Review Article

Minimally invasive treatment of low rectal cancer: stenting as a bridge to surgery

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Abstract: Stenting as a bridge to surgery (SBTS) is a relatively novel procedure, potentially useful to treat symptomatic left-sided malignant colonic obstruction. The clinical use of SBTS has been mainly suggested in advanced or non resectable tumors, in order to avoid the need for emergency surgery, thus obtaining a good palliation and, at the same time, delaying the elective major procedure. SBTS might also increase the rate of laparoscopic procedures, perhaps reducing the need of staged operations with stoma formation and possibly improving the quality life of patients. Aim of this review article is to provide a comprehensive analysis of the clinical use of self-expanding metallic stents (SEMS), specially in left-sided malignant colonic obstructions as a bridge to elective surgery.

Keywords: Self-expanding metallic stents (SEMS); bridge to surgery; colorectal cancer; palliative treatments; malignant colorectal obstructions

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Introduction

The employment of self-expanding metallic stents (SEMS) is now regarded as an interesting procedure in the treatment of symptomatic left-sided colonic obstruction due to colorectal cancer; nevertheless, the use of expanding stent is widely described in relieving obstructions in many different clinical scenarios, such as cardiac, vascular, biliary, hepatic, and esophageal diseases (1,2), other than in bariatric procedures and stenosing Crohn's and diverticular disease (3-7).

Colonic and rectal stents may be helpful in avoiding emergency surgery, allowing to achieve a relief of obstructive symptoms. Definitive surgical procedure is thus delayed, allowing to optimize medical management and obtaining benefits from radiological staging of the disease. Being said, final therapeutic strategy will be possibly discussed even in a multidisciplinary team, allowing for neoadjuvant therapy, when necessary (8). Moreover, the use of colonic stenting as a bridge to surgery (SBTS) might also increase the rate of laparoscopic procedures (9), also reducing the need of staged operations with stoma formation.

The use of SEMS is also indicated in patients with low rectal cancer to palliate obstructive symptoms in patient non-eligible for surgical excision or when a curative resection is impossible due to a locally advanced cancer or in presence of multiple metastases with no indication to surgery; on the other hand, the possibility to perform a delayed elective operation, may also increase the rate of sphincter saving procedures (10,11).

Even if colonic stenting before definitive surgery may be associated with a reduction of short-term overall morbidity and lower rate of temporary and permanent stoma, the feasibility of the procedure also depends on multiple factors such as local expertise, clinical status, level of obstruction, the presence of synchronous or metachronous lesions at

diagnosis (12).

In acute colonic obstruction, surgical decompression is impaired by a significant morbidity (45–50%) and mortality (15–45%) (13,14); more, an emergent operation with an unprepared distended colon, will make a primary anastomosis dangerous, and the formation of a temporary or permanent stoma is often mandatory.

Even if SBTS strategy is sometimes considered as a useful tool to decrease complications from major surgery, it is a not a free risk procedure: in fact, despite successful decompressions are reported up to 92%, complications related to stent insertion, such as bowel perforation, re-occlusion, stent migration and also death, have also been described in clinical series (15,16).

The use of SEMS as a bridge to surgery has similar short and long-term results compared to emergency surgery, with no significant differences in oncological long-term outcomes and a significantly lower stoma rate in the SBTS group (17). More, the possibility of cost savings has also been reported, thanks to a shorter hospitality stay (18).

Despite the possible advantages offered by SBTS procedures, unfortunately, not all the patients are ideal candidates: pre-operative perforation with intra-peritoneal gas is an absolute contra-indication; lesions of the lower the rectum are not usually amenable to stenting; long strictures and multilevel obstructions are obviously less likely to benefit from colonic stenting (19).

Review of literature

The experimental endoluminal use of SEMS in animals was first described by Wright *et al.* in 1985 (20), whereas the use of stents as a temporary treatment for colorectal malignancies was first reported in 1991 by Dohmoto *et al.* (21), who described the palliative use of SEMS in obstructing rectal cancer.

In 1994, Tejero *et al.* (22) reported a preliminary experience of two patients with colonic obstruction who were treated with metallic stents and obtained relief from the obstruction before elective surgery. This procedure involved three phase: the placement of the stent at the point of colon stenosis; the recovering time, who allowed for disease staging and colonic preparation and, finally, the operative time, accomplished without complication and with excellent results.

A retrospective case-matched study by Ng *et al.* 2006 (23) aimed to compare the outcomes after SBTS in obstructing left-sided colorectal cancer and after emergency surgery.

In this study, group I was made of 20 patients who underwent SEMS and subsequent elective surgical resection with primary anastomosis; group II consisted of 40 patients who underwent emergent colonic resection, with the anastomosis performed at the first operation in 29 patients (72.5%).

The two groups were comparable for preoperative co-morbidity and disease stage and were matched for age, sex and duration of obstruction. The operative mortality was 5% in group I and 12.5% in group II.

Patients in group I showed a significant shorter length of hospital stay and a shorter stay in the intensive care unit, while there were no differences in mortality. Reoperation rates, surgical and medical morbidity were similar in both groups. In other words, SBTS was associated with a higher rate of primary anastomosis and better outcomes in terms of hospital stay and length of stay in ICU, when compared with emergency resection.

A possible bias of this study could be identified in a lower ASA class in group I, other than a more distal tumor location, as half of the tumors were located at the rectum or recto-sigmoid junction, despite this different location of tumors between groups did not reach statistical significance.

A Systematic Review by Breitenstein *et al.* (24) also tried to address the issue of different approaches to treat left colorectal obstructive malignancies. The authors compared outcomes after one-, two- and three-stage procedures, as well as endoscopic SBTS, in order to provide a guidance for clinical practice. One stage procedure includes primary resection of the colon-rectum with primary anastomosis and no stoma formation; Hartmann's operation and resection with primary anastomosis plus protective stoma are considered as two-stage procedures (25); three-stage operations were defined as initial stoma formation for bowel decompression, then colonic resection and defunctioning stoma as a second-stage and, finally, stoma closure. Endoscopic stenting followed by a single-stage procedure is obviously a more appealing procedure compared with two- or three-stage operations.

Another retrospective study compared short- and long-term outcomes after SBTS and primary emergency surgery to treat acute onset colorectal cancers (Dastur *et al.* 2008) (26).

The authors identified 19 patients who underwent SBTS for left-sided colonic obstruction and 23 patients who had primary emergency surgery. No significant differences in terms of tumor location and stage were reported between the two groups. Successful stent insertion rate was 84%; SEMS was the only procedure performed in 2 patients

with advanced cancer, while SBTS was performed in the remaining patients. One patient died cause of stent-related complication (perforation) and another patient had a protective stoma due to stent migration.

In the "stenting group", there was a tendency towards a higher primary anastomosis rate compared to the primary surgery group; no significant differences between the groups were found in terms of length of hospital stay, 30-day mortality or morbidity. Moreover, long-term oncological outcomes, in terms of 3-year survival were also similar between groups. Saida *et al.* (27) also reported similar results in a Japanese series.

A prospective study by Brehant *et al.* (28) reported an intention-to-treat analysis about the elective colectomy rate after stent placement for colonic obstruction caused by cancer. The placement of a self-expanding stent as a preliminary treatment for patients with malignant colonic obstruction was performed in 30 patients. Location of lesions was as follows: one patient had a right colon cancer, one patient had a cancer of the transverse colon, while in 24 patients the cancer was located at the left colon and in 4 patients at the upper third of the rectum.

Successful stenting placement rate was 83%; placement failure was 16.6% and clinical failure 6%. There were no complications in 17 patients (80%). More, 5 patients underwent Hartmann's operation (n=2) or a colostomy (n=3). A colostomy was avoided in 23 patients (77%).

SEMS were finally effective as bridge to surgery in 92 of cases.

Several other prospective (6,29-31) and retrospective studies (32-35) have investigated on the role of colonic stenting in patients with malignant colonic obstruction as a palliative definitive treatment or a bridging tool before elective surgical resection.

Despite the potential benefits from stenting procedures, the risk for serious adverse events must also be taken into account. The Dutch Colorectal Stent Group investigators opted for an early closure of their multicenter randomized clinical trial, comparing endoscopic stenting versus surgery for stage IV left-sided colorectal cancer (36); in fact, a high number of serious adverse events in the nonsurgical arm were registered, including perforations and stent obstruction, so that a premature resolution of the trial was decided for ethical reasons.

Data about the overall efficacy and short-term outcomes after stenting procedures for colon cancer obstruction are now available from large clinical series other than two big meta-analyses(37,38).Despite colonic stenting is usually considered as a low risk technique, with a low mortality rate, commonly reported side-effects include failure of placement or to resolve the obstruction, perforation, dislocation, hemorrhage and stent obstruction (15).

Perforation is perhaps the most worrisome complication and is reported in 4% to 17% of cases, often associated with previous balloon dilatation of the stricture at the time of stent placement (16).

Stent migration is observed in approximately 10% of cases and occurs most frequently within the first week, maybe due to technical factors (colonic angulations, post-operative chemotherapy or radio therapy, fecal impaction). Larger diameter stents can usually be successfully re-performed.

Re-obstruction is reported in around 10% of cases, most frequently due to tumor overgrowth, stent fracture or disintegration, dehydration with fecal impaction; covered stents also seem to be more frequently associated with re-obstruction. Colonic edema and bleeding (0–5% cases) are also described, but do not require treatment.

Discussion

Colorectal tumors are a well-known cause of acute bowel obstruction; more, malignant colorectal obstruction is the main indication for emergency large-bowel surgery. Malignant colonic strictures often have a poor prognosis, cause of the advanced disease stage and frequent presentation in elderly patients. More, the frequent need for surgery on an unprepared bowel may increase the rate of morbidity and mortality.

Traditional management of symptomatic malignant left-sided colorectal obstructions involves the creation of an emergency decompressing colostomy or a resection with or without anastomosis. On the other hand, the increase of the use of self-expandable metal stents for the management of acute obstruction, both as a temporary bridge to surgery or as definitive palliation, is becoming more widely accepted.

Colonic stents have certainly demonstrated to be useful devices for the palliation of obstructive colorectal cancer. As a temporary measure before surgery, SEMS may allow time for a complete preoperative staging of the disease, make the mechanical bowel preparation possible and, moreover, sometimes these procedures allow to avoid a temporary or definitive fecal diversion. It may also allow time to administer neoadjuvant therapy when indicated. As a palliative measure, SEMS can substitute the need for a surgical time.

In most patients, SBTS can be achieved for palliation or

for preoperative purposes. Stenting placement in subtotal malignant obstruction can be achieved with good rate of technical success. However, the procedure requires proficiency in advanced endoscopic stenting techniques, specially when obstructions are complete. This is of crucial importance in order to avoid stenting complications (39), also in the light of possible tumor cells dissemination, with the risk for metastasis into the surrounding lymphatics, with a potential worsening of tumor prognosis; this serious possible oncological issue should also be considered before planning the use of a decompressive stent.

The early closure of the Dutch trial (36) due to excess of complications, should at least recall to a word of caution in the proper selection criteria for the use of SEMS in a malignant colonic obstruction.

Conclusions

SBTS may allow to avoid emergency surgery by converting emergency procedures into elective operations; nevertheless, correct indications for colonic stenting play a key role due to potential serious complications due to stents insertion. More, SBTS should be performed in high volume endoscopy units with a surgical back up, in order to maximize benefits, reducing the impact of possible adverse events.

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Footnote

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