

Comparative Concurrent Results of Vagotomy Procedures, Conventional Gastric Resection and Hemigastrectomy with Subtotal Vagotomy

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SUMMARY

The question of the best surgical treatment of duodenal ulcer remains unanswered.

In a series of 132 patients, results following gastric resection and hemigastrectomy with subtotal vagotomy were better than those following vagotomy procedures alone.

INTEREST in the surgical treatment of duodenal ulcer has been stimulated by the recent introduction of vagotomy by Dragstedt^{2, 3, 4} and co-workers. This procedure and gastric resection constitute the two currently popular methods of surgical treatment of this lesion. Gastric resection, including removal of at least three-fifths of the stomach and the ulcer-bearing portion of the duodenum, has stood the test of time as well as or better than other surgical procedures heretofore used.

The present study is based upon surgical treatment in 132 cases of duodenal ulcer. The postoperative follow-up period was approximately two years. Three types of operation were used concurrently during the period covered by the study. In 43 cases so-called complete vagotomy was used, with or without supplemental gastroenterostomy; in 47 cases the operation was conventional gastric resection; in 42 the procedure was hemigastrectomy and so-called subtotal vagotomy as recently described by Stevens.⁹

Of the three operative procedures studied in this series, vagotomy is the simplest to perform, but it has certain disadvantages, two of which appear to be of major importance: It attacks the nervous factor and not the hormonal factor apparently involved in the secretion of gastric acid, and impairment of emptying of the stomach occurs in an appreciable percentage of cases.

Gastric resection has had a longer test of time than has vagotomy, but its disadvantages are that it attacks the hormonal factor but not the nervous fac-

tor, and that it is a more destructive surgical procedure.

The purpose of hemigastrectomy with subtotal vagotomy, as used in the third group in this study, is to attack both the hormonal and nervous phases of the secretion of gastric acid. At the same time it was hoped that impairment of the emptying of the stomach could be avoided by leaving some vagus fibers intact. The destructiveness of conventional gastric resection is lessened by removing only half of the stomach.

This procedure was carried out with the full realization that the consensus is that partial vagotomy alone is not effective in eradicating duodenal ulcer. However, it was hoped that a combination of these procedures might prove at least as effective as the more radical conventional gastric resection. If this proves to be the case, it would have the advantage of being a less mutilating procedure, and possibly the occasional incidence of weight loss and anemia following the more radical gastric resection would be decreased.

Furthermore, in this connection, Aaron and co-workers,¹ quoting from a panel discussion at a meeting of the American Gastroenterological Association,¹³ stated that "the opinion that transthoracic or transabdominal vagotomy as usually performed is seldom complete is concurred in by all modern physiologists," and further that "complete vagotomy in experimental animals regularly causes digestive disturbances severe enough to cause death." Anatomic evidence of vagus fibers traversing the esophageal musculature, of small esophageal plexuses which may readily escape notice, and of ganglionic plexuses within the walls of the stomach is also cited to strengthen the belief that vagotomy as performed clinically is seldom complete.

Technically, subtotal vagotomy, as carried out in the series here reviewed, is simple. The vagus fibers are divided approximately one inch below the gastroesophageal junction on the lesser curvature of the stomach. The division is made after a mass ligation which includes the left gastric artery. Figure 1 is a diagrammatic illustration of photographs of the excellent anatomical dissections made by Dragstedt and co-workers.⁵ It shows that practically all fibers of both vagus nerves accumulate between the lesser curvature of the stomach and the left gastric artery before they enter the stomach.

This procedure differs from the partial vagotomy reported by Winkelstein and Berg¹² who used an-

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TABLE 1.

Operation	No. of Cases	Postoperative Clinical Results		
		Good	Unsatisfactory	Marginal Ulcer
1. Vagotomy procedures	43	33 (78%)	10 (22%)	3 (Insulin test negative in 2)
2. Conventional resection	47	42 (90%)	5 (10%)	1
3. Hemigastrectomy and subtotal vagotomy	42	38 (90%)	4 (10%)	1
Total	132			0

TABLE 2.—Gastric Acidity

Type of Operation	Preoperative			Postoperative		
	Night Secretion	Histamine	Insulin	Night Secretion	Histamine	Insulin
1. Vagotomy						
a. Alone	700cc./20°	66.6°	83.7°	247cc./10.5°	51°	13°
b. With gastroenterostomy	777cc./37°	52.4°	64°	530cc./2°	45°	13.8°
2. Conventional resection	808cc./29°	60°	62°	400cc./3.5°	18°	14.5°
3. Hemigastrectomy and subtotal vagotomy	746cc./52.5°	65.5°	74°	181cc./5°	25.3°	18.3°

terior (left) vagotomy. So-called "partial vagus resection" has also been attempted by Moore,⁸ who divided the left vagus and only the gastric branches of the right vagus nerve. This was unsuccessful in preventing the unfavorable side effects of vagotomy, but Moore concluded that "variations in procedure which may produce protection against ulcer without incurring side effects should be further studied."

RESULTS

Results of the present study are shown in Tables 1, 2 and 3.

COMMENT

Good clinical results following adequate gastric resection alone and following hemigastrectomy with subtotal vagotomy were the same (90 per cent). Good results following vagotomy with or without gastroenterostomy were relatively fewer (78 per cent). This coincides with the report of Walters¹¹ of good results in 79 per cent of cases following vagotomy procedures.

There were no deaths following gastric resection or hemigastrectomy with subtotal vagotomy. There was one operative fatality (from perforation of the esophagus) following vagotomy.

Stomal ulcers occurred in one patient following gastric resection, in one following hemigastrectomy with subtotal vagotomy, and in three following vagotomy and gastroenterostomy. The stomal ulcer that occurred following gastric resection healed and remained healed six months or more following supra-diaphragmatic vagotomy. In the cases in which marginal ulcers developed following vagotomy and gastroenterostomy, the lesions likewise healed and remained well six months or more after operation to destroy the gastroenterostomy and carry out adequate gastric resection.

Griswold⁶ suggested preoperative determination as to which patients with duodenal ulcer will respond best to gastric resection and which best to vagotomy. The acidity studies in this series (Table 2) may be helpful in making such a selection.

TABLE 3.—X-Ray Studies

Type of Operation	No. Cases Studied	Retention After 6 Hrs.	Per Cent Incidence
1. Vagotomy			
a. Alone	10	7	70%
b. With gastroenterostomy	12	2	17%
	22	9	41%
2. Conventional resection	33	0	0
3. Hemigastrectomy and subtotal vagotomy	38	0	0

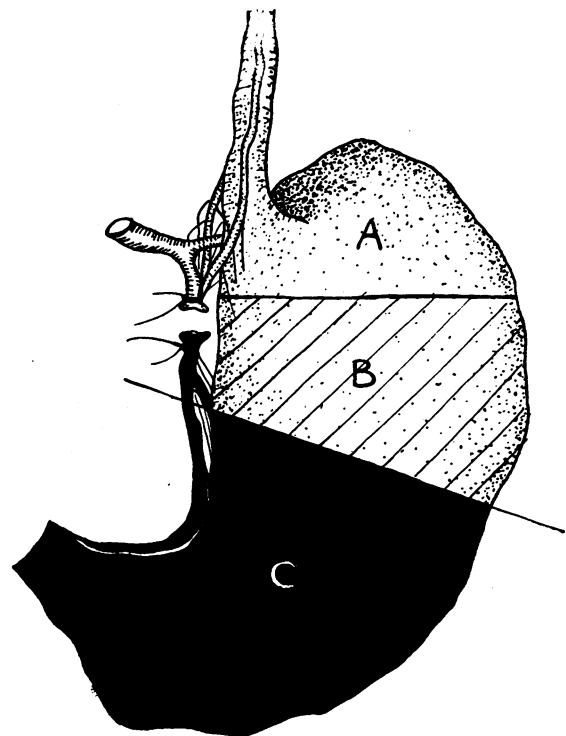


Figure 1.—Division of the accumulation of the fibers of both vagus nerves between the lesser curvature of the stomach and the left gastric artery is shown. A—Vagus nerve fibers intact. B—Denervated portion of remaining stomach after hemigastrectomy. C—Portion of stomach removed.

Histamine-induced secretion of gastric acids is greatly reduced following adequate gastric resection and following hemigastrectomy with partial vagotomy, whereas this effect is relatively minimal following vagotomy.

If this factor alone were considered, an opinion that at least those patients with a high acid secretory response to histamine should be treated by gastrectomy might be warranted. It has been suggested (Stevens and Kipen¹⁰) that this principle may apply in the selection of patients with post-gastroenterostomy marginal ulcer for surgical treatment, on the basis that in those cases in which there is a high histamine response, the hormonal factor, which is best treated by resection, is predominant.

Data on night secretion and insulin acidity values are not helpful, as the data are essentially the same following vagotomy as they are after resection procedures.

An effort was made to evaluate the influence of the alkaline duodenal content in gastrectomized patients in order to account for the similarity of insulin test results in gastrectomized patients to the results in vagotomized patients. Some gross studies were made to determine the bile content of the stomach following gastrectomy. The results were not consistent since the hydrochloric acid figures following insulin hypoglycemia were, on the whole, as low when no bile was found in the gastric contents as when bile was present.

Identical studies of gastric retention were made approximately two years following the three types of operations. The same measured amount of barium that was ingested preoperatively was used for x-ray studies included in this report. In patients who had undergone gastric resection and hemigastrectomy and in those who had had partial vagotomy there was no instance of retention. Seventy per cent of patients who had had vagotomy alone had six- to 24-hour retention. The incidence of retention after gastroenterostomy and vagotomy was 17 per cent.

The incidence of retention two years following vagotomy procedures is somewhat less than that reported for the same series (Kipen and Stevens⁷) one year after vagotomy. The reason for this is not clear. It might be postulated that some compensation occurs, as time progresses, through vagus fibers remaining in the esophageal wall and in esophageal plexuses which escaped detection when vagotomy was done.

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