

SURGERY FOR CHRONIC DUODENAL ULCER: COMPARISON OF RESULTS WITH VAGOTOMY—POSTERIOR GASTROJEJUNOSTOMY AND WITH VAGOTOMY— HEMIGASTRECTOMY

Evaluation of a Personal Series of 200 Patients

STANLEY O. HOERR, M.D.
Department of General Surgery

IN recent years our understanding of the advantages and the disadvantages of certain standard elective operations for chronic duodenal ulcer has improved. As a consequence, our ability to select the "best" operation for a patient deserving surgery is steadily improving. However, since it is unlikely that a single operation ever will prove suitable for every candidate for surgery for chronic duodenal ulcer, a continuing analysis of results of the various operations currently in use would seem to be in order. The report presented here is an evaluation of a personal series of 200 patients, 100 of whom underwent vagotomy—posterior gastrojejunostomy, and 100 of whom underwent vagotomy—hemigastrectomy for chronic duodenal ulcer, during the years 1950 through 1957. The series is consecutive for the operations performed except as noted in the tables; one patient was lost to follow-up.

Operations Currently Used

Partial gastrectomy for chronic duodenal ulcer probably is still the most widely used operation in the country at large, as it was shown to be in Ohio by a survey¹ performed several years ago. In general, the amount of stomach removed governs the effectiveness of the operation as well as the severity of the sequelae. The more stomach that is removed, the less likely is there to be recurrent ulceration, but the more likely are there to be symptomatic weight-loss and the dumping syndrome.

Hospital mortality rates disclosed in the survey¹ varied from 0 to 7.8 per cent, averaging about 5 per cent for the State of Ohio. A high mortality for an elective operation is the most serious argument against its use. The mortality after partial gastrectomy is unrelated to the amount of stomach removed, since usually it is secondary to technical problems related to the duodenal stump.

Vagotomy and drainage procedure. A few surgeons in a few centers have continued to believe in and to perform vagotomy—gastrojejunostomy, or vagotomy—pyloroplasty.²⁻⁵ For many years vagotomy—posterior gastrojejunostomy was the standard operation for chronic duodenal ulcer at the Cleveland Clinic Hospital. When it appeared that there would be a substantial number of patients with recurrent ulceration (more than 10 per cent) some of whom would require another operation, we shifted to vagotomy—hemigastrectomy. Evidence presented in this

paper concerning both relative mortality rates (inevitably greater in vagotomy—hemigastrectomy) and the current status of the patients, influenced us to turn to vagotomy—pyloroplasty as a standard operation. It may be stated that the mortality rate for drainage procedures (1.7 per cent for the State of Ohio¹) is lower than that for gastrectomy and that there is no postoperative problem of severe malnutrition. On the other hand, a recurrent ulceration at the anastomotic margin or in the duodenum or the stomach is more frequent than after gastrectomy, and some patients will require a partial gastrectomy at a second operation.

Vagotomy with gastric resection has been pioneered by several surgeons,⁶⁻⁸ and was used by us as the standard operation for a number of years. It has proved to be the most effective operation against recurrent ulcer, as the study of Herrington and associates⁹ recently has shown conclusively. This study renders obsolete an extensive resection of the stomach with its undesirable aftereffects, but the basic risk to life of gastrectomy remains, and undoubtedly patients will be lost who might have lived if a simple procedure without resection had been used.

Other operations. *Vagotomy alone* has no place as the sole surgical procedure to treat chronic duodenal ulcer, since postoperative obstruction and retention with possible nonhealing of the ulcer are entirely too prevalent. *Gastrojejunostomy alone* may be rarely employed in older patients with low gastric acidity and "burnt-out" ulcers where obstruction is the chief indication for surgical intervention. Most surgeons today will prefer to add vagotomy to this procedure. *Pyloroplasty alone* will be performed when a surgeon seeking an ulcer finds none, and hence it will not be therapy for an ulcer. (If he finds one, he should perform vagotomy also.) Other procedures such as the *tubular resection* have not been widely used.

A Personal Series

Since 1950 I have conducted a "forward" follow-up of all patients operated upon by me for chronic duodenal ulcer, starting at the time of operation and continuing it "forward" to the death of the patient. The advantages of comparisons within a personal series are obvious: selection of patients, operative technic, and evaluation are standardized. Likewise, the ease with which an individual's bias may be perpetuated in a personal series is obvious. The reader is invited to make the necessary allowances for possible bias.

Procedures. Three procedures have been used as routine or standard operations from 1950 to the present:

- 1950 through 1952: Vagotomy—posterior gastrojejunostomy (Series A)
- 1953 through 1957: Vagotomy—hemigastrectomy (Series B)
- 1958 to the present: Vagotomy—Heineke-Mikulicz—pyloroplasty
(with the one-layer technic of Weinberg and associates⁴)

None of the procedures listed has been used in a given period to the absolute exclusion of other procedures. For example, the partial gastrectomy without

vagotomy has been the usual emergency operation for massive hemorrhage. A gastric resection has been performed with or without vagotomy in a patient whose ulcer lay very near the pylorus and there was uncertainty as to whether it was a gastric or a duodenal ulcer. Gastric resection has also been performed in a patient in whom a gastric ulcer and a duodenal ulcer coexisted. During the later period when vagotomy—hemigastrectomy was the procedure of choice, vagotomy and a drainage procedure were unhesitatingly used in patients who were poor risks or in whom local inflammation appeared to render resection hazardous. *Table 1* lists the number of each type of operation performed during each period.

Table 1.—*Types of surgical procedure used for duodenal ulcer (excluding acute perforation) in 1950—1957*

Surgical procedure	Number of patients
Years, 1950—1952	
Vagotomy—posterior gastrojejunostomy* (Comprises Series A)	100 (88%)
Vagotomy—partial gastrectomy	5
Partial gastrectomy	9
Total	114
Years, 1953—1957	
Vagotomy—hemigastrectomy† (Comprises Series B)	100 (69%)
Vagotomy—posterior gastrojejunostomy	35
Partial gastrectomy	7
Vagotomy—pyloroplasty	2
Total	144

*No deaths in Series A.

†Two deaths in Series B.

Mortality and follow-up. Excluded from the mortality statistics for elective operations were any deaths following emergency surgery. (Patients surviving urgent or emergency procedures, on the other hand, have been included in evaluating late results.) Too little time has elapsed to permit evaluation of results of vagotomy—pyloroplasty, although early results suggest that they will be similar to those of vagotomy—posterior gastrojejunostomy. *Tables 2* and *3* give data on the survival and follow-up of patients.

Criteria. Two main classifications are used to analyze results: (1) "failure-at-

Table 2.—*Vagotomy—posterior gastrojejunostomy for chronic duodenal ulcer: follow-up periods for 100 patients**(No patient was lost to follow-up; three patients were excluded from this series.*)*

Number of years postoperatively	Number of patients	
	Living	Dead
(Hospital death)	—	0
1	0	1
2	0	2
3	0	1
4	1	3
5	0	1
6	12	0
7	29	2
8	35	0
9	13	0
Total	90	10
Grand total	100	

*To compensate in the series for the three patients who were excluded from follow-up, the next three consecutive patients who underwent vagotomy—posterior gastrojejunostomy (nos. 101, 102, and 103) were added to this series to complete the group of 100 patients. The three patients were excluded because: one patient underwent gastric resection (for gastric retention) in the immediately postoperative period; one patient died from carcinoma of the gallbladder within one year; one patient died from hepatic cirrhosis within one year.

any-time,” and (2) “current status.” Poor results in the “failure-at-any-time” group include every patient who *at any time* after operation gave evidence of a recurrent ulcer, required another operation, or was dissatisfied with his operation. By way of contrast, in the “current status” group, good results include every patient who is satisfied with his digestive system *at the time of the most recent follow-up*, even if at some time previously there was evidence of a recurrent ulcer, or a second operation was required, or the patient now uses medication or must follow a diet.

“Failure-at-any-time” results are grouped as follows. Good result: the patient is asymptomatic or has minimal digestive or nutritional disturbance that does not interfere with his daily schedule of living; the patient is satisfied with the result.

Table 3.—*Vagotomy—hemigastrectomy for chronic duodenal ulcer:
follow-up periods for 100 patients*
(One patient was lost to follow-up;* no patient was excluded from follow-up.)

Number of years postoperatively	Number of patients	
	Living	Dead
(Hospital death)	—	2
1	3	1
2	17	1
3	19	1
4	19	1
5	22	0
6	10	0
7	2	0
8	1	0
9	1	0
Total	94	6
Grand total	100	

*To compensate in the series for the one patient who was lost to follow-up, the next patient who underwent vagotomy—hemigastrectomy (no. 101) was included to complete a series of 100 patients.

Poor result: failure has occurred at any time, because of (1) proved recurrent ulcer, (2) one or more hemorrhages, (3) symptoms of ulcer without proof of ulcer, (4) dissatisfaction of the patient.

“*Current status*” results are grouped as follows. Good result: the patient is satisfied at present and has minimal or no digestive or nutritional disturbance and no interference with his daily schedule of living. (The patient may have had a second operation, or be under treatment for a recurrent ulcer.) Poor result: the patient is consistently dissatisfied or has symptoms or an ulcer out of control.

In either the “failure-at-any-time” or the “current status” concept a result may be *equivocal* or uncertain if: (1) other diseases exist which may yield overlapping symptoms. For example, a patient died of cirrhosis of the liver within two years of operation; no recurrent ulcer was proved but the patient was a nutritional cripple; advanced cirrhosis precluded adequate evaluation. (2) The patient is neither fully satisfied with the result nor is he leading a handicapped life, yet a recurrent or persisting ulcer is not proved.

Comparison of the Two Operations

It is clear from the data already given that the duration of the follow-up for the patients who underwent vagotomy—hemigastrectomy (Series B) is much shorter, on the average, than the follow-up for the patients who underwent vagotomy—posterior gastrojejunostomy (Series A). If past experience is any clue, the longer a series of patients is followed after operation for duodenal ulcer, the greater is the number of late ulcers that develop. From this standpoint, comparison should favor the results of the more recent series of patients who underwent vagotomy—hemigastrectomy, in which the median duration of follow-up is shorter.

"Failure-at-any-time." Data for both series are presented in *Table 4*. The

Table 4.—*"Failure-at-any-time"* in relation to 200 patients in Series A and Series B who underwent surgery for chronic duodenal ulcer*

Status of patient	Number of patients	
	Series A	Series B
	Vagotomy—posterior gastrojejunostomy	Vagotomy—hemigastrectomy
Died in the hospital	0	2
Second operation	9	1 (Bile gastritis ?)
(Ulcer—4)		
(No ulcer—3)		
("Gastrojejunitis"—1)		
(Dumping syndrome—1)		
Recurrent ulcer, no operation	9	1
Unsatisfactory, no ulcer	9	10
Equivocal	4	10
Too complicated to evaluate	1	2
	Total	
	32	26
Always good result	68	74
Grand total	100	100

*See text, pages 172-173 for explanation of term.

following points are noteworthy: (1) 2 deaths in the hospital in the vagotomy—hemigastrectomy group; (2) 9 secondary operations (all patients living) in the vagotomy—posterior gastrojejunostomy group, and 1 in the vagotomy—hemigastrectomy group; (3) 13 presumptive recurrent ulcers in the vagotomy—posterior gastrojejunostomy group compared with one recurrent ulcer in the vagotomy—

hemigastrectomy group, (4) a larger "equivocal" group with resection than with gastrojejunostomy. (Surgeons who follow both types of patients have noted that when a patient represents a good result after vagotomy—posterior gastrojejunostomy he may be completely free of symptoms of "gastric consciousness." The patient who has part of the stomach resected is not so likely to be symptom-free, and he feels well only in comparison with the discomfort he had experienced from the ulcer.)

The patient listed in the result category as "too complicated to evaluate" in Series A, died five years postoperatively of cirrhosis of the liver after four satisfactory years. In one patient in Series B, tuberculosis developed from which he subsequently recovered, and one patient was treated in a mental hospital for a psychotic episode (with vomiting) from which he subsequently recovered.

Current status. Data for both series are presented in *Table 5*. In Series A, 19

Table 5.—*Current status of 200 patients in both Series A and Series B who underwent surgery for chronic duodenal ulcer*

Current status	Number of patients	
	Series A	Series B
	Vagotomy—posterior gastrojejunostomy	Vagotomy—hemigastrectomy
Died in the hospital	0	2
Always satisfactory	68	74
Living	..59	..70
Died of other disease	...9	...4
Satisfactory after initial failure	19	8
Total currently satisfactory	87	84
Consistently unsatisfactory	7	7
Equivocal	4	8
Too complicated to evaluate	2	1
Total doubtful or unsatisfactory	13	16
Grand total	100	100

patients have recovered from temporary setbacks; some of these patients required another operation. It is noteworthy that seven patients in each series—none with proven ulcer—have had consistently poor results. It is probable that psychologic and constitutional factors beyond the reach of surgery are at work in these patients. The fact that the "equivocal" group is larger in Series B than in Series A reflects the higher incidence of nutritional problems and "gastric uncertainty" that follows partial gastrectomy.

Discussion

The findings in the personal, consecutive series comparing 100 patients who underwent *vagotomy—posterior gastrojejunostomy* and 100 patients who underwent *vagotomy—hemigastrectomy* indicate that the end results are not different if one chooses to judge by the current clinical status of the patients. Only one patient has been lost to follow-up, which for the most part has been conducted by annual mimeographed questionnaires mailed to the patients.

Since *vagotomy—posterior gastrojejunostomy* was the standard operation for several years before we changed to *vagotomy—hemigastrectomy*, the follow-up for the former group is longer—a median of eight years among 90 living patients, as compared with a median of four years among 94 living patients in the second group. The significant findings appear to be the following: (1) there were two deaths in the hospital in the group who underwent resection, compared with all surviving in the group who underwent gastrojejunostomy. (2) The total numbers of patients currently satisfied in each group are about the same. (3) Nine patients who underwent gastrojejunostomy came to a second operation, which was a resection in each of eight patients. Ulcers were found in four patients and gastrojejunitis in one patient. All but one of these patients are now satisfied with the results. (4) Only one patient who underwent primary resection required a second operation: conversion of a gastrojejunostomy (Billroth II) to a gastroduodenostomy (Billroth I). (5) There are 13 patients who underwent posterior gastrojejunostomy in whom recurrent ulceration presumably developed. In most of these, symptoms were transitory and responded readily to simple measures that had proved inefficacious before operation. (6) There was only one patient who underwent vagotomy—hemigastrectomy in whom an ulcer recurred.

Conclusion

Vagotomy—posterior gastrojejunostomy is a safer operation for chronic duodenal ulcer than is vagotomy—hemigastrectomy. If one accepts the fact that in an appreciable proportion of patients (13 per cent in this series) evidence of recurrent ulceration will develop at some time, and a few patients (9 per cent in this series) will come to a second operation, vagotomy—posterior gastrojejunostomy is a valuable procedure and should be used in preference to gastric resection in (1) poor-risk patients, or (2) in patients in whom there is an inflammatory mass or other technical hazards that increase the surgical risk.

The effectiveness of vagotomy—hemigastrectomy against recurrent ulceration, highlights the obvious conclusion that larger amounts of stomach need never be removed in treating chronic duodenal ulcer.

References

1. Hoerr, S. O. (Chairman): Elective operations performed for duodenal ulcer, with their mortality; results of survey in selected hospitals by Survey Committee, Ohio Chapter, American College of Surgeons. *Am. J. Surg.* 96: 365-368, 1958.

2. Oberhelman, H. A., Jr., and Dragstedt, L. R.: New physiologic concepts related to surgical treatment of duodenal ulcer by vagotomy and gastroenterostomy. *Surg. Gynec. & Obst.* **101**: 194-200, 1955.
3. Grimson, K. S.; Rowe, C. R., Jr., and Taylor, H. M.: Results of vagotomy during 7 years; clinical observations and tests of gastric secretions. *Ann. Surg.* **135**: 621-636, 1952.
4. Weinberg, J. A.; Stempien, S. J.; Movius, H. J., and Dagradi, A. E.: Vagotomy and pyloroplasty in treatment of duodenal ulcer. *Am. J. Surg.* **92**: 202-206; discussion, 206-207, 1956.
5. Smith, G. K., and Farris, J. M.: Rationale of vagotomy and pyloroplasty in management of bleeding duodenal ulcer. *J. A. M. A.* **166**: 878-881, 1958.
6. Druckerman, L. J.; Weinstein, V. A.; Klingenstein, P., and Colp, R.: Duodenal ulcer treated by subtotal gastrectomy with and without vagotomy; six year comparative study. *J. A. M. A.* **151**: 1266-1269, 1953.
7. Johnson, H. D., and Orr, I. M.: Surgical policy for peptic ulcer. *Lancet* **1**: 253-257, 1953.
8. Farmer, D. A.; Howe, C. W.; Porell, W. J., and Smithwick, R. H.: Effect of various surgical procedures upon acidity of gastric contents of ulcer patients. *Ann. Surg.* **134**: 319-331, 1951.
9. Herrington, J. L., Jr.; Edwards, L. W.; Classen, K. L.; Carlson, R. I.; Edwards, W. H., and Scott, H. W., Jr.: Vagotomy and antral resection in treatment of duodenal ulcer: results in 514 patients. *Ann. Surg.* **150**: 499-513; discussion, 513-516, 1959.