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Self-expandable metallic stent placement as palliative treatment of obstructed colorectal carcinoma

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Background: Stent placement in palliation of unresectable colon cancer is an alternative to surgical treatment. The through-the-scope stent for the exclusive treatment of colorectal cancer is not available in Japan. This report describes the use of an esophageal stent and the technical modifications required for its success in the treatment of colorectal strictures. We describe various technical strategies for colorectal stent placement and report on the outcomes. ***Methods:*** Medical records of patients who underwent palliative colonic stenting between June 1997 and March 2003 were reviewed retrospectively, and the clinical outcome was evaluated. ***Results:*** Insertion of a metallic esophageal stent was attempted in 12 patients (mean age, 73.0 years; 5 male, 7 female). Location of the stricture was in the rectum in 4 patients and in the sigmoid, descending, or transverse segments of the colon in 5, 1, and 2 patients, respectively. Two patients had recurrent colon cancer after surgery. The remaining 10 patients did not undergo surgery. Stent placement was technically successful in 11 patients, giving a technical success rate of 92%. Following successful stent placement, all but 1 patient obtained clinical success, generating a clinical success rate of 83%. Late complications occurred in 4 patients and included 2 migrations, 2 bleeds, and 1 obstruction. The complication rate of the procedure was 33.3%. There was no mortality or severe complications. The median survival period was 120 days. ***Conclusions:*** Stent placement can be considered safe and effective palliation for unresectable colorectal cancer. With technical modification of an esophageal stent, this procedure is now feasible.

Key words: stent, colon cancer, palliation

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Introduction

Surgical colostomy is the traditional approach for palliation of unresectable obstructive colorectal cancer and may result in increased patient discomfort. Various nonsurgical endoscopic treatment procedures, such as balloon dilatation[1] or Nd-YAG laser,[2,3] are also available. These procedures may cause perforation and require multiple sessions. Stent placement for the treatment of malignant colorectal strictures has become an alternative to surgery since first described by Dohmoto[4] in 1991. Innovations in stent technology have improved the efficiency of colorectal stent placement. The through-the-scope stent for the exclusive treatment of colorectal cancer is not available in Japan. This report describes the use of an esophageal stent and the technical modifications required for its success in the treatment of colorectal strictures. We describe various technical strategies for colorectal stent placement and report on the outcomes.

Methods

Patients

Medical records of patients who underwent palliative colonic stenting between June 1997 and March 2003 were reviewed retrospectively and the clinical outcome was evaluated. The eligibility criteria for colorectal stenting covers those patients with bowel obstruction, either complete or incomplete, who were considered unsuitable for surgical treatment due to extensive spread of the cancer or high surgical risk. Technical success was defined as the satisfactory deployment and precise positioning of the stent at the location of the stenosis. Four parameters, including abdominal pain, nausea or vomiting, difficult bowel movement, or oral diet were used to evaluate clinical improvement. Clini-

cal success was defined as improvement of one or more these parameters. Written informed consent was obtained for all patients before the procedure.

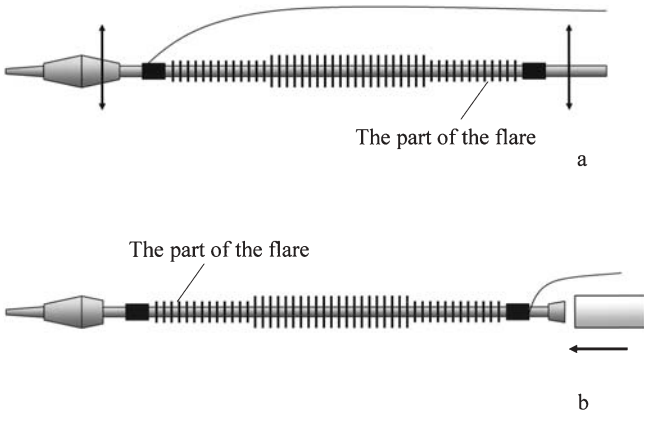

Fig. 1a,b. Schematic illustration of modification of Ultraflex stent delivery system. **a** Delivery system before modification. The shaft is cut at both sides of the mounted stent (*double-headed arrows*). **b** The delivery system is connected in reverse to the plastic tube so that the stent flare is located distally

Technique

Two types of stent were used: Ultraflex (Boston Scientific, Natick, MA, USA), 17–23 mm in diameter, 7–15 cm in length, and Wallstent (Boston Scientific), 22 mm in diameter, 10 cm in length. Stent selection was based on the location of the stricture. An Ultraflex stent was used in the proximal colon and an additional plastic tube was used to increase the length of the delivery system.[5] The Ultraflex stent was modified by cutting the delivery tube short and connecting it in reverse to the plastic tube to avoid migration (Fig. 1). As a result of this modification, the stent flare is relocated oral to the stenosis (Fig. 2). All stents were placed with endoscopic and fluoroscopic guidance. Initially, a 7-Fr. catheter was passed endoscopically with the aid of a guidewire [Jagwire, 0.035 in. (480 cm); Boston Scientific] inserted through the stenosis. To avoid perforation, balloon dilation is generally not performed.[6,7] When insertion of the stent delivery system through the structure was difficult, balloon dilation was used, but kept to a minimum (12 mm, CRE WG; Boston Scientific). After withdrawal of the balloon catheter, the guidewire was exchanged for a stiff guidewire [Amplatz Super Stiff, 0.038 in. (260 cm);

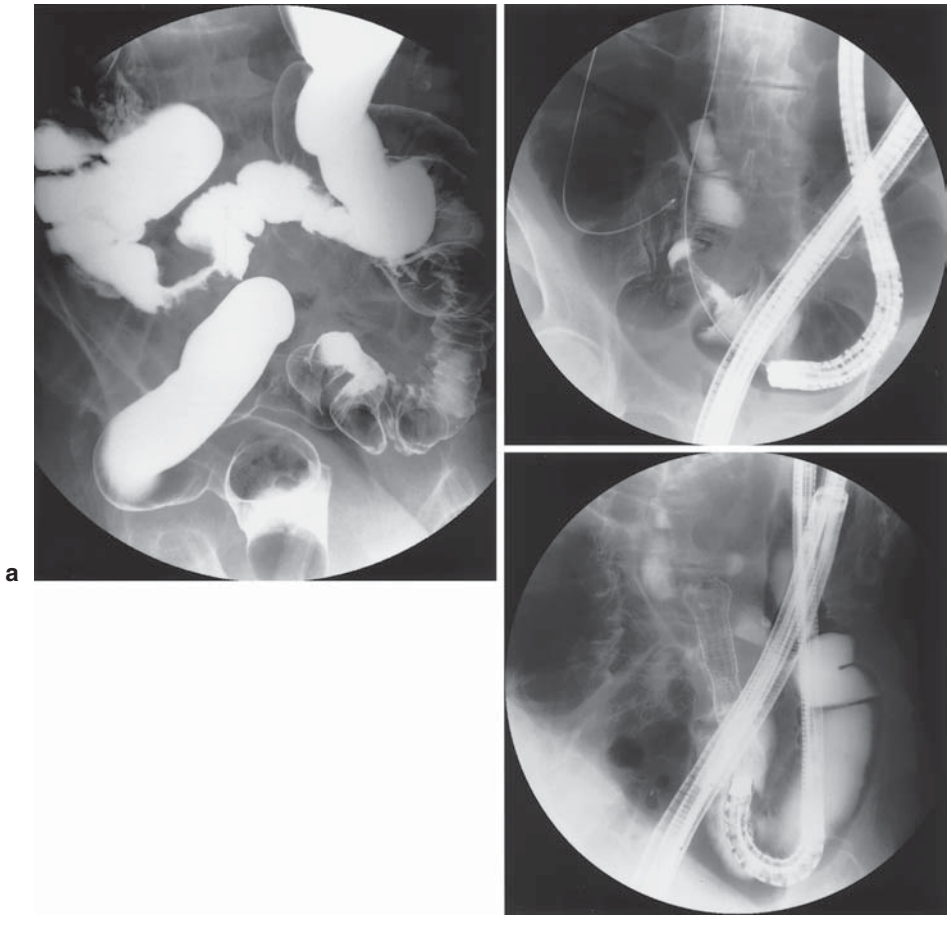

Fig. 2a–c. Transverse colon cancer treated with the covered stent. **a** Barium enema showing a stricture of the transverse colon. **b** The colonoscope is advanced to the level of the stricture. The guidewire is inserted through the working channel of the scope and passed across the stricture. **c** X-ray immediately following stent placement shows the stent was adequately positioned and fully deployed. The flare of the stent is located oral to the stenosis

Boston Scientific]. The guidewire was left in place and the catheter and endoscope were removed. The modified delivery system was then advanced over the wire to the stenosis. Some patients underwent stent placement with the aid of abdominal compression, a homemade sheath,[8] or an overtube (ST-S2; Olympus, Tokyo Japan). When expansion was sufficient, the delivery catheter was withdrawn.

After the procedure, passage of the stent was assessed by direct visualization or visualization of contrast material injected via the colonoscope. Each procedure was performed while the patient was under conscious sedation (Midazoram 5–10 mg).

Results

Twelve patients (mean age, 73.0 years; 5 male, 7 female) underwent palliative colonic stent placement (Table 1). Strictures were located in the rectum in 4 patients, and in the sigmoid, descending, or transverse segments of the colon in 5, 1, and 2 patients respectively. In 2 patients with recurrent colon cancer following surgery, a stent was placed at the anastomotic site. In one of these patients the stent was placed in the transverse colon after a right hemicolectomy, and in another was placed in the rectum after a low anterior resection. The remaining 10 patients did not undergo surgery. Stent placement was technically successful in 11 patients, generating a technical success rate of 92%. In 1 patient the guidewire would not pass through the obstruction and so stent placement was unsuccessful. Following successful stent placement, all but 1 patient obtained clinical success, a clinical success rate of 83% (Table 2). The patient who did not obtain clinical success following stent placement experienced dissemination that severely decreased the movement of both small and large intestines. Based on the success rate of technically

Table 1. Summary of stent placement treatment and outcomes for palliation of patients with obstructive colorectal carcinoma

Patient no.	Age/ sex	Site	Type of stent	Stent size (cm)		Outcome	Complication	Patient outcome	Follow-up (days)
				Diameter	Length				
1	41F	R	Wallstent	2.2	10	Failure	None	Dead	25
2	83M	R	Ultraflex	1.8	10	Success	Mg, Bl	Dead	418
3	93F	S	Ultraflex	2.3	7	Success	Ob	Dead	574
4	65M	T	Ultraflex	2.3	12	Success	Bl	Dead	148
5	85F	S	NA	NA	NA	Failure	None	Dead	92
6	82M	S	Ultraflex	2.2	10	Success	None	Dead	89
7	55F	S	Ultraflex	1.8	10	Success	None	Dead	166
8	69F	S	Ultraflex	1.7	10	Success	None	Alive	394
9	90M	R	Ultraflex	1.7	10	Success	None	Dead	30
10	68F	R	Ultraflex	1.7	10	Success	None	Dead	122
11	91F	T	Ultraflex	1.7	10	Success	Mg	Alive	222
12	54M	D	Ultraflex	1.7	15	Success	None	Alive	75

NA, not applicable; Mg, migration; Bl, bleeding; Ob, obstruction

Table 2. Summary of clinical symptoms and oral diet before and after the procedure

No.	Abdominal pain		Nausea, vomiting		Difficult bowel movement		Oral diet	
	Before	After	Before	After	Before	After	Before	After
1	+	+	+	+	+	+	None	None
2	−	−	−	−	+	−	Liquid	Solid
3	−	−	−	−	+	−	Liquid	Solid
4	+	−	+	−	−	−	Liquid	Solid
5	−	−	+	+	+	+	None	None
6	−	−	−	−	+	−	Liquid	Solid
7	+	−	−	−	+	−	None	Solid
8	−	−	+	−	+	−	Liquid	Solid
9	+	−	−	−	+	−	None	Solid
10	+	−	+	−	+	−	Liquid	Solid
11	−	−	−	−	+	−	Soft	Solid
12	+	−	+	−	+	−	None	Solid

successfully inserted stents, the clinical success rate would have been 91%.

Late complications occurred in four patients and included two stent migrations, two bleeds, and one obstruction, giving a complication rate of 33.3%. In one patient with rectal cancer, a larger stent was inserted following migration of the original stent 179 days after placement. In another patient with transverse colon cancer, stent migration occurred 140 days after stent placement. Although no obstructive symptoms were observed within 90 days of stent migration, this patient is being carefully monitored as an outpatient. One patient with rectal cancer, and another with recurrent transverse colon cancer, had bleeding episodes. In the patient with rectal cancer bleeding occurred 156 days after stent placement, and hemostasis was maintained with argon plasma coagulation. In the patient with recurrent transverse colon, cancer bleeding occurred 65 days after stent placement, but stopped spontaneously. Distal overgrowth was observed 430 days after stent placement in one patient with sigmoid colon cancer. In this patient we overlapped a second stent with the original. Obstruction of the stent was not observed until after the death of the patient. In this study, stent placement caused no mortality or severe complications.

The mean follow-up period for all patients was 197 days (range, 25–574). During the follow-up period, nine patients died of progression of underlying colorectal cancer. The median survival period was 120 days. The remaining three patients were still alive 76, 223, and 395 days, respectively, after stent placement.

Discussion

Colorectal cancer can cause colonic obstruction in 8%–25% of cases.[9] In patients with obstructive colon cancer, stent placement can offer rapid decompression. The indications for colorectal stenting of malignant colorectal obstruction are (a) for temporary colonic decompression in patients with acute, potentially resectable colorectal cancer, scheduled for single-stage surgical resection and (b) for the palliative treatment of patients with unresectable malignant colorectal obstructions.[10] More than 500 cases treated by colorectal stenting for presurgery or palliation have been described so far.[11] It is reported to be a safe and effective alternative to surgery. According to a recent review,[11] the technical success rate of this procedure is 86.6% (range, 75%–100%) and clinical success rates ranged from 84% to 100%. Our results are consistent with these data.

Colorectal stents were placed under fluoroscopic or endoscopic guidance. It is generally difficult to traverse colorectal lesions with a guidewire or delivery system. It is easier to use the small caliber of a biliary stent, but this method often gives unsatisfactory results. Technological innovation produced the through-the-scope stent, which has a slim and flexible delivery system and a larger-diameter stent when expanded, thereby allowing lesions to be readily traversed.[10] These devices are unavailable in Japan, so we modified a more readily available esophageal stent. As the Ultraflex stent was too short to reach the proximal colon an additional plastic tube was connected to extend the delivery system.[5,12] Although this technique was originally designed for gastric outlet obstruction,[13] with modifications it can be applied to the proximal colon and the small intestine.[5,12,14]

The most common complication of colorectal stenting is stent obstruction caused by tumor-related ingrowth or overgrowth or by impaction of feces. Tumor ingrowth obstructions can be managed by ablation of the obstruction or by placement of a second stent. For tumor overgrowth, placement of a second stent is effective. In the present study, one patient with tumor overgrowth was treated by placement of a coaxial stent. It is reported that migration and perforation occur more frequently in the intestine than in the esophagus or duodenum; this is because the large intestine is tortuous and unfixed at the transverse or sigmoid colon. Most cases of stent migration occur in the first few hours after insertion.[15] Migration is caused by misplacement, inadequate stent, or soft tumor tissue.[11] Low-grade obstruction can also lead to stent migration. Late stent migration can result from tumor shrinkage caused by pressure of the stent or by chemotherapy.[11,16] Perforation can be caused by the stent or the stent application procedure, particularly in the case of balloon dilation before stent placement,[6,7] and can be a fatal complication.[17] In the present study, balloon dilation was avoided when possible. Without balloon dilation, perforation rates are less than 5%.[10] Perforation can also be caused by steroids, chemotherapy, and radiation therapy[7] or by the sharp free ends of the metal wire mesh.[18–20] To avoid perforation we chose the blunt-ended Ultraflex stent in all but one patient with rectal obstruction. The Ultraflex stent with its high flexibility and blunt end was the most appropriate choice for the torturous and unfixed colon. The use of covered stents, such as the Ultraflex stent, may prolong stent patency according to a previous report.[21] The Ultraflex stent was originally made as an esophageal stent with a proximal flare. The delivery catheter was cut short and connected in reverse to the plastic tube, resulting in the stent flare being located oral to the obstruction. This modification appears to be beneficial in inhibiting stent migration, although further investigations on more patients would be required to ascertain the true clinical benefit. Although transient rectal bleeding generally requires no treatment,[10] two cases of rectal bleeding in the present

study required blood transfusion. In one patient, bleeding stopped spontaneously, whereas in another endoscopic treatment was required to stop the bleeding.

If radical surgery is unsuitable due to patient age or the presence of remote metastasis, palliative surgery is an option. Palliative surgery provides relief from local bleeding and obstruction; however, the mortality rate can be as high as 21% and there is little evidence that such resection prolongs survival.[22] The standard surgical management to decompress obstructive colorectal cancer is proximal colostomy/ileostomy. Reported morbidity and mortality rates of colostomy/ileostomy vary widely[23] and are related to the timing of surgery or the status of the patient at the time of stoma creation. Despite these variations, proximal colostomy/ileostomy has been recognized as a relatively safe and established treatment. On the other hand, stent placement can induce severe complications, with some being fatal.[24,25] Informative future investigations would include a randomized comparison between stenting and surgical alternatives and a review of criteria for the selection of patients for stenting or surgical procedures.

In summary, palliative stent placement for unresectable obstructive colon cancer is a safe and effective procedure. This procedure allows patients with unresectable colorectal cancers to avoid more invasive surgical treatment and gain enhanced quality of life.

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