



Stenting versus surgery in obstructed malignant colorectal cancer—a review of short and long-term results

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Abstract: Obstructed colorectal cancers (CRCs) continue to be challenging to manage. Apart from surgical resection, the use of self-expanding metallic stents (SEMS) has become increasingly popular. SEMS could potentially allow for the conversion of an emergency operation into a semi-elective procedure, allow for the optimization of the patient's physiology, avoid the requirement for a stoma, as well as allow for a minimally-invasive approach to be adopted. This review article therefore highlights the evidence available in the literature pertaining to the use of SEMS in obstructed CRCs.

Keywords: Stenting; bowel obstruction; outcomes; colorectal cancer (CRC)

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Introduction

Colorectal cancer (CRC) is one of the commonest cancers in the world. Emergency presentations of CRC include perforation, obstruction and bleeding. Options for perforated CRC are rather limited. In the presence of peritonitis, laparotomy with washout and resection of the primary is often required to control the sepsis (1). Extraperitoneal/retroperitoneal perforation will invariably require sepsis control, eventual resection of the cancer or proximal diversion of faecal stream. Oncological outcomes of perforated CRCs are dismal. Patients presenting with massive lower gastrointestinal haemorrhage from CRC is uncommon. Resuscitation with blood products is key in the initial stages. At the same time, control of the bleeding source is imperative. If surgical resection is not preferred in the acute setting, mesenteric embolization is an alternative option to control the massive haemorrhage prior to definitive surgery (2).

In patients presenting with intestinal obstruction, several options are available to deal with the crisis depending on

the site of obstruction, presence of metastatic disease as well as patients' pre-morbid conditions (3). The advent of self-expanding metallic stents (SEMS) has also opened a whole new paradigm in the management of intestinal obstruction. In this article, we seek to review the various options and focusing in particular the role of SEMS in obstructed CRC.

Before we delve further into the role of SEMS, surgery is obstructed CRC stills play an important role. In patients with right sided colonic obstruction (proximal to splenic flexure), the role of SEMS is less evaluated. This is probably contributed by the relatively lower morbidity in surgery for right sided CRC versus left sided ones (4). Stoma were also more frequently created in surgery for left sided colonic obstruction. However, emergency right hemicolectomy for right sided colonic obstruction is not without risks (5). A mortality rate of 10% with an acceptable leak rate of 4% has been reported. Stomas following right hemicolectomy have also been created, and notably in sicker patients.

Stenting for right sided colonic obstructions has been reported in smaller series than for left sided pathologies

Table 1 Summary of trials included in this review

Authors	Year published	Primary outcome	Number of patients recruited—SEMS	Number of patients recruited—ES
Cheung <i>et al.</i> (15)	2009	Successful one-stage operation	24	24
Pirlet <i>et al.</i> (16)	2011	Successful one-stage operation	30	30
van Hooft <i>et al.</i> (17)	2011	Mean global health status at 6-month follow up	47	51
Alcántara <i>et al.</i> (18)	2011	Length of hospital stay	15	13
Ho <i>et al.</i> (19)	2012	Sixty-day post-operative complication rates	20	19
Ghazal <i>et al.</i> (20)	2013	No primary outcome*	30	30
Sloothaak <i>et al.</i> (21)	2014	Long-term oncologic outcome*	26	32
Arezzo <i>et al.</i> (22)	2017	Sixty-day post-operative complication rates	54	59

*, sample size in Ghazal *et al.* (20) was determined arbitrarily at 30 patients in each arm; *, based on recruitment of patients from earlier study by van Hooft *et al.* (17).

(6,7). Intuitively, stenting for right sided obstructions would be slightly tougher as there is the need to traverse a longer segment of colon before reaching the pathology. In addition, with the relatively good outcomes for emergency right hemicolectomy procedure, including the adoption of laparoscopic procedures in certain instances, preference for stenting over surgery in right sided colonic obstructions is not clear (8,9).

For patients with left sided colonic obstructions, numerous surgical options have been described. These could range from simply a proximal defunctioning stoma, resection of the primary with or without primary anastomosis and with or without a protecting stoma. However, any emergency resection procedures are associated with far higher rates of morbidity compared with similar surgery under an elective setting. Mortality rates in patients who undergo emergency surgery (ES) for an obstructing lesion may be as high as 30%, compared with <5% in patients who undergo elective surgery (10,11).

The placement of a SEMS has been proposed as a “bridge-to-surgery” in patients who present with obstructing left sided colon cancers. First described in 1994 by Tejero *et al.* (12), the purported benefits of stenting include converting an ES into an elective one, therefore allowing for more complete staging and optimization of the patient’s pre-morbid conditions (13,14), as well as reduction in stoma creation rates and increased usage of a laparoscopic approach. This is however balanced against the concern of increased perforation which may result in dissemination of disease and worse outcomes.

A number of randomized controlled trials have sought

to evaluate both short term outcomes, as well as long term outcomes comparing SEMS with upfront ES in non-metastatic obstructing left sided CRC. This review will analyze the results from these RCTs and evaluate the evidence for SEMS versus ES with reference to these short-term and long-term outcomes.

Results

Overview of RCTs reviewed

Till date, eight RCTs have been published comparing SEMS with ES in obstructing left sided CRC (15-22). A summary of these trials can be found in *Table 1*. In all of these trials, short-term data relating to the safety of SEMS is reported, with all but two trials using short-term outcomes as the primary outcome for the study (15-19,22). Only three trials have attempted to address the concern of long-term recurrence (20-22), however none of these measured oncologic outcomes as their primary outcome. Notably, Sloothaak *et al.* (21) utilized a subgroup of patients originally recruited for the Dutch Stent-In 2 trial (17) for their oncologic analysis.

Numbers in each arm of the trials published were generally small, with none achieving more than a hundred patients in either arm. Importantly, two trials were stopped prematurely, albeit for different reasons.

Short-term outcomes

Almost all trials performed to evaluate SEMS versus ES

evaluated the short-term outcomes of SEMS. Taking a composite average of all trials performed, the overall technical success was 81.1% and the clinical success was 76.1% (23). The much-feared complication of colonic perforation during the deployment of SEMS only occurred in 5.0% of patients. This statistic however may under report the overall perforation rates, as not all studies reported “silent perforations”, which are detected only on pathological examination. In addition, 76.1% of patients proceeded to elective surgery, and the success of performing elective laparoscopic surgery was 41.0% (23).

Proponents of SEMS discuss its advantages being a reduction in the permanent stoma rate, as well as being able to use the intervening time from stenting to surgery to optimize the patient’s comorbidities, thereby resulting in reduced mortality rates. Comparing SEMS to ES, the combined permanent stoma rate was statistically significantly lower (8.7% *vs.* 20.0%, $P=0.0027$, 95% CI, 3.96–18.6%). There was however no difference in mortality rates (4.0% *vs.* 4.6%, $P=0.783$, 95% CI, –4.02–5.3%).

In spite of this, two studies were stopped prematurely, albeit for polar reasons. The Dutch Stent-In 2 trial by van Hooft *et al.* (17) was stopped prematurely due to increased 30-day morbidity amongst patients who underwent SEMS. The study by Alcántara *et al.* (18) was also stopped prematurely due to increased complications amongst the ES group. Out of 13 patients, four patients suffered from an anastomotic leak and patients who underwent ES suffered from an overall morbidity of 53.8%.

Together, these findings suggest that there are short-term advantages in patients who undergo SEMS. In particular, there is an increased usage of laparoscopic surgery in patients who successfully undergo stenting as well as a significant reduction in permanent stoma rates.

Long-term outcomes

Compared with short-term outcomes, only three trials published encountered for long-term oncologic outcomes in patients who underwent SEMS. The first trial to publish long-term oncologic outcomes was by Alcántara *et al.* In this study which had a mean follow-up period of 37.6 months, there was no statistically significant reduction in overall survival between patients who underwent SEMS and ES ($P=0.876$) although it must be noted that this study was stopped early, and as such, recruited few patients in each group.

The next trial to report on oncologic outcomes was

the Stent-In 2 trial (21). After the trial was stopped prematurely due to increased complications amongst patients who had undergone ES, patients with benign, as well as incurable disease were excluded. The authors then analysed the outcomes of patients remaining, and showed that while there was no difference in outcomes between patients who had SEMS and ES in terms of disease-free survival ($P=0.149$), disease-specific survival ($P=0.061$) and overall survival ($P=0.468$), there was however a statistically significant difference if patients who had undergone SEMS were divided into patients that suffered from a perforation and those who did not. The authors noted that 4-year disease free survival in the six patients who had suffered a perforation was zero. This was statistically significant compared to patients who did not suffer from a perforation. Although not statistically significant, patients who suffered from a stent perforation performed worse than patients who did not suffer from a stent perforation and from those who underwent ES. Unsurprisingly, the authors concluded that stent perforations were associated with an increased risk of recurrence, though conceded that the numbers were small.

The ESCO trial by Arezzo *et al.* was the most contemporary trial evaluating SEMS versus ES (22). Although it was powered to detect a difference in the 60-day morbidity of patients, the authors have followed up patients recruited into the study and report oncological results with a median follow up of 36 months (range, 16–58 months). The authors noted that there was no difference in overall survival ($P=0.998$) as well as progression-free survival ($P=0.893$) in both groups. Unlike the Stent-In 2 trial, this trial did not report outcomes specific to patients who had suffered from a perforation.

Metastatic CRC

In contrast to patients without metastatic disease, there is good evidence that SEMS should be utilized in patients who are known to have metastatic disease. Stenting is an alternative to stoma creation in such patients (24), and based on guidelines by the European Society of Gastrointestinal Endoscopy (ESGE), SEMS is the preferred treatment for patients with malignant obstructed who are managed with a palliative intent (25). Compared to patients who undergo stoma creation, patients who undergo stenting experience shorter length of stay within hospital (5 *vs.* 12 days, $P=0.003$), earlier commencing of chemotherapy (4 *vs.* 7 weeks, $P=0.02$), as well as reduced stoma creation rates (OR 0.19; 95% CI, 0.12–0.28), $P<0.01$) (26–28).

Conclusions

Numerous trials have been performed evaluating SEMS and ES but most have been small in number. The main concern regarding the use of SEMS has been concerns relating to the increased risk of tumor dissemination occurring in cases of perforation. In particular, there are concerns regarding the safety of stenting in patients who have a silent perforation during pathologic examination. Further trials will need to be performed as our understanding of the implications of SEMS for the oncologic safety of the patient remain unanswered. While SEMS can certainly be performed safely, and portends obvious short-term benefits to the patients, there is insufficient evidence to conclude that SEMS does not result in worse disease-free and overall survival.

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Footnote

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