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# Outcomes of colonic stent in obstructive colorectal lesion

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## Abstract

**Background:** Self-Expanding Metallic Stents (SEMS) can be used as a bridge to surgery or for palliation in the treatment of large bowel obstruction.

**Aim:** The purpose of the study to evaluates the short-term outcomes of SEMS and its related complications.

**Methods:** This study investigates a total of 27 patients who underwent colonic stenting for obstructed colonic lesions from January 2014 to July 2019. This procedure was performed by two colorectal surgeons at Security Forces Hospital in Riyadh, Saudi Arabia.

**Results:** Technical success was reported in 92.6% of cases and clinical success in 88.9% of cases. There were two cases of colonic perforation, two cases of stent migration, and four cases of stoma creation. The median duration from stent insertion to surgery was 12 days, and the median postoperative length of stay was four days.

**Conclusion:** Colonic stenting before surgery is safe and effective for relieving large bowel obstruction. The long-term outcome requires more follow-up and additional studies.

**Keywords:** Colonic stent; Obstructive Colorectal Lesion; Self-expanding metallic stents; Colorectal surgery.

## Introduction

Colorectal Cancer (CRC) is one of the most common malignancies worldwide in males and females [1]. In Saudi Arabia, CRC is the most common malignancy among males [2]. CRC patients present with acute intestinal obstruction in 8-13% of cases [3]. A total of 75% of obstructing CRCs occur distal to splenic flexure, with the sigmoid colon being the most common location [4]. Malignant colonic obstruction is managed via emergency surgery to relieve the obstruction, to de-function or resect the affected bowel and to

prevent further bowel ischemia or perforation [4]. The feasibility of primary anastomosis depends on the condition of the colon as well as the patient's hemodynamic status [4]. Stoma creation, either in the form of a diverting colostomy or an end colostomy, can occur at rates of up to 40% in the emergency setting [5]. Surgical management carries both high morbidity (40-50%) and mortality of 15-20% [6].

Colonic stent is an alternative approach, which could be used as a bridge to surgery or as palliation. Studies have suggested that the ideal timing between colonic stent and surgery ranges from 3-95 days [7]. The Self-Expandable Metallic Stent (SEMS) was used in colonic obstruction over twenty years ago. It can act as a Bridge To Surgery (BTS), allowing for temporary bowel decompression by restoring luminal patency. Definitive surgical resection can then be performed in a more elective setting and patients' comorbidities can be further optimized. In addition, colonic stenting can be used in a palliative setting [4]. Colonic stenting had technical and clinical success rates of 70.7%-94.3% and 69.0%-96.0%, respectively, with higher rates seen in single-operator series compared to data from pooled randomized controlled trials [8-10].

The main adverse complication of colonic stenting is perforation: 6%–9% of stenting cases have clinical evidence of perforation, while up to 14% of cases have silent perforation. Two randomized controlled trials were stopped prematurely for stent-related complications [8,11]. There is also increasing evidence that stenting should be considered only in a select group of patients [12]. The experience of the clinician is crucial in terms of both technicality, as colonic stenting is considered an advanced endoscopic procedure, and clinical judgement in identifying suitable patients for stenting [12].

## Material and Methods

The study was designed as a retrospective case series study. The study was ethically approved by Security Forces Hospital research committee. All patients who underwent colonic stenting for colonic obstruction between the period of January 2014 and 2019 as a bridge to surgery or palliative treatment were included. Most patients were admitted as emergency cases with clinical and radiological evidence of large bowel obstruction but without perforation or bowel ischemia. Prior Patients with bowel obstruction due to benign diseases were included in the study. All patients gave informed consent before the endoscopic procedure. Before any therapeutic intervention, radiological diagnosis through the use of CT scan of the abdomen and pelvis was performed upon the diagnosis of colonic obstruction, especially in the early days. Further detailed staging via CT scan was done after the stenting procedure. Two well-trained colorectal surgeons performed all endoscopic stenting procedures under combined endoscopic and fluoroscopic guidance and with the patients under moderate sedation in a dedicated endoscopic suite. Equipment included the WallFlex colon (WFL) and Hanaro colon (M.I.Tech) stents. A guidewire was first passed through the stenotic lesion under fluoroscopic guidance before deployment of the SEMS. After the procedure, all patients were monitored clinically and radiologically for evidence of bowel decompression to determine clinical success and complications. Final histopathological reports were also examined post-resection to determine cancer stage and evidence of microscopic perforations.

Technical success was defined as successful stent placement by both endoscopic and fluoroscopic endpoints. Clinical success was defined as clinical and radiologic evidence of colon decompression within 72 hours after stent placement. Patients were discharged after clinical improvement and underwent elective surgery within two weeks of stent insertion. The timing of elective surgery depended on performance status, adverse events and resolution of colon distension. Patient demographics were recorded, including age, gender, and past medical history. Disease characteristics were the site of the tumor and the presence of metastasis. Intervention variables were the date of the stent, intention (i.e., palliative or BTS), duration from diagnosis to stent insertion, and size and type of Self-Expanding Metal Stent (SEMS) deployed. For patients with subsequent surgical resection, details about the surgery, such as anastomosis, stoma creation, postoperative complications, and length of hospital stay, were also recorded. The primary outcome was the number of clinical and technical successes after the placement of a SEMS.

## Results

A total of 27 colonic stenting procedures were performed during the study period. The mean age was 59.2 (range 28-86) years. The baseline characteristics of these 27 patients are listed in Table 1. The majority of the tumors stented were left-sided and 66.7 % were located in the sigmoid colon. The aim of stenting was a bridge to surgery in 18 (66.7%) patients and palliation in 9 (33.3%) patients (Table 1).

**Table 1:** Patient demographic data.

| Parameters | N (%) |
|---|---|
| Male | 14 (51.1%) |
| Female | 13 (48.1%) |
| Tumor location:<br>• Sigmoid colon<br>• Descending colon<br>• Transverse colon | <br>18 (66.7%)<br>8 (29.6%)<br>1 (3.7%) |
| Stent intent:<br>• Bridge to surgery<br>• Palliative | <br>18 (66.7%)<br>9 (33.3%) |
| Success rate:<br>• Technical<br>• Clinical | <br>25 (92.6%)<br>24 (88.9%) |
| Comorbidities:<br>• Diabetes<br>• Hypertension | 19 (70.4%)<br>15 (55.6%)<br>10 (37%) |

**Table 2:** Details of self-expandable metallic stents.

| Stent type | No. |
|---|---|
| WallFlex (mm):<br>25 x 60<br>22 x 120<br>22 x 90<br>25 x 120<br>20 x 90 | <br>1<br>13<br>5<br>2<br>1 |
| Hanarostent (mm):<br>20 x 110<br>25 x 135<br>25 x 110 | <br>3<br>1<br>1 |

The main indication of stenting was acute large bowel obstruction and it was done within a median time of 24 ± 12 (range 12-48) hours from diagnosis. The length of the stent used in each patient was decided upon based on the length of the lesion seen on the CT scan. The types of stents used were the WallFlex colonic stent (Boston Scientific, Marlborough, MA, USA) and Hanaro colon (M.I.Tech) stent (Table 2). The technical success rate was 92.6%. Two cases of perforation were discovered four hours post-stent insertion clinically and by x-ray of the chest and abdomen. An emergency laparotomy and the Hartman procedure were performed for both patients.

The overall clinical success rate was 88.9%, and the causes of perforation in the two cases men-

tioned previously and in late migration distally in two cases after three months were the fact that no further intervention was performed until the definitive surgery and that the lesion shrank due to chemotherapy treatment (Tables 1 and 3). Twenty-two patients had surgery; the median time between stent and surgical resection in the bridge to surgery group was 12 ± 2 (10-14) days. A total of 70.3% of surgical resections were done as laparoscopic while 11.1% were done as open. Two patients who experienced perforation and one patient who had laparoscopic converted to open due to locally advanced sigmoid cancer. All patients with successful stenting underwent surgical resection with primary anastomosis without stoma (66.6% in the bridge to surgery group). An emergency Hartman's procedure was performed on all patients who had unsuccessful stent insertion (7.4%). Two patients in the palliative group who had successful stent insertion had an excellent response after three cycles of chemotherapy, where they underwent surgical resection with primary anastomosis and diverting loop ileostomy due to the patients' risk factors and nutritional status (7.4%). The anastomosis rate was higher for patients with successful stent insertion in which primary anastomosis was performed in all patients with successful stent insertion, and the Hartman procedure was performed in all patients with unsuccessful stenting. Among the nine patients who received palliative stenting, there were two cases of perforation, which required an emergency Hartman's procedure.

**Table 3:** Surgical details and complications.

| Parameter | No (%) |
|---|---|
| Methods:<br>• Open<br>• Laparoscopic | <br>11 (11.1%)<br>19 (70.3%) |
| Primary anastomosis:<br>• Successful stenting<br>• Unsuccessful stenting | <br>18 (66.6%)<br>0 |
| Stoma creation<br>Overall:<br>• Successful stenting<br>• Unsuccessful stenting | <br>4 (14.8%)<br>2 (7.4%) *<br>2 (7.4%) |
| Complications:<br>• Perforation<br>• Migration<br>• Re-obstruction | <br>2 (7.4%)<br>2 (7.4%)<br>0 |
| Length of stay (days):<br>• Post-stent<br>• Post-surgery | <br>4.5 ± 2<br>4 ± 3 |
| Time between stent and surgery in BTS | 12 ± 2 |

* The two stomas in successful stenting are from the palliative group, which had an excellent response to the chemotherapy and converted to resectable for both primary lesion and liver metastasis.

**Table 4:** Final histopathology of the resected specimen.

| Stage | No. |
|---|---|
| I | 0 |
| II | 9 |
| III | 8 |
| IV | 3 |

The final tumor pathologic stage is shown in Table 4. It is observed that there was a higher T stage among obstructed tumors. No microscopic perforations were found upon pathological examination. The median length of hospital stay was 4.5 days post-colonic stenting and six days after surgical resections.

## Discussion

Many studies in the last 30 years have examined the role of the SEMS in the treatment of obstructed colon cancer. Tang, M.H., et al. [4] showed that SEMS appears to be a safe and effective means of relieving large bowel obstruction caused by colorectal cancer. The complication rate was low and comparable to that of other studies. In their study, the technical and clinical success rates were 93.3% and 81.3%. After successful stent placement, patients were subsequently able to undergo surgical resection in an elective setting with minimal complications. The researchers also showed that the stoma rate is significantly lower in cases in which stenting is successful and that the success rate correlates with experience.

Watt, A.M., et al. [13] showed that stenting carries lower risk than emergency surgery, resulting in shorter hospital stays and lower post-stenting complication rates. In their study, clinical and technical success rates were high, and there was little difference between the BTS and palliation groups. The technical success rate was 96.2% and the clinical success rate was 92.0%. Their results are comparable to those of our series and suggest that stenting is safe with an acceptable rate of complications.

SEMS has important advantages over emergency surgery. The patient can undergo a significantly less-invasive procedure. Also, studies have shown that surgery is technically more successful after stenting [14]. This is due to the ability to optimize the patient's comorbidity prior to the operation, including maximizing their nutritional status and ensuring adequate bowel preparation. A BTS technique also makes it possible for laparoscopic oncological surgical resection to be performed after adequate bowel decompression, which was evident in our series.

Zhang et al. concluded that stenting, as opposed to emergency surgery, in a BTS population reduces the intensive care length of stay, generates higher primary rates of anastomosis and lowers both stoma and leak rates [15].

The short-term advantages of colonic stenting are a shorter hospital stay, higher anastomotic rates, and lower stoma rates. All reviews have shown that the long-term survival outcomes after colonic stenting are comparable to those of the traditional method, i.e., emergency surgical resection of obstructed colorectal cancer.

In evaluating the rate of perforation, we find that the risk of perforation is approximately 7.4%, which is comparable to that of the other series. Sebastian, S., et al. [14] found it to be 4% while Verstockt, B., et al. [16] found it to be as high as 14.4%. Stent migration occurred in 7.4% of cases, comparable to the previously reported data, which was 9.3% [14,16,17].

Almadi, MA. et al. found that the success rate for SEMS insertion in their cohort was 93.85%. Most of the patients in this study were stage IV (64%). The migration rate in this study was 8.21%, while the perforation rate was 4.1%. In their series, none of the patient or tumor characteristics were predictors for complications from SEMS insertion. They concluded that SEMS insertion for malignant colorectal obstruction is the best option for palliation or as a bridge to surgery when technical skills for such a procedure are

available [18].

It is important to choose patients who are suitable for stenting based on characteristics such as patient factors and tumor location. van Hooft, J.E., et al. [12] suggested that the subset of patients suitable for stenting should be further defined.

Technical failure is due mainly to the failure of passage of the guidewire through the lumen or false passage and perforation of the colon. Clinical failure is due mainly to perforation and migration of the stent. The size of the stent is a crucial factor in late or microscopic perforation and in-migration of the stent proximally or distally. Tang, M.H., et al. found that the size of the stent plays an essential role in the clinical success of SEMS [4].

The experience and the skills of the endoscopist are important factors for the success of colonic stenting. Meta-analysis data are usually lower than those in single-operator case series, possibly reflecting the importance of the caseload and experience of the endoscopist in the outcome of colonic stenting [8-10].

The main concern about SEMS as a BTS is its higher disease recurrence rates-and, therefore, lower survival rates-as a result of perforation or micro-perforation from colonic stenting. Sagar, J et al. [19] showed that there are no differences in long-term outcomes and survival rates between those who have stenting followed by resection and those who undergo emergency bowel resection. We support the opinion of Braham and his group that colon stenting also plays a role in patients with borderline resectable metastases, as prompt commencement of chemotherapy has a higher priority and outweighs the potential risk of tumor spread by stenting [16].

Guidelines for the management of left-sided colonic obstructions state that, in facilities where SEMS insertion is possible, they should be preferred to colostomy, as SEMS have a similar mortality/morbidity rate and a shorter hospital stay (grade of recommendation 2B) [20]. The guidelines also suggested considering alternative treatments to SEMS in patients eligible for further bevacizumab-based therapy due to the potentially increased perforation rates [20]. Furthermore, the guidelines state that SEMS should be used as a bridge to elective surgery in referral centers with specific expertise and selected patients, as their use seems to be associated with a lower mortality rate, a shorter hospital stay and a lower colostomy rate (grade of recommendation 1B) [20].

This study has limitations. First, it is a retrospective study and carries the possibility of selection bias. Second, two endoscopists performed the colonic stents and we did not examine its effect on our outcome. Third, the size of the study is small, which may affect the final outcome, although this study is comparable to other studies.

## Conclusion

Colonic stenting before surgery is safe and effective for relieving large bowel obstruction. The complication rate found in our series was low, and success rates were comparable to those in the existing literature. After successful stent placement, patients were subsequently able to undergo elective surgical resec-

tion with minimal complications. The stoma rate was significantly lower post-stenting and the success rate correlated with experience. The long-term outcome requires more follow-up and additional studies.

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