

Original Article

# Self-expanding Metallic Stent Placement as Conservative Treatment of Malignant Colorectal Obstruction: Efficacy and Safety

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## Key Words

Self-expanding metallic stent;  
Conservative treatment;  
Malignant colorectal obstruction

**Purpose.** To assess the safety and efficacy of self-expanding metallic stent (SEMS) placement in the treatment of malignant colorectal obstruction.

**Methods.** A retrospective chart review of 49 patients undergoing SEMS placement for conservative treatment between April 2013 and December 2016 at Changhua Christian Hospital was conducted.

**Results.** A total of 49 patients received stents as conservative treatment. The technical and clinical success rates were 94% and 90%, respectively. Early major complications (8%) related to stent placement included perforation (2/49) and stent migration (2/49). Late complications (18%) were migration (3/49), re-obstruction (4/49), death (1/49), and bleeding (1/49).

**Conclusions.** SEMS placement is an effective and safe conservative treatment for malignant colorectal obstruction.

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Colorectal cancer is among the three most common malignancies and is a major cause of cancer-related deaths in Taiwan. The incidence of colorectal cancer has been increasing rapidly in Asia over the past few decades.<sup>1</sup> Up to 29% of patients with advanced colorectal cancer present with acute colonic obstruction due to intraluminal tumor growth, and 70% of all malignant large-bowel obstructions occur in patients with left-sided colon cancer.<sup>1</sup> Conventionally, such patients are treated with emergent surgery, which includes a variety of procedures such as Hartmann's procedure and loop colostomy.<sup>2,3</sup> These interventions are associated with a mortality rate of 15%-

20% and a morbidity rate of 40%-50%.<sup>2,3</sup> Moreover, among a considerable number of patients, the ostomies are never reversed.<sup>4</sup> Patients with a permanent stoma have a significantly lower health-related quality of life.<sup>4</sup>

Since the first description of the use of metallic stents in 1991, self-expanding metallic stents (SEMS) have been widely applied as a palliative treatment strategy for malignant colorectal obstruction in patients with incurable disease.<sup>5</sup> In the palliative setting, the use of SEMS significantly reduces the length of hospital stay, mortality, medical complications, and the need for stoma formation. Furthermore, SEMS place-

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ment bypasses the risks associated with emergent surgery and anesthesia, avoids secondary surgery, and can be a bridge to surgery.<sup>6</sup> Although SEMS insertion has these advantages, serious stent-related complications such as perforation, stent migration, and re-obstruction can occur. The aim of this single-center analysis was to review current evidence on the efficacy and safety of SEMS placement in the treatment of malignant colorectal obstruction.

## Materials and Methods

A retrospective chart review of all patients undergoing SEMS placement between April 2013 and December 2016 was performed at Changhua Christian Hospital. Indications for stenting were patients with stage IV disease or those who refused further operations for any reasons. Elective stenting was most frequently performed for high ASA score patients who refused surgery and had symptoms of obstruction. Emergent stenting was performed for patients who had an acute obstruction and refused emergent surgery (colostomy). In total, 49 patients were included in this study.

Data were collected for the technical and clinical success rates. Technical success was defined as a successful stent placement at the first attempt with radiological confirmation. Clinical success was defined as clinical and radiological evidence of colonic decompression within 48 h of stent insertion without the need for reintervention. An early complication was defined as a complication occurring immediately following the procedure. A late complication was defined as a complication occurring 2 or more days after the procedure.

### Procedure for SEMS placement

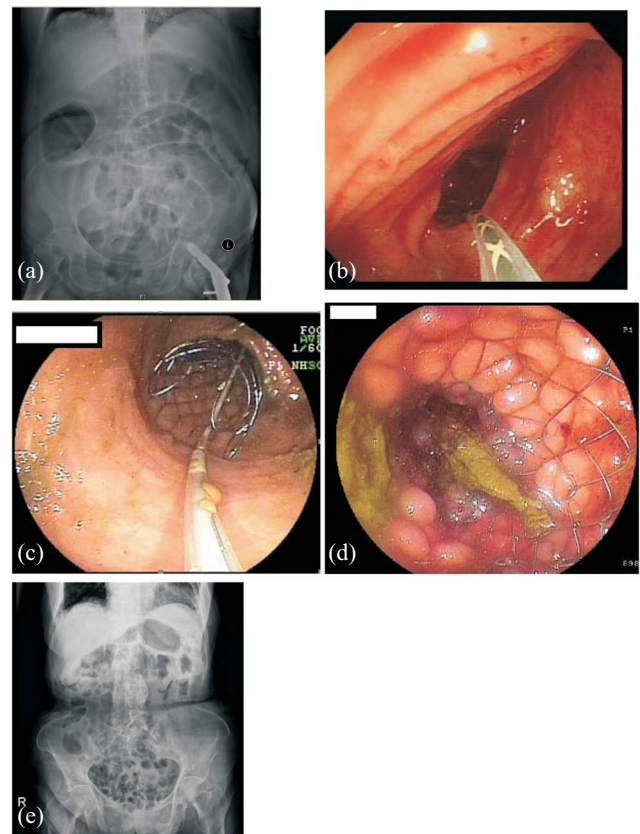
All SEMS were placed using a guide wire under fluoroscopy and colonoscopy. The SEMS had a maximum length of 12 cm and a diameter of up to 25 mm. The procedures were performed by 2 experienced endoscopists using the over-the-wire method (Figs. 1a-1e).

## Results

### Baseline data

A total of 49 patients were included in this study. The patients' mean age was 70.9 years (range 34-94; median 76 years). There were 21 and 28 men and women, respectively (Table 1). Eleven of 49 patients (22%) had received chemotherapy previously; 9 patients (18%) underwent radical surgery and experienced local recurrence.

Most patients had stage IV disease (35 patients; 71%) but 2 and 12 patients had stage II and III colon cancer, respectively (Table 1). Most patients had sigmoid colon cancer with obstruction (25 patients). Six patients had an ascending colon tumor, 5 had a trans-



**Fig. 1.** (a) KUB before SEMS placement, both small and large bowel loops with gaseous dilatation. (b) Cannulation of the stenotic area using a guidewire. (c) Stent is placed through the channel of the endoscope and expands when in position. (d) Colonic decompression after SEMS placement. (e) Follow-up KUB after SEMS placement.

verse colon tumor, 6 had a descending colon tumor, 25 had a sigmoid colon tumor, 6 had a recto-sigmoid colon tumor, and 1 had a rectal tumor (Table 1).

Stenting was performed as a definitive conservative treatment procedure in 49 (100%) patients. Emergent stenting was performed in 14 patients (29%), and elective stenting was performed in 35 patients (71%; Table 1). The patients with technical failure were all in the emergent stenting group.

Seventeen (35%) out of 49 patients receive chemotherapy after stent placement. There were 32 patients (65%) receiving hospice care after stent placement.

### Clinical/technical success or failure

The technical and clinical success rates were 94%

**Table 1.** Patient demographics

Number of patients	49
Sex	
Male	21
Female	28
Median age, year (range)	76 (34-94)
Previous therapy	
Chemotherapy	11 (22%)
Surgery	9 (18%)
Post stenting therapy	
Chemotherapy	17 (35%)
Hospice	32 (65%)
ASA score	
I	6 (12%)
II	7 (15%)
III	32 (65%)
IV	4 (8%)
Stage	
II	2 (4%)
III	12 (25%)
IV	35 (71%)
Tumor site	
Ascending colon	6 (12%)
Transverse colon	5 (10%)
Descending colon	6 (12%)
Recto-sigmoid junction	6 (12%)
Sigmoid	25 (52%)
Rectum	1 (2%)
Stenting	
Emergent	14 (29%)
Elective	35 (71%)

and 90%, respectively (Table 2). Three patients had a technical failure, 1 patient had a failure of approach, and 2 patients experienced perforation. Clinical failure occurred among 5 patients. One patient had a failure of approach, 2 patients experienced perforation, and 2 patients experienced stent migration.

### Complications

There were 4 early complications following the procedure: 2 patients experienced perforation and 2 migration (Table 3). Stent migration only occurred at sigmoid colon tumor obstructions.

Late complications included migration (3 patients), re-obstruction (4 patients), bleeding (1 patient), and death (1 patient) (Table 3). Re-obstruction occurred between 3-6 months after SEMS placement. Four patients with re-obstruction were managed by repeat SEMS placement. The 3 patients with stent migration had no symptoms. The bleeding occurred 6 months after SEMS placement and the patient was treated with colonoscopic argon plasma coagulation. The death was caused by sepsis due to suspected bacterial translocation during the colon obstruction despite the technical and clinical success of stenting.

**Table 2.** Technical and clinical success rates of SEMS placement

N = 49 (%)	
Technical success	46 (94)
Fail to approach	1 (2)
Perforation	2 (4)
Clinical success	44 (90)
Fail to approach	1 (2)
Migration	2 (4)
Perforation	2 (4)

**Table 3.** SEMS placement complications

N = 49 (%)	
Early complication	
Perforation	2 (4)
Migration	2 (4)
Late complication	
Migration	3 (6)
Re-obstruction	4 (8)
Bleeding	1 (2)
Death	1 (2)

## Discussion

In our study, we found that SEMS placement is an effective and safe conservative treatment for malignant colorectal obstruction. Endoscopic stenting has become an established intervention for patients with colorectal obstruction.<sup>3,7</sup> Stenting has gained acceptance in emergency settings as an alternative to surgical intervention due to the increased risks associated with surgery under such circumstances.

Among the 49 patients in this study, 2 had stage II colon cancer, 12 had stage III, and 35 had stage IV. This study's findings indicated that more patients with advanced colorectal cancer received SEMS for tumor obstruction problems. This procedure avoids colostomy and the risks associated with anesthesia.

Methods of colonic stenting include fluoroscopy alone, colonoscopy alone, and a combination of fluoroscopy and colonoscopy. In the rectum and distal sigmoid colon, fluoroscopy alone or colonoscopy alone can be performed. However, in more proximal lesions, the combined approach is better. Patients with proximal lesions usually have marked colonic angulations. Colonoscopy can help in visualizing the approach of the guidewire, and fluoroscopy is useful for documenting the length of an obstruction and for the diagnosis of perforation.

The mean age of the patients included in this study was 70.9 (range 34-94; median 76) years. Compared to younger patients, older patients tended to choose SEMS placement for conservative treatment of colon tumor obstruction due to their poor condition and the high risk posed by anesthesia.

Most (25) of the enrolled patients had sigmoid colon cancer. Six patients had ascending colon tumors, 5 had transverse colon tumors, 6 had descending colon tumors, 6 had recto-sigmoid colon tumors, and 1 had a rectal tumor. In our study, colon cancer obstruction was mostly observed in the sigmoid colon. All patients with technical failures were in the emergent stenting group. This may be because there was more severe obstructions in the emergent stenting group.

Technical stenting only failed in 3 patients (2 patients with recto-sigmoid colon tumors and 1 with a transverse colon tumor). This may indicate that the

obstruction angle caused by a recto-sigmoid colon tumor is too large for successful SEMS placement. Our study suggested that technical success in stent placement can be achieved in 94% of patients, with a clinically successful outcome (relief of obstruction) being achieved in 90%. Increasing the technical experience of endoscopists is likely to improve their success rates. These results are similar to that of another study in which the technical success rate was 93.24% with an 88.56% clinical success rate.<sup>8</sup>

The complication rate in this study was very low. Among the patients, only 2 had perforations, 2 experienced migration, and 1 died. The major complication rate of 10% is similar to that of another study,<sup>9</sup> in which the major complication rate was 12% in the stented group and 41% in the surgery group. In the current study, migration occurred only in patients with sigmoid colon obstruction. This may be explained by the stool consistency in that part of the large bowel and straining during defecation, which can cause stent expulsion or migration.<sup>10</sup> Similarly, late onset of tenesmus, pain, incontinence, and a foreign body sensation may be experienced because of stent migration into the anorectal area.<sup>11</sup>

The most serious complication of colonic SEMS placement is perforation, which has a reported mortality rate of 0.8%. In our study, 2 patients who experienced perforation received emergency surgery. In previous studies, just over one-fourth of patients required a second intervention after the index stent insertion with low overall rates of surgery (13%) and stoma creation (16%).<sup>12</sup> These findings are comparable to those of a large cohort of 223 palliative and bridge to surgery patients from the Mayo Clinic where 65% and 85% of patients, respectively, did not require any additional intervention or surgery. Chemotherapeutic agents, particularly bevacizumab, have been associated with an increased risk of colonic perforation. In our study, 1 of the 2 perforating patients had received neoadjuvant chemotherapy (bevacizumab) before SEMS placement.

## Limitations

Because this was a retrospective study, patient se-

lection bias was unavoidable. Different stent types (covered and uncovered) were used, but we did not analyze the efficacy and safety profile by individual stent types.

## Conclusions

SEMS placement is an efficient and safe conservative treatment for malignant colorectal obstruction.

## Sources of Financial Support

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原 著

## 自擴張金屬支架作為惡性結腸直腸阻塞的保守治療：功效和安全

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**目的** 評估自擴張金屬支架放置對緩解惡性結腸直腸阻塞的安全性和有效性。

**方法** 自 2013 年 4 月至 2016 年 12 月 49 名惡性結腸直腸癌阻塞患者接受自擴張金屬支架放置的回顧性研究。

**結果** 共 49 例患者使用支架置放進行保守治療。技術和臨床成功率分別為 94% 和 90%。與支架置放相關的早期併發症 (8%) 包括穿孔 (2/49) 及支架移位 (2/49)。晚期併發症 (18%) 是支架移位 (3/49)，再阻塞 (4/49)，死亡 (1/49) 和出血 (1/49)。

**結論** 自擴張金屬支架作為惡性結腸直腸阻塞的保守治療上是有功效和安全的。

**關鍵詞** 自擴張金屬支架、保守治療、惡性結腸直腸阻塞。