

# Recurrent Ulceration after Operation for Peptic Ulcer: Results after Gastroenterostomy, Gastrectomy and Vagotomy in 64 Cases

JAMES E. THOMPSON,\* M.D., THOMAS H. DAILEY,\*\* M.D.

*From the Surgical Services of the Roosevelt Hospital, New York City*

DURING the past 20 years many surgeons treating patients with peptic ulceration have abandoned the traditional two thirds gastrectomy. This has been motivated both by a desire to find a better operative procedure resulting in lower morbidity and mortality. Increasing reliance is being placed on vagotomy to reduce the incidence of recurrent ulceration. Accordingly, we have seen the adoption of vagotomy and gastroenterostomy, then vagotomy and two thirds gastrectomy; and then in sequence, vagotomy and hemigastrectomy, vagotomy and pyloroplasty, and finally vagotomy and antrectomy.

One of the most distressing results following operation for peptic ulcer is the development of recurrent ulceration. The term "recurrent" ulceration is used because it encompasses not only marginal or gastrojejunal ulcers, but also ulcers that may recur in the duodenum following gastroenterostomy, pyloroplasty or the Billroth I procedure. It also applies to gastric ulcers developing after operation for duodenal ulcer.

Ten years ago the senior author reported<sup>5</sup> 63 patients surgically treated for marginal ulcers, 35 following gastroenterostomy and 28 following gastrectomy. The present report includes reference to this

earlier group and adds 64 cases treated at The Roosevelt Hospital during the subsequent 10-year period, 1955 to 1964 (Table 1).

In the latter series 23 marginal ulcers developed following operation performed in our hospital, while in the remaining 41 the primary procedure was performed elsewhere.

Symptomatology and diagnosis of recurrent ulceration, has been covered adequately in the literature.<sup>2, 4</sup> Primary surgical procedures in the series varied but can be classified as 1) some form of gastrectomy with or without vagotomy, and 2) gastroenterostomy with or without vagotomy. In many instances more than one previous operation had been performed.

In comparing the two groups in regard to previous operation, several features are noted. The majority of recurrent ulcers in the previous report (1937-1954) were associated with posterior gastroenterostomy, whereas in the recent series, most recurrent ulcers followed gastrectomy. Also in the present series there is a definite increase in the number of patients who had undergone vagotomy previously. In 1964, 92 operations were performed for duodenal ulcer, 64 of which included vagotomy, whereas in 1955, none of 80 gastrectomies for duodenal ulcer included vagotomy.

Forty patients, almost two thirds of those with recurrent ulcers, had bleeding as a recent or initial symptom; twenty bled mas-

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Presented before the Southern Surgical Association, Dec. 7-9, 1965, Hot Springs, Va.

\* Chief of Surgery.

\*\* Chief Surgical Resident.

sively, and 12 underwent emergency operation. Six patients were admitted with a perforated marginal ulcer. The severity of hemorrhage and the extent of peritoneal soiling from a perforated ulcer, are complications which influence the choice of operative procedure.

Until recently we favored the Billroth II procedure for primary duodenal ulceration, using the Billroth I only for the occasional gastric ulcer. In the past 10 years vagotomy has been added with increasing frequency to gastrectomy for duodenal ulcer. Vagotomy was performed in about two thirds of cases during 1964. Only in the past 5 years have we employed vagotomy and pyloroplasty, at first only sporadically, but in the past 2 years quite frequently. In the year 1964 this procedure was employed in 43 patients, 15 of whom underwent emergency operations for massive hemorrhage.

Certain features about the surgical treatment of duodenal ulcer are important in lowering the incidence of recurrent ulceration: 1) Removal of all gastric antrum when performing gastrectomy; in particular, removal of all antral mucous membrane when closing the duodenal stump. 2) Use of a short proximal jejunal loop when performing gastrojejunostomy. 3) Removal of at least two thirds of the stomach when not adding vagotomy to the procedure. 4)

TABLE 1. *Recurrent Ulceration after Gastric Surgery*

Previous Operation	1937-1954		1955-1964	
Gastroenterostomy	35		19	(5)
Gastrectomy	28		43	(7)
Pyloroplasty and vagotomy	0		1	
Pyloroplasty	0		1	
Total	63	(4)	64	(13)

() = Vagotomy at previous operation.

Avoidance of any type of anastomosis that might divert alkaline duodenal contents from the gastrojejunostomy stoma.

The only violation of these principles in the present series was that too frequently inadequate resection had been performed at the original gastrectomy.

#### Analysis of 64 Cases

##### Recurrence after Gastroenterostomy (14)

(Five of the 19 cases in Table 2 are discussed separately under Miscellaneous.)

Gastroenterostomy in three patients was originally performed in our hospital. Five patients were admitted because of massive hemorrhage with clinical shock. An emergency procedure was necessary in all but one.

TABLE 2. *Results of Operation for Recurrent Ulcer after Gastroenterostomy (1955-1964)*

Operation	No. Cases	Op. Death	Second Recurrent Ulcer	Good Result		Lost to Follow up
				1-5 Years	5-10 Years	
Gastrectomy	13*	1	1	4	5	2
Gastrectomy with vagotomy	3	0	0	3	0	0
Trans-abdominal vagotomy	2	0	0	1	0	1
Ablation gastroenterostomy	1	0	1	0	0	0
Total	19	1	2	8	5	3

\* Five had previous vagotomy.

TABLE 3. *Result of Operation for Recurrent Ulcer after Gastrectomy (1955-1964)*

Operation	No. Cases	Op. Death	Second Recurrent Ulcer	Good Result		Lost to Follow up
				1-5 Years	5-10 Years	
Revision gastrectomy with vagotomy	13	1	1	9	1	1
Trans-abdominal vagotomy	11	1	0	5	1	4
Trans-thoracic vagotomy	7	0	1	0	4	2
Revision gastrectomy	2	0	0	1	0	1
Conversion Billroth II to Billroth I	5	0	1	1	2	1
Miscellaneous	5	1	0	0	2	2
Total	43	3	3	16	10	11

Previous vagotomy had been performed on three of the trans-abdominal, two of the trans-thoracic and both of the gastric revision patients.

*Partial Gastrectomy—Billroth II Without Vagotomy* (5). Operation usually entailed division of the proximal and distal jejunal loops, followed by end-to-end jejunojejunostomy. The stoma was removed intact along with the distal two thirds of the stomach. The new jejunojejunostomy thus lay in the proximal jejunal loop.

In one patient, for speed in accomplishing the emergency operation and because of the patient's precarious condition, a quicker means of accomplishing the gastrectomy was chosen. The gastroenterostomy lay at a slightly higher level than normal so it was left in place; then the stomach was divided distal to it. The marginal ulcer lay exposed in the stoma and was transfixed, thus controlling hemorrhage. The open end of the stomach was then closed in the classical fashion first employed by Billroth. Unfortunately, less than 50 per cent of the stomach was removed. The patient had a hemorrhage 4 months later and underwent transthoracic vagotomy. This case represents the only poor result in the group.

*Results:* 1. Good results followed in four cases for 8, 8, 10 and 10 years, respectively.

2. One patient bled 4 months later, had a transthoracic vagotomy and is now lost to follow up.

*Partial Gastrectomy—Billroth II Without Vagotomy (Done at a Previous Procedure)* (4). The vagotomy in each case had been performed at our hospital. The intervals between vagotomy and the present gastrectomy were 5 months, 2, 2 and 5 years, respectively.

*Results:* 1. Two patients are well for 1 and 2 years, respectively. 2. One patient died postoperatively from peritonitis. 3. One patient died 2 years later, cause unknown.

*Partial Gastrectomy—Billroth II With Vagotomy* (2). Two patients have done well for 3 and 4 years, respectively.

*Subdiaphragmatic Vagotomy* (2). One patient underwent emergency ligation through a gastrotomy incision of a massively bleeding stomal ulcer; then vagotomy was performed. The other patient underwent emergency vagotomy and closure of a perforated stomal ulcer.

**Results:** 1. The patient with massive bleeding has done well for 5 years. 2. The patient who had a perforated ulcer is lost to follow up.

*Ablation of Gastroenterostomy Stoma With Restoration of Normal Anatomy (1).* This patient, admitted in poor condition, was bleeding massively from a marginal ulcer. He had a recurrent ulcer, and 2 years later underwent elective vagotomy and two thirds gastrectomy.

**Result:** Since gastrectomy the patient has done well for 2 years.

#### Recurrence after Gastrectomy (44)

Gastrectomies in 18 patients had been performed in our hospital, the remainder elsewhere (Table 3). Massive hemorrhage was the reason for operation in 13, and as an emergency in six.

*Revision of Gastrectomy With Vagotomy (13).* This treatment was used when an inadequate amount of stomach had been removed and when it was thought advisable to remove the marginal ulcer. This provides a specimen for microscopic study (one patient in the 1937-1954 series had a carcinoma at the stoma) and may serve to shorten a lengthy proximal jejunal loop.

**Results:** 1. There were two operative deaths, and one patient developed a second marginal ulcer. 2. Two patients died later of other causes. 3. Eight patients were free of symptoms for 1, 1, 1, 2, 2, 4, 4, and 7 years, respectively. 4. One patient was lost to follow up.

*Subdiaphragmatic Vagotomy (11).* This was the sole procedure carried out when it was believed that an adequate amount of stomach had been removed previously. If the operation had been performed elsewhere the closed duodenal stump was investigated. One patient had previously undergone gastrectomy and vagotomy else-

where; a Hollander test indicated that vagotomy was incomplete, and this proved to be so at operation. Another was bleeding massively, and prior to vagotomy the bleeding ulcer was transfixed through a gastrotomy.

**Results:** 1. There was one postoperative death 38 days after reoperation for intestinal obstruction. 2. Four patients have been lost to follow up, but the remainder are without ulcer symptoms for 1, 1, 2, 2, 4, and 6 years, respectively.

*Trans-thoracic Vagotomy (7).* This operation was employed for a variety of reasons. On two occasions it was performed as a delayed procedure 2 weeks after closure of a perforated marginal ulcer. On another occasion it was a secondary operation performed after the patient recovered from a gastrotomy and ligation of a bleeding marginal ulcer. In one case it was performed because a previous subdiaphragmatic vagotomy was thought to be incomplete. The remainder were submitted to this form of vagotomy at the choice of the surgeon because he believed the gastrectomy needed no revision, and there was no severe bleeding.

One disadvantage to the thoracic approach to vagotomy is the inability to establish the existence of the marginal ulcer. However, in this group of seven cases there was strong clinical evidence of such ulceration.

**Results:** 1. One patient developed a marginal ulcer for the second time, and the Billroth II was converted to a Billroth I. He has been without symptoms for 3 years. 2. Four patients are without evidence of recurrent ulceration for 6, 6, 7, and 7 years, respectively. 3. Two cases are lost to follow up.

*Revision Of Stoma And Additional Gastrectomy (2).* One of these patients had undergone gastrectomy and vagotomy at our hospital a few years previously. In one in-

stance vagotomy was found to be complete by the Hollander test. The other patient had high acid secretion, and the vagus nerves were not reinvestigated; the surgeon chose to remove additional stomach to accomplish a three-quarter gastrectomy.

*Results:* One patient is confined to a mental institution at the end of 1 year; the other is lost to follow up.

*Conversion of Billroth II to Billroth I (5).* (Case described above is not included). The performance of this operation is based on the hope that a patient who develops recurrent ulcer after a Billroth II procedure may have a duodenum that will not ulcerate after the Billroth I, despite some evidence of a higher rate of recurrence after a Billroth I anastomosis.<sup>3</sup> In no instance was this primary conversion accomplished with vagotomy.

*Results:* 1. Good results were achieved in each of two cases for 8 years. 2. One patient had a poor result initially. Within a year he had recurrent ulcer symptoms and eventually underwent pyloroplasty and vagotomy along with removal of a calculous gallbladder. He has been well for 2 years. 3. One patient with advanced hepatic cirrhosis was readmitted on several occasions with melena. In 1965 this patient had a sudden exsanguinating hemorrhage and at emergency operation was found to be bleeding from a recurrent duodenal ulcer. 4. One case is lost to follow up.

*Miscellaneous (5).* One patient who had perforated a marginal ulcer was treated by closure of the perforation. The remaining four cases were operated upon as emergencies for massive hemorrhage and were treated by transfixion of the bleeding ulcer through a gastrotomy parallel to the stoma. One patient also underwent subdiaphragmatic vagotomy.

*Results:* 1. The patient with perforated ulcer has had no symptoms for 8 years. One who underwent gastrotomy has been

well for 7 years. 2. One patient died post-operatively from hepatic coma and myocardial infarct. 3. Two patients are lost to follow up.

### Miscellaneous (8)

In this category are placed those patients whose re-recurrent ulceration was not stomal. It includes five patients who developed gastric ulcers: one after a Billroth I, three after posterior gastroenterostomy and one after simple pyloroplasty. The patient who had undergone the Billroth I procedure subsequently underwent vagotomy and ligation of a massively bleeding prepyloric ulcer. He is lost to follow up. The other four patients, one of whom had already undergone vagotomy and gastroenterostomy, were treated by gastrectomy. Two are lost to follow up, and the other two are well after 2 and 4 years, respectively.

Two patients had undergone gastroenterostomy but developed recurrent duodenal ulceration. One patient had a massively bleeding recurrent duodenal ulcer 2 years following emergency vagotomy, pyloroplasty and transfixion of a bleeding ulcer. These three patients underwent gastrectomy; vagotomy was added in one. They have remained well for 2, 3 and 4 years, respectively.

### Discussion

The operation preceding development of a recurrent ulcer is given for the 10-year period of this series (and for our earlier experience from 1937 to 1954) in Table 1. In the past 10 years we encountered more recurrent ulcers following gastrectomy and fewer after gastroenterostomy. In our experience since 1937 we have never encountered a gastro-jejuno-colic fistula associated with marginal ulcer following gastrectomy. Four such fistulas following gastroenterostomy were treated before 1955, but none since.

TABLE 4. *Follow Up of Recurrent Ulcer [1937-1954]*

Primary Operation for Recurrent Ulcer	No. Cases	Second Recurrent Ulcer	Good Result		Total Cases (>50 years of age 38)	
			10-15 Years	15-20 Years		
Gastrectomy without vagotomy	17	4*	4	9		63
Gastrectomy with vagotomy	10	4**	4	2	Operative Deaths	2
Ablation gastro- enterostomy	1	0	0	1	Died of other disease	4
					Lost to follow up	29
Total	28	8	8	12	Recurrence	28

\* One died of massive hemorrhage.

\*\* Three died of massive hemorrhage.

Reliance is placed on vagotomy both to prevent and to treat marginal ulceration. In the earlier group only four of 63 patients undergoing operation for marginal ulcer had vagotomy as part of a previous procedure, whereas in the recent group, 13 of 64 patients had already been treated by vagotomy.

Vagotomy was performed in our hospital on eight of the 13 patients. The pathologic report of tissues removed in these cases indicated that two patients had incomplete vagotomy. (We have not undertaken frozen section examination of the vagus nerves.) There is every indication that the vagotomy in the other six patients had been accomplished.

No Hollander test or gastric analysis was performed on seven of the 13 patients. Failure to test five of the patients for vagal function was due to: one had perforated ulcer, two underwent emergency operations for massive hemorrhage, and two were admitted bleeding massively. A Hollander test indicated complete vagotomy in one; gastric analysis suggested some vagal function in two and no free HCL in three. In one report of a large series,<sup>7</sup> Hollander tests performed postoperatively indicated complete vagotomy in 82 per cent.

Operations in the 1955-1964 period were primarily urgent and associated with bleed-

ing or perforation; attention was then directed towards preventive measures. Vagotomy was performed if it had not been done previously or was incomplete, providing conditions permitted the added operation. Exceptions were those cases in which a Billroth II was converted to a Billroth I.

There were four operative deaths in the present series, a mortality rate of 6 per cent. Three have since died of other causes. Forty-one of the remaining 57 patients were followed. Five developed a second recurrent ulcer; in three the operative procedure did not include vagotomy.

### Summary and Conclusions

In the 10-year period from 1955 to 1964, 661 gastrectomies for duodenal ulcer were performed at The Roosevelt Hospital. We have evidence that 18 developed recurrent ulcers, a recurrence rate of 2.7 per cent (1.5% for those having vagotomy and 3.2% for those with gastrectomy alone). Undoubtedly others lost to follow up also have developed a new ulcer. It is not unreasonable, therefore, to assume that the recurrence rate following gastrectomy is nearer 4 or 5 per cent, if one includes patients managed medically.

We also have information concerning the outcome of patients previously reported<sup>5</sup>

who were operated upon during the years 1937-1954 (Table 4). During this 28-year period 125 patients underwent operations for recurrent ulcer (two patients are included in both time periods).

Thirteen of 71 patients who survived operation, did not die of other causes, and who were followed, developed a second recurrent ulcer, an incidence of 18 per cent. Thirty-seven of these patients had undergone vagotomy, of whom six developed a second recurrent ulcer, an incidence of 16 per cent. The remaining 34 patients had not had vagotomy, and seven developed a second recurrent ulcer, an incidence of 20 per cent.

Ulcer recurrence rate for individuals with marginal ulcers is three to four times greater than it is for patients with duodenal ulcer undergoing initial gastrectomy. Vagotomy will not always ensure complete and permanent protection against recurrent ulceration. Although the total number of cases we reported is not large and the follow up is not lengthy, the figures from our institution and elsewhere<sup>1, 6, 8, 9</sup> indicate that vagotomy offers some benefit in the treatment of established recurrent ulcers.

Massive hemorrhage was the initial symptom in 20 patients, 12 of whom required emergency operation. In addition, six patients were suffering from perforated ulcer.

In elective situations, adequate gastrec-

tomy and vagotomy are recommended. Lesser though acceptable procedures such as pyloroplasty or gastrotomy and suture of the bleeding ulcer may be indicated during massive hemorrhage. Subdiaphragmatic vagotomy should be added whenever possible; otherwise trans-thoracic vagotomy should be performed as soon as possible postoperatively.

In perforated marginal ulcers simple closure of the ulcer or revision of the anastomosis should be done in association with, or followed at a later date by, vagotomy.

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### DISCUSSION

DR. WALTER J. BURDETTE (Houston): I would like to comment on recurrent ulceration in two types of cases: 1) those having had vagus resection and pyloroplasty; and 2) those having had plication of a perforated ulcer.

Dr. Brian Rasmussen and I have examined the results in 308 cases of vagus resection with concomitant pyloroplasty over a period of 10 years. We have found that there were 12 recurrences, two with gastric as well as duodenal component, all of these having occurred within 1½ years following operation. Free gastric acid was found in all of

these; in the 10 that permitted a Hollander test there was evidence that the nerve had not been completely resected. Operation was performed by a different surgeon in each case. Eight of these had gastro-intestinal bleeding following surgery. Four had recurrent pain.

The management of five of these was trans-thoracic vagus resection with actual evidence of intact nerve fibers. Two had subtotal gastrectomy. Three have been followed on medical therapy alone. Two are dead, one from an unrelated cause, an automobile accident, and one from massive hemorrhage and hepatic failure beginning 8 months