

## Duodenal stents for malignant duodenal strictures

S D Johnston, S T D McKelvey, R J Moorehead, R A J Spence, T C K Tham

Accepted 12 March 2002

---

### SUMMARY

**Duodenal obstruction may be caused by inoperable malignant disease. Symptoms of nausea and vomiting have been traditionally palliated by surgery. The aim of the study was to determine the efficacy of the endoscopic placement of metal self expanding duodenal stents for the palliation of malignant duodenal obstruction. Four patients with malignant gastric outlet obstruction are described. One patient had a history of oesophagectomy for oesophageal adenocarcinoma and presented with further dysphagia. At endoscopy the recurrent oesophageal tumour and an adenocarcinoma involving the pylorus were both stented. In the other three patients there was a previous history of colonic carcinoma, cholangiocarcinoma and oesophageal adenocarcinoma respectively. All four patients were successfully stented with good palliation of their symptoms. Duodenal Wallstents are a useful alternative to surgery in patients with inoperable malignant duodenal obstruction or those who are unfit for surgery.**

---

### INTRODUCTION

Duodenal obstruction may be caused by inoperable malignant disease. Symptoms of nausea and vomiting have been traditionally palliated by surgery although surgical gastrojejunostomy is associated with significant morbidity and mortality.<sup>1</sup> An endoscopic alternative to surgery, employing the placement of self-expanding metal stents across strictures, has previously been described for malignant gastric outlet obstruction.<sup>2-6</sup> However the number of patients described in the literature is relatively small and it is not routine practice in many institutions.

We describe the efficacy of the endoscopic placement of metal self-expanding duodenal stents for the palliation of malignant gastroduodenal obstruction in four patients.

### METHODS

We used self-expanding metallic stents (Wallstent Enteral, Boston Scientific, Microvasive, UK) 22mm in diameter and 60-100mm in length. These stents are constructed from a woven stainless steel superalloy and have a larger diameter than the commonly used biliary stents. Before deployment, these stents are constrained by a transparent plastic membrane (Unistep System) onto a delivery system of outer diameter 10Fr and

overall length of 230cm. This long thin delivery system allows the insertion and deployment of stents through the accessory channel (diameter 4.2mm) of an upper gastrointestinal endoscope.

Stents were placed under endoscopic and fluoroscopic guidance. After identification of the stricture, we passed a standard 0.035-inch Zebra guidewire (Boston Scientific, Microvasive, UK) through it using a standard ERCP catheter. We determined the length of the stricture by the distance the catheter travelled over the guidewire

---

The Ulster Hospital, Upper Newtownards Road,  
Dundonald, Belfast BT16 1RH.  
Division of Gastroenterology.

S D Johnston, MD, MRCP, Consultant Physician.

T C K Tham, MD, FRCP, Consultant Physician.

Division of Gastrointestinal Surgery.

S T D McKelvey, MCh, FRCS, Consultant Surgeon.

R J Moorehead, MD, FRCS, Consultant Surgeon.

Belfast City Hospital, Lisburn Road, Belfast BT9 7AB.  
Department of Surgery.

R A J Spence, OBE, MA, MD, FRCS, Consultant Surgeon.

Correspondence to Dr Johnston, Level 6, Belfast City Hospital.

under fluoroscopic monitoring. The Wallstent Enteral was advanced over the guidewire so that the ends of the undeployed stent were equidistant from the ends of the stricture. We assessed the adequacy of stent placement at the conclusion of each procedure using endoscopy and fluoroscopy.

## RESULTS

We carried out the placement of metal self-expanding duodenal stents in four patients with malignant gastroduodenal obstruction. All four patients were unsuitable for surgical treatment in view of their advanced disease as assessed by their attending gastroenterologist and surgeon.

A 57-year old man with a previous history of distal oesophagectomy and proximal gastrectomy in 1996 for adenocarcinoma presented with further dysphagia. At endoscopy a 5cm malignant lesion was evident in the distal oesophagus. A 10cm length 22mm diameter Wallstent was inserted in good position. In addition an infiltrating biopsy-

proven adenocarcinoma involving the pylorus was found and two 7cm length 22mm diameter Wallstents were inserted successfully in tandem across the stenosis. The first stent was deployed too distal to the stricture and the second stent was deployed more proximally in good position across the stricture with the distal portion overlapping the first stent. At 2-month follow-up he was eating normally and gaining weight. He died from progressive disease four months following stent insertion.

A 65-year old lady with previous right hemicolectomy for carcinoma of the colon was admitted with features of duodenal obstruction due to local recurrence resulting in extrinsic compression between the second and third part of the duodenum. An initial attempt at endoscopic placement of a duodenal stent was unsuccessful due to equipment incompatibility. A bypass gastroenterostomy and anterior gastrostomy were performed. The former was complicated by retrograde intussusception of the efferent loop and resulted in further vomiting and a large gastric aspirate (Figure 1). Repeat endoscopy confirmed extrinsic compression between the second and third part of the duodenum and a 6cm length 22mm Wallstent was successfully placed across the extrinsic compression with resolution of her vomiting and a marked reduction in the amount of gastric aspirate (Figure 2). The anterior gastrostomy was then allowed to close over once the duodenal stent had been inserted successfully endoscopically. She was discharged home after a six-week admission and had a two-month period of good symptom control before being re-admitted with symptoms due to an obstructed stent caused by tumour ingrowth. An unsuccessful attempt was made to insert a further stent in tandem in order to relieve the obstruction and co-existent distal small bowel obstruction on contrast studies was also noted at that time. A defunctioning percutaneous gastrostomy was performed for symptom palliation. She died a short time later.

A 64-year old man had a history of inoperable cholangiocarcinoma and was palliated two years previously by means of a hepaticojejunostomy. He presented with recurrent vomiting and Barium meal demonstrated a stricture due to extrinsic compression as a result of recurrent tumour in the second part of the duodenum with no flow of contrast beyond. A 9cm 22mm Wallstent was inserted across the stricture and provided good symptomatic relief. Following endoscopy routine

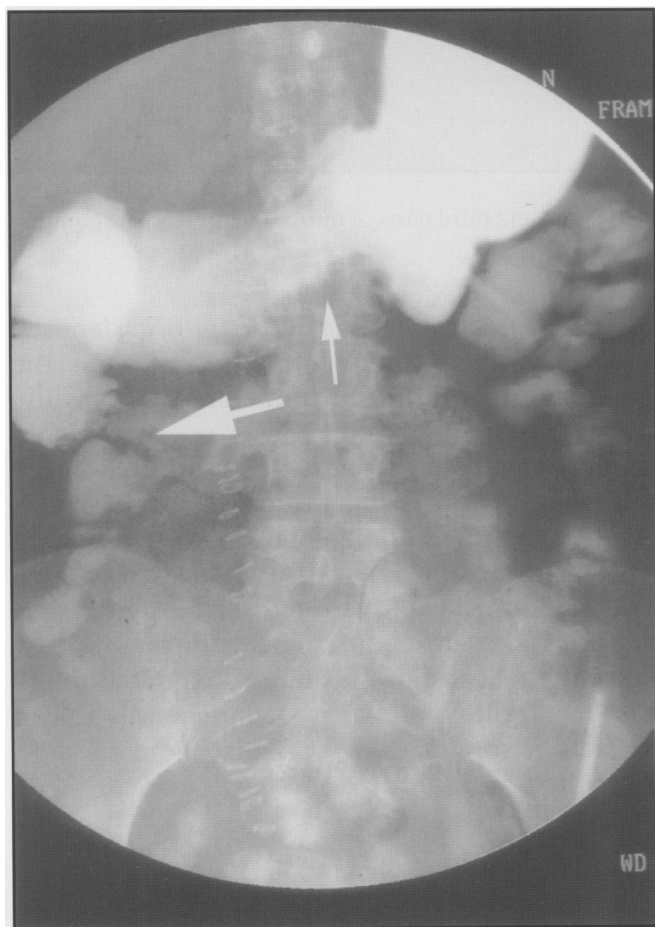
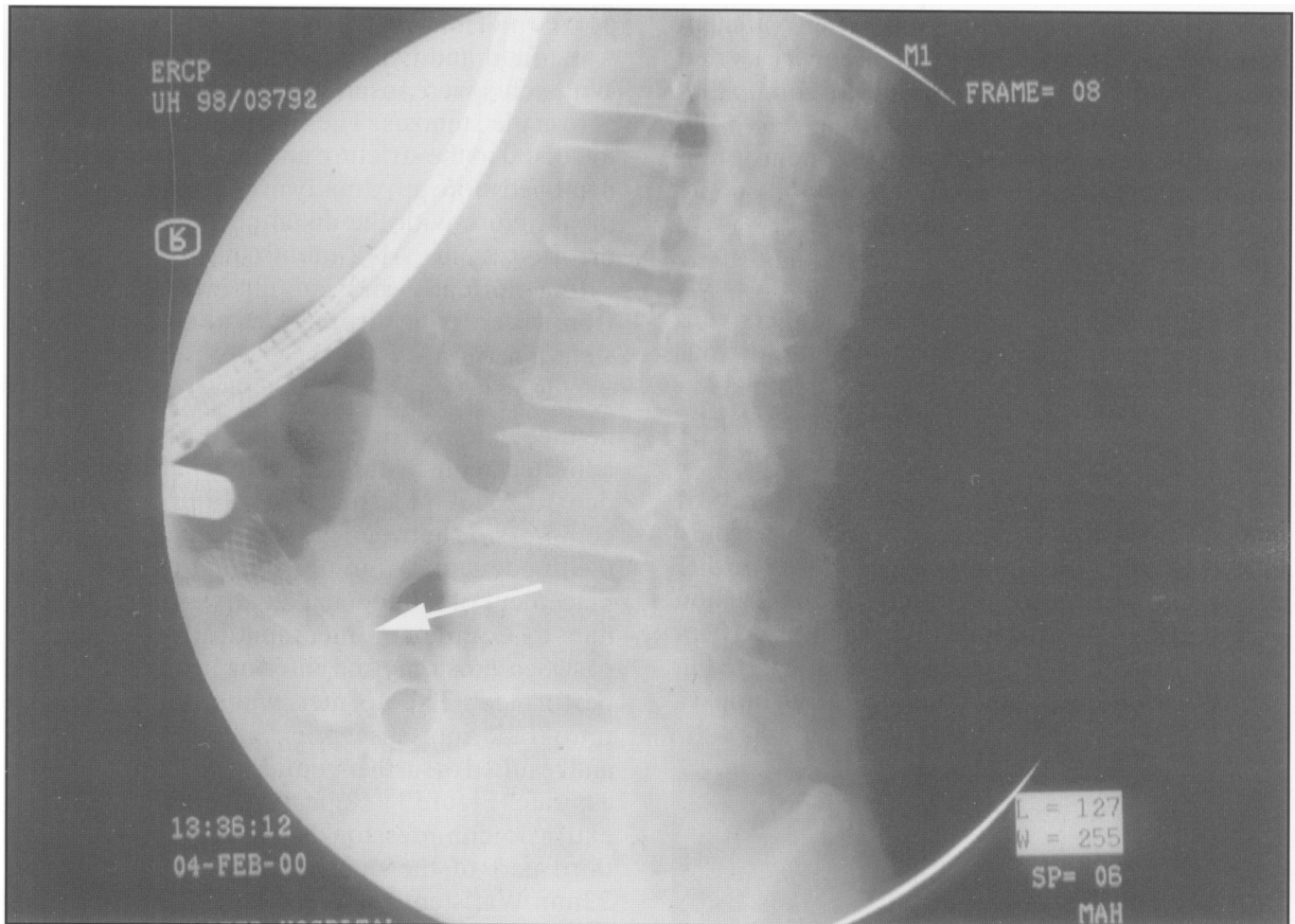


Fig 1. Barium meal demonstrating obstruction between the second and third parts of the duodenum (thick arrow; the thin arrow demonstrates the gastroenterostomy).



*Fig 2.* Endoscopic deployment of the duodenal stent between the second and third parts of the duodenum (arrow pointing to duodenal stent).

Gastromiro meal was suspicious of a small contained perforation in the proximal part of the second part of the duodenum. He had no symptoms and was treated conservatively with intravenous antibiotics, parenteral nutrition and was fit for discharge after 1 week. He subsequently tolerated a light diet and remained well for four months at which time he developed ascites and died one month later.

A 56 year old man with adenocarcinoma arising from the gastro-oesophageal junction had undergone oesophagectomy 14 months earlier. He presented with vomiting, abdominal pain, weight loss and cachexia. CT scan of his abdomen showed soft tissue around the aorta in the diaphragmatic crus and soft tissue adjacent to the duodenal loop. There was abdominal ascites. Barium meal showed delayed gastric emptying from a narrow pyloric channel. While in hospital he was noted to have significant vomiting and was unable to keep any fluids down. At upper gastrointestinal endoscopy, there was a large

amount of gastric residue due to pyloric stenosis, probably from tumour infiltration, and the duodenum could not be entered. A therapeutic duodenoscope (Olympus) was used. A Zebra guidewire (Boston Scientific) was inserted across the pyloric stenosis under fluoroscopic guidance. A 9cm long, 2.2cm diameter uncovered enteral Wallstent (Boston Scientific) was passed through the scope and deployed across the pylorus. A routine post procedure Gastromiro swallow showed that most of the contrast passed through the stent. Following the procedure he was able to tolerate a soft diet. He was discharged 2 days after the procedure.

#### DISCUSSION

The management of malignant gastroduodenal obstruction is difficult. Our patients were unsuitable for surgery in view of their advanced disease. Whilst supportive care is commonly used, it neither relieves nausea or vomiting, nor allows an adequate food intake. Surgical options include

gastrojejunostomy or antral gastrectomy, although these are associated with significant morbidity and mortality.<sup>1</sup> Other treatment options, including chemotherapy and radiotherapy, are not helpful in relieving symptoms. The combination of a surgically placed jejunostomy for feeding purposes and a defunctioning percutaneous endoscopic gastrostomy has been used, but is often unsatisfactory.<sup>7</sup> Endoscopic dilatation only provides transient relief of symptoms and carries a significant risk of perforation.

We have found that the placement of self-expanding metallic Wallstents is a safe and effective alternative to surgery in patients with inoperable malignant duodenal obstruction. The slim and flexible delivery system allows stent placement into the angulated parts of the upper gastrointestinal tract without prior dilatation. The larger diameter of these stents allows patients to resume a normal diet. This advantage has also been confirmed in one of the largest studies to date.<sup>8</sup> Twelve patients with malignant gastroduodenal obstruction were followed up, of whom 6 were able to resume a regular diet, three could eat pureed food, in two patients the procedure was unsuccessful due to technical reasons and one patient had coexistent distal small intestinal obstruction.<sup>8</sup> One of our patients may have had a small contained perforation. An estimate of the incidence of perforation related to the placement of duodenal stents is limited by the small size of the studies. In one study of 31 patients, one perforation occurred, representing a complication rate of 3%.<sup>9</sup> An alternative to endoscopic placement is stent placement under fluoroscopic control.<sup>10</sup>

The use of Wallstents for the relief of malignant gastric outlet obstruction is more cost-effective than surgical gastrojejunostomy.<sup>11</sup> In addition, stenting can be expected to provide a greater quality of life and there is less time required for convalescence. In one study, the median survival time for patients who underwent enteral stent placement compared with those who underwent surgical gastrojejunostomy was 94 and 92 days, charges were \$9,921 and \$28,173 ( $p < 0.005$ ) and duration of hospitalization was 4 and 14 days ( $p < 0.005$ ), respectively.<sup>11</sup>

In conclusion, recent studies suggest that the endoscopic placement of enteral stents provides a feasible and effective means of the palliation of obstructive symptoms due to malignant

gastroduodenal obstruction and may be preferable to surgery although confirmation of this is awaited from randomised controlled trials.

## REFERENCES

1. Weaver DW, Winczek RG, Bouwman DL, Walt AJ. Gastrojejunostomy: is it helpful for patients with pancreatic cancer? *Surgery* 1987; **102**(4): 608-13.
2. Topazian M, Ring E, Grendell J. Palliation of obstructing gastric cancer with steel mesh self-expanding prostheses. *Gastrointest Endosc* 1992; **38**(1): 8-60.
3. Keymling M, Wagner HJ, Vakil N, Knyrim K. Relief of malignant duodenal obstruction by percutaneous insertion of a metal stent. *Gastrointest Endosc* 1993; **39**(3): 439-41.
4. Kozarek RA, Ball TJ, Patterson DJ. Metallic self-expanding stent application in the upper gastrointestinal tract: caveats and concerns. *Gastrointest Endosc* 1992; **38**(1): 1-6.
5. Maetani I, Ogawa S, Hoshi H, Sato M, Yoshioka H, Igarashi Y *et al.* Self-expanding metal stents for palliative treatment of malignant biliary and duodenal stenoses. *Gastrointest Endosc* 1994; **26**(8): 701-4.
6. Maetani I, Inoue H, Sato M, Ohashi S, Igarashi Y, Sakai Y. Peroral insertion techniques of self-expanding metal stents for malignant gastric outlet and duodenal stenoses. *Gastrointest Endosc* 1996; **44**(4): 468-71.
7. Buto SK, Tsang TK, Crampton AR, Berlin G. Nonsurgical bypass of malignant duodenal and biliary obstruction. *Gastrointest Endosc* 1990; **36**(5): 518-20.
8. Soetikno RM, Lichtensein D R, Vandervoort J, *et al.* Palliation of malignant gastric outlet obstruction using an endoscopically placed Wallstent. *Gastrointest Endosc* 1998; **47**(3): 267-70.
9. Pinto Pabon IT, Diaz LP, Ruiz De Adana JC, Lopez Herrero J. Gastric and duodenal stents: follow-up and complications. *Cardiovasc Intervent Radiol* 2001; **24**(3): 147-53.
10. Lee JM, Han YM, Kim CS, Lee SY, Lee ST, Yang DH. Fluoroscopic-guided covered metallic stent placement for gastric outlet obstruction and post-operative gastroenterostomy anastomotic stricture. *Clin Radiol* 2001; **56**(7): 560-7.
11. Yim HB, Jacobson BC, Saltzman JR, *et al.* Clinical outcome of the use of enteral stents for palliation of patients with malignant upper GI obstruction. *Gastrointest Endosc* 2001; **53**(3): 329-32.