Palliative self-expandable metallic stent placement for colorectal obstruction caused by an extracolonic malignancy

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A B S T R A C T

Endoscopic stenting with a self-expandable metallic stent (SEMS) is widely accepted for the management of malignant colorectal obstruction (MCRO). This procedure is effective for both palliative purposes and as a bridge to surgery. MCRO can arise from colorectal cancer (CRC) or advanced extracolonic malignancy (ECM), including gastric, pancreatobiliary, small bowel, endometrial gynecologic, or urinary malignancies. In patients with an ECM, the pathogenesis of obstruction is different from that of CRC and is caused by direct tumor invasion into the lumen or extrinsic compression at an advanced stage. These differences and the advanced clinical condition can influence the clinical results. Endoscopic colonic stenting for ECM has lower technical and clinical success rates than for CRC. Appropriate patient selection and technical issues are key to improved outcomes. In the near future, a prospective clinical trial should evaluate the efficacy and safety of SEMS placement for MCRO caused by ECM.

Keywords: colorectal cancer, colorectal obstruction, extracolonic malignancy, self-expandable metallic stent

Introduction

Acute colorectal obstruction causes symptoms such as nausea, vomiting, abdominal pain, distention, and altered bowel habits, and results in bowel dilation and fluid retention. Perfusion to the intestine can be compromised, leading to necrosis, dehydration, or perforation—complications that increase the mortality rate. Malignancy is the most common cause of colorectal obstruction, causing 90% of cases.1 Malignant colorectal obstruction (MCRO) generally requires rapid bowel decompression, such as emergency surgery, which is associated with high mortality and morbidity.2–5

Since its introduction for treating MCRO in 1991,6 endoscopic stenting with self-expandable metallic stents (SEMSs) has become widely accepted for the palliative management of malignant colonic obstruction and as a bridge to surgery.7–9 Given its low invasiveness, this procedure is an option, along with bypass surgery or colostomy, for patients with unresectable colonic obstructions.9

MCRO can also occur in patients with an extracolonic malignancy (ECM), such as gastric, pancreatobiliary, urogenital, and gynecologic malignancies.10–12 Accumulated evidence has shown that SEMS placement is an acceptable alternative to surgery for managing MCRO caused by colorectal cancer (CRC). Although the obstructions in CRC are caused by intraluminal growth, those in ECM occur as a result of peritoneal dissemination, direct invasion from an organ near the colon into the lumen, or extrinsic compression. The tumor fixes the stricture site, which loses its flexibility. In addition, intestinal peristalsis can be blocked by adhesions after a previous operation, radiation, or carcinomatosis from the primary lesion. These conditions make it difficult to insert a colonoscope, to traverse the stricture, and to insert the SEMS. In comparison with CRC, bowel obstruction caused by ECM tends to cause a complex stricture, potentially at more than one location. Therefore, accessing or traversing a stricture caused by ECM is more difficult than for those resulting from CRC.

Emergency surgery performed on acutely ill patients with large-bowel obstruction due to malignancy, which includes bypasses, resection, and colostomy, has a 16–23% morbidity rate and a 5–20% mortality rate.13–14 Palliative surgery for MCRO caused by ECM is also associated with significant morbidity.15,16 Even with successful surgery, many patients require a colostomy or ileostomy. The stoma has significant morbidity and reduces the quality of life over the short- and long-term.17 Given the low invasiveness of SEMS placement, it is an effective alternative for resolving MCRO caused by ECM.

Until 2000, few patients with colorectal obstruction due to ECM had undergone SEMS placement for palliation.14,15 In most of these early studies, colonic obstruction from ECM was included in malignant colonic obstruction and was not distinguished from that of...
Some authors have reported simultaneous SEMS placement at two proximal obstructions of the colon caused by an ECM. Guidewires, and stents have increased the indications for treating an obstruction proximal to the splenic flexure. Thirty-four recent articles report the effectiveness and safety of SEMS placement for a proximal obstruction in ECM. Improvements in endoscopy, guidewires, and stents have increased the indications for treating proximal obstructions of the colon caused by an ECM.

Although multiple strictures typically rule out SEMS placement, some authors have reported simultaneous SEMS placement at two different obstruction sites. Kim et al. reported better clinical outcomes for SEMS placement for patients with one or two obstructions versus multiple obstructions. After a careful pre-procedural examination, including high-resolution CT, barium, or water-soluble enema images, we think one can insert a SEMS for one or two obstructions.

Table 1 Self-expandable Metallic Stent (SEMS) Placement for an Extracolonic Malignancy (ECM)

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Patients (n)</th>
<th>Covered</th>
<th>Including gastric cancer (%)</th>
<th>Including carcinomatosis</th>
<th>CT, MRI, or contrast enema</th>
<th>Endoscopic/fluoroscopic placement</th>
<th>TS (%)</th>
<th>CS (%)</th>
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<tr>
<td>Miyayama et al</td>
<td>2000</td>
<td>8</td>
<td>Uncovered and covered</td>
<td>Y (25)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>100</td>
<td>88</td>
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<td>Uncovered</td>
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<td>Y</td>
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<td>N</td>
<td>100</td>
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<td>13</td>
<td>Uncovered</td>
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<td>N</td>
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<td>N</td>
<td>100</td>
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<td>NA</td>
<td>Y</td>
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<td>Uncovered and covered</td>
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<td>Y</td>
<td>Y</td>
<td>87</td>
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<tr>
<td>Shin et al</td>
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<td>39</td>
<td>Uncovered and covered</td>
<td>Y (79)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>87</td>
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<td>Y</td>
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<td>Trompetas et al</td>
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<td>Y</td>
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<td>111</td>
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<td>Y (100)</td>
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<td>Y</td>
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<td>Keranen et al</td>
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<td>24</td>
<td>Uncovered</td>
<td>Y (17)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>96</td>
<td>65</td>
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<tr>
<td>Kim et al</td>
<td>2013</td>
<td>20</td>
<td>Uncovered and covered</td>
<td>Y (70)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>90</td>
<td>85</td>
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<tr>
<td>Moon et al</td>
<td>2014</td>
<td>44</td>
<td>Uncovered</td>
<td>Y (59)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>93</td>
<td>77</td>
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</table>

CT, computed tomography; MRI, magnetic resonance imaging; N, no; NA, not available; TS, technical success; CS, clinical success; Y, yes.
site. Under fluoroscopic and endoscopic guidance, the site of the obstruction is identified in the endoscopic image or delineated with contrast medium. An angiographic catheter, biliary catheter, sphincterotome, or balloon catheter preloaded with a hydrophilic 0.035-inch biliary guidewire is used to traverse the stricture under fluoroscopic guidance until a safety loop of the guidewire is created proximal to the stricture. ECM strictures tend to be longer than CRC strictures. It becomes more important to negotiate the stricture and to measure its exact length. A water-soluble contrast agent is injected into the proximal side of the stricture to assess stricture length. A balloon catheter can also be used to measure the length of the stricture. The appropriate length of the stent is determined by adding 2–5 cm to the length of the stricture. The delivery system is advanced through the working channel over the guidewire and is guided fluoroscopically into the site of obstruction. The middle of the stent is adjusted at the narrowest site of the stricture, while the outer sheath is retracted under fluoroscopic and endoscopic guidance.

Balloon dilation of the stricture is performed before or after stent placement (Fig. 1), when the delivery system cannot pass through the stricture or the expansion of the stent is unsatisfactory. Although prestenting dilation with a balloon catheter has been related to colonic perforation in experimental and clinical studies of CRC, we found no relationship between balloon dilation before or afterwards, and perforation. Only in colorectal obstruction caused by ECM is it permitted to perform balloon dilation before or afterwards, when the patient does not have definite luminal mucosal changes caused by the direct infiltration of malignant cells.

We often cannot define the spread of the tumor along the colon in disseminating cases. In these cases, we check the length of the narrowing on both sides of the tumor; a SEMS with sufficient length to cover the narrowed portion should be selected. If the stricture is located at the splenic/hepatic flexure or in another acutely angled area, a braided-type SEMS, such as the WALLSTENT (Boston Scientific, Natick, MA), should be avoided. A braided SEMS might not expand and could kink in a stricture in an acutely angled portion of the bowel (Fig. 1); knitted-type SEMS like the Niti-S (Taewoong, Inc., Gimpo, South Korea) stent can overcome this problem.

Clinical outcomes

To date, more than 400 cases of SEMS placement for colorectal obstruction caused by an ECM have been described in 16 reports. Twelve groups preferred endoscopic/fluoroscopic placement, and four groups used radiological placement.

The technical success rate was 88.5% (range 67–100%) in the 12 articles reporting more than one endoscopic/radiological placement. Radiological placement was reported to be technically successful in 92.5% (range 42–100%). There seems to be no difference according to the procedure (radiological or endoscopic/fluoroscopic), location in the colon (right and left side), or etiology (gastric or nongastric).

Fig. 1. Endoscopic balloon dilation after WallFlexTM Colonic Stent (made by Boston Scientific Corporation (Natick, MA 01760-1537)) placement with insufficient expansion.
The clinical success rate was 72.2% (range 20–100%) in the 12 articles reporting more than one endoscopic/radiological placement. Radiological placement was reported to be clinically successful in 75% (range 20–100%). There was also no difference in terms of the procedure, location, or etiology.

Complications

The most common complication is reobstruction of the SEMS due to tumor ingrowth (Table 2). This complication can be resolved by placing an additional SEMS using stent-in-stent techniques or by surgery. Given the etiology of ECM, obstruction at another site can also occur. When obstruction symptoms recur, the possible causes of the patient’s symptoms must be reassessed using CT or a barium or water-soluble enema. Although secondary stent-in-stent SEMS placement for MCRO is a promising way to resolve the symptoms, it is reasonable to perform this procedure in patients who are not candidates for surgery. The use of a covered SEMS is not favored as first-line therapy because of the high rate of migration. For secondary intervention for an occluded SEMS due to tumor ingrowth, however, a covered SEMS is a promising option for managing tumor invasion via the stent mesh. In such situations, the risk of migration is relatively low.

Sometimes, the SEMS becomes kinked and does not dilate in an acutely angled portion of the bowel, such as the splenic or hepatic flexure (Fig. 1). This complication can occur with a braided-type SEMS, such as the WALLSTENT, but not with a knitted-type SEMS, such as the Niti-S. We can manage this situation with balloon dilation or additional stent-in-stent placement.

Stent migration was the second most common complication. In general, migration is caused by misplacement, inadequate stent length, placement for incomplete obstruction, or soft tumor tissue. Late stent migration might be related to tumor shrinkage caused by chemotherapy after SEMS placement. A covered SEMS is regarded as superior at preventing tumor ingrowth, but inferior at preventing stent migration in MCRO, because the stent is less embedded in the lumen wall compared with uncovered stents. Because the ECM obstruction is caused by both direct tumor invasion and extrinsic compression, adhesions, and decreased peristalsis, it is assumed that the migration rate of SEMS placed for ECM is high, although no prospective, randomized study has examined this issue.

Future directions

In this review, SEMS placement for MCRO due to an ECM was shown to be an appealing option in patients who are deemed poor surgical candidates. Relative to surgery, stent placement allows a more rapid return to functional intestinal status, with a shorter hospital stay; as a result, the early induction of chemotherapy is possible for patients who need palliative chemotherapy. However, stent insertion for MCRO with ECM is technically challenging and accompanied by complications. A careful preoperative examination of multiple strictures is necessary when selecting candidates for SEMS placement. When considering SEMS for MCRO with an ECM, it might be best to exclude patients with three or more colonic strictures. It is necessary to compare the efficacy and safety of SEMS for MCRO with ECM with surgery in a prospective, randomized study. The development of new endoscopes, devices to traverse the stent, and novel highly flexible stents will facilitate SEMS placement for colorectal obstruction with an ECM.

Conflicts of interest

All contributing authors declare no conflicts of interest.

References


