

VAGOTOMY WITH GASTRO- ENTEROSTOMY FOR DUODENAL ULCER

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In the past few years there has been increasing agreement that a Billroth I partial gastrectomy alone is the most satisfactory surgical treatment for chronic gastric ulcer which is not associated with a duodenal ulcer or a high acid curve, and that this operation in a modified form can be used for ulcers very high up on the lesser curvature of the stomach. Only when the ulcer is high and posterior, adjacent to the oesophagus, is it necessary to use a transthoracic approach and perform an upper partial gastrectomy. For the more common case of duodenal ulcer, with its wider age incidence, which fails to respond to medical treatment there is much less agreement. Some surgeons—for example, Ogilvie (1953)—would not, in the absence of complications, advise an operation below the age of 40, but there are many cases in which a dangerous and incapacitating illness had started at least 20 years previously. It has been found impossible to be completely successful, by removing enough stomach to prevent further ulceration, without producing disturbances due to an insufficient organ. A subtotal gastrectomy cures duodenal ulcer, with only about 2% of proved recurrences, but about 10% of cases subsequently suffer from unpleasant symptoms and nutritional defects which at least make one hesitate to advise a high gastrectomy for young patients. There is much truth in Napoleon's saying that an army marches on its stomach.

Since 1948 one of us has submitted 269 cases of duodenal ulcer to vagotomy. It was quickly realized that if vagotomy was performed alone the result was usually unsatisfactory owing to gastric retention. Ulcer pain was relieved, but this was replaced by foul eructations, diarrhoea, and loss of weight. A barium-meal x-ray examination often showed a large 24-hour gastric residue even though the patients had no stenosis of the duodenum at the time of the vagotomy. The earlier a gastro-enterostomy is performed on these patients the better will be the permanent result. It was then decided to try vagotomy combined with posterior gastro-jejunostomy. Schindler (1937), from gastroscopic observations, found that a gastro-jejunostomy was more satisfactory if placed as near the pylorus as possible. It was considered even more important to drain the lowest part of the stomach when atonic following vagotomy. Incidentally, a low posterior gastro-jejunostomy is more easily converted to any form of partial gastrectomy than a high vertical one, should this prove necessary.

The vagotomy was always performed through the abdomen after mobilizing the left lobe of the liver. This latter procedure makes the operation easier, safer, and more certain. We also consider that Somervell clamps, which are non-crushing and yet non-slipping, contribute to the absence of complications in both gastro-jejunostomy

and partial gastrectomy. Convalescence is usually uneventful: most of the patients can dispense with the Ryle tube in 48 hours. A post-operative chest complication was the commonest cause of a delay in recovery, but many of the patients suffered from chronic bronchitis. The operation is very safe; only one patient died in the post-operative period: a week after his operation he developed bronchopneumonia during the onset of a severe influenza epidemic. He died 48 hours later, and a post-mortem examination confirmed the diagnosis, but no cause for his death was found in the abdomen.

According to Johnson and Orr (1953), G. Crile, jun., and his colleagues have used this operation over 400 times, with a mortality less than $\frac{1}{2}$ %. His recurrence rate was 6%, but this was regarded as better than radical gastrectomy, with an operative mortality of 4% and a recurrence rate of 1%. Series of gastrectomies have been performed with a mortality under 2% (Tanner, 1954), but Johnson and Orr found a 4% mortality in a collected series of 3,000 post-war gastrectomies.

Illingworth (1953) has drawn attention to the comments of Jordan (1952) in her exhaustive report for the American Gastroenterological Association on the various surgical procedures. She compared the results of 842 cases of gastric resection with 633 cases of vagotomy plus gastro-jejunostomy (see Table):

Gastric Resection Compared with Vagotomy plus Gastro-jejunostomy

	Gastric Resection	Vagotomy + Gastro-jejunostomy
No. of cases	842	633
Primary mortality	3%	1.3%
Recurrent ulceration	1.7%	2.7%
Freedom from symptoms, return to work, and absence of post-operative haemorrhage	86.4%	78.8%

In this country, Pollock (1952) has reviewed 1,524 cases of vagotomy used alone and with other procedures. He found 12% of unsatisfactory results in a collected series of 511 cases of vagotomy combined with gastro-jejunostomy: 8% had recurrent ulcer pain, but in only 1% was there a proved recurrence. The follow-up, however, was for more than three years in only 7%. Hand and Patey (1953) have been disappointed in their results of vagotomy, but they combined it with gastro-jejunostomy in only eight cases, with one relapse. They combined vagotomy with hemi-gastrectomy in 17 cases and no recurrence of ulceration has occurred so far.

Late Results

Tanner (1954) has stated that no definite conclusions can be drawn from anything less than a five-year follow-up for an operation performed for peptic ulcer. We agree with that policy, but it becomes progressively more difficult to trace old patients, and an increasing number will die of unrelated diseases. We therefore decided to examine and fill in a questionnaire for all those patients who had been operated on between six and four years previously. Ninety-five patients were in this category, and with persistence it has been possible to follow up all of them.

Five male patients had died in the intervening years. The deaths were due to carcinoma of the bronchus, coronary thrombosis, influenza, and intestinal obstruction with a lung abscess due to peritonitis from appendicitis in earlier life. These four patients were apparently cured of their duodenal ulcer, which gave no further symptoms; three of them died in hospital, and a post-mortem examination revealed no active ulcer. The fifth non-survivor was an early case: a man aged 67, who had a gastro-jejunostomy 10 months after his vagotomy, at first progressed favourably, with gain in weight. Later he developed pain in the left iliac fossa, with radiological evidence of extensive

diverticulitis. A rapidly progressive psychosis caused his death in a mental hospital. There was never any definite evidence that this man's later abdominal symptoms were due to his duodenal ulcer or to the surgical treatment. It has, however, been found by others that, if the "drainage" operation on the stomach is not performed at the time of the vagotomy, symptoms presumably due to gastritis are more likely to occur.

Seven of the 95 patients developed symptoms of recurrent ulceration—six had recurrent pain, while one developed melaena; all these were submitted to a further operation. It is noteworthy that in two of these cases, both early ones, the operation notes stated that the vagotomy was probably incomplete. An insulin test meal confirmed the incompleteness of the vagotomy. A further four patients had slight attacks of pain, probably due to recurrent ulceration. One of these had a small haematemesis, so there was no doubt about the presence of at least a temporary ulcer in this case.

We are very pleased with the result in the remaining 79 cases with no history of recurrent ulceration. Some of them, especially the older ones, have other diseases, with chronic bronchitis heading the list, which are not directly related to the duodenal ulcer. The majority have no symptoms whatsoever, and all display no nutritional defect. It is usual for the patient to retain his or her occupation, or even to obtain a better and more strenuous one, without losing weight. One young man has resumed playing Rugby football, which is not usual after a high partial gastrectomy. Serious diarrhoea was seen only after vagotomy without a "drainage" operation. Constipation is common among patients with duodenal ulcer who are chosen for operation chiefly because they are eating so little: a return to a normal daily evacuation was the most common post-operative result. It has already been recorded that an afferent-loop syndrome is rare after this operation compared with a high Polya partial gastrectomy (Wells and MacPhee, 1952). It was more likely to occur if vagotomy was performed on a patient who already had a high rather than a low gastro-jejunostomy.

Secondary Operations on the 4- to 6-year-old Cases

It is appropriate here to discuss the fate of the 7 patients of the 95 who were submitted to further operative procedures for recurrent symptoms. The two cases in which the vagotomy was incomplete were submitted to a Polya partial gastrectomy. The result was excellent in one patient and fairly good in the other, who has some dumping and occasional vomiting. Removal of the pyloric antrum below the stoma, with closure of the duodenum, was performed in four cases, with a satisfactory result in two. The two failures were both in women, who complained of symptoms suggesting an afferent-loop syndrome. A Billroth I conversion of both of these unsuccessful pylorotomies has resulted in cure of one, but it failed to relieve the other of attacks of pain and vomiting. With these symptoms she still looks well and has not lost weight. In spite of cancer-phobia and an unsuccessful second marriage, it is thought that her symptoms are genuine. Professor Wells has recently converted her gastrectomy to the Roux-en-Y type, so we await the final result with interest.

Findings at the Secondary Operations

So far as we know, no case of perforated ulcer has occurred in the 240 cases after the operation of vagotomy and gastro-jejunostomy. Out of this total, 17 patients have undergone a secondary operation with no mortality. No jejunal ulcer was seen and a stomal ulcer was found in only two cases. One of these followed incomplete vagotomy performed on a patient who had already had an operation for a perforated duodenal ulcer, and a subsequent posterior and an anterior gastro-jejunostomy performed by various surgeons. A partial gastrectomy had been contemplated on two of these occasions, but the extensive peritoneal adhesions dating from the perforation had caused each surgeon to

retreat from his original plan. After partial gastrectomy, finally performed with great difficulty, and a convalescence marred by jaundice due to incompatible blood transfusion, the patient made a good recovery. He has now been working at the coalface for some years, with no dyspepsia.

In those cases with symptoms—for example, haematemesis—suggestive or conclusive of recurrent ulcer the original duodenal ulcer appeared to be the cause, but at the second operation the oedema and crater had always disappeared; in fact, the ulcer seemed to be healed. A recurrent gastric ulcer has been found on only one occasion. This patient, a young woman, had already had two perforated duodenal ulcer closures when submitted to vagotomy and gastro-jejunostomy. A Billroth I partial gastrectomy has now apparently cured her. It is interesting that a fractional test meal examination just before her third operation showed a low acid curve, so it is possible that her gastric ulcer either was missed at this time or was too small to feel.

Type of Secondary Operation

Nine of the earlier failures of vagotomy with gastro-jejunostomy were submitted to either pylorotomy or a Polya partial gastrectomy, just over half the stomach being removed if there was evidence that the vagotomy was incomplete. Two of these cases, already mentioned, have been converted to Billroth I anastomoses. In addition eight further cases have been converted to a Billroth I partial gastrectomy, all with an excellent result. This means that there has been only one failure out of 15 secondary cases, and even this case might be finally cured.

A peritoneal adhesion occluding the efferent loop of the gastro-jejunostomy once made it necessary to reopen the abdomen 10 days later: no further trouble occurred in this case.

Jaundice due to a large duodenal ulcer is rare. Three such cases have been encountered, requiring in addition cholecystenterostomy: two of these have been successful, one for six years, but the third later developed fatal ascending cholangitis due to stenosis of the biliary anastomosis.

Discussion

Vagotomy, including attempted vagotomy, combined with a low gastro-jejunostomy, has given a very satisfactory result for duodenal ulcer, lasting between four and six years in 88%. The operation is very safe and has not caused any reactivation of phthisis in four patients with major quiescent lung lesions. A secondary operation was required in 7.4%, and a Billroth I conversion has been found to be the most satisfactory way to relieve the failures, which are not all due to recurrent ulceration. In view of the further 5% of patients with slight symptoms who must be regarded as unstable, and the success obtained with a Billroth I conversion, it was obvious that we should try vagotomy combined with a Billroth I resection as a primary operation wherever possible. This has now been done in 30 cases. At first only those with a wide duodenum were regarded as suitable. The operation is now considered possible in all cases (Schmitz *et al.*, 1954) by splitting the anterior wall of the duodenum. There has been no mortality so far, but we feel that in poor-risk patients, especially if there is a large oedematous ulcer, it may still be wiser to perform vagotomy with gastro-jejunostomy, which allows a Billroth I resection later if necessary, when the duodenum will take more kindly to sutures.

The immediate post-operative recovery has been satisfactory apart from two cases which had excessive intra-gastric bleeding. One of them had to be reopened 10 hours later, when a bleeding artery was found near the lesser curvature of the stomach. The whole anastomosis was resutured and the patient made a good recovery. The early results after leaving hospital, including gain in weight, appear satisfactory, but a few years must elapse before they can be truly assessed. Wells and MacPhee (1954) and R. Welbourn (1954, personal communication), by different

routes, have come to the same conclusion—that vagotomy and Billroth I resection should be tried further. Vagotomy and limited partial gastrectomy has been very successful in the hands of Johnson and Orr (1953).

Summary

For duodenal ulcer, excluding cases of acute bleeding but including a few perforated cases which required more than simple closure, the operation of abdominal vagotomy combined with a low gastro-jejunostomy is a very safe procedure and appears to produce good results lasting four to six years in 88%.

The failures (7%) were submitted to a further operation without mortality: all except one case have been relieved.

A Billroth I conversion was the most satisfactory secondary procedure; also, vagotomy combined with a Billroth I partial gastrectomy may prove to be the best primary procedure.

Vagotomy should be included in the treatment of duodenal ulcer because only 50% of permanent good results can be expected from gastro-enterostomy alone.

We now regard vagotomy combined with gastro-jejunostomy to be at least the best second-choice operation.

Most of the follow-up work was done by S. O'D., but we are indebted to Mr. Harral Thompson for following up the cases at the Royal Southern Hospital during his tenure of the post of surgical registrar

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EFFECTS OF DORSO-LUMBAR SYMPATHECTOMY ON PEPTIC ULCERATION

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Extensive dorso-lumbar ganglionectomy and splanchnicectomy as carried out from the treatment of hypertension interrupts the sympathetic nerve supply to the stomach (Bingham *et al.*, 1950); by masking symptoms it may have a harmful effect on the course of peptic ulcer. Frequently it is only by complications such as pyloric obstruction, perforation, or haemorrhage that the ulcer announces its presence. The following case illustrates these features.

Case Report

A male shipping clerk aged 38 was admitted in April, 1949, suffering from angina of effort. This had started six months previously, when he had breathlessness and pain

down the inner side of the left arm on exertion; a week later the pain became substernal and compelled him to stop when walking. During the six weeks before admission pain had come on at rest and had lasted about five minutes. He gave a previous history of an appendicectomy for vague dyspeptic symptoms in 1930; the operation had given him relief, but at intervals he had continued to have mild epigastric discomfort. There was no history of nephritis or other renal lesion. The family history was indefinite; his mother had died in childbirth and his father died suddenly at age 40, cause unknown.

He was a moderately well nourished man whose blood pressure remained between 230/130 and 220/130 during his stay in the medical ward. The fundi showed early vascular changes but no haemorrhages, exudates, or papilloedema. Clinical examination of the heart, lungs, abdomen, and central nervous system was negative and there was no albuminuria. A cardiogram taken in March, when he was an out-patient, had shown evidence of ischaemia in the shape of terminal inversion of the T waves in lead V₄; but on admission the cardiogram at rest was normal. Radiologically the heart shadow was normal and the lung fields were clear. Intravenous pyelography showed normal concentration and excretion of the dye, and no abnormality was demonstrated in either kidney. Urea clearance was 74%, maximum urea concentration 2.3 g. per 100 ml., and blood urea 36 mg. per 100 ml.

In May, 1949, a left dorso-lumbar ganglionectomy and splanchnicectomy was performed by the transpleural route, the ganglia from D 6 to L 1 being removed. After this he had complete relief from angina of effort. His blood pressure remained in the region of 155/110 until the beginning of October, when it began to rise again. During this period, however, he complained of vague epigastric discomfort and distension with occasional slight nausea.

He was readmitted in November, 1949, with a blood pressure of 198/118, and a right dorso-lumbar ganglionectomy and splanchnicectomy was performed, the ganglia from D 6 to L 1 being removed. After this operation he remained completely free from angina, and his own doctor never found his systolic blood pressure higher than 180. However, he began to have attacks of epigastric distension and vomiting. At first these attacks occurred at intervals of several months, but later the intervals shortened to two or three weeks. During the attacks vomiting was profuse and continued at 24 hours or more until the stomach was completely emptied; food taken the previous day was sometimes recognized. His appetite failed, he lost weight, and he experienced increasing constipation. Pain was absent throughout. He was seen in consultation on July 25, 1951, when a diagnosis of pyloric stenosis was made; at that time his blood pressure was ranging between 160/100 and 140/90. A barium-meal examination showed a large resting content in the stomach and a marked degree of pyloric stenosis, which was not lessened after treatment with atropine. He was admitted once more in August, and laparotomy was performed in September. There was a large active chronic ulcer of the anterior duodenal wall, covered by omental adhesions; the stomach was dilated and its muscular wall was much hypertrophied. A posterior (no-loop antiperistaltic) gastro-jejunostomy was performed.

He remained well for eight months, then began to have a sense of fullness after meals with anorexia but no pain. On August 24, 1952, he was awakened with sudden severe pain radiating over the whole abdomen and accompanied by tenderness and rigidity. A laparotomy was carried out (Mr. J. Hinton Robertson); after evacuation of a considerable quantity of gas and fluid, a perforated jejunal ulcer was located diametrically opposite the stoma of the gastro-jejunostomy. This was closed by suture. During convalescence a fractional test meal showed total acidity of 48 units and free HCl 22 units. Two months later the gastro-jejunostomy was undone and a partial gastrectomy was