PARTIAL GASTRECTOMY AND PEPTIC ULCER

BY

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Peptic ulcer appears to have been a rare condition before the twentieth century. Duodenal ulcer in particular seems to have developed with the rush and hurry of modern civilization. As the decades have succeeded one another the disease has increased in frequency and apparently also in severity. Conservative measures have failed to control an increasing number of cases, and surgical intervention is required more often in treatment. Moreover, the relatively simple operation of gastro-enterostomy, which appeared adequate to control the disease in former years, seems now to fail before the pressure of stomal ulceration.

Partial gastrectomy has become the standard operation, but the best design of this operation has never been agreed. Large or small stomata, placed in front of or behind the colon, with or without valves, directed to right or to left, are employed in various combinations, and the view has gained ground that the design of partial gastrectomy is not a matter of importance. Nevertheless the incidence of post-gastrectomy syndromes varies enormously. Some centres report their researches into the problems of burst duodenal stumps and bile vomiting. Other surgeons read these papers with silent wonder at why they do not have the same experience.

This paper is an attempt to correlate the frequency and severity of post-gastrectomy syndromes with the technique used in the operation. A method of gastrectomy is described which is not followed by serious post-operative symptoms. The inadequacy of gastro-enterostomy must, however, first be illustrated.

Gastro-enterostomy and Duodenal Ulcer

The object of this operation is to prevent any accumulation of acid juice in the stomach as the result of hypersecretion and pylorospasm. The effect is to heal the duodenal ulcer, and the operation can be relied upon to do so. Symptoms of post-gastrectomy type are extremely rare after gastro-enterostomy. In a recent review D. H. Clark (1958, personal communication) found only two examples of "dumping" in 300 cases, and A. W. Kay (1958, personal communication) had only one such case in 150 patients. I have no examples in 125 cases of my own.

The great advantage of gastro-enterostomy is that the patient retains his stomach and with it his full gastronomic ability. He can eat and drink a full meal and get on with his work. His stomach does not empty as precipitately as it does after partial gastrectomy, and indeed some of the food continues to be carried by antral peristalsis via the duodenum. Apart from the safety valve provided by the stoma, the stomach behaves physiologically and the patient returns to his normal health and vigour.

The operation is excellent in every respect but one—the vulnerability of the stoma to further ulceration. In the early part of the century this was put at less than 4%, but later Clark (1951), in a careful follow-through study found that the results were poor in one-third of the cases, with a "hard core" of 18% of serious gastrojejunal ulcers. My own results are indicated in Table I, which refers to a group of 51 duodenal ulcer

TABLE I.—Results of Gastro-enterostomy for Duodenal Ulcer

Time since Operation	Good Result (%)			Recurrent Ulcer (%)
	Fully Well	Slight Relapse	Total	
Up to 4 years	86	6	92	8
At 5 years	72	12	84	16
10 "	56	15	71	29
15-18 "	45	17	62	38

patients subjected to gastro-enterostomy more than 15 years ago. For simplicity the results are expressed as percentages, corrected to allow for five deaths from unassociated causes and for three patients with whom contact was lost halfway through the follow-up period. Those patients described as "fully well" possess a robust digestive system that few cases of partial gastrectomy can claim. The term "slight relapse" denotes patients with rare episodes of mild discomfort. They are well satisfied with the operation and regard themselves as cured.

It will be seen that 15 years after gastro-enterostomy not quite one-half of my patients are fully well: nearly two-thirds may fairly be regarded as satisfactory. By that time, however, over one-third of all patients have developed a stomal ulcer. Table I indicates that the stoma continues to be vulnerable over the years and that the recurrent ulceration is not confined to the early post-operative period. Most of the patients with gastro-jejunal ulcer were treated by partial gastrectomy and have had no recurrence of symptoms since. Three, however, died from an acute complication of the stomal ulcer before gastrectomy was decided upon.

These results are very similar to those of Clark, and it is probable that the ultimate incidence of gastrojejunal ulcer after gastro-enterostomy for duodenal ulcer is of the order of 38%. It may be debated whether the difference between these results and the earlier recorded figures is real or apparent. Follow-through departments with

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statistical discipline and regularized attendance were infrequent in the early days, while methods of investigation were not so searching as they are now. Gastroscopy did not exist, radiological methods were less detailed, and a loose conception of "gastritis" was used to describe cases of dyspepsia with negative findings. The early published figures may therefore not be comparable with modern ones.

In 1918 Walton had established a follow-through department at the London Hospital. From then onwards he personally interviewed his old patients at a regular weekly clinic, at which it was later my privilege to assist. In 1934 he reported a 3.2% incidence of gastrojejunal ulcer in a large series of cases (Walton, 1934). This figure was the number of cases recognized by x-ray examination or by surgical exploration. It did not include the undiagnosed dyspeptics whom the advent of gastroscopy was later to reveal as stomal ulcer cases also. It is probable, therefore, that Walton's recorded incidence of gastrojejunal ulcer was less than the real figure. This correction, however, is certainly not of such a degree as to explain the tenfold difference between his figures and those in Table I. It seems probable that the increasing vulnerability of the stoma after gastro-enterostomy is real and, like duodenal ulcer itself, is an example of the increasing intensity of the peptic ulcer phenomenon in the modern community.

Effect of Time on Results of Surgery : Vagotomy

Table I illustrates another matter of more general significance. It portrays the results of simple gastro-enterostomy as they appeared at different stages of follow-through observation. The figures that were so gratifying up to four years after operation did not look so well 10 years later. The moral of this should be borne in mind when considering the various "new" operations on the stomach which are being performed for peptic ulcer. The addition of vagotomy to gastro-enterostomy is the most promising of these. It is, however, still a new procedure, and the results should be viewed with some reserve until enough time has elapsed to allow a mature judgment to be made. Clearly, the results of gastro-enterostomy alone are not good enough.

Gastric Ulcer and the Billroth I Gastrectomy

So far the discussion has been limited to the problems of hyperacidity and stomal ulceration after gastro-enterostomy. These are the concern of duodenal ulcer cases. There is, however, little hypersecretion in association with gastric ulcer, and problems of anastomotic ulcer after operation do not arise.

For gastric ulcer the sole object is the removal of the lesion: an extensive resection is not required, and a Billroth I anastomosis is easily arranged. With this operation the gastro-duodeno-jejunal sequence in the onward passage of food is preserved and bile can mix freely with it. There is consequently a minimum of interference with digestion and nutrition. Simple dumping symptoms may occur, but since there is no element of obstruction they are easily controlled and the results are excellent (see Table III).

Duodenal Ulcer and the Polya Gastrectomy

Unfortunately the Billroth I operation will not do for duodenal ulcer because, like gastro-enterostomy, stomal ulceration develops in a high proportion of cases.

Thus Goligher, Moir, and Wrigley (1956) found 17% of cases developed a gastroduodenal ulcer. They suggested that the explanation was the movement of alkaline juice away from the Billroth stoma, which was thereby exposed to the acid secretion of the remnant of the stomach. In a Polya type gastrectomy the movement of alkaline juice is towards the jejunal stoma, which is thereby protected from recurrent ulceration. For duodenal ulcer, therefore, a Polya gastrectomy must be performed, but to achieve security at least three-quarters of the stomach must be removed (Wells and MacPhee, 1954).

The price to be paid is a subsequent lack of full strength and vigour and a group of effects which have been called the post-gastrectomy syndrome. The term is unfortunate, because a number of symptoms due to faulty anastomoses have been lumped together with the effects necessarily due to the loss of the stomach. The latter—for example, a tendency to anaemia due to deficient absorption of iron—are generally amenable to treatment. The more serious symptoms, such as bile vomiting, are due to intestinal obstruction at the stoma. They are not due to the loss of the stomach and should not be included as part of any syndrome. The phenomenon of "dumping" therefore needs close examination.

Dumping

Dumping is a condition which follows the too-rapid emptying of the stomach into the jejunum. It is due not so much to the reduced capacity of the stomach as to the loss of the regulating mechanism of the pylorus. In the intact stomach this mechanism can be observed by cineradiography after a barium meal. The pyloric mill takes the ingested food portion by portion, mixes it to and fro with a little regurgitant duodenal juice, and passes it through the sphincter. In the duodenum it moves forwards and backwards again, taking up its admixture of bile and pancreatic juice until it is delivered by a peristaltic wave into the jejunum. In this way each bolus of food is adjusted in size, dilution, pH, and content of enzymes before it is allowed to pass on, and the jejunum is protected from all chemical and mechanical assaults.

After a partial gastrectomy this protection is completely lost, and after a meal the food is "dumped" unchanged into the jejunum in the space of a few minutes. The inrush of the meal excites sympathetic reflexes from the gut resulting in symptoms of fullness and discomfort locally, together with more generalized effects such as weakness, faintness, tachycardia, and sweating. These manifestations comprise the dumping syndrome, which is a crude but not unsatisfactory description, provided it is realized that both the abdominal and the general symptoms are different aspects of the same reflex. There is nothing to be gained by an attempt to restrict the term only to the general group.

It is important to recognize that there is no element of obstruction in dumping. The symptoms are due solely to the invasion of the unprotected jejunum by food. They can therefore be avoided by reducing the rate of outflow from the gastric remnant to the level at which it can be accepted without distress by the jejunum. The patient can do this by eating slowly, avoiding liquid foods, and deferring drinks until the first wave of food has passed on. Hypertonic solutions seem to exert a powerful stimulus to the jejunum, and

so sweet articles of diet should be avoided at a main meal. Fortunately essential protein foods like meat are relatively inert and can be taken in quantity, and a moderate intake of fat is innocuous. The meal-time restrictions of the gastrectomized patient are therefore not too onerous provided that all he has to deal with are the simple uncomplicated dumping effects just described.

Bile Vomiting

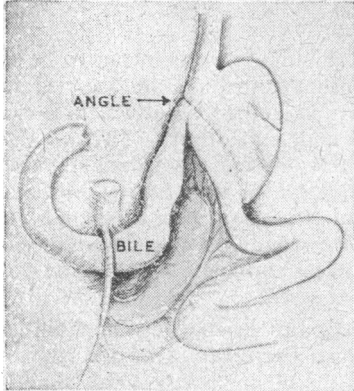Bile vomiting is *not* a part of the dumping phenomenon. It is due to intestinal obstruction at the stoma and dilatation of the afferent loop of jejunum with bile, until a peristaltic h e a v e empties it into the stomach. The point of obstruction lies at the junction of the afferent jejunum and the lesser-curve end of the gastric stump (Fig. 1). A kink is apt to form here at the end of the gastrectomy operation when the stump of the stomach is allowed to fall back to its position under the diaphragm, drawing the anastomosis up with it. Thereafter bile tends to collect behind the kink and the symptoms which follow depend on the degree of obstruction caused by it.

FIG. 1.—Afferent-loop obstruction caused by hitching jejunum to lesser curve.

In most cases the vomiting of bile begins soon after the operation. As the obstructed intestine hypertrophies it may diminish or cease altogether, leaving, however, a persistent sense of nausea. Some patients bring up a little bile every day. Others collect it in the afferent loop with increasing distress until relief comes from the vomiting of a large quantity of stale fluid. Loss of the biliary component in the digestion of fat may result in diarrhoea, steatorrhoea, and malnutrition. The chief symptoms, however, are the reflex effects of distension of the afferent jejunal loop by the bile, which are almost indistinguishable from the symptoms of dumping just described.

This similarity in the symptoms of dumping and of stomal obstruction is due to the fact that sympathetic afferent impulses from the whole of the jejunum are transmitted through one segment only, the ninth dorsal. A stimulus applied to one part of the jejunum therefore produces the same effects as a stimulus at any other part. Experimentally this may be a weighted bag, a distending balloon, or hypertonic solutions. Pathologically it may be a collection of obstructed bile in the afferent loop or a heavy meal dumped into the efferent loop. The reflex effects are all the same. The only difference is in their degree, which is much greater with the obstructive dilatation of the afferent loop than with the simple overloading of the efferent loop in true dumping.

Subemetic Afferent-Loop Obstruction. — It is important to recognize that lesser degrees of stomal obstruction can exist without the outward and visible sign of bile vomiting. This condition would then be indistinguishable from efferent-loop dumping except for one thing: true dumping symptoms can be controlled by the patient. He has only to exercise discrimination in his eating habits to reduce the symptoms to a tolerable level or to avoid them altogether. The victim of the afferent-loop syndrome cannot do this. No matter how careful he is, his jejunal loop is choked with bile and he cannot escape. If he is fortunate he may find that by lying down in a particular attitude the bile may leak into his stomach and pass on or be vomited. He may even prefer to eat his meals lying down. But he is afraid to eat. The summation of reflexes from food in the efferent jejunum and from an extra flow of bile into the afferent jejunum may result in complete prostration. Malnutrition and vitamin deficiencies now bring their own troubles, and the patient's misery is sealed by being classed as an intractable dumper.

Diagnosis and Treatment

Bile vomiting is pathognomonic of obstruction. Even minor and rare episodes of it are sure pointers to the diagnosis. With obstruction of the afferent loop the vomitus is a clear yellow fluid devoid of any food particles. Admixture of food with the bile indicates an obstruction in the efferent jejunum or beyond. Barium-meal examination will demonstrate at once the relatively uncommon distal stomal obstruction. In the radiology of afferent-loop obstruction the significant point is the failure of the meal to enter the proximal jejunum although the efferent jejunum appears quite normal.

In the absence of bile vomiting diagnosis must rest firmly on the basis that symptoms which fail to respond to simple eating rules are due to mechanical obstruction. The conception of intractable dumping must be firmly rejected.

Surgical exploration should be advised in all cases where symptoms are severe enough to justify it. At operation the parts will probably appear perfectly normal. The afferent loop may be bulky and hypertrophied, but it is unlikely to be found actually distended. The offending kink at the attachment of the jejunum to the lesser curve of the gastric stump may be obscured by filmy adhesions or by the mesocolon if the anastomosis was retrocolic. The surgeon must not be misled by these innocent appearances. The anastomosis must be dissected completely bare for inspection. Thoughtful manipulation of the parts may be needed to indicate the mechanics of the obstruction. Filling the afferent jejunum with saline by means of an oesophageal catheter negotiated into it may help to display the kink, especially if the stomach is drawn upon to exaggerate its acuteness and simulate the effect of the erect posture.

The obstruction can be relieved in several ways. The simplest is to anastomose the afferent and efferent loops together, without much dissection. Wells has used a "pantaloons" form of enteroplasty at the stoma with the same object in view. More recently Wells and Johnston (1956) have reported good results from conversion of the anastomosis to a Roux Y form. Yet another method is to undo the anastomosis entirely and make a Billroth I connexion with the old duodenal stump.

All these methods, however, divert the alkaline juices away from the stoma, and if the original lesion was a duodenal ulcer the conversion involves the risk of subsequent anastomotic ulceration. I therefore prefer to release the obstructing kink by detaching the jejunum from the lesser-curve half of the existing

anastomosis, retaining the greater-curve half as a stoma reduced in size but adequate. The success of this simple manœuvre is clear proof that the kink in the jejunum at its attachment to the lesser curve was indeed the cause of the obstruction.

The advantage of this method is that the alkaline juices continue to bathe the gastrojejunal junction and protect it from ulceration. If the old anastomosis does not lend itself to this procedure it is better to separate the parts entirely and make a new one with the method described in this paper.

Some Techniques of Gastrectomy

Although there are few more grateful patients than those who have been relieved of their afferent-loop obstruction, it would clearly have been better if the original operation had not caused it. In carrying out a partial gastrectomy the surgeon cannot avoid exposing the patient to dumping symptoms. He can, and should, however, see to it that his operation does not add any element of obstruction at the stoma which may produce the much more distressing and intractable effects of bile distension in the afferent loop. It is therefore relevant to examine the Polya operation and some of its modifications with this matter in mind. The historical approach is illuminating. Polya's (1911) original paper described a limited resection of the stomach with implantation of the whole width of the gastric stump into the side of the jejunum behind the transverse colon.

Full-width Stoma

The first modification of this procedure followed the realization that anastomotic ulceration could result from insufficient resection of the stomach in duodenal ulcer cases. At least three-quarters must be removed. To do this the line of transection must cross the lesser curve about 1½ in. (3.8 cm.) below the cardia. This level is roughly 3 in. (7.5 cm.) above the origin of the jejunum, and if the intestine is hitched up to this point the obstructing kink illustrated in Fig. 1 is apt to form there. In a retrocolic anastomosis the acuteness of this angle may be increased by the snaring effect of the hole in the mesocolon. The edges of the hole should of course be sutured to the stomach well above the line of anastomosis, but it is often difficult to do this at the highest point, where the kink lies.

Valved Anastomosis

Early in the study of dumping after gastrectomy it was observed that a barium meal could pass backwards into the afferent loop, and the conclusion was drawn that this was the cause of the symptoms (Ogilvie, 1935; Mimpriss and Birt, 1948). A " valved " anastomosis was therefore designed to prevent this happening. The stoma was restricted to the lower half of the cut end of the stomach and the " valve " was formed by closing the upper half and suturing the contiguous jejunum to it as far as the lesser curve. The technique succeeds completely in 'its object, not indeed by any valve mechanism but by establishing the same obstructing kink at the high point at the lesser-curve attachment of the jejunum.

The conception of a valve runs counter to all accepted principles of physiology. The idea that some sort of vis a tergo would propel the food emerging from the stomach in one direction ignores the fact that peristalsis is the only means of moving the contents along the gut. It discounts the normal physiological process of a to-and-fro mixing of food and bile in the duodenum. Its acceptance for so long must be viewed as a measure of the concern felt by surgeons about the apparently intractable nature of post-gastrectomy syndromes.

Antecolic Anastomosis

This method of approximating the stomach and jejunum seeks to avoid the constricting effect of the hole in the mesocolon which may arise with the retrocolic anastomosis. It is easier to do, and also easier to undo if ulceration should arise at the stoma. Colonic involvement in the latter event is also less likely than after a retrocolic anastomosis.

In this operation the jejunum is brought out from its natural position under the mesocolon and carried in front of the colon and omentum to be attached to the stump of the stomach under the liver. Two serious effects may result from this dislocation of the gut. One of these is the obstruction which may follow adhesion of coils of efferent jejunum in the region of the spleen. Visick (1948) described this condition with its symptoms and radiological appearances and mentioned that he was forced to operate on five cases.

The other disadvantage lies in the new possibilities of obstruction inherent in the creation of the gastro-jejunal sling in front of the other viscera. This sling is fixed at each end, but free to swing and rotate in the middle. Behind it lies a foramen. With such an arrangement the stage is set for a loop of gut to slip behind the sling and become obstructed. A more subtle form of obstruction results from partial rotation of the sling (Fig. 2). This movement approximates the afferent and efferent jejunal loops, the angle between them at the lesser curve attachment becomes more acute, and the obstructive effect is enhanced.
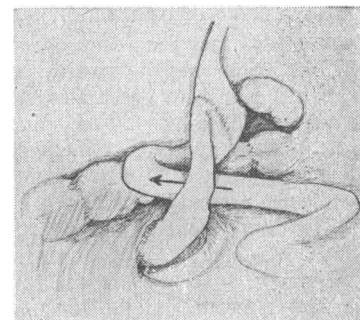
These events may occur at any time after the creation

FIG. 2.—Antecolic anastomosis showing rotation with impaction of jejunum.

of the sling. If they arise in the immediate post-operative period the distension may rupture the duodenal stump (Stammers, 1952; Warren, 1954; Henson, 1955; Simon, 1956; Watson, 1958). In one series of cases the mortality due to ruptured duodenal stump was 3.8% (Goligher et al., 1956). The cause of this grave complication is not sufficiently recognized. Technical instructions on partial gastrectomy stress the need for secure closure of the duodenal stump with unabsorbable sutures. This is misleading. The need is to remove the possibility of obstruction which causes the burst and which is increased unnecessarily by placing the anastomosis in front of the colon.

The obstructive events, however, may not arise until later, when the suture lines are healed. They now take the form of bile vomiting and so-called intractable dumping already described. Wells and MacPhee (1954) have described how this may occur months or even years after the operation.

There are therefore two items among techniques of partial gastrectomy which tend to produce post-operative obstruction: they are hitching of the afferent jejunum to the lesser-curve end of the gastric stump, and the placing of the anastomosis in front of the colon. The second of these may aggravate the first.

Retrocolic No-loop Gastrectomy

The upper jejunum arises from a posterior fixed point under the transverse mesocolon, to which it is attached by the ligament of Treitz. From this origin the gut falls away to the left renal pouch, where it lies in a sac bounded above by the mesocolon, with colon to the left, and colon and omentum in front. Within this enclosure the mass of guts can squirm and wriggle freely in the process of digestion.

Many gastrojejunal anastomoses interfere with this arrangement by the creation of a second fixed point in the jejunum by hitching it up to the gastric stump. We have seen that obstruction can result from this, either at the angle of attachment or behind the afferent loop so created. In the operation described below both these effects are avoided by placing the anastomosis at the natural fixed point at the attachment of the ligament of Treitz. A special preparation of the gastric stump is required to bring the gastric stoma down to the required level.

The steps of the operation are illustrated in Fig. 3. The division and closure of the duodenum and the mobilization of the body of the stomach are carried out
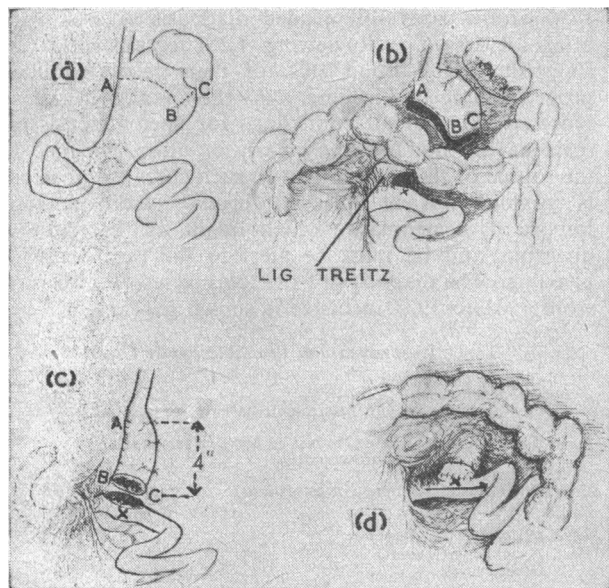

FIG. 3.—Retrocolic no-loop anastomosis.

in the usual way. The fundus of the stomach is now freed from its attachments by dividing all the vasa brevia and peritoneal membranes to within half an inch (1.3 cm.) of the oesophagus. The line of section across the stomach is made in an angular fashion as shown at ABC in Fig. 3 a and b. AB is closed by sutures: BC is to be the stoma. By these means the gastric remnant is converted into a freely mobile tube about 4 in. (10 cm.) long. This is now swung down from its original horizontal position to a vertical one, bringing the stoma BC down to the level of the origin of the jejunum (Fig. 3 c).

The ligament of Treitz is now identified and an opening is made in the mesocolon continuous with it. The end of the tube of stomach is brought through this hole and anastomosed to the side of the jejunum at its origin (Fig. 3 d). With this method of reconstruction there is no afferent jejunal loop, the stoma being in effect an extension of the ligament of Treitz. There is no drag on the mesentery of the jejunum, which falls away to the left in the normal way. The stomach remnant is supported at either end.

Results

By dispensing with the kink and the necessity for an afferent jejunal loop this operation avoids those post-gastrectomy symptoms which are due to obstruction. These are the major ones, and during the 20 years in which it has been used by me for duodenal ulcer there have been no burst duodenal stumps and no cases of bile vomiting or of intractable dumping. The results, indeed, are comparable with those of the Billroth I operation, which has been employed during the same period for gastric ulcer. The post-operative records have been gathered over the years at a weekly follow-through department. To illustrate the results 110 consecutive cases of operation for peptic ulcer have been taken from which to compile Tables II and III. The operations in this group date from March, 1948, retrospectively in order to provide a minimum period of 10 years' observation. There was no operative mortality, but 10 patients have since died of unrelated disease. Tables II and III refer to the remaining 100

TABLE II.—*Operations Performed for* 100 *Cases of Peptic Ulcer*

Retrocolic no-loop anastomosis	..	..	54 cases
Duodenal ulcer ..	..	31	
Duodenal* and gastric ulcers	..	5	
Gastrojejunal ulcer	..	12	
Gastric ulcer	..	..	6	
Billroth I anastomosis ..	..	..	42 ,,
Gastric ulcer	..	..	39	
Gastric* and duodenal ulcer	..	3	
Antecolic anastomosis ..	..	..	..·	4 ,,
Duodenal ulcer	..	..	4†	

* This lesion predominating. † One patient with bile vomiting.

patients. Table II sets out the actual operations performed. The standard procedures have been the retrocolic, no-loop gastrectomy for duodenal ulcer, and the Billroth I for gastric ulcer. There have been two exceptions to this rule: where suspicion of malignancy in a gastric ulcer has required removal of the first part of the duodenum the jejunal anastomosis has been substituted for the Billroth; in duodenal cases where the mesocolon has been too short or too distorted to allow a retrocolic anastomosis, an antecolic one has been done instead. Four antecolic anastomoses have been made for this reason, and one of these patients suffered mildly from bile vomiting afterwards.

The object of Table III is to illustrate the post-operative capacity for work and for meals. No

TABLE III.—*Ten-year Results of Gastrectomy for Peptic Ulcer*

	Billroth I 42 Cases	No-loop Retrocolic 54 Cases	Total %
Recurrent ulcer ..	0	0	0
Off work ..	0	0	0
Change to light work ..	3	9	12·5
Diarrhoea ..	0	1	1
Bile vomiting ..	0	0	0
Meals:			
Fail to eat meat	0	0	0
No sweet course ..	19	25	46
,, liquids ..	22	32	56
Discomfort with full meal ..	18	31	51

patient failed to return to work after the gastrectomy, although 12 changed to a lighter job. At meal-times all the patients can take meat and vegetables. About half of them, however, restrict the size of the meal, refrain from sweet foods, and do not drink with their food. The most frequent problem in the follow-through department is how to advise a patient who has to limit the size of his meals to take sufficient food in the circumstances of his employment. Most of the patients improve on their pre-operative weight, but few regain the pre-ulcer weight of their youth. Some of them appear less robust than a normal person, but none has the distress of an intractable dumping syndrome.

Conclusion

In making this contribution I have communicated with many colleagues, who have kindly informed me of the techniques of gastrectomy which have been associated with their published papers dealing with post-gastrectomy syndromes. In all of these techniques the jejunum is fixed to the lesser curve of the gastric stump, either by a valve or by a full-width stoma. It is difficult to avoid the conclusion that this step is the cause of subsequent obstructive phenomena. This conclusion is supported by the results of the no-loop retrocolic gastrectomy described.

Summary

The inadequacy of simple gastro-enterostomy for duodenal ulcer at the present time is demonstrated.

The fallacy of judging operations for peptic ulcer on short-term results is illustrated.

The distinction between the dumping syndrome and post-operative obstructive phenomena is discussed.

Some techniques of gastrectomy are analysed with regard to post-operative obstructive effects.

Reasons are given to suggest that attaching the jejunum to the lesser curve of the gastric stump is the cause of major post-gastrectomy syndromes. A full-width stoma or valve is the technique most likely to do this. Further obstruction may result from the antecolic position of the stoma.

A method of gastrectomy is described in which a tube of fundus is mobilized to reach down to an anastomosis at the ligament of Treitz. The creation of an afferent jejunal loop is thereby avoided. No major post-gastrectomy symptoms have occurred in a 10-year follow-up of the results of this operation.

I would like to put on record my thanks for the help I have received from Mr. J. R. G. Bastable, senior registrar, and Mr. Michael P. Ward, registrar, of the London Hospital, in analysing the records of the follow-through cases to provide the material for the tables in this paper.

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ALIMENTARY BLEEDING OF OBSCURE ORIGIN

A FOLLOW-UP STUDY AND COMMENTARY

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All clinicians will have had the experience of treating patients with alimentary bleeding and in whom routine clinical and radiological tests have failed to reveal the cause. The purpose of this paper is to review the possible reasons for bleeding in such cases.

In all large series of patients with gastro-intestinal bleeding, such cases account for about 15–25% of the total series: thus Schiff (1947) recorded 26.4% among 325 admissions, and, on reviewing this and a further series of cases in 1952, still noted 20.6% of cases with no cause of their bleeding demonstrated. Palmer (1952), despite a vigorous diagnostic policy, found that 14% of his cases still evaded diagnosis several weeks after admission. Reviewing 1,252 cases, Birke and Engstedt (1956) found 15% of their cases without a proved source of bleeding. At the Central Middlesex Hospital, 20% of all admissions for haematemesis and melaena did not have any x-ray or other evidence for the source of their bleeding. In such cases the physician is anxious not to miss a chronic ulcer or, more important, a neoplasm which might at that time be operable, and he must be alert to the rare causes of bleeding. The diagnosis of the total series of admissions from 1941 to 1957 inclusive is shown in Table I.

TABLE I.—*Proved and Probable Peptic Ulcer*

Chronic gastric ulcer	423
Duodenal ulcer	844
Post-operative group (gastro-enterostomy or partial gastrectomy)	168
" Acute lesion " group (214 had an acute gastric erosion or ulcer seen gastroscopically)	720
Hiatus hernia	47
Unclassified (incomplete investigations)	96
	2,298
Carcinoma ventriculi	57
Portal hypertension	75
Other causes	96
	2,526

This problem can be studied in three ways. First, by reviewing the follow-up results to see if any subsequent causes of bleeding appear in those with initial x-ray negative findings and without any obvious clinical explanation; secondly, by reviewing our knowledge of uncommon causes so that vigilance can be increased; and, thirdly, by studying further possible precipitating causes of gastroduodenal haemorrhage.

Follow-up Studies

At the Central Middlesex Hospital nearly all the patients with gastro-intestinal bleeding are admitted under the department of gastro-enterology. Such