

# Considerations in the Management of Malignant Bowel Obstruction



Caitlin T. Yeo, BSc, MD<sup>a</sup>, Shaila J. Merchant, MSc, MHSc, MD, FRCSC<sup>b,\*</sup>

## KEYWORDS

- Malignant bowel obstruction • Cancer • Palliative management • Medical therapy
- Surgery • Gastrostomy tube • Stents • Ablation

## KEY POINTS

- Malignant bowel obstruction (MBO) is encountered in advanced intra-abdominal and pelvic malignancies and requires a patient-centered multidisciplinary approach. Specialized teams with expertise in symptom assessment and management are recommended.
- The existing literature is based predominantly on retrospective case series reporting survival as the primary outcome. Prospective studies that evaluate symptom relief and quality of life are under way.
- Medical treatment, including nasogastric tube decompression, intravenous fluids, and medications, are the mainstay of management.
- Procedural (venting gastrostomy tubes and stents) and surgical (resection, bypass, and stoma creation) interventions may be offered to well-selected patients.

## BACKGROUND

Malignant bowel obstruction (MBO) is a challenging problem that patients and clinicians encounter in advanced malignancies and may occur in up to 51% of patients with colorectal, ovarian, pancreatic, and gastric cancers.<sup>1</sup> MBO can cause symptoms of abdominal pain, nausea, and vomiting and often requires hospitalization and has an impact on patient quality of life (QOL).<sup>2</sup> It usually represents a terminal phase of the disease with median survival in the range of 1 month to 3 months.<sup>3</sup> In 2007, the International Conference on Malignant Bowel Obstruction and the Clinical Protocol Committee proposed the following specific criteria for MBO: (1) clinical evidence of bowel obstruction, (2) bowel obstruction beyond the ligament of Treitz, and (3)

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<sup>a</sup> Division of Surgical Oncology, University of Calgary, Tom Baker Cancer Centre, 1331 29 St NW, Calgary, Alberta T2N 4N2, Canada; <sup>b</sup> Division of General Surgery and Surgical Oncology, Queen's University, Burr 2, 76 Stuart Street, Kingston, Ontario K7L 2V7, Canada

\* Division of General Surgery and Surgical Oncology, Queen's University, Burr 2, 76 Stuart Street, Kingston, Ontario K7L 2V7, Canada

E-mail address: [shaila.merchant@kingstonhsc.ca](mailto:shaila.merchant@kingstonhsc.ca)

Twitter: @QueensGenSurg (S.J.M.)

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intraabdominal primary cancer with incurable disease, or (4) nonintraabdominal primary cancer with clear intraperitoneal disease.<sup>4</sup> These criteria are utilized by the authors and, therefore, the management of esophageal and gastric outlet obstruction is not discussed. Although benign causes of obstruction (ie, adhesions, hernia, and strictures) are important to consider, they are responsible for approximately 10% of obstructions in patients with a clinical suspicion of MBO<sup>5</sup> and are not related directly to malignancy; therefore, they are not discussed.

MBO comprises a wide variety of causative factors, including mechanical and functional causes and intraluminal and extraluminal sources, and may be related to primary or recurrent disease, nodal metastasis, or carcinomatosis.<sup>6</sup> Functional impairment can be due to tumor involvement of nerves in the mesentery or celiac plexus, chemotherapy and radiation side effects, opiate and anticholinergic medications, and electrolyte abnormalities due to dehydration, vomiting, and paraneoplastic syndromes.<sup>6</sup> Obstruction causes bowel wall distention, resulting in increased fluid secretion and release of inflammatory mediators and vasoactive intestinal polypeptide that further worsen bowel edema and symptoms of bloating, cramping, nausea, and vomiting.<sup>7</sup> Radiographic investigation is important in differentiating between functional and mechanical causes of MBO and determining the burden and level of disease. Plain films have poor sensitivity and specificity and are more useful for identifying constipation or assessing response to treatment.<sup>8</sup> Computed tomography has a sensitivity of 48% to 81%, depending on the degree of obstruction, and a specificity of up to 95% for identifying the cause<sup>9</sup> and plays a major role in guiding management decisions.<sup>10</sup>

The inability to tolerate oral intake has significant psychological and social implications for patients and their families. The goals of treatment must consider patient priorities and QOL. Often the most important goal for these patients is the ability to spend time with family at home<sup>11</sup>; however, a majority of studies reporting on MBO outcomes focus on overall survival and there is a lack of data that capture symptom relief and QOL.<sup>12</sup> Selecting the appropriate treatment of a patient with MBO is challenging and requires an individualized patient-centered multidisciplinary approach. Treatment may involve 1 or more medical, procedural, or surgical interventions. Realistic expectations regarding outcomes and potential risks of each treatment option require careful discussion. Providing the appropriate information and the manner in which it is conveyed is critical but may pose challenges for the health care provider. In a survey,<sup>13</sup> surgeons reported facing the ethical dilemma of “providing patients with honest information without destroying hope.”

The objectives of this article are to (1) review the management of MBO summarizing medical, procedural, and surgical options using the currently available evidence and (2) highlight some new developments in the field.

## MEDICAL MANAGEMENT

Medical therapies form the mainstay of management. This usually requires insertion of a nasogastric tube (NGT) for decompression and administration of a variety of agents, including intravenous fluids, analgesics, steroids, antisecretory, antimitility, and antiemetic agents, for which there are several existing reports.<sup>1,6,14,15</sup> There is limited evidence to support the use of water-soluble contrast agents to alleviate symptoms of MBO.<sup>16</sup> This section discusses studies that compare outcomes of medical management to surgical and procedural interventions.

A large population-based study compared surgical, procedural (gastrostomy tubes and stents), and medical management of MBO in patients with colorectal, gastric, ovarian, and pancreatic cancers in their final year of life.<sup>17</sup> A majority (65%) of patients

received medical therapy alone compared with surgical and procedural management. Although those who received medical management had the shortest hospital length of stay (LOS), they also had the highest readmissions for obstruction. During the study period, the utilization of gastrostomy tubes and stents increased whereas the utilization of surgery decreased. Rates of medical management remained stable and high, suggesting that it is a mainstay in management. Bateni and colleagues<sup>18</sup> reported a greater utilization of medical (75%) compared with surgical (25%) strategies in patients with MBO. Medical management was associated with less hospital utilization, fewer in-hospital deaths, and more frequent discharges home; however, readmissions to hospital and rates of reobstruction were higher in patients managed medically. Lilley and colleagues<sup>19</sup> studied patients with MBO from ovarian or pancreatic cancer at the end of life and reported a high (69%) utilization of medical management; however, patients treated with surgery or gastrostomy tubes had lower risk of readmission for MBO. With respect to survival, some studies report increased survival associated with surgical compared with medical management<sup>17,19</sup> whereas other studies report no difference by management type.<sup>18,20</sup>

In summary, medical management is the mainstay of treatment of patients with MBO. Compared with surgical and procedural interventions, those managed medically have shorter hospital LOSs but also are more likely to be readmitted for resurgence in symptoms. Some patients may be good candidates for procedural and surgical interventions.

## PROCEDURAL MANAGEMENT

In recent years, increased experience with procedural interventions, such as venting gastrostomy tube (VGT), endoscopic stent, and ablation, has added to the armamentarium of options to consider in the management of MBO.

### *Venting Gastrostomy Tubes*

Experience with VGT for the management of MBO has increased over the years, with safe performance in increasingly complex patients. VGTs are inserted to relieve refractory nausea and vomiting, usually in the setting of multilevel obstruction and gut dysfunction, where surgery is not feasible, and generally in patients with limited life expectancy.<sup>21</sup> Successful insertion of VGT allows for removal of the NGT and can serve as a durable long-term management option. VGT can be placed surgically in the operating room, endoscopically, or under fluoroscopic guidance by interventional radiology, with recent reports favoring the endoscopic, fluoroscopic, and combined approaches.

Several case series<sup>22–25</sup> and a systematic review<sup>26</sup> report outcomes of VGT in patients with MBO. There is substantial variability in outcomes, which is expected, given the heterogeneity in the patient cohorts and definitions of complications. Richards and colleagues<sup>24</sup> reported a 9% major and 37% minor complication rate, whereas Shaw and colleagues<sup>25</sup> reported a 10% major and 4% minor complication rate. Overall, insertion of a VGT was found to significantly reduce the symptoms of nausea and vomiting.<sup>22,23</sup>

Patients with malignant ascites may have an increased likelihood of complications or unsuccessful VGT insertion<sup>22,23</sup>; however, successful placement was performed in 77% of patients in 1 study.<sup>25</sup> Insertion of a temporary or indwelling intraperitoneal catheter for ascites management may help to facilitate greater success of VGT insertion.<sup>23,25</sup> In a recent systematic review, which included 25 studies and 1194 patients, Thampy and colleagues<sup>26</sup> summarized a variety of outcomes related to VGT insertion,

including successful insertion at first attempt in 91%, major complication in 2%, and minor complication in 20%. Furthermore, median survival ranged from 17 days to 74 days, and mean survival ranged from 35 days to 147 days, consistent with existing literature demonstrating poor survival in these patients.

In summary, insertion of a VGT is helpful in alleviating nausea and vomiting and can be performed safely. In patients with ascites, there is an increased likelihood of complications and unsuccessful insertion; however, ascites is not considered an absolute contraindication to insertion.

### **Endoscopic Stents**

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Experience with endoscopically placed stents is growing. Stents often are used as a bridge to curative intent surgery, primarily for patients with colorectal obstruction.<sup>27</sup> In patients who are not candidates for a curative intent approach, stents are used to alleviate symptoms of MBO related to a single point of obstruction. Patients with multi-level obstruction generally are not candidates for stent placement.

Some general considerations of stent placement include the availability of local expertise, site and length of the obstruction, use of covered versus uncovered stents, risk of complications, surgical options, patient prognosis, and the need for systemic therapy.<sup>27,28</sup> The European Society of Gastrointestinal Endoscopy<sup>28</sup> and American Society for Gastrointestinal Endoscopy<sup>27</sup> suggest that stent placement is effective for palliation of colonic MBO. Placement of stents for this indication is associated with high rates of clinical success, shorter hospitalization, decreased intensive care unit admission, and shorter time to initiation of chemotherapy, but a higher risk of long-term complications, such as perforation, migration, and reobstruction compared with surgery, demonstrated in 2 separate meta-analyses.<sup>29,30</sup> A randomized clinical trial comparing endoscopic stent to surgery for metastatic left-sided colorectal cancer closed early because of a greater than expected rate of perforation in the stent group.<sup>31</sup>

The majority of experience with endoscopic stents comes from stenting intraluminal lesions due to colorectal cancer rather than narrowing or invasion secondary to extraluminal pathology. Single-institution studies have examined the use of stents in extraluminal narrowing secondary to genitourinary, gynecologic, pancreatic, and gastric cancers.<sup>32–34</sup> In these small studies, technical success was reported to be 87% to 90% in 2 of the studies<sup>33,34</sup> but was low (20%) in another study that compared outcomes in patients receiving stents for colonic versus extracolonic malignancy.<sup>32</sup> In that study, patients with extracolonic malignancy were more likely to require surgical diversion for persistent obstructive symptoms despite stent insertion.<sup>32</sup> In a large multicenter study, extrinsic compression from tumor also was associated with a higher likelihood of technical and clinical failure.<sup>35</sup> Overall, there are few data to support the use of stents in extracolonic malignancies.

Another important consideration is the increased risk of stent perforation in patients receiving antiangiogenic agents as part of systemic therapy. In a meta-analysis, the use of bevacizumab was associated with a 12.5% risk of perforation compared with 7% in patients receiving chemotherapy without bevacizumab.<sup>36</sup> A 20-fold increase in stent perforation with bevacizumab also was reported by a multicenter Italian study.<sup>35</sup> Therefore, decision making surrounding stent placement also should include consideration of systemic therapies that a patient may be eligible for.

Finally, the risk of stent complication is higher in patients who live longer with the stent<sup>29,30</sup>; therefore, patients with a longer life expectancy may be considered for surgery. Manes and colleagues<sup>35</sup> reported, however, that 82% of stents maintained patency at 6 months, and 65% still were functioning 1 year after placement. Taken

together, the selection of patients who are suitable for stent placement requires a careful discussion of risks and benefits and the consideration of potential systemic therapies and patient prognosis.

### **Endoscopic Ablative Therapies**

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The utilization of endoscopic ablative therapies to palliate symptoms (ie, obstruction, pain, and bleeding) from carcinomas of the gastrointestinal tract is reported in patients who are deemed unfit for surgery, but the literature is outdated. Commonly described modalities for palliation of lower gastrointestinal tract cancers are Nd:YAG<sup>37-42</sup> and diode,<sup>43</sup> which are forms of laser ablation and typically require multiple treatment sessions. Reported complications include perforation, stricture, and hemorrhage.<sup>39</sup>

Farouk and colleagues<sup>37</sup> reported outcomes in a small series of patients receiving Nd:YAG in the palliation of advanced rectal cancer. This was successful as the sole form of treatment in 78% of patients, with 76% avoiding an ostomy. Eckhauser and Mansour<sup>40</sup> reported successful palliation of obstructive symptoms with decreased hospital LOS and overall cost in patients treated with the Nd:YAG laser compared with operative diversion in patients eligible for a staged resection of their colorectal malignancy. In patients who were deemed to have unresectable disease, the same investigators reported successful palliation of obstructive and bleeding symptoms. Van Cutsem and colleagues<sup>42</sup> reported that although initial palliation was achieved in 88% of patients, it could be maintained only in 51% and 41% of patients at 6 months and 12 months, respectively. Use of diode laser demonstrates similar outcomes for initial palliation, with the advantages of smaller size, portability, and lower cost over Nd:YAG laser.<sup>43</sup>

In summary, the experience with endoscopic ablative therapies for palliation of lower gastrointestinal tract malignancies is outdated, and utilization is highly dependent on availability of the necessary equipment and expertise. There is a need for updated literature.

## **SURGICAL MANAGEMENT**

### **Outcomes of Surgery**

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Decisions pertaining to the surgical management of MBO are challenging, and current recommendations are based mainly on retrospective cohort or case series data. In 2016, an updated Cochrane review was performed regarding surgery for MBO in patients with advanced gastrointestinal and gynecologic cancers.<sup>12</sup> Since the initial review performed in 2000,<sup>44</sup> none of the new studies provided additional information to change the original conclusions. The investigators reported high risk of bias in the studies that were included, most of which were retrospective case series. There was a lack of standardized outcome measures, no data available on QOL, and marked variation in clinical management. They concluded that the role of surgery for MBO requires careful evaluation using validated outcome measures and that a greater standardization in management should be considered.

Olson and colleagues<sup>45</sup> performed a systematic review of patients undergoing surgery for MBO from peritoneal carcinomatosis. The data were heterogeneous and the results were highly variable. They found that surgery led to symptom improvement in 32% to 100%, resumption of diet in 45% to 75%, and facilitated discharge home in 34% to 87%. Mortality ranged from 6% to 32% and major morbidity from 7% to 44%. Persistent and recurrent obstruction and readmissions due to MBO were up to 47%, with all-cause readmission rates as high as 74%. Furthermore, median survival was limited, particularly in those with poor prognostic features (ie, ascites, palpable mass, and continued obstruction postoperatively) who survived only

26 days to 36 days. A study by Bateni and colleagues<sup>18</sup> also reported that patients treated with surgery had higher rates of complications (44% vs 21%), in-hospital deaths (10% vs 4%), and lower rates of discharge home (76% vs 90%) compared with patients receiving medical management. Furthermore, patients who experience a major postoperative complication are less likely to experience improvement in symptoms.<sup>46</sup> The survival benefit associated with surgical management reported by some<sup>17,19</sup> is likely a result of selection bias, whereby patients with better performance status and favorable disease are selected to undergo surgery and ultimately have better outcomes. These studies highlight that although surgery may lead to symptom improvement and survival benefit in some, it is associated with substantial morbidity and mortality and lower rates of discharge home.

### ***Patient Selection Strategies***

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Patients with MBO are at high risk of complications from surgery due to the increasing burden of cancer, cancer-related catabolism, and malnutrition caused by the insidious progression of their MBO.<sup>47</sup> Despite these risks, there still may be a role for surgical management in appropriately selected patients because some tolerate palliative surgery and chemotherapy with survival beyond 1 year.<sup>48</sup>

Multiple studies have reported on factors that are associated with poor surgical outcomes. Wright and colleagues<sup>3</sup> reported that patients with an Eastern Cooperative Oncology Group (ECOG) score of 0 or 1 had a mean survival of 7.5 months compared with 1 month to 2 months in patients with an ECOG score of 2 or greater, regardless of medical and/or surgical intervention. Surgery does not benefit patients with poor clinical status, multilevel obstruction, ascites, carcinomatosis, palpable masses, or very advanced disease. Rather, these patients are better palliated with medical management or VGT.<sup>49</sup> Studies suggest that any ascites is a predictor of poor outcome, high recurrence rates, and increased morbidity and mortality.<sup>50,51</sup> One retrospective study found that low serum albumin, metachronous presentation of cancer and obstruction, ECOG score greater than 1, and low hematocrit on admission were predictive of 90-day mortality in patients with stage 4 cancer undergoing surgery for MBO.<sup>52</sup>

Anticipating who is most likely to benefit from surgical intervention is critical. Diagnostic laparoscopy may allow for a more accurate assessment of disease burden to identify those that may benefit from surgery.<sup>53</sup> Sugarbaker<sup>54</sup> recommended surgical intervention in patients with good performance status, localized disease, and low histologic grade. Krebs and Goplerud<sup>55</sup> developed a prognostic index and reported that patients less than 45 years old with minimal nutritional deficiency, no palpable intraabdominal masses, little to no ascites, no progression while on chemotherapy, and no prior radiation therapy had improved outcomes after surgery. Other factors that influence a surgeon's choice to offer surgical intervention include younger patient age, low-grade or indolent tumors, good preoperative functional status, and potential for symptom control.<sup>13</sup> These studies are limited by their retrospective nature and lack of explicit patient selection strategies. Prospective studies are needed to better define prognostic factors and outcomes for patients undergoing surgical intervention for MBO.

### ***Surgical Options***

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The surgical options for MBO include resection, bypass, stoma creation, and VGTs. Surgical resection of the obstruction is ideal if there is localized disease in an area that can be removed; however, in a population-based study by Merchant and colleagues,<sup>17</sup> only 10% of surgically managed MBO patients underwent resection. Bypass surgery allows for successful palliation<sup>56</sup> and is selected when resection is not possible due to dense adhesions or significant lengths of affected bowel. This

often is encountered in patients who have had previous radiotherapy.<sup>57</sup> If resection or bypass is possible and an anastomosis is created, it is important to consider the nutritional status of the patient and its implications on healing because malnutrition is an independent risk factor for anastomotic leak.<sup>58</sup> Creation of a stoma is considered when the obstruction involves the distal small bowel or colon and when anastomotic healing is a concern. Proximal obstructions are not amenable to stomas due to problems of high output, dehydration and electrolyte imbalance.<sup>59</sup> Finally, if the intraoperative findings are worse than expected and resection, bypass, or stoma creation is not possible, placement of a VGT may allow for decompression and symptom management.<sup>26</sup> Laparoscopic approaches to MBO may be a less-invasive option with potential for lower morbidity,<sup>56</sup> but this is likely approach inappropriate for patients with extremely distended bowel, significant burden of disease, or dense adhesions from prior surgery, because there is an increased risk of iatrogenic injury.<sup>60</sup> Merchant and colleagues<sup>17</sup> reported that only 5% of patients had laparoscopic surgery for MBO.

In summary, surgical decision making in MBO requires a tailored multidisciplinary approach that should consider expected outcomes of surgery, appropriate patient selection, and the ideal intraoperative approach, with alternative plans for palliation if the extent of disease is greater than anticipated. Specific considerations include location and extent of disease, disease cadence, overall prognosis, patient nutritional status and comorbidities, availability of life-extending systemic therapy, previous administration of radiotherapy, and patient preferences and goals of care. Although surgical intervention may provide symptom relief in well-selected patients, it is associated with substantial morbidity and mortality, and at the current time there is a lack of high-level evidence for or against surgery for MBO.<sup>12</sup>

## NEW DEVELOPMENTS AND FUTURE DIRECTIONS

### *Multidisciplinary Management and Opportunities for Palliative Care*

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With high symptom burden, frequent hospitalizations, limited life span, and complexities surrounding patient goals of care and QOL, patients with MBO may be managed best by providers with appropriate expertise. This is well demonstrated in a study by Lee and colleagues,<sup>61</sup> which describes the experience of a Canadian hospital that developed a dedicated multidisciplinary team that reviews and manages all MBO cases in gynecologic cancer patients. After program implementation, women with MBO spent less time in hospital and had fewer intensive care unit admissions. They also were less likely to undergo palliative surgery but more likely to undergo chemotherapy. MBO resolution rates were similar among the groups. The investigators suggested that a specialized program for this high-needs population improved the care and outcomes of these patients. A study by Miner and colleagues<sup>62</sup> demonstrated that open dialogue between the surgeon, patient, and family in key decision making pertaining to palliative surgery led to improved patient outcomes, including high rates of symptom resolution and fewer postoperative complications compared with the published literature at that time. These studies demonstrate the clear benefits of appropriate expertise in the management of patients with MBO.

Consideration of referral to a palliative care service is also reasonable, given the high symptom burden and proximity to death. Prior studies have shown very low rates of referral to palliative care.<sup>19</sup> A recent randomized clinical trial demonstrated that close symptom monitoring of patients with cancer, in whom worsening symptoms triggered a specific intervention resulted in improved median survival compared with those who received usual care.<sup>63</sup> Gabriel and colleagues<sup>64</sup> reported that patients with MBO who were managed by a palliative care service had greater improvement in symptoms,

<b>Intervention</b>	<b>General Considerations</b>
Medical	<ol style="list-style-type: none"> <li>1. Typically the mainstay of management<sup>17,18</sup></li> <li>2. Patient not suitable for procedure or surgery</li> <li>3. Patient has limited life span</li> <li>4. Hospital LOS is short but readmissions for obstruction are high<sup>17,18</sup></li> </ol>
Procedural	<ol style="list-style-type: none"> <li>1. Patient has obstruction amenable to procedural intervention</li> <li>2. Appropriate expertise available</li> <li>3. Patient understands risks, benefits, and limitations of the procedure</li> <li>4. Lower risk of readmission for obstruction compared with medical management<sup>19</sup></li> </ol>
Surgical	<ol style="list-style-type: none"> <li>1. Patient has obstruction amenable to surgical intervention</li> <li>2. Appropriate expertise available</li> <li>3. Reasonable expectation that the patient will tolerate surgical intervention</li> <li>4. Patient understands risks, benefits, and limitations of the surgery</li> <li>5. Increased survival compared with medical management<sup>17,19,62</sup></li> <li>6. Higher rates of complications, in-hospital deaths, and lower rates of discharge home compared with medical management<sup>18</sup></li> </ol>

higher rates of documentation of do-not-resuscitate wishes, and higher rates of discharge to hospice compared with those who did not have involvement of a palliative care service. These studies suggest benefit to close symptom monitoring and management, best done by multidisciplinary teams with appropriate expertise.

### ***Measuring the Success of Interventions and Upcoming Studies***

There is a need to consider outcomes beyond survival and complications, which traditionally are reported in the MBO literature.<sup>65,66</sup> Survival is less relevant because these patients typically have a short life expectancy. Complications are important to report but provide only a glimpse of the whole picture. QOL-centered and patient-reported outcomes, including ability to return home or to a hospice, days out of hospital,

<b>Procedural Intervention</b>	<b>Patient Selection</b>	<b>Outcomes</b>
Venting gastrostomy tube	Multilevel obstruction Gut dysfunction Patients with ascites may be considered <sup>25</sup>	Successful insertion at first attempt = 91% <sup>26</sup> Major complication = 2% <sup>26</sup> Minor complication = 20% <sup>26</sup>
Endoscopic stents	Single site of obstruction Intraluminal obstruction Higher risk of perforation in patients receiving bevacizumab <sup>35,36</sup>	Technical success at first attempt = 92% <sup>35</sup> Successful colonic decompression = 90% <sup>35</sup> 6-mo stent patency = 82% <sup>35</sup> 1-y stent patency = 65% <sup>35</sup> Stent migration = 9% <sup>30</sup> Stent perforation = 10% <sup>30</sup> Stent occlusion = 18% <sup>30</sup>
Endoscopic ablative therapies	Patients with bleeding, obstruction, tenesmus	Avoidance of ostomy = 76% <sup>37</sup>



good days, days without NGT, resumption of oral intake, relief of nausea and vomiting, QOL scores, need for total parenteral nutrition, and readmission for obstruction, must be considered. Determining the success of treatment requires careful consideration of some or all of these outcomes, and future research endeavors must consider these.

Review of several clinical trials currently recruiting patients with MBO reveals that more relevant outcomes are indeed being considered. For example, the Southwest Oncology Group S136 prospective randomized trial (NCT02270450) is comparing surgical to nonsurgical management and will examine outcomes, such as days outside hospital, ability to eat, days with NGT, intravenous hydration, solid food, and survival. A single-arm prospective study from Roswell Park Cancer Institute (NCT04027348) is examining the efficacy of triple therapy with dexamethasone, octreotide, and metoclopramide in clearing obstruction. The MAMBO trial (NCT03260647) is a prospective study that is aiming to streamline the management of MBO in patients with advanced gynecologic cancer through development of a multidisciplinary team and algorithm for outpatient management. These trials are anticipated to provide high-level evidence to inform clinical decision making.

<b>Table 3 Prognostic factors, patient selection, and outcomes for surgical interventions for malignant bowel obstruction</b>		
<b>Prognostic Factors/ Surgical Intervention</b>	<b>Patient Selection</b>	<b>Outcomes</b>
Prognostic factors associated with benefit from surgery	Age <45 y, minimal nutritional deficiency, no palpable intraabdominal masses, little to no ascites, no progression while on chemotherapy, low-grade localized disease, good performance status, reasonable life expectancy <sup>13,54,55</sup>	Mortality = 6%–32% <sup>45</sup> Serious complications = 7%–44% <sup>45</sup> Recurrent obstruction = 0–63% <sup>12</sup> Palliation of obstructive symptoms = 32%–100% <sup>45</sup> Increased survival compared with medical management <sup>17,19,62</sup> Fewer readmissions for obstruction compared with medical management = 25% vs 33% <sup>19</sup>
Resection	Localized disease Good nutritional status	Restores bowel continuity Avoids ostomy Risk of anastomotic leak
Bypass	Dense adhesions or significant lengths of affected bowel Irradiated bowel <sup>57</sup>	Restores bowel continuity without resection Avoids ostomy Risk of anastomotic leak
Ostomy	Distal small bowel or colorectal obstruction Emergent/impending perforation Concerning nutritional status <sup>58</sup>	Avoids risk of anastomotic leak Risk of high-output ostomy requiring hospital admission = 26%–37% <sup>59</sup> Short-term (retraction, necrosis, skin irritation, leakage) and long-term (prolapse, hernia, body perception) complications of ostomy

## SUMMARY

A 1-size-fits-all approach is not suitable for patients suffering from MBO. A variety of management options are available, and the optimal approach must consider patient suitability for procedural or surgical interventions, performance status, prognosis, preferences, goals of care, QOL, and the availability of local expertise. General considerations, patient selection, and outcomes of medical, procedural, and surgical interventions are summarized in **Tables 1–3**.

Given that MBO is considered a preterminal event with poor survival, future research endeavors must move away from outcomes, such as survival, and consider more relevant, patient-centered outcomes. Results from the prospective trials, discussed previously, are expected to provide higher-level evidence than exist currently. There is emerging evidence that multidisciplinary teams with expertise in symptom evaluation and management are best suited to manage these patients and consideration should be given to assembling such teams at local institutions.

## CLINICS CARE POINTS

- Medical interventions are the foundation of management in MBO.
- Some patients may have disease that is amenable to procedural and/or surgical interventions.
- If procedural and/or surgical interventions are deemed reasonable, the appropriate expertise must be available, and the patient should have a clear understanding of the risks, benefits, and limitations of the proposed plan.
- Evidence suggests that the involvement of multidisciplinary teams with interest and expertise in MBO can improve patient outcomes.

## DISCLOSURE

The authors have nothing to disclose.

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