield House and the Royal Masonic Hospital, one, a gentleman of 66, died on the second day from extensive mesenteric thrombosis. Compared with the dangers and disablements the lesion brings, these risks are small.

TREATMENT OF MASSIVE BLEEDING FROM PEPTIC ULCER

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In a previous report from the Royal Victoria Infirmary, Newcastle-upon-Tyne, Ogilvie and Spencer (1950) described the results of treatment, in a general medical clinic, of massive bleeding from gastric and duodenal ulceration. Among 170 consecutive patients admitted as emergencies because of severe bleeding the mortality was 2.4%. The series was in no way a selected one, and contained all such patients admitted to one medical clinic during the years 1941–8 in an industrial area, where the majority of severe medical and surgical emergencies find their way to the teaching hospital; 27 of the patients (16%) were aged 60 or over. It was recognized that there were many variables to consider, such as the age of the patient, the duration of severe bleeding before admission to hospital, the presence of a chronic ulcer, the situation of the ulcer, the cardiovascular condition of the patient, and the presence of intercurrent disease. Although the series was not a very large one, it did not appear from the analysis of the cases that any of these factors, except that of age, had seriously affected the results.

Since that report was published observation has been continued and developed in the hospital in order to define a policy in the treatment of massive ulcer bleeding, particularly in regard to the relationship of medical and surgical treatment, and to assess its precise results. Tanner (1951) explained clearly the need for such a policy in the management of this difficult problem if the results are to be properly evaluated, and described his own large experience following different methods of treatment (Table I). In his hands the procedure with the lowest mortality in a series of 854 patients was the Finsterer method, by which is meant: "To operate on all patients giving a history of chronic ulcer as soon as a diagnosis of massive bleeding is made. If it is uncertain whether the bleeding is due to chronic ulcer an