

# Complications of Vagotomy in the Treatment of Hiatal Hernia

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Inclusion of vagotomy and pyloroplasty in the surgical treatment of gastroesophageal reflux associated with hiatal hernia has long been controversial. To evaluate the morbidity of vagotomy in the treatment of reflux esophagitis, a retrospective study of 311 patients treated by the Hill posterior gastropexy technique of hiatal hernia repair was tabulated. Vagotomy with the anti-reflux operation was performed upon 159 patients (51%). Vagotomy was not included for 152 patients (49%).

The incidence of postoperative symptoms with or without vagotomy was almost equally divided—41% without vagotomy and 47% with vagotomy. However, the major postoperative symptoms that occurred in both groups were abdominal cramps and bloating which usually disappeared in the early postoperative period and were attributed to the anti-reflux procedure and not to vagotomy.

When vagotomy was included with the anti-reflux operation, the incidence and duration of long term, disabling postoperative symptoms were significantly increased. Diarrhea occurred two times more frequently. Nausea and vomiting occurred ten times more frequently and dumping was present only in vagotomized patients.

Long term postoperative symptoms, judged on a basis of symptoms lasting longer than three months duration, occurred in 1% of patients without vagotomy and 26% when vagotomy was included.

This study revealed that no additional protection against recurrent symptoms of gastroesophageal reflux or radiographic evidence of recurrent hiatal hernia was provided by inclusion of vagotomy. In conclusion, vagotomy is contraindicated in the treatment of gastroesophageal reflux except in the presence of peptic ulcer disease.

IN 1967, a paper was published by the senior author<sup>2</sup> advocating adjunctive vagotomy and pyloroplasty in the surgical treatment of reflux esophagitis associated with hiatal hernia. This series of 35 patients revealed an incidence of 46% postoperative symptoms attributed to vagotomy. These symptoms included diarrhea, abdominal cramps and bloating, nausea and vomiting, and dumping. To evaluate the morbidity of vagotomy in the treatment of reflux esophagitis, a retrospective study of 311 patients treated by the Hill<sup>1</sup> posterior gastropexy technique of hiatal hernia repair was tabulated. Each patient was operated upon and followed by the senior author. Vagotomy with the anti-reflux operation was performed upon 159 patients (51%). In 152 patients (49%) vagotomy was not included. The four operative combinations are outlined in Table 1.

## Results

Significant postoperative symptoms were observed in 136 patients (44%). In Table 2 the postoperative symptoms are tabulated in relationship to the operative procedure. The incidence of postoperative symptoms with and without vagotomy are compared in Table 3. Abdominal cramps and bloating were equal in the two groups; however, the incidence of diarrhea was twice as

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TABLE 1. *Operative Procedures*

Operation	No.	Per cent
Repair only	134	43
Repair with pyloromyotomy	18	6
Repair with vagotomy and pyloroplasty	118	38
Repair with vagotomy and resection	41	13
Totals	311	100

prevalent in the vagotomized group. Postoperative nausea and vomiting occurred ten times more frequently when vagotomy was included. Dumping syndrome occurred in 11 patients following vagotomy but did not occur with hiatal herniorrhaphy alone. There was a significantly higher incidence of persistent longterm (longer than 3 months) postoperative symptoms in patients who had vagotomy (Table 4). Postoperative symptoms were judged on a basis of duration rather than severity. Although the total incidence of postoperative symptoms was approximately equal in the two groups, only two (1%) of 152 non-vagotomized patients had symptoms longer than 3 months as compared with 41 (26%) of 159 patients in whom a vagotomy was included. The majority of the 41 patients with long-term symptoms had unrelenting diarrhea which was resistant to medical management.

Table 5 compares the duration of postoperative symptoms to the respective operative procedures.

In Table 6 the incidence of postoperative symptoms is tabulated according to the major indication for surgical intervention. In patients with uncontrolled esophagitis

the incidence of postoperative symptoms was the same with or without vagotomy. The most significant increases in postoperative symptoms were associated with esophageal obstruction caused by symptomatic lower esophageal rings and strictures. In each category the incidence was three times higher when vagotomy was included.

The morbidity associated with vagotomy and pyloroplasty in patients with peptic ulcer disease is emphasized in Tables 7, 8 and 9. Ulcer disease was not present in any patient whose treatment was limited to repair of the hiatal hernia (Table 7). Tables 8 and 9 reveal that the total incidence of postoperative symptoms, the specific symptoms, and the duration of symptoms were almost identical when vagotomy and pyloroplasty were included regardless of the presence or absence of ulcer disease.

Eight of the 11 vagotomized patients with dumping had mild symptoms which were easily controlled by medical management. The remaining three patients had severe symptoms which were resistant to medical management (Table 10).

Some degree of obstruction occurred in a total of 78 patients (Table 11). However, if patients with preoperative obstruction due to a lower esophageal ring or stricture are deleted, only 42 patients (14%) had postoperative obstructive symptoms. In this group the majority of patients had mild symptoms which either subsided spontaneously or responded promptly to dilatation. Only 5 patients (2%) of the group without evidence of preoperative esophageal obstruction had severe symptoms which required repeated dilatation.

TABLE 2. *Comparison of Postoperative Symptoms to Operation*

Operation	Symptom				
	Symptomatic	Diarrhea	Cramps & Bloating	Nausea & Vomiting	Dumping
Repair only (134 Pts.)	57 (43%)	25 (19%)	51 (38%)	1 (1%)	0 (0%)
Repair & pyloromyotomy (18 Pts.)	5 (27%)	1 (6%)	4 (22%)	1 (6%)	0 (0%)
Repair + vagotomy & pyloroplasty (118 Pts.)	59 (50%)	44 (37%)	50 (42%)	20 (17%)	9 (8%)
Repair + vagotomy & resection (41 Pts.)	15 (37%)	10 (24%)	11 (27%)	0 (0%)	2 (5%)
Totals (311 Pts.)	136 (44%)	80 (26%)	116 (37%)	22 (7%)	11 (4%)

TABLE 3. *Comparison of Postoperative Symptoms to Operation*

Operation	Symptom				
	Symptomatic	Diarrhea	Cramps & Bloating	Nausea & Vomiting	Dumping
Repair without vagotomy (152 Pts.)	62 (41%)	26 (17%)	55 (36%)	2 (1%)	0 (0%)
Repair with vagotomy (159 Pts.)	74 (47%)	54 (34%)	61 (38%)	20 (13%)	11 (7%)
Total (311 Pts.)	136 (44%)	80 (26%)	116 (37%)	22 (7%)	11 (4%)

TABLE 4. Duration of Postoperative Symptoms

Operation	Symptomatic	< 3 Months	> 3 Months
Repair without vagotomy (152 Pts.)	62 (41%)	60 (40%)	2 (1%)
Repair with vagotomy (159 Pts.)	74 (47%)	33 (21%)	41 (26%)

Symptoms of gastroesophageal reflux and x-ray evidence of recurrent hiatal hernia are compared in patients with and without vagotomy in Table 12. Although the number of patients involved are small, the incidence of symptomatic and radiographic recurrence was higher in the vagotomized group. In Table 13, the recurrence rates are tabulated in relationship to the four operative combinations. Patients in whom vagotomy and pyloroplasty was included had approximately twice the recurrence rate of patients in whom treatment was limited to hiatal hernia repair. Twenty-seven patients had evidence of both symptomatic and radiographic recurrence of gastroesophageal reflux and hiatal hernia (Table 14). In this group, 16 patients had a repeat anti-reflux procedure and re-operation was recommended for an additional four patients. Vagotomy had been included in 13 of these 20 patients.

Discussion

This is a retrospective study of almost equal numbers of patients with symptomatic hiatal hernias managed by transabdominal anti-reflux procedures with or without adjunctive vagotomy. Morbid postoperative symptoms have been categorized as diarrhea, abdominal cramps and bloating, nausea and vomiting, and dumping. Significant postoperative symptoms occurred in 44% of the total series. However, the most striking feature is that only two (1%) of 152 patients in whom surgery was limited

TABLE 5. Duration of Postoperative Symptoms

Operation		< 3 Months	> 3 Months
Repair only	(134 Pts.)	55 (41%)	2 (2%)
Repair with pyloromyotomy	(18 Pts.)	5 (27%)	0 (0%)
Repair + vagotomy and pyloroplasty	(118 Pts.)	26 (22%)	33 (28%)
Repair + vagotomy and resection	(41 Pts.)	7 (17%)	8 (20%)
Totals	(311 Pts.)	93 (30%)	43 (14%)

to the anti-reflux operation had postoperative symptoms lasting longer than three months; whereas, 41 (26%) of 159 patients with adjunctive vagotomy had persistent, incapacitating postoperative symptoms lasting longer than three months.

An analysis of these postoperative symptoms reveals that abdominal cramps and bloating occurred with an equal incidence with or without vagotomy (36%—without vagotomy; 38%—with vagotomy). This symptom complex is probably analogous to the “gas-bloat syndrome” described by Woodward.<sup>3</sup> Aerophagia manifested by belching occurs preoperatively in 92% of patients with gastroesophageal reflux<sup>2</sup> and continues postoperatively until the patient has made an adjustment to his new-founded freedom from the symptoms of gastroesophageal reflux. This symptom complex which occurred in this series where the Hill posterior gastropexy was used exclusively appears to be a function of the anti-reflux procedure rather than the adjunctive vagotomy.

A 20% incidence of longterm persistence of the “gas-bloat syndrome” is reported following the Nissen anti-reflux operation.<sup>3</sup> This syndrome is associated with left upper quadrant gastric distention with inability to belch. Following posterior gastropexy, no patient developed difficulty in belching. The ability of these pa-

TABLE 6. Comparison of Postoperative Symptoms with Indication for Operation

Indication	Operation					
	Repair only		Repair + Vagotomy & Pyloroplasty		Repair + Vagotomy & Resection	
	No. Pts.	Postop Symptoms	No. Pts.	Postop Symptoms	No. Pts.	Postop Symptoms
Uncontrolled esophagitis	58 (38%)	36 (62%)	56 (48%)	34 (61%)		
Symptomatic ring	5 (3%)	1 (20%)	13 (11%)	9 (69%)		
Obstruction-stricture	28 (19%)	6 (21%)	14 (12%)	9 (64%)		
Obstruction-incarcerated	14 (9%)	4 (29%)	5 (4%)	2 (40%)		
Acute hemorrhage	4 (3%)	1 (25%)	11 (9%)	1 (9%)		
Chronic anemia	5 (3%)	1 (20%)	4 (3%)	1 (25%)		
Gallbladder symptoms	38 (25%)	13 (34%)	3 (3%)	1 (33%)		
Peptic ulcer disease			12 (10%)	2 (17%)	41 (100%)	15 (37%)
Totals	152 (100%)	62 (41%)	118 (100%)	59 (50%)	41 (100%)	15 (37%)

TABLE 7. Comparison of Postoperative Symptoms and Ulcer Disease

Operation	No. Patients	Postop Symptoms
Repair only—ulcer present	0	
Repair + vagotomy and pyloroplasty—no ulcer	94	47 (50%)
Repair + vagotomy and pyloroplasty—ulcer present	24	12 (50%)
Repair + vagotomy and resection—no ulcer	0	
Repair + vagotomy and resection—ulcer present	41	15 (37%)

tients to belch appears to account for the transitory nature of these symptoms.

Diarrhea occurred in 35% of patients following vagotomy compared to 17% of patients without vagotomy. Nausea and vomiting, and dumping appeared to be associated with vagotomy rather than hiatal hernia repair as indicated by the significantly increased incidence in vagotomized patients. No patient in whom surgery was limited to an anti-reflux procedure developed symptoms of dumping.

The incidence of postoperative symptoms in patients operated upon for uncontrolled esophagitis was 62% when surgery was limited to the anti-reflux operation and 61% when vagotomy and pyloroplasty was included.

In contrast, the incidence of postoperative symptoms in patients with symptomatic lower esophageal ring and esophageal stricture treated by hiatal hernia repair alone manifested a significantly lower incidence of postoperative symptoms than the vagotomized group. An incidence of approximately 20% occurred without vagotomy compared to an incidence of approximately 65% with vagotomy.

The overall incidence of postoperative symptoms does not appear to be altered by the addition of vagotomy regardless of the presence or absence of ulcer disease. Even the incidence of specific symptoms were almost identical whether or not ulcer disease was present and persistent symptoms occurred equally in both groups (30%). It is of special interest that when vagotomy and pyloroplasty was included, dumping occurred only in those patients in whom *no* ulcer disease existed (Table 8).

TABLE 8. Comparison of Postoperative Symptoms After Vagotomy and Pyloroplasty With and Without Ulcer Disease

Symptom	No Ulcer (94 Pts.)	Ulcer Present (24 Pts.)
Symptomatic	47 (50%)	12 (50%)
Diarrhea	34 (36%)	10 (42%)
Cramps and bloating	39 (42%)	11 (46%)
Nausea and vomiting	17 (18%)	3 (13%)
Dumping	9 (10%)	0 (0%)

TABLE 9. Comparison of Duration of Postoperative Symptoms After Vagotomy and Pyloroplasty With and Without Ulcer Disease

Ulcer Disease	Symptomatic Patients	< 3 Months	> 3 Months
No ulcer (94 Pts.)	47 (50%)	21 (22%)	26 (28%)
Ulcer present (24 Pts.)	12 (50%)	5 (21%)	7 (29%)

Pyloromyotomy in combination with hiatal hernia repair was performed upon 18 patients. The indication for pyloromyotomy was the endoscopic finding of marked scarring of the pyloric channel sufficient to cause significant difficulty in passing the scope at the time of preoperative esophagogastroduodenoscopy. This procedure appeared to have no effect on the development of postoperative symptoms (Table 2).

Forty-two patients *without* preoperative symptoms had esophageal obstruction following operation. In patients with mild obstruction, the symptoms subsided spontaneously or responded promptly to dilatation. Although the number of patients with severe postoperative obstructive symptoms was small (5 patients), vagotomy and pyloroplasty had been performed upon each of these patients. Mechanical narrowing of the esophagogastric junction at the time of hiatal hernia repair is implicated as a major cause of postoperative esophageal obstruction when no obstruction existed preoperatively.

The incidence of recurrent gastroesophageal reflux symptoms and radiographic evidence of recurrent hiatal hernia was significantly greater in patients who had adjunctive vagotomy. This finding suggests that the addition of vagotomy does not provide additional protection against symptomatic or anatomic recurrence of hiatal hernia.

Hill<sup>1</sup> and Woodward<sup>3</sup> report that vagotomy does not improve the longterm results of hiatal hernia repair and is associated with significant longterm postoperative morbidity. Woodward<sup>3</sup> has indicated that the prolonged morbid postoperative symptoms associated with the Nissen procedure are severe enough to consider reserving this operation for recurrent or complicated gastroesophageal reflux problems. In contradistinction, the Hill posterior gastropexy used in this series, when

TABLE 10. Incidence of Dumping Syndrome

Operation	Total	Dumping	
		Mild	Severe
Repair without vagotomy (152 Pts.)	0 (0%)	0 (0%)	0
Vagotomy and pyloroplasty (118 Pts.)	9 (8%)	7 (6%)	2 (2%)
Vagotomy and resection (41 Pts.)	2 (5%)	1 (2%)	1 (2%)
Totals (311 Pts.)	11 (4%)	8 (3%)	3 (1%)

TABLE 11. *Postoperative Esophageal Obstruction*

Operation		Mild Symptoms		Severe Symptoms	
		No.	Dilated	No.	Dilated
Repair only	(134 Pts.)	(23- 9*) 14 (10%)	(13- 7*) 6 (5%)	(4- 4*) 0 (0%)	(4- 4*) 0 (0%)
Repair with pyloromyotomy	(18 Pts.)	(3- 0*) 3 (17%)	(1- 0*) 1 (6%)	(1- 1*) 0 (0%)	(1- 1*) 0 (0%)
Vagotomy and pyloroplasty	(118 Pts.)	(25-12*) 13 (11%)	(12- 8*) 4 (3%)	(14- 9*) 5 (4%)	(14- 9*) 5 (4%)
Vagotomy and resection	(41 Pts.)	(7- 0*) 7 (17%)	(1- 0*) 1 (2%)	(1- 1*) 0 (0%)	(1- 1*) 1 (0%)
Totals	(311 Pts.)	(58-21*) 37 (12%)	(27-15*) 12 (4%)	(20-15*) 5 (2%)	(20-15*) 5 (2%)

\* The number of patients with preop obstruction from ring or stricture were subtracted from the total number of patients for each operation.

TABLE 12. *Comparison of Symptomatic and X-Ray Recurrence*

Type of Operation	No.	Recurrence		Re-operation
		Symptomatic	X-ray	
Repair without vagotomy	152 (49%)	15 (10%)	13 (9%)	4 (3%)
Repair with vagotomy	159 (51%)	23 (15%)	22 (14%)	12 (8%)
Totals	311 (100%)	38 (12%)	35 (11%)	16 (5%)

TABLE 13. *Comparison of Symptomatic and X-ray Recurrences*

Type of Operation	No.	Recurrence		Re-operation
		Symptomatic	X-ray	
Repair only	134 (43%)	13 (10%)	9 (7%)	3 (2%)
Repair with pyloromyotomy	18 (6%)	2 (11%)	4 (22%)	1 (6%)
Repair + vagotomy and pyloroplasty	118 (38%)	21 (18%)	20 (17%)	10 (9%)
Repair + vagotomy and resection	41 (13%)	2 (5%)	2 (5%)	2 (5%)
Totals	311 (100%)	38 (12%)	35 (11%)	16 (5%)

TABLE 14. *Comparison of Symptomatic and X-ray Recurrences in Same Patient*

Operation	No.	Combined Symptomatic and X-ray Recurrence	Re-operation	Needs Operation
Repair only	134 (43%)	8 (6%)	3 (2%)	3 (2%)
Repair with pyloromyotomy	18 (6%)	1 (6%)	1 (6%)	
Repair + vagotomy & pyloroplasty	188 (38%)	16 (14%)	10 (9%)	1 (1%)
Repair + vagotomy & resection	41 (13%)	2 (5%)	2 (5%)	
Totals	311 (100%)	27 (9%)	16 (5%)	4 (1%)

performed *without* vagotomy, had only a 1% longterm complication rate and its use is recommended in the treatment of uncomplicated gastroesophageal reflux in addition to complicated and recurrent hiatal hernia problems.

This series clearly demonstrates that vagotomy significantly increases the incidence of longterm post-operative morbid symptoms and should be reserved for those patients in whom ulcer disease is documented when treating gastroesophageal reflux.

## References

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