

## PAPERS AND ORIGINALS

## Treatment of severe side effects after vagotomy and gastroenterostomy by closure of gastroenterostomy without pyloroplasty

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### Summary and conclusions

We describe nine patients who had severe, persistent abdominal pain, vomiting, dumping, or diarrhoea several years after truncal vagotomy and gastroenterostomy had been performed for duodenal ulceration. Each patient was judged to have a bad clinical result (Visick grade 4). There was no evidence of recurrent ulceration in any of the patients, and in each the patency of the pyloric canal was confirmed radiologically or endoscopically. Each patient was treated by simply dismantling the gastroenterostomy without addition of a pyloroplasty. In one patient the surgeon suspected that a vagal trunk might have been left intact, and a revagotomy was performed by the "highly selective" technique. Postoperatively, none of the patients developed gastric retention. Symptomatic improvement occurred in eight patients, and four of them achieved perfect results (Visick grade 1).

Side effects are common after vagotomy and gastroenterostomy, and are largely attributable to the presence of the gastroenterostomy stoma. Our results show that the symptoms may be alleviated by closing the gastroenterostomy, without precipitating gastric retention.

### Introduction

Experience in this unit and elsewhere has shown that the incidence of recurrent ulceration is similar after both highly

selective vagotomy (HSV) and truncal vagotomy (TV), but that the incidence of side effects of operation is significantly less after HSV than after TV.<sup>1, 2</sup> Although preserving the vagal nerve supply to the extragastric viscera may contribute to the relative freedom from side effects after HSV,<sup>3, 4</sup> preservation of an intact antrum, pylorus, and duodenum—allowing a more normal pattern of gastric emptying—is probably the main factor.

The addition of a drainage procedure to truncal vagotomy was found to be necessary to prevent the gastric retention that developed in many patients after vagotomy alone. Nevertheless, gastric motility and gastric emptying both improve with time after complete gastric vagotomy,<sup>5</sup> and the drainage procedure may be superfluous when a year or more has elapsed from the time of vagotomy. Hence, we thought it logical simply to dismantle the gastroenterostomy in patients who develop symptoms of abnormal gastric emptying after truncal vagotomy and gastroenterostomy, provided radiological or endoscopic examination confirmed the patency of the pylorus. To date we have performed this procedure in nine patients, with encouraging results: none of the patients have developed gastric retention, and most have sustained considerable improvement in their symptoms.

### Patients and methods

Nine patients, five men and four women (mean age 41 years), had each undergone truncal vagotomy and gastroenterostomy for duodenal ulceration 1-13 years previously (mean 7 years). Each patient subsequently developed severe, disabling symptoms, which persisted despite medication and rendered the operation a complete failure (Visick grade 4). Four patients complained of abdominal pain, but no evidence of recurrent ulceration was found in any of them. Vomiting (particularly of bile), "dumping," and diarrhoea were prominent and often incapacitating (see table). One patient had severe steatorrhea and what were considered to be pathological fractures of both femurs. Three patients had lost more than 7 kg in weight.

In six patients fiberoptic oesophagogastroduodenoscopy was performed, and in five bile was seen in the stomach. In five of the patients who complained of bilious vomiting the gastric mucosa was reddened and bile-stained. In each patient the pylorus was visualised, and accepted the instrument without evidence of stenosis. Barium-meal examination, which was carried out in all patients, confirmed that

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ulceration had not recurred and that the pylorus appeared to be of normal calibre.

At laparotomy, after suitable mobilisation to permit inspection of the duodenum and the stoma, the gastroenterostomy was dismantled and the holes in the stomach and small bowel were closed. In one patient this procedure was supplemented by a highly selective vagotomy. This was performed because examination of the hiatal region suggested to the surgeon that a vagal trunk was intact, although there had been no suggestion of ulcer recurrence. After operation, the patients were seen yearly at the gastric follow-up clinic, where the quality of the clinical result was assessed "blindly" by a panel of two or three doctors who were unaware of the nature of the operative procedure. The length of follow-up ranged from 6 to 64 months, with a mean of 21 months.

## Results

Closure of the gastroenterostomy led to a reduction in the incidence of all symptoms (see table), pain, bilious vomiting, and dumping being particularly improved. The severity of all symptoms except diarrhoea and heartburn or reflux was also much reduced. Incapacitating and continuous diarrhoea had been the major symptom in two patients. In one the diarrhoea was little improved after closure of the stoma, but in the other patient the frequency of diarrhoea was reduced from eight times a day to once a day. In two patients in whom heartburn or gastro-oesophageal reflux had been a prominent symptom the incidence and severity of the symptoms were unaltered after closure of the stoma; the single patient who developed these symptoms after the revision procedure was the one who had also undergone highly selective vagotomy.

At the most recent clinical assessment at the gastric follow-up clinic, four patients were judged to be Visick grade 1 ("perfect"), four were Visick grade 3 ("fair" or "moderate" category), and one remained Visick grade 4. This patient, a man who had undergone the disconnection procedure more than three years before, and who had also had a highly selective vagotomy, continued to complain of anorexia, nausea, vomiting of food and bile, epigastric fullness, dumping, and symptoms of gastro-oesophageal reflux. No evidence of recurrent ulceration was seen recently at endoscopy, but reflux of bile through the pylorus was evident, and some food residue was seen in the stomach. Nevertheless, the pylorus was patent, and no evidence of delay in gastric emptying was seen on barium-meal examination. Despite the lack of objective findings, the patient continually requested a return to his previous state. Thus a pyloroplasty was performed 41 months after the disconnection of his gastroenterostomy. He has not attended for review since.

Effect of dismantling gastroenterostomy on incidence of symptoms in nine patients

Symptom	Incidence	
	Preoperative	Postoperative
Pain .. .. .	4	0
Anorexia .. .. .	2	1
Nausea .. .. .	3	3
Bile vomiting .. .. .	5	1
Food vomiting .. .. .	5	3
Epigastric fullness .. .. .	5	4
Heartburn or reflux .. .. .	2	3
Dumping .. .. .	6	1
Severe diarrhoea .. .. .	2	1

## Discussion

Truncal vagotomy, which was revived and popularised by Dragstedt and Owens in 1943,<sup>6</sup> was originally performed without the addition of a drainage procedure. Dragstedt and others soon found, however, that truncal vagotomy alone produced gastric stasis in many patients. For example, Moore *et al*,<sup>5</sup> who studied gastric emptying radiologically in patients after truncal vagotomy, noted that emptying was delayed as a result of the operation. Conclusive clinical evidence of delayed gastric emptying was found in only one of Moore's 15 patients, however, and even that patient's symptoms of gastric retention improved spontaneously after a few months. Nevertheless, subsequent clinical experience showed that gastric retention was a considerable problem after truncal vagotomy alone, and

Tanner<sup>7</sup> found it to be an important feature in 27 out of 55 patients, most of whom required a drainage operation. Thus for the past 30 years it has been standard practice to complement truncal vagotomy by a pyloroplasty or gastroenterostomy.

Moore *et al*<sup>5</sup> noticed that a patient who developed signs and symptoms of delayed gastric emptying soon after truncal vagotomy alone improved spontaneously, eventually becoming free from symptoms during the first year after operation. We have observed similar improvement in two out of 25 patients who had undergone highly selective vagotomy plus pyloro-duodenal dilatation for pyloric stenosis and who had clinical evidence of gastric retention soon after operation. In a study of the gastric emptying of a test meal of dextrose solution, Donovan *et al*<sup>9</sup> found that complete gastric emptying was delayed in patients who had undergone selective vagotomy alone, but over the ensuing nine months the pattern of emptying became more normal.

Thus many patients never develop gastric retention after truncal vagotomy without a drainage procedure, and in many others gastric stasis improves with time. For these reasons, we thought that closure of the gastroenterostomy without the addition of pyloroplasty might be an effective and acceptable procedure if patency of the pylorus could be shown and if at least a year had elapsed since the vagotomy. Our results provide strong support for this idea, because none of the nine patients showed signs of delayed gastric emptying after closure of the gastroenterostomy, although one patient complained of suggestive symptoms. An overall improvement in symptoms followed this procedure in eight of the nine patients, and their Visick grades improved greatly. The symptoms of vomiting, dumping, and diarrhoea were all diminished.

The clinical results five to eight years after truncal vagotomy and pyloroplasty are very similar to those after truncal vagotomy and gastroenterostomy.<sup>10</sup> Indeed, two recent prospective randomised trials<sup>11, 12</sup> have shown that there is no significant difference between the results of the two procedures in terms of operative mortality, side effects of operation, or incidences of recurrent ulceration. Despite the slightly higher incidence of recurrent ulceration after truncal vagotomy plus pyloroplasty, "loop" problems are absent and it is slightly superior to truncal vagotomy plus gastroenterostomy in terms of long-term metabolic sequelae. These facts have tipped the balance in favour of truncal vagotomy plus pyloroplasty in the opinion of many surgeons. The considerable clinical improvement obtained in our small group of patients with severe symptoms after vagotomy and gastroenterostomy by the simple expedient of closing the gastroenterostomy stoma is a relative argument in favour of the use of gastroenterostomy as the primary form of drainage procedure to complement truncal vagotomy. While reconstruction of the pylorus after pyloroplasty has been described,<sup>13, 14</sup> restoration of anatomical "normality" may not in fact be matched by return of normal physiological function in the antral "mill" and pyloric sphincter. It is easier, as Kennedy has pointed out, to close a gastroenterostomy than to "restore" a pylorus.

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