Gastric emptying after surgery for the dumping syndrome

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Summary

The dumping syndrome following gastric surgery for peptic ulcer disease can cause severe morbidity. In this study the benefit of interposition of an antiperistaltic jejunal loop to reverse peristalsis and delay gastric emptying was assessed in four patients with severe symptoms by performing gastric emptying studies pre-operatively, and at 6 months and 24 months following surgery. Gastric emptying was delayed at 6 months but by 2 years had returned to pre-operative values. Patients' symptoms were improved at 6 months and remained so despite the deterioration in gastric emptying. This surgical procedure is of some value to patients with severe symptoms due to the dumping syndrome.

KEY WORDS: peptic ulcer, vagotomy.

Introduction

The dumping syndrome after surgery for peptic ulceration can cause severe morbidity characterised by gastrointestinal and vasomotor symptoms. Corrective operative procedures have been tried. They included interposition of isoperistaltic or antiperistaltic jejunal loops, but evidence for their value is conflicting (Fenger *et al.*, 1972; Miranda *et al.*, 1980). In this study we investigated four patients with severe symptoms from the dumping syndrome who were treated surgically with interposition of a long antiperistaltic jejunal loop. Gastric emptying studies were performed pre-operatively and at 6 and 24 months.

Patients and methods

The four patients (three female) had previously undergone vagotomy for duodenal ulcer with antrectomy in three as a Billroth I and in the other as a

Billroth II construction. Severe symptoms of the dumping syndrome developed 3-24 months after surgery and did not respond to conventional medical therapy. Surgery was performed by JRS and consisted of interposition of a 15-18 cm long antiperistaltic loop to delay gastric emptying. This was assessed by a liquid meal of Clinifed 500 (400 ml) mixed with 7 MBq of technetium 99mDTPA (diethylene triamine penta-acetic acid). The rate of gastric emptying was monitored by gamma camera over 90 min as previously described by Dew *et al.* (1983).

Patients' symptoms were assessed by questionnaire before, and 6 and 24 months after surgery. These recorded whether or not the patients had experienced post-prandial abdominal symptoms of nausea, vomiting, colicky abdominal pain, abdominal fullness and/or distension, and diarrhoea. Also recorded were whether they experienced post-prandial systemic symptoms of generalised weakness, faintness, palpitations, drowsiness and sensation of heat, flushing or sweating. Patients were asked to grade each symptom experienced as mild (1), moderate (2), or severe (3). They were asked to record whether these symptoms occurred regularly at each meal, more than 3 days a week, in which case the symptoms score was doubled. Those with symptoms which occurred less often had no change in the symptom score; the maximum possible score was 60.

Statistical analysis of symptom scores and gastric emptying was performed by using paired *t*-tests.

Results

The results of gastric emptying studies for the four patients before and after surgery are shown in Fig. 1. All patients had delayed gastric emptying at 6 months postoperatively compared with pre-operative

FIG. 1. The rate at which a meal labelled with technetium-99mDTPA leaves the stomach in four patients who had interposition of a reversed jejunal loop for the dumping syndrome. The measurements were performed: (1) (○) Pre-operatively; (2) (▲) 6 months' postoperatively; (3) (■) 2 years' postoperative. At each period the time taken (min) for half of the meal to leave the stomach (T_{50}) is shown in the insert. The hatched area represents the range of gastric emptying in six healthy subjects: T_{50} (mean $\pm$ s.d.) = 82 ± 10 min.

values but at two years the rate of gastric emptying had returned to the pre-operative value. Symptoms were significantly improved in all patients at 6 months, including systemic as well as gastro-intestinal ones (Table 1). At 2 years, despite the loss of

delay in gastric emptying, improvement was still maintained in post-prandial systemic symptoms, but gastrointestinal symptoms were no longer significantly improved. None regretted undergoing further surgery.

Discussion

The dumping syndrome can cause severe morbidity in a small number of patients following partial gastrectomy. It results from rapid gastric emptying delivering hyperosmotic food and fluid into the upper small intestine. This provokes rapid peristalsis and an outpouring of fluid into the intestinal lumen with resultant abdominal pain, distension and diarrhoea. Depletion of the plasma volume secondary to fluid passing into the gut results in systemic symptoms of faintness, palpitations and dizziness. In recent years the role of humoral agents has become increasingly recognized and many of these such as vasoactive intestinal peptide (VIP), serotonin, enteroglucagon, neurotensin and polypeptide P have been found to be elevated in patients with the dumping syndrome following meals (Editorial, 1980; Sagor *et al.*, 1981).

In our patients, symptoms were much improved and this correlated with improvement of gastric emptying at 6 months. By 2 years however, gastric emptying as measured by T_{50} with a test meal had increased to pre-operative levels, but systemic symptoms remained significantly improved although abdominal ones had recurred albeit not so severely. It may be that measurement of gastric emptying with a liquid meal is too sensitive in these patients, and that if a solid or semi-solid feed had been used the emptying time would have remained significantly delayed. Further, the trigger for some of the systemic manifestations of the dumping syndrome might be related to some of the humoral factors mentioned which were not released following this corrective surgery although abdominal symptoms returned when the gastric emptying again deteriorated. The

TABLE 1. The mean values for gastric emptying (T_{50} in min); total symptoms score, abdominal symptom score, systemic symptom score are shown pre-operatively and at 6 and 24 months postoperatively, along with the pre-values for the paired *t*-tests comparing pre-operative values with 6 and 24 months (mean $\pm$ s.d.).

	Gastric emptying T_{50} (min)	Total symptoms	Abdominal symptoms	Systemic symptoms
Pre-operatively	1.9 $\pm$ 0.5	42.3 $\pm$ 3.2	19.3 $\pm$ 3.0	23.0 $\pm$ 4.1
6 months' post-operatively	44.5 $\pm$ 33.2	14.0 $\pm$ 4.2	10.5 $\pm$ 4.7	5.0 $\pm$ 2.9
24 months' post-operatively	2.5 $\pm$ 1.5	17.5 $\pm$ 8.7	12.0 $\pm$ 8.1	4.0 $\pm$ 3.6
Paired <i>t</i> -test:				
Pre-operatively and 6 months	$P < 0.01$	$P < 0.005$	$P < 0.05$	$P < 0.005$
Pre-operatively and 24 months	NS	$P < 0.01$	NS	$P < 0.005$

operation of interposition of a long antiperistaltic reversed jejunal loop has been shown to be of some value in patients incapacitated by symptoms resulting from the dumping syndrome.

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