

# Self-Expanding Metal Stenting for Malignant Colonic Tumours: A Prospective Study

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## Abstract

**Background:** self-expanding metal stents (SEMS) have been used in the management of malignant colorectal obstruction for palliation or as a bridging tool to single-stage surgery. We present the clinical results of a series of patients with colonic cancer in whom SEMS were inserted endoscopically under radiological guidance. **Methods:** between September 2007 and January 2010, prospectively collected data from 21 patients who underwent SEMS insertion was analysed. This data includes demographics, indication for stenting, stent size, technical success, clinical success, complications, survival and duration of hospitalisation. **Results:** 14 male and 7 female patients with malignant colonic obstruction underwent SEMS insertion: 19 requiring palliation and 2 bridging to surgery. The rate of technical success was 100% and of initial clinical success was 100%. In 16/19 (84.2%) of the palliation group, clinical success was maintained at mean follow up of 3.4 months (1 - 6 months), while 3/19 (15.8%) died, two with functioning stents and one with stent occlusion. The two patients with operable tumours were successfully bridged to one-stage elective surgery at 1 month and 4 months following stenting. Post-procedure complications occurred in 5 patients: 1 perforation, 2 pain, 1 migration and 1 stent occlusion. All patients were discharged alive and the median hospital stay was 1 day (range: 1 to 13 days). **Conclusion:** SEMS provides an effective and safe option in the palliation of malignant colorectal obstruction. In operable patients, it provides a useful option to avoid colostomy, by facilitating safer single-stage surgery. In this prospective study of SEMS insertion, high rates of technical and initial clinical success were achieved. This could be attributed to performing the procedure under combined endoscopic and radiological guidance.

**Keywords:** Self-Expanding Metal Stent; Stent; Colon/Colonic Obstruction

## 1. Introduction

Primary or recurrent adenocarcinoma, pelvic malignancies, and metastatic diseases can lead to the development of malignant colorectal strictures. Up to 85% of acute colonic obstructions are due to malignancy and between 8% and 28% of patients with colonic cancer present with obstructive symptoms [1]. Traditional management of symptomatic malignant colorectal obstruction involves emergency colostomy. However, patients with acute or chronic large bowel obstruction are usually high-risk surgical candidates due to poor general health. The dilated bowel wall proximal to the obstruction is often friable, which complicates emergency surgical interventions [2].

In 1991, Dohmoto [3] reported the first use of self-

expanding metallic stents (SEMSs) for palliation of colorectal cancer. Since then, a growing number of reports and reviews have demonstrated the effectiveness of SEMSs for palliation in patients with advanced non-resectable carcinoma and as a bridge to surgery in those patients with resectable disease [4-7].

This is a report of our experience with one type of SEMS for palliation of 19 inoperable patients and bridging of 2 operable patients with colorectal cancer.

## 2. Methods

This prospective study was conducted at a single centre between September 2007 and January 2010. A total of 21 patients (mean age 72 years; range 32 - 93; 14 men) with left sided (descending colon, sigmoid or rectum)

cancer were treated by endoscopic insertion of SEMSs under radiological guidance in a prospective series. Treatment recommendations were made by a colorectal surgery/interventional radiology/oncology multidisciplinary team. Inclusion criteria were the presence of primary or recurrent malignant left-sided colon cancer with obstructive symptoms (abdominal pain and distension, passage of small-calibre stools, or constipation that required stool softeners) confirmed by abdominal radiographs or computed tomography (CT) scan. No patient had complete bowel obstruction.

Exclusion criteria were perforation, peritonitis, or other serious complications demanding urgent surgery and the presence of rectal stenosis less than 5 cm from the anal sphincter. All patients had symptoms related to the stenosis, including abdominal pain and distension, tenesmus, passage of small-calibre stools, or constipation that required stool softeners.

Lesions were located in the rectum in 3 patients, in the rectosigmoid junction/sigmoid colon in 12 patients and in the descending colon in 5 patients. In 1 patient the stenosis was caused by an anastomotic recurrence after sigmoid colectomy.

Each patient gave written informed consent for the treatment. Phosphate enemas were administered in the morning of the procedure. Stenting procedures were performed by a colorectal surgeon (AK) and an interventional radiologist (MD). Self-expanding metal stents (Niti-S Enteral Colonic Stent, Taewoong Medical Co., Ltd, Korea) were inserted endoscopically across the lesions under fluoroscopic control. The stricture was traversed with the endoscope, which was inserted into the left colon or more proximally. A stainless steel guidewire with a spring tip was inserted through the colonoscope as far as possible into the left colon. The length of the lesion was measured during withdrawal of the endoscope. The appropriately sized stent was loaded onto the distal tip of the introducer and the pusher was inserted through the introducer until it reached the stent. The introducer, which contained the stent and the pusher, was passed over the guidewire beside the endoscope and through the stenotic segment. After proper positioning, the introducer was withdrawn keeping the pusher firmly against the stent, thereby allowing the prosthesis to expand.

The whole procedure was performed without premedication in less than 30 minutes. Treatment success was considered the restoration of asymptomatic defecation with the disappearance of obstructive symptoms. Seventeen patients (81%) were discharged on the same day with laxatives, while 4 patients (19%) remained in hospital for longer duration due to other medical or social reasons.

Post stenting assessments were performed in specialist

clinics where treatment success was determined by asking patients at each follow-up visit about stool number, abdominal pain and distension, the need for laxatives, and the presence of diarrhoea, or constipation. All complications and deaths were recorded up to 6 months following stenting. Patients missing or, "lost to follow up", were traced and contacted by telephone. Deaths were confirmed from medical records, or death certificates were obtained from the General Register Office ([www.gro.gov.uk](http://www.gro.gov.uk)).

### 3. Results

Twenty-one consecutive patients were included in this study. Indications for stenting and stents' characteristics are summarized in **Table 1**. SEMSs were placed with palliative intent in 19 patients and as a bridge to surgery in 2 (**Table 1**).

Two SEMSs were placed in 4 patients, because of long strictures/malpositioning of first stent. Metal stents were placed correctly in all patients achieving a technical success rate of 100%. No patient underwent balloon dilatation, either before or after stent placement. All patients tolerated the procedure well and no complication was observed within 24 hours of stent placement.

**Table 1. Characteristics of the colonic stents used in the study.**

Parameter	No. Patients	%	
Indication for stent placement	Palliation	19	91
	Bridge to surgery	2	9
No. Stents placed per patient	1	17	81
	2	4	19
Stent length (mm)	80	3	14.3
	120	14	66.6
	Two 120	2	9.5
	120 and 60	1	4.8
	120 and 80	1	4.8
Stent diameter (mm)	20	3	14.3
	24	12	57.1
	28	2	9.5
	Two 24	3	14.3
	Two 28	1	4.8

**Table 2. Post-procedural complications.**

Complication Type	No. Patients	%
Perforation	1	4.8
Stent Occlusion	1	4.8
Stent Migration	1	4.8
Pain	2	9.5
Rectal Bleeding	0	0
Tenesmus	0	0

The patients were followed for a median of 3.5 months (range 1-6 months).

During follow-up after SEMS placement for palliative treatment, complications resulted in 1 clinical failure (4.8%) (**Table 2**). A 32-year-old woman with metastatic adenocarcinoma of the sigmoid colon was readmitted with complete intestinal obstruction due to stent occlusion 2 weeks following stenting and died soon after admission. One patient, an 82-year-old man developed delayed perforation. This was concealed perforation at the stent site that was treated conservatively and the patient had no further complications.

Late distal migration of the stent was observed in 1 case two months after insertion. Overall the incidence of complications was 23.8% (5/21), with one mortality (4.8%) following stent occlusion.

The remaining patients (76.2%) did not experience pain, tenesmus, or bleeding during follow-up. All had restoration of asymptomatic defecation and relief of abdominal discomfort. Most used stool softeners.

The two patients with operable tumours survived until elective one stage surgery at 1 month and 4 months following stenting. In the palliative group, clinical success was maintained in 15/19 patients (84.2%) at mean follow up of 3.4 months (1 - 6 months), while 3/19 (15.8%) died, two with functioning stents. Thus, for those patients, stent placement had fulfilled its palliative purpose over their entire remaining life span.

#### 4. Discussion

In the UK, approximately 34,000 patients are diagnosed with colorectal cancer each year [8]. Colonic obstruction is almost exclusively associated with tumours in the recto-sigmoid region, and acute colonic obstruction has a high mortality (17%) and morbidity (39%) [8]. There is no evidence that palliative resections prolong survival [9], while the presence of a colostomy decreases the quality of life [10]. For palliative treatment, it has been suggested that SEMS provide a solution that combines good results with short hospital stay, good tolerance and acceptance by the patients [4-7]. In patients who are suitable for curative surgery, colonic stenting creates an op-

portunity for resuscitation, correction of electrolytes imbalance, optimising bowel preparation, improving the nutritional status and planning for definitive elective resection at a later date [11].

Colonic stenting, like any clinical intervention, is not devoid of complications. However in our study we had 100% technical success in placement of stents in addition to low complication rates. The most serious complication of this procedure is perforation of the colon. In our study only one patient suffered with delayed perforation, which was treated conservatively and did not affect the outcome of his stenting. One explanation for the low number of post-procedural perforation is the avoidance of balloon dilation of the stents during their placement. The technique that was used and the collaboration of a colorectal surgeon with an interventional radiologist can also explain the good technical success across this cohort. As stenting devices and our skills develop, endoscopic capabilities will continue to expand to involve more complicated cases and patients with more advanced disease.

Our study was not without limitations. There was no comparative group *i.e.* emergency surgery group, to assess the effectiveness of stenting against surgery. In addition, there was lack of randomisation and the number of patients involved was small, therefore, it is not possible to assure the validity of the results. Involvement of a larger number of patients could have defined the technical and clinical success rates more accurately and could have potentially identified more post-procedural complications. Finally, there were no patients with transverse or ascending colon tumours and the follow up was limited to a maximum of 6 months. Despite the fact that 70% of bowel obstructions occur in the left and sigmoid colon [7], future studies should also investigate the use of colonic stents for more proximal obstructing colonic tumours.

A systematic review by Sebastian et al. of 54 uncontrolled trials and case reports on placement of self-expandable metal stents revealed a technical success rate of 90% - 100%, a clinical success rate of 84% - 94% and clinical success when used as bridge to surgery of 71.7%. Major complications related to stent placement included perforation (4%), stent migration (11.8%) and re-obstruction (7.3%), causing a cumulative mortality of 0.58% [7]. A more recent review by Watt et al. found median complication rates of stent migration 11%, perforation 4.5%, and tumour overgrowth 12% [12]. Nevertheless insertion of SEMS for acute malignant colonic obstruction was associated with lower mortality rates, a lower mean number of operations per patient, and a reduction in the number of permanent and temporary stomas required compared with

either emergency resective surgery or emergency diverting colostomy. Though the cost associated with colonic stenting is higher than the cost of performing a diverting colostomy for the initial management of acute, malignant colonic obstruction, the incremental cost associated with providing one additional improved patient outcome is very reasonable [13].

Summarizing, the use of SEMS for palliation of malignant colorectal tumour is a safe and effective procedure. As a bridge to a single stage surgery it appears a promising method with good outcome, but no randomized controlled trial between stenting and primary surgery has been carried out to date to provide the necessary clinical proof [14]. A Cochrane review in 2002 concluded that the limited number of randomised control trials into the management of obstructing left-sided colorectal carcinoma together with methodological weaknesses does not allow reliable assessment of the best treatment strategy [15]. There is a clear need for further large randomised studies.

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