

Palliation of Malignant Gastric Obstruction : Fluoroscopic-Guided Covered Metallic Stent Placement¹

Jeong Min Lee, M.D., Young Min Han, M.D., Chong Soo Kim, M.D., Sang Yong Lee, M.D.,
Ki Chul Choi, M.D., Soo Tak Lee, M.D.², Hyun Young Han, M.D.³

Purpose : To demonstrate the feasibility and clinical efficacy of self-expanding, covered, metallic stent placement for the palliative treatment of malignant gastric obstruction.

Materials and Methods : Under fluoroscopic guidance, the placement of self-expanding, covered stents was attempted in 23 patients (age range, 31-78 years) with inoperable or recurrent gastric malignancies. All 23 suffered dysphagia and/or vomiting after the ingestion of soft foods, or swallowing difficulty. Three different types of self-expanding, covered metallic stents were used and in all patients, these were placed perorally using the over the guide wire technique. Success was defined both technically and clinically.

Results : Stent placement was technically successful in 19 patients (82.6 %) but because the guidewire failed to successfully negotiate the sites at which there was obstruction, was unsuccessful in four (17.4 %). Stent placement was well tolerated in all patients except one, in whom an acutely angled efferent loop from remnant stomach was present. In this case, stent placement required a strong metallic guidewire. After placement, 17 of the 19 patients (89.5 %) were able to ingest solid and/or soft foods without dysphagia and showed a markedly decreased incidence of vomiting. Two others showed some improvement in the frequency of vomiting but were able to ingest only a liquid diet. In one patient, the stent migrated two days after the procedure. During the follow-up period of 2-7 months (mean, 74 days), there were no clinically significant complications.

Conclusion : For the short-term palliative treatment of patients with gastric inlet or outlet obstructions, the placement of self-expanding metallic stents has proven relatively easy and safe, as well as reasonably effective.

Index words : Stomach, neoplasms
Stomach, interventional procedure
Stomach, stenosis or obstruction

The majority of cases in which gastric cancer occurs at the esophagogastric junction (gastric inlet obstruction;

GIO) or antrum (gastric outlet obstruction; GOO) are unresectable and show local recurrence. Patients with GIO or GOO may present with swallowing difficulty or intractable vomiting, and/or the inability to eat, conditions which lead to a progressive deterioration in their quality of life. The consequences are weight loss and dehydration, which often require intravenous fluid administration. Although surgical treatment is still the most appropriate approach for the curative or palliative treat-

¹Department of Diagnostic Radiology, Chonbuk National University Hospital
²Department of Internal Medicine, Chonbuk National University Hospital
³Department of Radiology, Eulgy University Hospital
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Address reprint requests to : Jeong-Min Lee, M.D., Department of Diagnostic Radiology, Chonbuk National University Hospital,
#634-18 Keumam-Dong, Chonju-shi, Chonbuk, 561-712, Korea.
Tel. 82-652-250-1152 Fax. 82-652-72-0481
E-mail: JMSH@CHOLLIAN.NET

ment of advanced gastric cancer, it offers satisfactory palliation in only approximately 50 % of patients and may be associated with considerable morbidity (1-4). This is especially true for patients who are elderly, medically unfit, or have extensive metastases.

The main objective of palliative treatment is the rapid relief of dysphagia and restoration of the passage of fluids and solids. Palliative treatment includes dilation, intubation, electrocoagulation, Nd: YAG tumor vaporization, and photodynamic therapy through endoscopy (5-8). The use of self-expanding metallic prostheses as a palliative treatment for unresectable tumors of the esophagus has been shown to be effective and safe (9), and in relation to malignant gastric obstructions, non-surgical palliative measures involving the use of self-expanding endoprotheses, via a gastrostomy (10-12) or

perorally (13-18), have recently been reported. Except in a few isolated cases (9, 16) in which covered self-expanding stents were implanted, the stents used in these studies were of the uncovered self-expanding type.

The purpose of our study was to assess the effectiveness and the outcome of covered stent placement in patients with malignant gastric inlet and outlet obstruction.

Materials and Methods

Between May 1993 and March 1999, 23 patients with obstructive gastric malignancies underwent treatment involving the use of covered expanding metallic stents for the palliation of symptomatic obstruction characterized by swallowing difficulty or intolerance to oral alimentation, and/ or nausea and vomiting, as noted on initial

Table 1. Treatment and Follow-up of 23 Patients with Malignant Gastric Obstruction

Patient No	Age/ Sex	Site of Stricture	Type and Length of Stent (cm)	Alimentation		Complications	Outcome & Duration(weeks)
				Before procedure	After procedure		
1	36/F	Antrum-pylorus	Choo, 12	Continuous vomiting	Liquids, Intermittent vomiting, bloating	None	Dead, 2
2	53/F	Antrum	Choo,12	Intermittent vomiting	Soft diet	None	Dead, 7
3	75/M	Antrum-pylorus	Choo,12	Intermittent vomiting	Soft diet	None	Dead, 4
4	79/M	Antrum-pylorus		Continuous vomiting			Failed
5	70/M	Antrum-pylorus		Continuous vomiting			Failed
6	59/F	Antrum-pylorus	Retrievable Song, 10	Intermittent vomiting	Solid diet	None	Dead, 1
7	53/M	Antrum-pylorus	Choo,12	Continuous vomiting	Soft diet	Initial failure None	Dead, 10
8	66/M	Antrum	Choo ,10 Choo,14	Continuous vomiting	Solid	Upward migration	Alive,6
9	70/M	Antrum-pylorus	Retrievable Song,12	Intermittent vomiting	Soft diet	None	Alive,4
10	79/M	Antrum-pylorus		Continuous vomiting			Failed
11	73/F	Efferent loop		Continuous vomiting			Failed
12	69/M	Efferent loop	Choo,10	Continuous vomiting	Soft diet, Bloating	Initial failure None	Dead,4
13	31/F	Anastomosis site	Song,10	Continuous vomiting	Soft diet	None	Dead, 4
14	72/M	Efferent loop	Choo,10	Intermittent vomiting	Liquids, Bloating	None	Dead, 2
15	76/M	Efferent loop	Choo,8	Intermittent vomiting	Soft diet	None	Dead, 10
16	69/M	Efferent loop	Song,8	Intermittent vomiting	Soft diet	None	Dead, 8
17	74/M	Esophagogastric junction and cardia	Choo,8	Swallowing Difficulty	Soft diet	None	Dead, 26
18	70/M	Cardia	Choo,8	Intermittent vomiting liquids	Soft diet	None	Alive,30
19	75/M	Esophagogastric junction and cardia	Song,10	Swallowing difficulty	Soft diet liquids	None	Dead, 12
20	70/F	Esophagogastric junction and cardia	Song,10	Intermittent vomiting	Soft diet	None	Dead, 8
21	69/M	Cardia	Choo,12	Swallowing difficulty liquids	Solids	None	Dead, 23
22	67/M	Esophagogastric junction and cardia	Choo,14	Swallowing difficulty, Continuous vomiting	Liquids	None	Dead, 12
23	66/M	Esophagogastric junction and cardia	Choo,8	Swallowing difficulty, Intermittent vomiting	Soft	None	Alive, 5

evaluation. In all cases, contrast studies revealed complete or nearly complete obstruction of the gastric inlet (n=7), gastric outlet (n=10) and site of anastomosis (n=6) (Table 1). Seventeen patients were men and six were women; their age ranged between 31 and 79 (mean, 66) years. Malignancy was diagnosed on the basis of endoscopic or surgical biopsy; the etiology of the malignant stenoses was primary (n=22) or metastatic disease (n=1). Tumor size ranged from 4 cm to 8 cm. Eleven patients had previously undergone therapy, as follows: prior surgery such as radical gastrectomy or gastrojejunostomy or feeding jejunostomy (n=8), chemotherapy (n=1), esophagogastrostomy with radiation therapy and chemotherapy (n=1), and radiation therapy (n=1). Twelve patients were thought to be inoperable because of their advanced age or the metastatic spread of their cancers. Informed consent was obtained from each.

Three different types of self-expanding, covered metallic stents were used: the 18mm the Choo esophageal stent (Solco Intermed, Seoul, Korea) (n=15), the 18mm first generation Song stent (Solco Intermed, Seoul, Korea) (n=4), and the 16mm retrievable Song stent (Doosung Medi-tech, Seoul, Korea) (n=4). The first generation Song stent was covered with silicone and the other two with polyurethane. The Choo stent has 3-mm gaps made entirely of polyurethane and located between the metallic stents of the body, and to permit flexibility, the retrievable Song stent uses nitinol wire (Fig. 1).

Different types of introduction tubes and pushing catheters were used; 8 mm in diameter for the Choo stent, 11mm in diameter for the first generation Song stent, and

6mm in diameter for the retrievable Song stent. The introduction tube was made of polytetrafluoroethylene or polyethylene, and for GIO and for GOO were 80 and 140 cm in length, respectively. The delivery system consisted of a guidance tip, an introduction tube, a compressed stent, and a pushing catheter (Fig. 1).

All procedures involved the use of a digital angiographic unit with patients in a supine position and during the procedure, patients were monitored by means of continuous pulse oximetry and blood pressure measurement. In all patients, a nasogastric aspiration tube was in place for 24 hours before the procedure, in order to decompress the stomach. A sedative (1.25-2.5 mg) (Midazolam, Dormicum; Roche, Seoul, Korea) and an



Fig. 1. Three types of covered expandable metallic stents and introducers.

From left to right, Song stent, Choo stent, and retrievable Song stent with introducers for each stent.

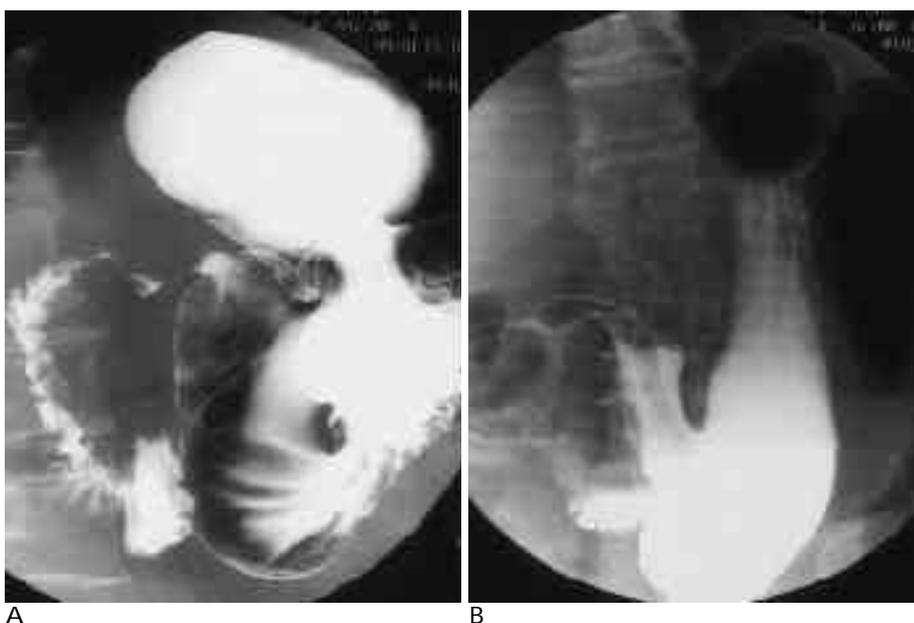


Fig. 2. Stent placement in gastric outlet obstruction.

A. UGI radiograph obtained before the procedure shows malignant tumor of the pyloric portion of the stomach. B. UGI radiograph obtained after the procedure shows smoothly curved stent that fits in the anatomic curvature of the pylorus and good relief of obstruction.

analgesic drug (50 mg) (Meperidine, Pethidin; Samsung Pharm, Seoul, Korea) were administered intravenously. No general anesthesia was required.

Topical oropharyngeal anesthetic gel (Lidocain Viscous 2 %; Roxane Laboratories, Ohio, U.S.A.) was used. Under fluoroscopic guidance, a 6-French angled catheter (Cobra or Headhunter; Cook, Bloomington, Ind) and a 260-cm-long, 0.035-inch hydrophilic angled guidewire (Radiofocus Wire; Terumo, Tokyo, Japan) were passed beyond the stenosis. The guidewire was then exchanged for a superstiff, 260-cm-long 0.038-inch guidewire (Am-

platz Superstiff EX; Meditech/ Boston Scientific, Watertown, Mass.). A 15-mm-diameter balloon catheter (PE-MT; Meditech/Boston Scientific, Watertown, Mass.) was advanced through the stenosis over the guidewire, which was then dilated several times to enable passage of the catheter stent assembly. In patients with GOO, the balloon catheter was exchanged for an 8-French angled catheter (Judikin s R4; Cordis, Miami, FL) and a 260-cm-long, 0.9-mm metal guide wire (Savary; Solco Intermed, Seoul, Korea) was introduced through the catheter and advanced through the stenosis into the duodenum pars

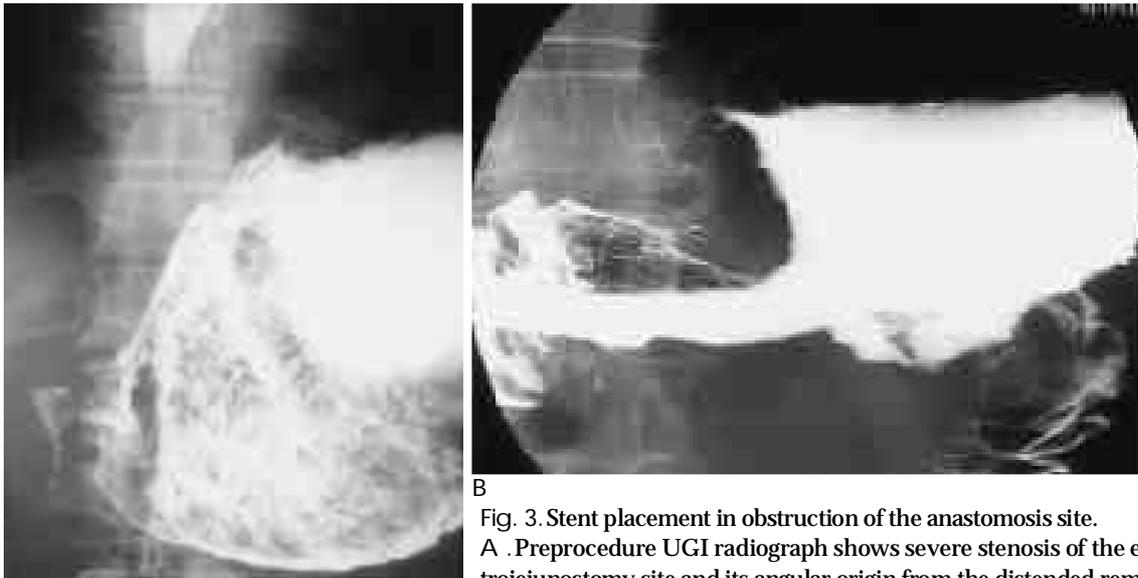


Fig. 3. Stent placement in obstruction of the anastomosis site. A .Preprocedure UGI radiograph shows severe stenosis of the efferent loop of gastrojejunostomy site and its angular origin from the distended remnant stomach. B. UGI radiograph after stent placement shows good barium passage through the stent



Fig. 4. Stent placement in gastric inlet obstruction. UGI radiographs obtained before (A) and after (B) placements of the Choo stent in gastric cardia and upper body show good relief of obstruction.

IV or jejunum. The stent length chosen was such that the neoplasm was overlapped by 1-2cm on either side.

To facilitate passage, anesthetic gel was used to lubricate the surface of the introducer-stent assembly; because of strong resistance to friction, to the acute-angled anatomic curve, and to the tight stenosis itself, it was sometimes very difficult to pass this into stenoses of the gastric antrum and pylorus. Coiling of the assembly in the gastric fundus was prevented by introducing a 0.9-mm, metal guidewire that made the assembly stiffer. To induce sufficient stiffness, it was important to advance the distal soft tip of the Savary guidewire into the duodenum pars IV. A stent at least 4-cm longer than the stricture was positioned in such a way that the proximal and distal parts of the stent rested on the proximal and distal margins of the stricture. The pushing catheter was

then held in place while the introduction tube was withdrawn, a maneuver which released the stent and allowed it to expand within the stricture. Because all stents demonstrated adequate immediate self-expansion, no post-deployment balloon dilation was performed.

Technical success was defined as correct placement of the stent across the stricture in such a way that its patency was sufficient to relieve the obstruction, as shown by post-procedural barium contrast studies. Clinical success was defined as improvement in a patient's diet (peroral intake). Outcome data were obtained by reviewing follow-up appointment notes and progress, and - in addition - patients who reported pain or symptoms of obstruction, such as dysphagia and vomiting, were interviewed at least monthly.

Results

Of the 23 patients in whom we attempted to place the covered stent, placement of the stent was achieved in 19 patients (Technical Success 82.6 %). In 19 patients, we were able to pass the guide wire through the obstructed segment or stenoses without difficulty. Cannulation of the stenosis took 10-50 min (mean, 20 min) in the 19 patients in whom it was successful. Despite the integration of fluoroscopic and endoscopic guidance, we were not able to pass the guidewire in four patients: three had long, segmental occlusions at the antrum, and one showed complete occlusion of the efferent loop at the site of the gastrojejunostomy. As a result, stent place-

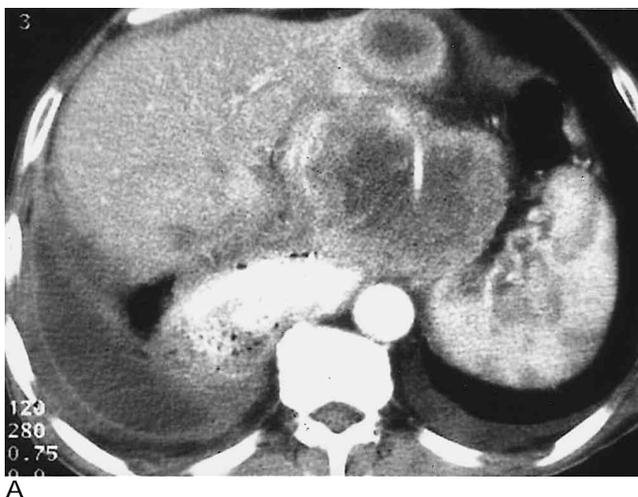


Fig. 5. Migration of the stent in a patient with secondary gastric outlet obstruction by recurrent lymph nodal metastases after esophagogastrectomy. A. Abdominal CT reveals extensive lymphadenopathy around celiac artery and dilated intrathoracic stomach. B. UGI radiograph reveals narrowing and anterior displacement of the antrum caused from extrinsic compression by lymphadenopathy. C. UGI radiograph after the second stent placement shows good relief of the obstruction and previously migrated stent in dilated proximal stomach. The upwardly migrated stent was removed by using of endoscopic snare.

B

C

ment failed in these patients. Two underwent gastrojejunostomy, but for two, because of their poor general condition, surgery was not possible. During the early phase of this study, initial stent placement failed in two patients (case 7 & 12); this was because we could not advance the introducer-stent set through the stenosis into the duodenum due to loop formation of the delivery system in the fundus of the stomach. The large gastric lumen is not capable of supporting and stabilizing the wire-stent system while this is being advanced through the stenotic area, and a strong wire that can support the introducer-stent set while it is moving into the stenosis is thus needed. On the second attempt, using a 0.9-mm metal Savary wire, we managed to place the stents in these two patients.

There were no major complications, such as perforation or pressure ulceration from the ends of the stents. In one case involving metastatic gastric cancer after esophagectomy with esophagogastronomy, the stent migrated from its initial location and vomiting again developed two days after deployment. In that patient a second stent was inserted and the symptoms improved. The upwardly migrated stent was removed using an endoscopic snare. There was no case of obstruction due to tumor invasion, inflammatory tissue growing through the mesh wall of the stent, or food debris. In four patients, mild to moderate epigastric pain was attributable to the stent, but within one week, spontaneous improvement was noted.

During the follow-up period of 2-7 months (mean, 74 days), symptoms of obstruction, such as nausea and vomiting, disappeared and the quality of life was improved substantially. In 17 patients, the intake of at least soft food was restored (clinical success, 89 %). Two patients (Case 1 & 14), however, who were already at a preterminal stage (death occurred 2 weeks after stent implantation), showed intermittent vomiting (some improvement in frequency) and poor feeding due to marked meteorism and loss of appetite. This was despite the fact that radiologic examination had shown free passage of barium. Fifteen patients died 1 to 26 (mean, 8.1) weeks after stent insertion, having remained free of obstruction; 14 died from progression of their malignant disease and one from disseminated, cancer related, intravascular coagulation. Four patients are still alive; in one, the follow-up period has been 30 weeks, and in the others, 4-6 weeks.

Discussion

Malignant gastric obstruction resulting from primary or metastatic cancer is often a preterminal event that leads to progressive deterioration in a patient's quality of life. Obstructive symptoms of nausea, vomiting, and abdominal distention, as well as nutritional deficiencies, result in frequent hospital admissions and high morbidity. Although surgical palliation is common, morbidity is high and palliation suboptimal (3, 4). In addition, recurrent gastric carcinomas obstructing a gastrojejunal anastomosis represent an incurable stage of the disease. To provide palliation for these patients, multiple non-surgical interventions including endoscopic palliation with feeding tubes, ablative therapy with Nd-YAG laser, periodic bougienage, and expandable metal prostheses are approaches which have been investigated (5-8, 15-18). Various endoscopic interventions require repeated endoscopic sessions, however, and in these patients with a short life expectancy, such as these, the deployment of expandable metal stents seems to be the most reasonable therapeutic alternative.

Expandable metal stents have recently been used to treat malignant gastric and duodenal strictures (10-18). Although such attempts have generally been successful, the type of stent used and the techniques of stent placement described in these studies have not been uniform. Various types and sizes have been used successfully, and have been inserted by endoscopy (18), under combined endoscopic and fluoroscopic guidance (15-17), or under fluoroscopic guidance (10-14).

In most such few cases, various types of uncovered stents (vascular, biliary, and enteral) were used. The prevalent use of bared stent may be related to its flexibility and -because of its greater compressibility- the availability of low caliber delivery device. The problem frequently encountered during stent placement has been the difficulty involved in passing the delivery system through gastroduodenal stenoses, due to the length and tortuosity of the esophagogastric tract (14, 19). To overcome the problem, a low-caliber flexible delivery device was needed, and the use of a covered stent (that needed a larger-caliber delivery device) was therefore restricted. However, stent reocclusions caused by tumor ingrowth or inflammatory tissue growth through the mesh wall of the stent were reported, and clinical success was thus impaired (17). In addition, bleeding, the formation of granulation tissue due to exposed proximal

and distal wires at the edges of the prostheses, and food impaction are other potential problems. Although a covered stent appears to need a larger-caliber delivery device and to be more rigid than a bared stent, it will most likely help solve this problem.

The development of a covered metallic stent has definitely been an advance in the palliative treatment of dysphagia arising from esophageal malignancy; it is easy to place, effectively relieves dysphagia, and prevents tumor ingrowth (9). In 1993, Song et al. (9) successfully used a covered stent to palliate antral obstruction through a gastrostomy, so averting delivery problems associated with stent rigidity. To our knowledge, however, there has been no case reports describing procedures whereby other types of covered metallic stents have been placed over a peroral guide wire under fluoroscopic guidance to treat malignant pyloric obstruction.

We used two types of flexible, polyurethane-covered stent for relieving GOO. Choo et al. (21) reported success in the palliative treatment of colorectal obstruction with flexible stents covered with impermeable polyurethane membrane, and Song et al. (20) described the successful palliative treatment of esophageal stenosis using polyurethane-covered, retrievable, expandable stents. The same types of stent were used in our series. In our study, the polyurethane membrane could effectively prevented tumor ingrowth into the stent. The retrievable Song stent has a nylon loop which was hooked inside each bend of the proximal portion of the stent and strung with a thread. Because it would be easy to remove the migrated stent upwardly using a hooked catheter, we thought this stent might be useful in case of acutely angled stenosis, which carries high risk of stent migration.

Complications involved in the use of covered metal stents for the palliation of esophageal and colon cancers include migration, obstruction, perforation, and bleeding (9, 20, 21). These complications may also be expected to occur where covered metal stents are placed in the stomach and small intestine; other than migration, however, they have not been observed in the present case. In our study, stent migration occurred in a patient with metastatic gastric cancer arising from esophageal cancer after resective surgery. This occurrence might be related to a drawback inherent in the structure of a covered stent: it is more easily dislocated than the uncovered type. The latter uses a mesh structure which aids adhesion to the digestive tract wall and prevents it from sliding into the stomach, and is thus less easily dislocated than the covered type. An uncovered type, however, is

exposed to inflammatory and tumoral ingrowth, reducing the lumen and requiring repeated endoscopic sessions. A controlled study, including a greater number of patients and long-term follow-up, are needed to prove the superiority of the covered stent for relieving gastric obstruction, and its better long-term patency.

Stent implantation in this series was managed entirely under fluoroscopic guidance, without the need for endoscopy, and using a peroral approach. Fluoroscopic guidance, in our experience, contributes more to satisfactory catheterization of stenoses and accurate stent positioning than does endoscopy. The proximal part of the stenosis might be more easily located endoscopically and if retention is present, the gastric contents are aspirated to facilitate the access to the stenosis. To negotiate the stenosis and advance the guidewire through it, however, fluoroscopic guidance might be better than endoscopic guidance. In addition, the delivery systems currently available for covered stents are too large to permit endoscopic placement, and the use of a covered stent is thus excluded. Although easily available in our practice, endoscopy is considered optional.

In our view, the key step for peroral stent placement is passing the introducer-stent set through the stenosis over the guidewire, thus preventing the stent from looping into the stomach. The large gastric lumen is not capable of supporting and stabilizing the wire-stent system while this is being advanced through the stenotic area. To prevent the delivery system from looping in the dilated stomach some guidance through the stomach is important. To overcome this difficulty, Strecker et al. (13) used combined multiple guidewires to track the stent through the dilated stomach and stenosis. Binkert et al. (19) inserted self-expandable, uncovered, metallic endoprotheses in the stomach and the duodenum via the working channel of the endoscope under combined endoscopic and fluoroscopic guidance. They reported that the endoscope provided enough stiffening for the delivery system to be easily maneuvered through the stomach as far as the duodenum pars IV. Another possible way of overcoming the problem is the use of an overtube to stiffen the delivery system through the dilated stomach (22, 23). We used a 0.9-mm Savary guidewire, which was stiff enough to prevent looping in the dilated stomach, and this effectively supported the introducer-stent set while it was being delivered through the stenosis, thereby preventing the introducer-stent assembly system from coiling in the gastric fundus. To provide enough stiffness to prevent coiling in the fundus, it was

important to advance the distal soft tip of Savary guide-wire into the duodenum pars IV.

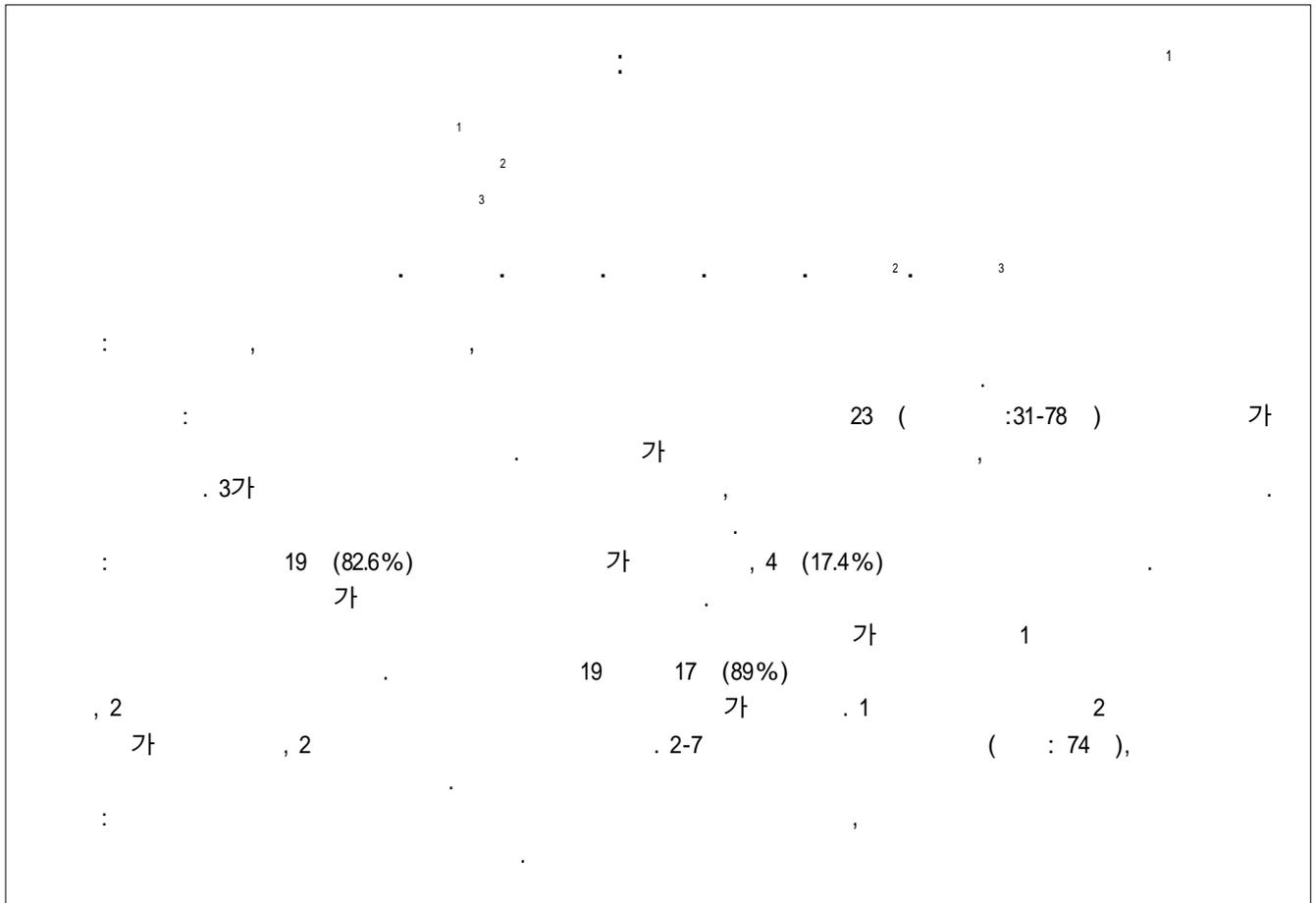
Stent insertion was successful in 82.6 % of our cases, which is slightly lower than in other published series (22, 23). This discrepancy between our study and others might be related to the primary cause of obstruction or stenoses, the severity of obstruction, and the inherent limitation of the introducer-stent system over the guidewire. We attempted stent placement in gastric outlet obstruction caused by primary gastric cancer at its preterminal stage, but in all patients there was technical failure, with complete obstruction of the gastric outlet (n= 3) and the efferent loop of gastrojejunostomy (n= 1). Gastric outlet stenoses occurring in cases of primary gastric cancer are quite irregular and curved, and may be more difficult to negotiate with a guidewire than those related to metastatic lesions or extrinsic compressions. In our cases, the difficulties involved in stent insertion were related to the relatively large caliber delivery systems and markedly dilated proximal gastric segment, as well as the acutely angled anatomic curve found in some patients. Technical success may therefore be improved either by manufacturing a low-caliber flexible delivery device or a flexible stent with better compressibility, in addition to using a stiff guidewire to prevent looping in the stomach.

In conclusion, the placement of a covered self-expanding metallic stent offers good palliation for inoperable malignant gastric inlet and outer obstruction, and recurrent gastric cancer involving gastroenterostomy. It is also easy to perform and a safe alternative to surgery. The advantages are the minimally invasive approach, the small number of complications and the fast recovery from acute symptoms. To determine the role of covered stents in the palliative care of patients with incurable or inoperable gastric obstructions, comparison with uncovered stent placement as well as surgical bypass procedures is warranted.

References

1. Meijer S, DeBakker OJGB, Hoitsmer HFW. Palliative resection in gastric cancer. *J Surg Oncol* 1983;23:77-80
2. Bown SG. Palliation of malignant dysphagia: surgery, radiotherapy, laser, intubation alone or in combination? *Gut* 1991;32:841-844
3. Sarr MG, Gladen HE, Beart RW, Heerdan JA. Role of gastroenterostomy in patients with unresectable carcinoma of the pan-

4. Weaver DW, Wincek RG, Bouwman DL, et al. Gastrojejunostomy: Is it helpful for patients with pancreatic cancer? *Surgery* 1987; 102:608-613
5. Lambert R. Endoscopic treatment of esophagogastric tumors. *Endoscopy* 1996;28: 27-37
6. Laukka MA, Wang KK. Endoscopic Nd: YAG laser palliation of malignant duodenal tumors. *Gastrointest Endosc* 1995;41:225-229
7. Regula J, MacRobert AJ, Gorchein A, et al. Photosensitization and photodynamic therapy of oesophageal, duodenal and colorectal tumours using 5-aminolaevulinic acid-induced protoporphyrin IX: a pilot study. *Gut* 1995;36:67-75
8. Moreira LS, Coelho RC, Sadala RU, Dani R. The use of ethanol injection under endoscopic control to palliate dysphagia caused by esophagogastric cancer. *Endoscopy* 1994;26:311-314
9. Song HY, Do YS, Han YM, et al. Covered esophageal metallic stent tubes: experience in 119 patients. *Radiology* 1994;193:689-695
10. Song HY, Yang DH, Kuh JH, et al. Obstructing cancer of the gastric antrum: palliative treatment with covered metallic stent. *Radiology* 1995;187:357-358
11. Keymling M, Wagner HJ, Vakili N, Knyrim K. Relief of malignant duodenal obstruction by percutaneous insertion of a metal stent. *Gastrointest Endosc* 1993;39:439-441
12. Baere TD, Harry G, Ducreux M, et al. Self-expanding metallic stents as palliative treatment of malignant gastroduodenal stenosis. *AJR* 1997;169:1079-1083
13. Strecker ED, Boos I, Husfeldt KJ. Malignant duodenal stenosis: Palliation with peroral implantation of a self-expanding nitinol stent. *Radiology* 1995;196:349-351
14. Pinto IT. Malignant gastric and duodenal stenosis: palliation by peroral implantation of a self-expanding metallic stent. *Cardiovasc Interv Rad* 1997;20:431-434
15. Venu RP, Pastika BJ, Kini M, et al. Self-expandable metal stents for malignant gastric outlet obstruction: a modified technique. *Endoscopy* 1998;30:553-558
16. Wayman J, Bliss R, Richardson DL, Griffin SM. Self-expanding metal stents in the palliation of small bowel stenosis secondary to recurrent gastric cancer. *Gastrointest Endosc* 1998;47:286-290
17. Nevitt AW, Vida F, Kozarek RA, Raltz SL. Expandable metallic prostheses for malignant obstructions of gastric outlet and proximal small bowel. *Gastrointest Endosc* 1998;47:271-275
18. Patton JT, Carter R. Endoscopic stenting for recurrent malignant gastric outlet obstruction. *Br J Surg* 1997;84:865-866
19. Binkert CA, Jost R, Steiner A, Zollikofer CL. Benign and malignant stenoses of the stomach and duodenum: treatment with self-expanding metallic endoprotheses. *Radiology* 1996;199:335-358
20. Song HY, Park SI, Jung HY et al. Benign and malignant esophageal strictures: treatment with a polyurethane-covered retrievable expandable metallic stent. *Radiology* 1997;203:747-752
21. Choo IW, Do YS, Suh SW, et al. Malignant colorectal obstruction: treatment with a flexible covered stent. *Radiology* 1998;206:415-421
22. Feretis C, Benakis P, Dimopoulos C, et al. Palliation of malignant outlet obstruction with self-expanding metal stents. *Endoscopy* 1996;28:225-228
23. Feretis C, Benakis P, Dimopoulos C, et al. Duodenal obstruction caused by pancreatic head carcinoma: palliation with self-expandable endoprotheses. *Gastrointest Endosc* 1997;46:161-165



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