PAPERS AND ORIGINALS

Vagotomy and Pyloroplasty for Gastric Ulcer

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Summary

In a series of 68 patients with gastric ulcer who were treated by vagotomy and pyloroplasty there were no operative deaths, though one patient who received massive transfusions died 14 weeks later from hepatic necrosis probably associated with serum hepatitis. Four patients developed recurrent peptic ulceration requiring further surgical treatment. The clinical condition of all but three of the remainder was satisfactory after an average follow-up period of three years and two months. Of the 14 patients who presented with an acutely bleeding gastric ulcer, one subsequently required gastrectomy for continued bleeding; in all the others the immediate and long-term results were satisfactory. Of 21 patients with a "high" ulcer and 29 with combined gastric and duodenal ulceration one (4.8%) and three (10%) respectively suffered recurrences. We conclude that vagotomy and pyloroplasty is a satisfactory form of treatment for a high or bleeding gastric ulcer, but that for all other gastric ulcers some form of gastric resection is preferable.

Introduction

Successful treatment of gastric ulcers by vagotomy and pyloroplasty has been reported by several authors (Hendry and Bahrani, 1965; Farris and Smith, 1966; Burge, 1966; McNeill *et al.*, 1969). Forrest (1969) reviewed the literature and concluded that the overall results were not as good as those of Billroth I gastrectomy. Even if his conclusion is confirmed there still may be a place for so-called conservative or non-resectional surgery in such patients as the elderly, the severely undernourished, and those with bleeding, with "high" ulcers, or with combined duodenal and gastric ulcers.

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Patients

Sixty-eight patients with gastric ulcer were treated by vagotomy and pyloroplasty either at the General Hospital, Birmingham (33), or the Royal Salop Infirmary, Shrewsbury (35), during the years 1962 to 1970 inclusive. Most patients had a truncal vagotomy, but 14 of the Birmingham patients had a selective vagotomy. All patients had a Heinecke-Mikulicz pyloroplasty.

The average length of history was nine years. Forty of the patients were men (average age 56, range 30 to 87) and 28 were women (average age 60, range 27 to 78). In 14 the operation was performed for acute bleeding from the gastric ulcer, six had a suspected carcinoma of the stomach, and one had a perforated ulcer. In the remainder operation was undertaken after medical treatment had failed to control their symptoms.

The patients were divided into three groups depending on the position of the gastric ulcer—prepyloric, mid-lesser curve, or "high" ulcers (Table I). Those with gastric ulcer combined with past or present duodenal ulceration are listed separately.

TABLE I—Position of Gastric Ulcer (68 Patients)

	Gastric Ulcer Only	Gastric Ulcer + Duodenal Ulcer
Prepyloric	5	4
Lesser curve	18	20
High	16	5

Criteria of Assessment

Immediate postoperative complications were recorded and all patients reviewed at least once after discharge from hospital. Most were reviewed again after one year.

In an attempt to make the review objective and unbiased, a detailed questionnaire was sent to each patient. It was designed to assess the incidence of dumping, diarrhoea or change in bowel habit, persistent vomiting, dietary restrictions, weight, and residual indigestion. The patients were also asked for their opinion of the result of the operation. Sixty completed the questionnaire. Of the eight who did not, three had died and five were not traced. However, apart from one patient who is discussed in detail later these eight patients had been seen as out-patients at least one year after operation, and some had filled in similar questionnaires previously.

The patients were graded on a modified Visick scale: grade 1, symptom free; grade 2, minor symptoms not interfering with

social or economic life; and grade 3, more major symptoms which involve some interference with social or economic life. If the ulcer had recurred the possible reasons for recurrence were assessed.

Three groups of patients were separately analysed: those presenting with an acutely bleeding gastric ulcer, those with high gastric ulcers, and those with combined gastric and duodenal ulcers.

Results

IMMEDIATE

There were no deaths while a patient was in hospital or within a month of operation. Some postoperative complication occurred in 25 (37%) (Table II). The commonest complication was respiratory infection, followed by wound infection or haematoma, deep venous thrombosis, and diarrhoea. There were

TABLE II—Postoperative Complications (25 Patients)

Chest infection	11 (1 needed a respirator)
Wound infection	5
Wound haematoma	2 (1 incisional hernia)
Deep vein thrombosis	3 (1 pulmonary embolus)
Diarrhoea	4
Re-bleeding	2 (1 gastrectomy)

Two patients had more than one complication.

only two serious complications, both in patients who had had a severe haematemesis. One woman receiving steroid medication had associated septic arthritis and cardiac failure. She had a massive haemorrhage from a chronic gastric ulcer and was treated by vagotomy and pyloroplasty. After operation she had a severe chest infection and needed assisted respiration by a respirator for several days. She then recovered well. The other patient is discussed in detail.

A 39-year-old male methylated spirit drinker was admitted to hospital with a massive haematemesis. On the same day a vagotomy and pyloroplasty was performed for a high posterior gastric ulcer. The stomach was dissected off the pancreas, a biopsy specimen was taken from the ulcer edge, the splenic artery in the base was undersewn, and the gastric defect was closed. He received 10 pints (5.7 litres) of blood. Ten days later further severe bleeding from the ulcer bed necessitated a partial gastrectomy and the splenic artery was again undersewn. He received another 12 pints (6.8 litres) of blood. A further 10 days later severe bleeding recurred. The splenic artery was then ligated at the coeliac axis, and another 16 pints (9.1 litres) of blood and 7 pints (4 litres) of plasma were given. He appeared to make a satisfactory recovery and was discharged from hospital.

Fourteen weeks after the first operation he was readmitted with acute liver failure and hepatic coma and died 24 hours later. Necropsy showed massive liver necrosis consistent with viral hepatitis. Homologous serum jaundice probably followed the blood and plasma transfusions he received.

LONG-TERM

Recurrences.—Four patients (all in the Birmingham series) developed further peptic ulceration (Table III). One woman with both lesser curve and duodenal ulcers needed an antrectomy for a recurrent duodenal ulcer. An insulin test was not done. Two women with both lesser curve and duodenal ulcers had a Billroth I gastrectomy for recurrent gastric ulcer—the insulin

TABLE III—Recurrent Ulcers in 4 Patients

Original Ulcer	Time Recurrence	Insulin Test	Recurrent Ulcer	Treatment
Lesser curve + D.U.	8 months	Omitted	D.U.	Antrectomy Good
Lesser curve + D.U.	8 months	Positive	Lesser curve × 2	Gastrectomy Good
Lesser curve + D.U.	2 months	Negative	Lesser curve	Gastrectomy Good
High	2 years	Negative	High	Gastrectomy Good

test was negative in one and positive in the other according to the criteria of Hollander. One man with a high gastric ulcer developed a recurrent gastric ulcer and had a negative insulin test. His subsequent gastrectomy was particularly difficult. These four patients are now well with no significant digestive symptoms. Three of them developed their recurrent dyspeptic symptoms within a few months of the original vagotomy and pyloroplasty.

Clinical Assessment.—Excluding the four patients with recurrent ulceration and the patient who died 14 weeks post-operatively, there were 63 patients available for long-term follow-up. Their modified Visick grading is shown in Table IV. The average length of follow-up for these patients was three

TABLE IV—Long-term Visick Grading (63 Patients)

Grade No. (%)	1 39 (58)	2 21 (31)	3 3 (5)	Recurrences 4 (6)
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years and two months, and 17 patients were followed up for more than five years. Minor occasional diarrhoea or looseness of bowel action was the reason for inclusion of most patients in the Visick 2 grade. The three patients in the Visick 3 grade suffered from dumping, diarrhoea, vomiting, or indigestion, but none had a recurrence demonstrable on a barium meal examination. One patient felt no better after operation but two claimed to be improved. Excluding the patient who died of homologous serum jaundice 94% have no recurrence and 90% have a satisfactory long-term result (Visick 1 or 2).

Bleeding Ulcers.—All the 14 patients who presented with an acutely bleeding gastric ulcer left hospital alive. The operation did not succeed in controlling the haemorrhage in the one case already discussed. One other patient had slight postoperative intragastric bleeding which settled spontaneously. Therefore, in 93% of cases the operation was successful in controlling the bleeding with no recurrence on long-term follow-up.

High Ulcers.—Twenty-one patients in this series had an ulcer high up on the stomach wall, but only one (4.8%) has recurred.

Combined Ulcers.—Twenty-nine patients in this series had a gastric ulcer combined with present or past duodenal ulceration. Three (10%) of these developed a recurrent ulcer, all within one year of operation—one was a recurrent duodenal ulcer and two were recurrent gastric ulcers.

Discussion

For most surgeons a Billroth I gastrectomy is still the treatment of choice for gastric ulcer, and vagotomy with pyloroplasty must be shown to offer definite advantages if it is to be preferred in any particular case. No operative mortality was reported by Goligher *et al.* (1968) following gastrectomy, vagotomy and antrectomy, or vagotomy and gastroenterostomy in a trial involving 507 patients, and, though technically difficult cases were excluded from this trial, it seems unlikely that gastrectomy would have a much higher mortality than vagotomy and pyloroplasty. Functional sequelae have been shown to be as common after vagotomy and pyloroplasty as after gastrectomy in cases of duodenal ulcer (Goligher *et al.*, 1972), and reported recurrence rates for gastric ulcer treated by vagotomy and pyloroplasty are generally higher (Duthie *et al.*, 1970; Sawyers *et al.*, 1971) and the symptomatic results less satisfactory (Duthie *et al.*, 1970) than after gastrectomy.

As the present series of cases was surveyed retrospectively it was often difficult to be sure why vagotomy and pyloroplasty was chosen in preference to a Billroth I gastrectomy. Apart from those who were unfit or elderly, however, there were three groups in which some special factor was present which may have influenced the decision.

Combined Gastric and Duodenal Ulcers.—A gastric ulcer

associated with past or present duodenal ulceration may be a secondary lesion, due either to gastric stasis (Johnson, 1955) or to bile reflux (Capper, 1967). It might, therefore, be reasonable to hope that cure of the duodenal ulcer by vagotomy and pyloroplasty would be followed by healing of the gastric ulcer as well, and Douglas and Duthie (1971) reported no recurrences in 35 patients with combined ulcers treated in this way. In our series, however, 3 out of the 29 patients in this group suffered a recurrence. Kraft *et al.* (1971) also reported a 10% recurrence rate for combined ulcers compared with only 3% for isolated gastric ulcers treated by vagotomy and pyloroplasty, while in the series of 72 patients with gastric ulcer similarly treated by Burge *et al.* (1970) the three who developed further gastric ulceration all had associated duodenal lesions. We therefore feel that for combined ulcers vagotomy and antrectomy is a better alternative to gastrectomy as a primary operation than vagotomy and pyloroplasty.

High Ulcers.—Vagotomy and pyloroplasty gave satisfactory long-term results in all but 1 of our 21 patients with high ulcers. Most of these ulcers were on or close to the cardia and, as was often recorded in the operation notes, gastrectomy with removal of the ulcer would have been difficult or extensive. In some cases a Pauchet manoeuvre would have helped to minimize the extent of resection, but there would probably have been a greater risk of operative death or of long-term nutritional side effects than with vagotomy and pyloroplasty. A third possibility is the Kelling-Madlener operation, in which the ulcer (after biopsy) is left in situ and a distal gastrectomy performed. Mauer (1951) reported good results with this operation, and it has been suggested as a possible alternative to gastrectomy by Farris and Smith (1966). We believe, however, that in patients with high ulcers vagotomy and pyloroplasty with biopsy of the ulcer edge is probably the wisest choice.

Bleeding Gastric Ulcers.—Fourteen of our patients presented with acute haemorrhage and this may well have been regarded as an indication for a shorter and less traumatic procedure than gastrectomy. In 13 both the immediate and long-term results were satisfactory; the remaining patient was bleeding from the ulcer base on the pancreas, and re-bled even after gastrectomy. Unless the ulcer is so situated that gastrectomy is relatively easy, we prefer vagotomy and pyloroplasty, with undersewing of the ulcer, as a life-saving procedure in the presence of haemorrhage. In a series of 77 cases of bleeding peptic ulcer (26 of which were gastric) reviewed by Foster *et al.* (1965) the mortality for this

form of treatment was 12% compared with 22% for gastrectomy, although the incidence of further haemorrhage was the same.

Conclusion

We believe that for an easily resectable gastric ulcer a Billroth I gastrectomy is the treatment of choice, with the addition of vagotomy if duodenal ulceration is also present. However, for the high and difficult gastric ulcer and for the bleeding gastric ulcer vagotomy and pyloroplasty is an acceptable alternative to partial gastrectomy. But as with all forms of conservative surgical treatment of gastric ulcer the possibility of malignancy must be remembered and biopsy should never be omitted. A four-quadrant specimen has been advocated by many authors; we prefer excision of a specimen from the rim of the ulcer but not including the base. This can readily be achieved even with the difficult high posterior ulcer via an anterior gastrotomy, the resulting defect being closed with catgut from inside the stomach.

Requests for reprints should be sent to Mr. J. Alexander Williams.

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Vagotomy for Gastric Ulcer

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Summary

Out of a series of 75 patients who were treated by vagotomy and drainage for gastric ulcer 66 have been followed up for one to seven years (average three-and-a-half years). Four recurrent gastric ulcers occurred among the 33 cases of ulcer of the lesser curve or body with no antral or duodenal lesion (type I). Among the 42 patients with an antral ulcer or an associated active or healed

pyloric or duodenal lesion (type II or III) there was only one recurrence. The recurrence rate for men was 5% and for women 12%. One patient died two years after operation from cancer which may have originated in the stomach. The clinical results in patients without recurrences were generally satisfactory.

Vagotomy, preferably selective, with drainage is a satisfactory operation in gastric ulcers of types II and III. For ulcers of type I, gastrectomy is to be preferred except in selected cases.

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Introduction

Most surgeons in Britain today accept vagotomy, associated with a drainage procedure, as the treatment of choice for duo-