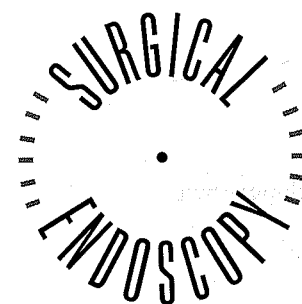




and Other Interventional Techniques

Comparison of stent placement and colostomy as palliative treatment for inoperable malignant colorectal obstruction

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Abstract

Background: Stent placement is a useful palliative treatment for inoperable acute malignant colorectal obstruction. However, data comparing stent placement with colostomy are scarce.

Methods: We compared the clinical outcome of 18 patients who had stent placement and 17 patients who underwent only colostomy.

Results: The postoperative hospital stay was 22.3 days for stent placement compared with 47.4 days for colostomy ($p = 0.016$). The duration to readmission was 129.2 days for stent placement and 188.4 days for colostomy. The estimated duration of primary stent patency was 106 days. Mean survival period was 134 days in patients with stent placement and 191 days in patients with colostomy.

Conclusion: Postoperative hospital stay was shorter in patients with stent placement but duration to readmission and survival were longer in patients with colostomy. However, stent placement increases the option of palliative treatment and is an effective treatment contributing to improving quality of life.

Key words: Stent placement — Colostomy — Palliative treatment — Acute malignant colorectal obstruction

Palliative treatment of colorectal obstruction should be considered in patients with primary disseminated or recurrent colorectal malignancy. Treatment options depend on the patient's condition, site of obstruction, extent of disease, and life expectancy. Although palliative resection or decompressive colostomy remains the standard, alternative noninvasive treatments also should be considered.

Self-expandable metallic stent (SEMS) placement in patients with acute colorectal obstruction is a minimally

invasive procedure and obviates the need for colostomy for evacuation, relieving physical and psychological burden and contributing to improvement of quality of life [1, 4, 9]. SEMS placement has been reported to be a safe and highly effective alternative in patients with unresectable colorectal obstruction [2, 3, 6, 7]. However, data comparing SEMS with colostomy are scarce.

The purpose of our study was to evaluate the clinical aspects of SEMS placement, and compare with colostomy with respect to the palliative effect for inoperable malignant colorectal obstruction.

Materials and methods

Between January 1996 and December 2002, a total of 42 patients with inoperable malignant colorectal obstruction were admitted to our department. All patients presented with clinical signs and symptoms of acute total obstruction. Clinical evidence of perforation or peritonitis was absent. The patients received either palliative stent placement or colostomy.

Eighteen patients (seven women and 11 men; age range, 47–83 years; mean age, 65 years) underwent colorectal stent placement to resolve acute large bowel obstruction. Inclusion criteria were as follows: (1) metastatic disease, (2) peritoneal carcinomatosis, (3) high surgical risk, and (4) patient refusing colostomy. Exclusion criteria were (1) obstruction extending to < 5 cm from the anal verge, because this would cause severe tenesmus, and (2) obstruction occurring in more than one location.

Five patients had primary obstructing colorectal cancer with metastases, and the other 13 patients had recurrent malignancies of colorectal or other primary cancers consisting of colorectal cancer ($n = 9$), esophageal or gastric cancer with widespread peritoneal carcinomatosis ($n = 3$), and ovarian cancer with pelvic metastases ($n = 1$).

All patients underwent endoscopic insertion of an esophageal noncovered self-expandable metallic stent (Ultraflex; Microvasive Endoscopy, Boston Scientific, Natick, MA). The stents were 7 or 10 cm long and had a 17 mm central diameter with a 23 mm funnel-shaped proximal end.

As controls, 17 patients (eight women and nine men; age range, 43–82 years; mean age, 61 years) underwent colostomy to resolve acute large-bowel obstruction. The controls comprised 10 early cases before stent treatment was introduced and seven cases not indicated for stent placement because the obstruction was within 5 cm from the anal verge. Four patients had primary obstructing colorectal cancers with metastases, and the other 13 patients had recurrent

Table 1. Clinical data of 18 patients undergoing stent placement for palliation of acute malignant colorectal obstruction

Patient	Location of obstruction	Cause of stenosis	Stent insertion	Complication	Subsequent treatment	Survival
1. 67y. ♂	Rectum	Recurrent	Success	Anorectal pain	Colostomy	26 days
2. 47y. ♂	Rectum	Primary (lung, liver metastasis)	Success	Migration		109
3. 81y. ♀	Rectum	Recurrent	Success	Minor bleeding		510
4. 83y. ♀	Rectum	Primary (lung, liver metastasis)	Success			7
5. 55y. ♀	Rectum	Metastatic gastric cancer	Success	Tenesmus	Colostomy	70
6. 55y. ♀	Descending	Recurrent	Success			167
7. 64y. ♀	Rectum	Recurrent	Success	Fecal impaction		178
8. 71y. ♀	Sigmoid	Primary (liver metastasis)	Success	Obstruction		132
9. 57y. ♀	Descending	Recurrent	Success	Abdominal discomfort	Colostomy	94
10. 52y. ♂	Sigmoid	Primary (liver metastasis)	Success	Abdominal discomfort		111
11. 71y. ♀	Sigmoid	Recurrent	Success	Obstruction		257
12. 83y. ♂	Rectum	Primary (liver metastasis)	Success	Minor bleeding		21
13. 62y. ♂	Ascending	Primary (lung, liver metastasis)	Success		Colostomy	42
14. 60y. ♀	Rectum	Metastatic esophageal cancer	Success			13
15. 77y. ♀	Rectum	Recurrent	Success	Anorectal pain		37
16. 50y. ♂	Rectum	Metastatic gastric cancer	Success	Tenesmus		146
17. 66y. ♀	Rectum	Recurrent	Success	Anorectal pain, obstruction	Colostomy	147
18. 70y. ♂	Rectum	Metastatic ovarian cancer	Unsuccess		Colostomy	134

malignancies of colorectal or other primary cancers consisting of colorectal cancer ($n = 11$), gastric cancer with widespread peritoneal carcinomatosis ($n = 1$), and ovarian cancer with pelvic metastases ($n = 1$).

Written informed consent was obtained from all patients before stent placement or colostomy.

The present study aimed to evaluate stent placement comparing with colostomy. The outcome measures evaluated were complications, time to initiation of oral intake, postoperative hospital stay, duration to readmission, and survival. For statistical analysis, unpaired t test was used to compare the groups treated with SEMS and colostomy. Since the results did not follow a standard distribution, statistical calculations were carried out by assuming a logarithmic distribution. Primary stent patency and patient survival rates were estimated using the Kaplan-Meier method and were analyzed by the log rank test. A p value < 0.05 was considered significant.

Results

Using both fluoroscopic and endoscopic guidance, stent insertion was attempted in 18 patients with complete colonic obstruction due to advanced malignancy. Stent placement was successful in 17 of the 18 patients, or a technical success rate of 94.4%. One patient had a long segment of stenosis and required placement of two overlapping stents in series. Placement of stent was unsuccessful in one patient who had a sharply angulated stricture at the rectosigmoid junction, due to metastatic ovarian cancer. The guidewire could not pass through the stricture. Most proximal stents were placed in the ascending colon. There were no significant complications associated with insertion, and no clinical or radiological evidence of perforation within 24 of stent placement. However, two patients who successfully achieved decompression died within 2 weeks after stent placement. Although perforation and other complications were not observed in these two cases, one case had hepatic as well as pulmonary metastases of the primary rectal cancer, and liver failure and respiratory insufficiency observed at admission progressed leading to death; the other case had peritoneal dissemination of esophageal can-

cer, and cachexia aggravated the general condition after surgery leading to death.

Delayed complications were observed in 13 (76.5%) of the 17 patients. Minor complications included mild anal bleeding, abdominal discomfort, tenesmus, and anorectal pain. Mild anal bleeding and abdominal discomfort were the result of manipulation to advance the delivery system. Both patients recovered uneventfully after 48 h. Tenesmus and anorectal pain were associated with insertion of the stents in the lower portion of the rectum. Fecal impaction at the proximal end of the stent occurred in one patient and was resolved by administering cleansing enemas.

Major delayed complications were observed in four (23.5%) of the 17 patients. Three patients developed stent occlusion. Colonoscopic results demonstrated tumoral ingrowth and overgrowth, and palliative colostomy was performed. Stent migration occurred in one patient (5.9%) who had a primary rectal stricture. The stent was expelled from the anal verge 43 days after placement. She underwent laparotomy with creation of a loop transverse colostomy.

Five patients required stoma creation subsequently. Since there were two early postoperative deaths, the number of clinically successful cases was therefore 11, and the clinical success rate was 61.1% (Table 1).

In the controls, colostomy was conducted under general anesthesia with the creation of a loop colostomy. Complications occurred after colostomy in seven (41.2%) of the 17 patients, comprising postoperative pneumonia in two cases, respiratory and liver failure in two cases, pericostomy bleeding in one case, and abdominal discomfort in two cases. Among them, the two cases with respiratory and hepatic failure died within 2 weeks after undergoing colostomy. These two cases were both recurrent malignancies metastasized to the lung and liver. Cachexia was observed from admission and respiratory as well as hepatic failure aggravated after surgery leading to death (Table 2).

Fourteen patients (82.4%) in both the SEMS placement group and colostomy group achieved decompres-

Table 2. Clinical data of 17 patients undergoing colostomy for palliation of acute malignant colorectal obstruction

Patient	Location of obstruction	Cause of stenosis	Complication	Survival
1. 62y. ♀	Rectum	Primary (lung, liver metastasis)		70 days
2. 60y. ♂	Sigmoid	Recurrent		86
3. 73y. ♀	Rectum	Recurrent	Pneumonitis	128
4. 58y. ♂	Rectum	Primary (lung, liver metastasis)		321
5. 56y. ♂	Rectum	Metastatic gastric cancer		149
6. 66y. ♀	Sigmoid	Recurrent	Respiratory failure, liver failure	9
7. 43y. ♂	Rectum	Recurrent	Abdominal discomfort	75
8. 82y. ♂	Sigmoid	Primary (liver metastasis)		834
9. 53y. ♂	Rectum	Recurrent		381
10. 64y. ♀	Sigmoid	Metastatic gastric cancer		50
11. 53y. ♂	Sigmoid	Recurrent	Respiratory failure, liver failure	11
12. 59y. ♀	Rectum	Recurrent	Peristoma 1 bleeding	131
13. 56y. ♀	Rectum	Primary (lung, liver metastasis)		224
14. 78y. ♂	Rectum	Recurrent		29
15. 72y. ♀	Rectum	Recurrent	Abdominal discomfort	196
16. 48y. ♀	Rectum	Recurrent		132
17. 72y. ♀	Rectum	Recurrent	Pneumonitis	436

Table 3. Comparison of stent placement and colostomy with respect to outcome after decompression

	Oral intake	Day to initiation of oral intake after decompression	Discharge	Day of hospital stay after decompression	At-home period
SEMS (<i>n</i> = 17)	14 cases (82.4%)	1.6 ± 1.0 days**	10 cases (58.8%)	22.3 ± 15.3 days*	129.2 ± 140.5 days
Colostomy (<i>n</i> = 17)	14 (82.4)	6.7 ± 1.8**	9 (52.9)	47.4 ± 22.4*	188.4 ± 209.7

*, *p* = 0.016; **, *p* < 0.01

sion and were able to start oral intake. The time to initiation of oral intake was 1.6 days for patients with SEMS placement and 6.7 days for patients who had colostomy, with a significant difference (*p* < 0.01).

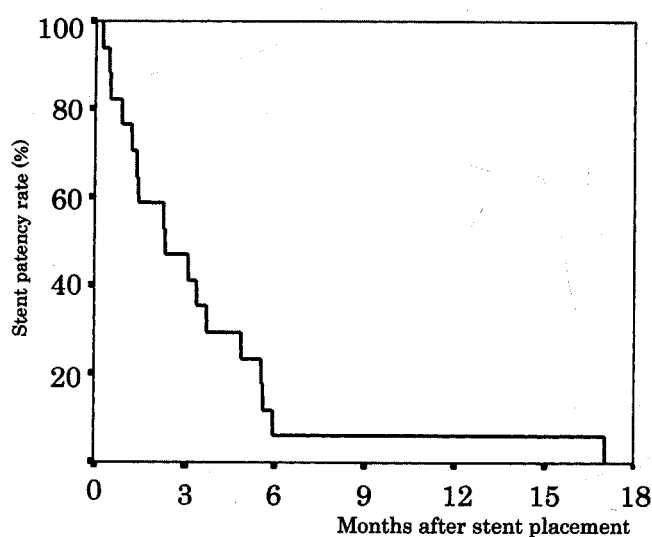
Ten of 17 patients (58.8%) who had SEMS placement were discharged from hospital, compared with 9 of 17 patients (52.9%) who underwent colostomy. The remaining patients remained hospitalized for reasons unrelated to stent placement or colostomy. For both treatments, two early deaths each occurred after surgery, and cancer was the direct cause of death.

The mean postoperative hospital stay was 22.3 ± 15.3 days for SEMS placement compared with 47.4 ± 22.4 days for colostomy, and was significantly shorter for SEMS placement (*p* = 0.016).

The mean duration to readmission was 129.2 ± 140.5 days for SEMS placement and 188.4 ± 209.7 days for colostomy, with no significant difference. Although subjects who underwent colostomy apparently were able to stay at home for a longer period than those who had SEMS, there was no significant difference (Table 3).

The estimated duration of primary stent patency was 106 ± 29 days. The primary patency rate for the SEMS was 47.1% at 3 months, and 5.9% at 6 and 12 months (Fig. 1).

All patients died eventually because of progression of the primary disease. The mean survival period was 134 ± 33 days in patients with SEMS and 191 ± 51

**Fig. 1.** Cumulative primary stent patency curve. Estimated by Kaplan-Meier method.

days in patients with colostomy. The survival rate for patients with SEMS was 58.8% at 3 months, 17.7% at 6 months, and 11.8% at 12 months. The survival rate for patients with colostomy was 58.8% at 3 months, 35.3% at 6 months, and 17.7% at 12 months. Survival was apparently prolonged in patients who had colostomy, but the difference was not significant (Fig. 2).

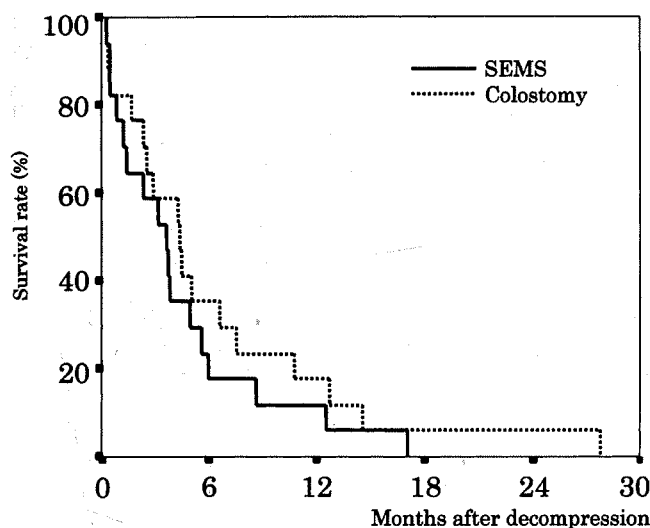


Fig. 2. Cumulative survival curves of stent replacement and colostomy. Estimated by Kaplan-Meier method. No significant difference was detected by the log rank test.

Discussion

Surgery remains the standard treatment for acute malignant large bowel obstruction, despite the relatively high postoperative morbidity and mortality. In resectable cases, preoperative decompression by colostomy as a bridge to surgery reduces quality of life, prolongs the period of hospitalization, and necessitates a second surgery to resect the tumor [8]. Recent reports show the value of stent placement as an alternative method of preoperative decompression for the relief of acute colorectal obstruction, as the procedure is relatively safe and can avoid high-risk emergency laparotomy and double surgeries for resection [2, 6, 9]. This method also has the advantage of being cost-effective [3, 6]. While stent insertion is indicated for acute large bowel obstruction in patients scheduled to undergo tumor resection with curative intent, SEMS for colorectum is still not covered by health insurance in Japan. In addition, there is a concern that SEMS may promote the proliferation or metastasis of the cancer, since the tumor is continuously compressed from the luminal side [11]. For these reasons, SEMS is not used actively for preoperative decompression in cases of colorectal cancer. However, there is no detailed report of whether SEMS actually promotes proliferation and metastasis of cancer. This issue requires further study.

On the other hand, it has been increasingly reported that placement of SEMS is useful as a palliative treatment for inoperable cases of acute malignant colorectal obstruction. The procedure is less invasive than a colostomy, and the ability to defecate naturally and the shorter hospital stay after decompression would relieve the physical and psychological burden, contributing to the improvement of quality of life [5, 10, 12].

Recently, we have also actively tried SEMS placement in inoperable cases of malignant colorectal stenosis and found this procedure to be an effective treatment.

Stent placement as a therapeutic option is highly effective in achieving rapid decompression of the colon, with reported success rates of 75–100% [6]. In our study, symptoms of obstruction were resolved in 94.4% of technically successful cases, and the clinical success rate was 61.1%.

Delayed complications of stent placement were observed in 13 (76.5%) of the 17 patients. Minor complications of minor bleeding, tenesmus, and fecal impaction were observed in the present series, but these symptoms improved by conservative treatment.

We did not encounter any case of perforation, although perforation is one of the serious complications reported to occur at a rate of ~5% [1, 7]. Perforation may be associated with the insertion process or caused directly by the stent, but insertion is suspected to be the major cause. These complications can be avoided by careful placement of the guidewire. In patients with acute large bowel obstruction, colonoscopy needs to be performed by a well-experienced endoscopist who can manage the situation without unnecessary gas insufflation.

Major late complications of stent placement reported include stent occlusion due to tumor growth, stent migration, and peritonitis due to perforation [6, 7]. In our series, the most frequent delayed complications were tumor ingrowth into the lumen of the stent or overgrowth at the proximal or distal end of the stent, which occurred in three patients. Stent occlusion due to tumor growth reportedly occurs in up to 20% of patients [1, 7, 10]. We managed these cases with palliative colostomy. However, a second stent has also been reported to be useful [5, 6]. This option warrants further investigation.

The incidence of migration of uncovered stents in published studies of colorectal strictures ranged from 10% to 20% [7, 10]. In our study, stent migration occurred in only one patient (5.9%). Migration may be caused by misplacement, inadequate stent, or soft tumor tissue. The peristaltic movements of the bowel might result in stent migration. Since we used uncovered esophageal stents, the larger caliber of the colon in comparison with the esophagus may be an additional factor facilitating stent migration [10]. When the esophageal stent is used in the esophagus, the flared part of the stent is stabilized at the oral side of the tumor. When used in the colorectum, since the placement is retrograde, the flared part is positioned at the anal side of the tumor and fails to function as a stopper. Migration might have occurred because the stent was not retained properly.

Delayed perforation after stent placement is caused by necrosis due to continuous compression of the stent on the colorectal wall. However, this complication is commonly reported in cases treated additionally by chemotherapy or radiotherapy [3]. Therefore, it is important to consider the risk of perforation both at the time of insertion and also during the follow-up period.

According to our experience, stent placement is useful for palliation of malignant colorectal obstructions despite the occurrence of acute complications. Although colostomy is conventionally used to palliate acute

malignant colorectal obstruction, stent placement accomplished decompression in 94.4% of the cases and eventually improved the clinical symptoms in 61.1% of the cases. The mean stent patency period was 106 days, with patency rates of 47.1% at 3 months and 5.9% at 1 year. As a palliation therapy, stenting is evaluated as effective if death occurs due to disease progression without signs of stent occlusion. If stent occlusion is observed in patients with relatively preserved health status, the necessity of retreatment with a second stent or stoma creation should be considered.

However, we found no report that compares SEMS placement and colostomy in terms of clinical outcome. Therefore we conducted a comparison between 18 patients who had SEMS placement and 17 patients who underwent only colostomy, and evaluated time to initiation of oral intake, hospital stay, duration to readmission, and survival period as outcome measures.

Although both SEMS placement and colostomy successfully relieved acute large bowel obstruction, approximately 40% of the patients were continuously hospitalized. The reason was not complications associated with SEMS placement or colostomy, but was due to disease progression. For patients who were discharged, the mean hospital stay was 22.3 days after SEMS placement and 47.4 days after colostomy. Compared with colostomy, SEMS placement requires a significantly shorter hospital stay until discharge. SEMS placement is minimally invasive and oral intake can be started as soon as obstruction is resolved. On the other hand, colostomy is a surgery conducted under general anesthesia, and oral intake is started later compared to SEMS placement, even in the absence of postoperative complication. This may account for the difference in hospital stay.

The mean duration to readmission was 129.2 days for SEMS placement compared with 188.4 days for colostomy. Patients with colostomy seem to be able to stay home for a longer period than those with SEMS, but the difference was not significant. In patients with SEMS, although natural defecation is preserved, constant compression of the tumor by the stent results in pressure necrosis, ingrowth, or overgrowth of the colorectal tumor. This may be a factor leading to earlier readmission than in patients with colostomy. In addition, contact of the tumor with fecal content tends to cause abnormalities such as minor bleeding and fecal impaction. To resolve these issues, we recommend stool regulation with laxatives to avoid stool impaction, and selection of stents with appropriate diameters.

For colostomy, since the tumor does not come into contact with the feces, evacuation is evidently better controlled than for SEMS. Although increased psychological burden and other demerits have been cited for colostomy, patient care may be easier when the patient is bedridden. Therefore, colostomy may have some merits and is not necessarily inferior in all clinical aspects.

The reported survival periods after palliative SEMS placement were 147 days and 204 days [4, 12]. In the present series, the mean survival period was 134 days for

SEMS cases and 191 days for colostomy cases, showing apparently longer survival in patients with colostomy although the difference was not significant. However, patients who had SEMS placement included some with poor health status to the extent that general anesthesia could not be used. In addition, survival depends on local-regional spread of disease and remote metastases. A prospective randomized trial comparing SEMS and colostomy is warranted.

In the present study, postoperative hospital stay was shorter in patients with SEMS placement, but duration to readmission and survival were longer in patients with colostomy. Acute obstructive malignant colorectal tumors are difficult to treat, because the patients have multisystemic problems. These tumors traditionally require emergency surgical decompression by colostomy, a procedure that carries a high rate of morbidity and mortality. Placement of SEMS is a minimally invasive procedure that can be performed without general anesthesia, reduces the need for colostomy, and has economic advantages. This procedure may revolutionize the management of acute large bowel obstruction. Since SEMS contributes greatly to improvement of quality of life, this procedure should be established as a new technique in the future.

The choice between SEMS placement and colostomy for inoperable malignant colorectal obstruction depends on individual cases. Stent placement is the preferred management option in patients with ascites and high anesthetic risk, or patients who refuse colostomy. If the rectal tumors are < 5 cm from the anus, stent placement may cause incontinence, and colostomy may therefore be more convenient for the patient. In rapidly growing tumors, particularly those with multiple stenoses, treatment with surgery is superior to treatment with stent placement because of the high probability of stent or bowel occlusion at other locations. The choice should therefore be made considering the disease and health status of each patient.

In conclusion, postoperative hospital stay was shorter in patients with SEMS placement, but duration to readmission and survival were longer in patients with colostomy. However, SEMS placement increases the option of palliative treatment and is an effective treatment contributing to improving quality of life. Clinical development of colorectal SEMS placement covered by health insurance is desirable.

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