

Gastric Stasis and Gastric Ulcer after Selective Vagotomy Without a Drainage Procedure

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Summary

Two independent trials of selective vagotomy without the addition of a drainage procedure in the treatment of uncomplicated duodenal ulcer have shown that gastric stasis may occur after the operation and that in some cases this may be complicated by gastric ulcer. These findings do not support the contention that selective vagotomy alone allows normal gastric emptying.

Introduction

In an interim report by Burge *et al.* (1969) it was suggested that if patients with duodenal ulcer without stenosis are treated by selective vagotomy, a drainage operation such as pyloroplasty or gastrojejunostomy may be omitted. In their experience there were no serious or permanent problems resulting from delayed gastric emptying in these patients.

We have used selective vagotomy without drainage for patients with duodenal ulcer without stenosis, but the occurrence of postoperative gastric stasis in our series suggests that a drainage procedure is necessary.

Patients and Methods

As part of two independent prospective controlled clinical trials in Birmingham and Liverpool, 15 patients with uncomplicated chronic duodenal ulcers have been treated by selective vagotomy without a drainage procedure. In both series the clinical trial was designed to compare selective vagotomy with selective proximal vagotomy in patients with duodenal ulcer. The results of treatment by selective proximal vagotomy have been satisfactory and the details of these trials will be published later.

The operative technique used for selective vagotomy was similar to the technique described by Burge *et al.* (1969), with careful preservation of both the coeliac and the hepatic branches of the vagus nerves. Ten patients were from Birmingham and five from Liverpool: all were men aged 21 to 63 years. No patient had duodenal stenosis or gastric retention as demonstrated by preoperative barium meal and operative palpation.

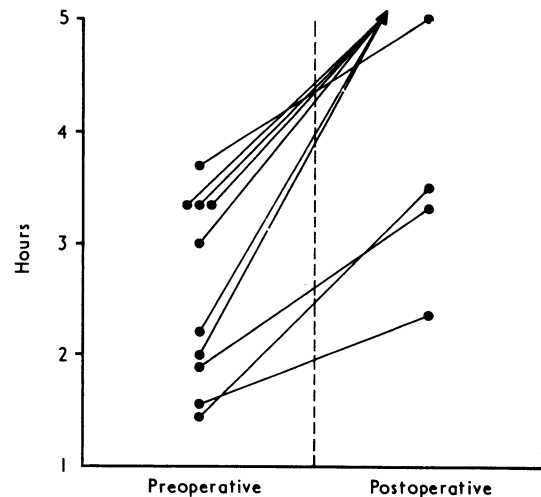
All patients in the Birmingham series had assessment of resting gastric residue and the rate of gastric emptying of a fluid meal of 10% dextrose before and three months after operation. The gastric residue was assessed by aspiration after a 12-hour fast. A double dye dilution technique with radioactive phenol red was used to assess the gastric volumes (modified method of George, 1968). After 750 ml of hypertonic dextrose solution had been drunk, gastric volumes were determined at regular intervals up to four hours, and if the stomach had not then emptied the gastric contents were aspirated at five hours to obtain a final

residue. The stomach was arbitrarily considered to be empty when the gastric volume had fallen to 20 ml. Gastric emptying studies were not performed before or after operation in the Liverpool series.

The clinical results were assessed between 4 and 17 months after operation. All patients with dyspeptic symptoms after operation have been investigated by barium meal and insulin test.

Results

Birmingham.—Before operation none of the patients had any gastric food residue after a 12-hour fast. After selective vagotomy all 10 had some gastric food residue after a 12-hour fast which usually required prolonged gastric lavage to clear. The preoperative and postoperative emptying times with hypertonic dextrose are shown in the Chart. The delay in gastric emptying after selective vagotomy was highly significant ($P < 0.001$).



Preoperative and postoperative gastric emptying times.

The emptying pattern was considerably altered by operation in nine of the patients; the initial rate of emptying was more rapid but the denervated stomach seemed unable to eject the final residue. The six patients with incomplete emptying at five hours had final gastric residues ranging from 25 to 175 ml. The patient with 175 ml remaining at five hours had a further emptying test six months postoperatively, and the five-hour residue had fallen to 85 ml. He still complained of occasional fullness and vomiting.

Liverpool.—Three of the five patients developed dyspepsia after selective vagotomy and are discussed in detail.

Case 1.—Three months after selective vagotomy a man aged 21 complained of abdominal pain and vomiting. Acid secretory studies after insulin hypoglycaemia six and nine months postoperatively indicated an incomplete vagotomy. Eight months after operation a barium meal examination showed a duodenal and a lesser curve gastric ulcer with poor gastric emptying. Nine months after the first operation he was reoperated on, the pathological state was confirmed, and antrectomy was performed. He is now well.

Case 2.—Six months after vagotomy a man aged 47 complained of upper abdominal discomfort and distension and a barium meal

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examination showed delayed gastric emptying with a lesser curve gastric ulcer. Acid secretory studies showed no response to insulin, indicating a complete vagotomy. At reoperation, eight months after the first operation, a lesser curve gastric ulcer was present but no duodenal ulcer. He is now well after antrectomy.

Case 3.—An insulin test was negative three months after vagotomy in a man aged 37. After one year he developed epigastric pain and vomiting and barium meal examination showed a lesser curve gastric ulcer with normal gastric emptying. The ulcer was confirmed by gastroscopy. Conservative treatment of the ulcer was undertaken and further gastroscopy showed that the ulcer was healing. Fourteen months after the operation and two months after the development of a gastric ulcer a barium meal examination showed an apparently normal stomach which still emptied normally. He was then symptom-free.

Discussion

The idea of treating patients with duodenal ulceration by vagotomy without a drainage operation is attractive and has been the goal of many surgeons. Dragstedt and Owens (1943) advocated vagal section for duodenal ulcer; a truncal vagotomy was the operation first used. It soon became clear that there were many complications resulting from gastric retention (Jackson, 1948; Slaney *et al.*, 1956), and Dragstedt *et al.* (1947) were quick to point out that most patients with duodenal ulcer required some form of drainage operation in addition to vagotomy.

Burge *et al.* (1969) suggested that selective vagotomy would retain sufficient innervation to the prepyloric and pyloric regions of the stomach via the pyloric branch of the anterior vagus and so allow normal gastric emptying to occur. Nevertheless, Franksson (1948) had earlier attempted to use bilateral selective vagotomy without drainage, but because of the complications of gastric retention, even in patients with no ulcer stenosis, he later abandoned the operation (Shiina and Griffiths, 1969). De Miguel (1970) treated 20 duodenal ulcer patients without any evidence of stenosis by selective vagotomy without drainage.

Two years after operation about half the patients had some gastric retention on barium meal examination.

Experimental evidence of gastric retention after selective vagotomy in the dog is provided by Shiina and Griffiths (1969). Two to three weeks after operation barium studies showed severe gastric stasis with retention of barium for up to 24 hours. Eight weeks after operation the gastric stasis had only partially improved.

Burge *et al.* (1969) reported good clinical results after selective vagotomy without drainage and advocated the operation in patients with duodenal ulcer without stenosis. They state that the flatulence and foul eructations which may occur soon after operation, and are associated with a large nine-hour residue on a "special" barium meal, disappear with time. It seems likely that the effects they describe soon after operation are due to the same delay of gastric emptying that we have measured at three months after operation, and many of our patients may later improve as theirs seem to have done. Nevertheless, in one of our patients gastric stasis persisted at one year and in others gastric ulceration had developed in association with stasis. Therefore, with the technique of selective vagotomy that we have used, some form of gastric drainage procedure should always be added.

Requests for reprints should be sent to Mr. J. Alexander Williams.

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Effects of Salbutamol and Isoprenaline/Phenylephrine in Reversible Airways Obstruction

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Summary

Ventolin (salbutamol) and Medihaler-Duo (isoprenaline/phenylephrine combination) standard pressurized inhalers were used to administer doses of two or six "puffs" to 16 patients with known reversible airways obstruction. The doses were administered in random order over two days. Both the Ventolin and Medihaler-Duo inhalers substantially increased FEV₁, but in the doses used salbutamol was more effective than isoprenaline/phenylephrine ($P < 0.01$). There was no significant difference between two and six puffs of salbutamol, though there seemed to be an advantage of six puffs of isoprenaline/phenylephrine over two puffs ($P < 0.05$). Adrenaline (1/1,000) 0.5 ml and atropine 0.6 mg produced similar increases in FEV₁ to those produced by salbutamol.

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The Pao₂ fell more than 5 mm Hg in three patients after salbutamol and in three after isoprenaline/phenylephrine. There was no significant fall in mean Pao₂ in any of the treatment groups. It is concluded that the Ventolin inhalant, administered in the conventional dose of two puffs, is as effective a bronchodilator as subcutaneous adrenaline and atropine, is more effective than the Medihaler-Duo, and is without detectable side effects.

Introduction

This investigation was prompted by a desire to know whether the conventional doses of salbutamol and isoprenaline/phenylephrine mixture produced a maximal bronchodilator response, and if not whether there were any contraindications to higher dosage. Salbutamol is thought to have minimal β_1 -adrenergic effect (Brittain *et al.*, 1968; Kennedy and Simpson, 1969; Palmer and Diament, 1969; Warrell *et al.*, 1970) but other reports (Bass *et al.*, 1969; Chapman, 1969; Hume, 1970) have shown a fall in Pao₂ after its use in some patients. In contrast, this has not been found to happen with a phenylephrine/isoprenaline mixture (Chapman, 1969; Harris, 1970; Hume, 1970). Phenylephrine