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Stent as bridge to surgery in patients with malignant large bowel obstruction

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ABSTRACT

Self-expandable metal stents (SEMSs) have been used in the management of colorectal obstruction as an alternative to emergency surgery. The stent as a bridge to surgery is a preoperative modality for the relief of acute obstruction so that resection can be done on an elective basis after stabilization of the acute illness and bowel preparation. Using PubMed, a literature search regarding the outcomes, mortality, morbidity, and long-term prognosis of SEMS's use as a bridge to surgery in colorectal obstruction was undertaken. Although the data reported from randomized clinical trials give conflicting results, the use of SEMSs as a bridge to surgery in patients with obstructive colon cancer is recommended.

1. Introduction

Approximately 8%-29% of patients with colorectal malignancy present with acute colonic obstruction [1,2].

Emergency surgery procedures required for the treatment of left-sided colorectal cancer obstruction (LCCO) are associated with a mortality rate of 15%-20% and a morbidity rate of 40%-50% [3,4].

Colonic stent placement for malignancy was first used in the early 1990s and was then proposed either as palliative strategy in inoperable patients or as a bridge to surgery; Tejero et al [5] first reported the use of self-expanding metal stents (SEMSs) as a bridge to surgery in 2 patients with colonic obstruction in 1994.

In the setting of operable patients, the temporary placement of a colonic stent, allowing colonic decompression, should avoid the need of emergency surgery and allows for a shift to elective surgical strategy, thus avoiding colostomy and providing the possibility of subsequently performing an elective segmental resection with a primary anastomosis, even laparoscopically [6,7].

Furthermore, a stent placement that avoids the need for emergency surgical treatment enables clinical management of patients with volume resuscitation and treatment of underlying comorbidities, thus allowing improvement in the overall general condition before undergoing elective surgery [6-8].

Finally, in patients with rectal cancer, preoperative neoadjuvant therapy can be administered with the stent in place after relief of obstruction [9].

This report provides an update on the technical specifications, efficacy, and safety considerations regarding stents for use in the colon in the setting of bridge to surgery.

2. Background

SEMSs are devices used to restore the lumen of the colon, consisting of woven, knitted, or laser-cut metal mesh cylinders that exert self-expansive forces until they reach their maximum fixed diameter. SEMSs are generally composed of stainless steel and alloys such as Elgiloy and nitinol and are packaged in a compressed form constrained in the delivery system. SEMSs are available in several sizes of diameter and length. The various stents that are commercially available and their features are outlined in Table 1.

3. Technical considerations and issues

Detailed reviews on optimizing stent placement and minimizing stent-related adverse events are available [10].

Stent delivery devices can be placed either over the wire or through the scope under endoscopic control alone, combined endoscopic and radiologic control, or radiologic guidance alone.

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Table 1
Available SEMS for colorectal obstruction.

Model, Brand	Delivery system	Material	Length (mm)	Covering
EGIS colorectal, S&G Biotech	TTS	Nitinol	60, 80, 100, 120	UC, FC
Hercules SP, S&G Biotech	OTW	Nitinol	110, 130, 150, 170, 190	Inner UC Outer PC
Wallfelx colonic, Boston Scientific	TTS	Nitinol	60, 90, 120	UC
Ultraflex Precision Colon, Boston Scientific	OTW	Nitinol	50.7, 80.7, 110.7	UC
Wallstent colonic, Boston Scientific	TTS	Stainless steel	60, 90, 120	UC
Evolution colonic, Cook Endoscopy	TTS	Nitinol	60, 80, 100	UC
Bonastent, Endochoice	TTS	Nitinol	60, 80, 100	UC, PC
SX-ELLAcolorectal, Ella CS	OTW	Nitinol	80.2, 90, 110.3, 130.5	UC, FC
Hanarostent, M.I. Tech	TTS, OTW	Nitinol	60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160	UC, FC
Ecostent, Leufen Medizintechnik OHG	OTW	Nitinol	80, 100	UC
Micro-Tech, Micro-Tech Europe	TTS, OTW	Nitinol	80, 100, 120	UC, PC

Abbreviations: TTS, trough the scope; OTW, over the wire; UC, uncovered; FC, fully covered; PC, partially covered.

The stent slides over a guidewire that should be passed through the stricture. Briefly, an atraumatic hydrophilic guidewire inserted in a 7-F endoscopic retrograde cholangiopancreatography catheter or a sphincterotome may be introduced to cannulate the stricture; the guidewire is then withdrawn, and the contrast agent is injected to delineate the location, length, and anatomy of the stricture. A 0.035-in stiff guidewire is then inserted after removing the hydrophilic guidewire, and the catheter is withdrawn. The SEMS selected should have a length adequate to cover the entire stricture plus 1-2 cm beyond both stricture margins. The SEMS is then deployed through the endoscope. At the end of the procedure, the contrast agent is injected through the endoscope to rule out the presence of a perforation [11,12].

Technical success is reported as a measure of successful endoscopic placement of the stent in the correct position.

Colonic stents have been placed for palliation or in a bridge-to-surgery strategy. However, the clinical and anatomical conditions of the patient are quite different. Therefore, colonic stent placement in the setting of obstructed patients deserves a specific evaluation of efficacy [13].

A pooled analysis including 54 studies reported the use of stents in 1198 patients. The percentage of technical success varied ranging from 64%-100% (median = 94%, interquartile range: 90-100), showing no statistical difference in the technical success in the palliative group (93.35%) and in the bridge-to-surgery group (91.9%) ($P = 0.34$, not significant [NS]). Failure rates were not influenced by the technique of placement, combined radiologic and endoscopic technique or radiologic guidance alone (4.5% and 9.6%, respectively, $P < 0.086$, NS), nor by the type of stents, covered or uncovered ($P = 0.34$) [14].

Indeed, an international guideline suggests colonic SEMS placement to be the best option when technical skills for such a procedure are available [15].

More proximal lesions are technically challenging when compared with obstruction in the left colon or in the rectum. An important factor affecting the technical success of colonic stent insertion is the length of obstruction [14].

As the main limitation in placing the stent is the passage of guidewire through the stricture, several technical tricks are suggested to improve the rate of successful placement. The usage of hydrophilic biliary guidewires helps to achieve passage through the stricture. A clear cap (similar to cap-assisted endoscopic mucosal resection) and a sphincterotome are used to orient the catheter in the direction of the lumen, particularly for lesions at flexures or corners [16]; in these cases we have used a side-viewing endoscope [17].

All these tricks are useful to reach a high rate of technical success in colorectal stenting and are adopted from endoscopic retrograde cholangiopancreatography cannulation techniques. Indeed, endoscopists with pancreaticobiliary experience seem to have higher success rates and lower complication rates than those without it [18].

Several types of SEMSs can be used. Covered stents are not indicated because they migrate more easily. Choo et al [19] reported a 50% migration rate with the use of 2 covered stent types in 20 patients.

4. Surgical outcomes and related issues

The strategy of bridge to surgery by using a stent placement includes 3 steps, each with a specific aim and outcomes. All steps contribute as a part to the whole process of bridging.

The first step is the stent placement, avoiding the need of emergency surgery. The second step is the medical treatment during the time between stent placement and surgery. During this time, the effort should be addressed to manage the comorbidities and to provide the best condition for the elective surgery. The third step is the elective surgical strategy that should be performed in accordance with the guideline of minimally invasive surgery.

Colonic stent placement as a bridge-to-surgery purpose has been shown to be effective in large nonrandomized series. The initial data regarding the knowledge of efficacy and safety of colonic stent in bridge to surgery came from uncontrolled trials and individual case series. In a polled analysis by Sebastian et al, including stent placement series for both palliative and bridge-to-surgery strategies, the percentage success rates in individual series varied from 64%-100% (median = 94%, interquartile range: 90-100). The technical success in the palliative group was 93.35% and in the bridge-to-surgery group was 91.9% ($P = 0.34$, NS).

In a bridge-to-surgery group including 407 patients in 21 series of nonrandomized reports, the procedure was technically successful in 374 (91.9%) patients. Clinical success in this subgroup, defined as the ability to perform a single-stage surgery with primary anastomosis, was achieved in 292 patients. The overall percentage of clinical success was 71.7%. The mortality rate from stent insertion was 0.5% and is significantly lower than the reported figures for emergency surgery [14].

Subsequently, several reviews including nonrandomized and randomized studies comparing the outcomes of SEMSs followed by elective surgery with those of emergency surgery without prior stenting have been published.

A review including only nonrandomized studies on 363 patients with stents placed as a bridge to surgery showed that rates of primary anastomosis after elective surgery following stenting were at