Module: Malignant Bowel Obstruction

Learning Objectives

Attitudes

- Analyze personal biases about operative and non-operative management of malignant bowel obstruction (MBO)
- Understand how the four pillars of medical ethics relate to forming treatment plans for MBO
- Understand that patient values in end-of-life care may be different than your own

Knowledge

- Define MBO
- Describe the pathophysiology and epidemiology of MBO
- Describe the indications for surgical intervention
- Understand the efficacy of medical management for symptomatic control
- Know the efficacy of common palliation procedures (nasogastric tube, gastrostomy tube placement, endoscopic stenting)
- Explain the benefits and risks associated with parenteral nutrition for MBO
- Synthesize a treatment plan that aligns with patient values

Skills

- Demonstrate value-based counseling respecting patient autonomy
- Counsel patients on medical options for symptom management
- Counsel patients on operative indications and management
- Counsel patients on transition to hospice support
- Counsel patients on the role of palliative surgery vs curative intent

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Introduction

Patients with advanced malignancies can have several obfuscating factors, making it challenging to define malignant bowel obstruction (MBO). These include non-malignant etiologies of obstruction secondary to prior treatment modalities (i.e. surgical adhesion and radiation enteritis) as well as pseudo-obstructive symptoms caused by tumor disruption of the celiac and myenteric plexus, severe electrolyte imbalances, and narcotic medications. Furthermore, imaging (CT & MRI) cannot readily delineate between malignant and nonmalignant obstruction.

The 2007 International Conference on MBO's Clinical Protocol Subcommittee provided a consensus definition of MBO to facilitate further research efforts with the hope of creating best practice guidelines. Their definition requires a) clinical evidence of a bowel obstruction via history, physical examination, or radiographic examination, b) bowel obstruction beyond the ligament of Treitz, c) intra-abdominal primary cancer with incurable disease, or d) non intra-abdominal primary cancer with clear intraperitoneal disease.[1]

Epidemiology

MBOs represent a complex clinical problem that is difficult to define and study. Available data are largely limited to specific tumor types and aggregating total incidence is challenging due to variable definitions of MBO. Retrospective and autopsy data suggest that intestinal obstruction occurs in as high as 51% and 28% of patients with ovarian and gastrointestinal cancers respectively.[2] Associated primary malignancies include stomach (6%-19%), pancreas (6%-13%), bladder (3%-10%), and endometrium (3%-11%).[3] The average age at presentation is 61 years, and the average time from initial diagnosis of cancer to the presentation of malignant bowel obstruction is 14 months.[3] Around two thirds of patients with malignant bowel obstruction are women, likely due to the association with gynecologic malignancies.[3] Although MBO is thought to be a late finding, around 22% of patients have an episode of MBO at their initial diagnosis.[3] The worldwide burden of MBO will likely continue to rise, as rates of gastrointestinal & gynecologic cancer continue to grow.

Pathophysiology

Mechanical

Mechanical obstruction is the most common etiology of MBO and can be further divided into three main categories: intrinsic, extrinsic, and infiltrative. Intrinsic obstructions occur due to tumor growth within the lumen (i.e. at the primary tumor in gastrointestinal malignancies). Extrinsic pathology can cause obstructive presentations due to luminal narrowing from bowel compression (i.e. peritoneal metastases). Rarely, infiltrative pathology (i.e. intestinal linitis plastica) can cause intestinal wall thickening which reduces motility and decreases lumen size.

Adhesions and fibrosis from oncologic treatments (i.e. surgery, radiation, chemotherapy) can also result in mechanical MBO. In general, small bowel MBOs are more often due to peritoneal

carcinomatosis or metastatic ovarian cancer while large bowel MBOs are more often due to direct tumor obstruction (i.e. colorectal cancer).[3-6]

Functional

In the absence of mechanical obstruction, oncologic disease weakens normal peristalsis. Peritoneal carcinomatosis impairs neural signaling and muscle function within the peritoneum. Tumors can also invade the mesentery, disrupting the celiac and enteric plexus. Both chemotherapy and opioid medication disrupt functioning of the enteric nervous system. Paraneoplastic syndromes can further exacerbate pseudo-obstructive symptoms through intensifying electrolyte derangements. Since MBO is a late finding of advanced oncologic disease, presentations are inevitably multifactorial, which precludes an exact understanding of the disease burden attributable to each etiology. [4-6]

Sequelae

In similar fashion to non-malignant bowel obstruction patients, the pathophysiology of the resultant sequelae is due to bowel wall changes, secretory/absorptive imbalances, and their resultant systemic effects. Obstruction causes an increase in intraluminal pressure, causing bowel wall edema and inflammation due to impaired blood flow. This ischemic progression further narrows the bowel lumen causing a compounding effect. This results in an accumulation of gastric, biliary, and pancreatic secretions proximal to the obstruction resulting in fluid/electrolyte loss and malnutrition. The clinical sequelae of nausea/vomiting worsen dehydration and these electrolyte imbalances. Ultimately, this puts patients at risk of severe malnutrition and cachexia. Progression of disease to septic shock may occur when the intestinal wall perforates or bacterial translocation ensues due to progressive mucosal damage. [3-9]

Management

Initial Management

Conservative management akin to management of non-malignant SBOs should be selected for the majority of patients during their initial presentation. Restriction of oral intake, electrolyte repletion, and intravenous fluid resuscitation remain critical for best practice management. Patients should be encouraged to ambulate. Patients with lab values and exam findings concerning for perforation should be started on intravenous antibiotics and evaluated for surgical management. The decision to pursue surgical management in the setting of advanced cancer presents a unique challenge to patients and surgeons and requires careful deliberation.[10]

Non-Surgical Management

There are myriad non-surgical management options for MBO symptom relief. Although no studies have shown superiority of an anti-emetic regimen, several medications may be trialed including 5-HT3 antagonists like ondansetron, D2 antagonists like prochlorperazine, anticholinergics like scopolamine, and NK-1 antagonists like aprepitant. Multi-modal analgesia should be offered to patients with careful titration of opioid medication.[3,11,12]

Nasogastric decompression

Nasogastric tube decompression can be pursued if there are significant symptoms with worsening nausea/emesis or evidence of complete obstruction on imaging.[4] Recent literature demonstrates a modest symptomatic benefit to nasogastric decompression. Without intervention, patients experienced emesis twice daily and had an 80% daily incidence of nausea. After nasogastric tube placement, patients experienced emesis once daily with a 40% daily incidence of nausea.[13] This improvement may not be of significant value to every patient and needs to be discussed before proceeding with tube placement.

Glucocorticoids

A Cochrane systematic review (last updated in 2006) demonstrated a non-significant benefit of IV dexamethasone for resolution of obstruction, with a number needed to treat of 6.[14] A 2024 multicenter retrospective review demonstrated a similar effect with non-significant decrease in non-elective surgical intervention.[15] At this time there are no randomized control trials that demonstrate a statistically significant benefit to glucocorticoid administration.

Somatostatin analogues

Octreotide, lanreotide, and pasireotide are all somatostatin analogues that induce splanchnic blood vessel vasoconstriction, reduce intestinal and pancreatic secretions, and increase absorption of water and electrolytes. Traditionally thought to be helpful for symptomatic management, somatostatin analogues demonstrated no difference in MBO symptom control in a 2016 systematic review.[16] However, somatostatin analogues have been shown to significantly reduce nasogastric tube output in prospective trials and may reduce number of episodes of emesis.[17,18]

Multi-Drug Regimen

A 2024 prospective trial (n = 15) investigated triple therapy with dexamethasone 4mg twice daily, metoclopramide 10mg every 6 hours, and octreotide 300mcg three times daily, and showed symptom improvement in 80% of patients.[19] Further research will be needed to determine the true efficacy of these medications for MBO symptom control.

Total parenteral nutrition

Initiation of total parenteral nutrition (TPN) is controversial because there is limited benefit to short course implementation, with associated complications. Complications include infection, thrombosis, liver dysfunction, and the sequelae of central venous catheter placement. Emerging literature suggests that patients on parenteral nutrition spend 29 of their final 142 days in the hospital, and 25% develop catheter associated bacteremia.[20] Furthermore, patient training can take weeks and may detract from quality of life. A recent systematic review demonstrated a significant survival advantage in patients with peritoneal carcinomatosis receiving TPN.[21] However, the included studies were highly susceptible to selection bias and demonstrated a

survival benefit of 29 days. For many patients, 29 days may not offset the risks of parenteral nutrition. Clinical gestalt suggests that TPN should be considered in patients with MBO who have expected survival greater than three months, are undergoing treatment with curative intent, and during the peri-operative period for malnourished patients.[4]

Stent

Self-expanding mental stents (SEMS) and lumen-opposing metal stents (LAMS) are two endoscopic options for symptom control. Patient selection for stent placement is important because patients with multiple areas of obstruction and tumor location in the distal rectum do not benefit from placement. Associated complications include migration, perforation, bleeding, and recurrence. LAMS placement allows proceduralists to bypass the obstructed bowel without placing the patient at risk of surgical morbidity. A 2021 systematic review found that LAMS was successfully performed in nearly 95% of patients with re-intervention rate of 6%, comparable to traditional stenting.[22] Endoscopic stent placement offers a reasonable palliative option for selected patients who are not candidates for surgical management with successful symptom management. Stent placement may also reduce associated mortality with future surgical intervention.[23] Median stent patency is 3-4 months with 20-30% of patients requiring re-intervention roughly 4 months after placement.[24-26] Thus, stents are not a durable solution for patients with a life expectancy measured in years.

Gastrostomy tube

Venting gastrostomy tubes have been traditionally considered a long-term solution for decompression, with better durability than nasogastric tube placement. Recent literature suggests that venting gastrostomy tubes give patients lower likelihood of readmission, ICU stay, and death in an acute care hospital.[27] However, statistical significance may not translate to meaningful value for every patient. Without any method of gastric decompression, patients have an episode of emesis twice per day. Emesis frequency improves to once every other day for patients after gastric decompression.[13] This modest benefit may be due to the traditional gastrostomy tube placement in a non-dependent location on the anterior gastric wall. Further research is needed to investigate novel methods for improved decompression.[28]

Surgical Management

Patients with MBO may have several high-risk factors including advanced disease, malnutrition, advanced age, previous abdominal surgery and radiation, ascites, active chemotherapy, and poor preoperative functional status. If a patient is a surgical candidate with acute features on presentation, surgical intervention should be offered. However, operative mortality can be as high as 40% with complications occurring in up to 90% of cases. [6] A recent multi-center prospective comparative effectiveness trial found no significant difference in "good days" for patients that received surgery or non-surgical treatments during the first 3 months after registration.[29] However, surgical management was associated with a significant benefit weeks after operative intervention. Beyond 4 weeks, survivors reported statistically significant improvement in nausea, emesis, pain, constipation, and bloating. All available evidence

highlights a necessity for appropriate preoperative counseling before proceeding with surgical management.

Ethics

Surgical counseling in the setting of malignant bowel obstruction requires respect for autonomy while striking a balance of beneficence and non-maleficence. This equilibrium becomes increasingly difficult to achieve due to a paucity of outcomes data for these interventions during end-of-life care. It is difficult to predict which patients will benefit from surgery. Ethical tension is heightened when there is muddled delineation between palliative intent and futile intervention. To honor each pillar of medical ethics, surgical oncologists should strive for the following:

Beneficence

- Intervention should relieve symptoms and improve quality of life
- Intervention should not be futile

Non-maleficence

- Intervention is higher risk in terminally ill patients and discussion should include risk of complications, recovery time, and potential for worsening suffering

Autonomy

- Informed consent should include discussion of prognosis with/without intervention
- Non-surgical palliative options must be discussed

Justice

- Interventions should be evidenced based for fair allocation of medical resources

The palliative triangle is a model that was created to better understand why patient satisfaction was high despite poor traditional outcomes data (morbidity, mortality, survival, etc) for palliative operations. The model proposes a balance between the values of a surgeon, patient, and their family. The value proposition of a proposed intervention should be in line with the value system of the patient.[30] Surgical counseling should prioritize shared decision making with the patient to have a realistic benefits and burdens discussion. Anticipated duration of palliation is a key consideration that may shift the pendulum towards or away from intervention.[10] Ultimately, "value" and "worth" are difficult to define in this patient population. A single institution study of patients undergoing palliative-intent operations demonstrated no difference in overall, recurrence-free, and reoperation-free survival between patients who stated their surgical intervention was "worth it", or "not worth it."[31] This suggests that traditional metrics used to evaluate efficacy of surgical intervention are less relevant for patients with malignant bowel obstruction who typically have advanced oncologic disease. Although surgical oncologists may feel compelled to act, counseling should honor patient autonomy. The focus should not be on what can be done surgically, but what should be done ethically in accordance with the patient's values and best interests.

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Pre/Post Test
Questions

1. List three factors that complicate operative intervention for MBO.
2. What is the efficacy of nasogastric decompression for symptom relief of MBO?
3. What class of medications have been shown to reduce gastric secretions in patients with MBO?
4. What are the drawbacks of TPN initiation for patients with MBO?

Answers

1. Advanced disease
   Malnutrition
   Advanced age
   Previous abdominal surgery and radiation
   Ascites
   Active chemotherapy
   Poor preoperative functional status
2. Decreased emesis from twice daily to once daily
3. Somatostatin analogues
4. Increased hospital stay during end-of-life care
   25% chance of bacteremia

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Case

Mrs. L is a 25 year-old mother of two with a history of iron deficiency anemia, admitted to the medical service for gastrointestinal bleeding and colitis in the setting of subacute on chronic abdominal pain and acute blood loss anemia. She was found to have a mass in her proximal transverse colon that was unable to be traversed during her colonoscopy on hospital day 2. Surgery is consulted due to concern that Mrs. L will become obstructed.

Notably, Mrs. L has been passing flatus, having bowel movements. She has been having 10 months of postprandial abdominal pain described as cramps, without any nausea or vomiting episodes. No personal or family history of colorectal malignancy. She has never had abdominal surgery before. CEA is within normal limits. CT A/P reveals narrowing of her transverse colon.

Questions

1. What other imaging studies would you recommend?
2. What is your differential diagnosis at this time?
3. How would you counsel the patient on surgical intervention at this time?

Case Continued

On hospital day 7, Mrs.L has worsening nausea, distension, and is no longer tolerating PO intake. She has two episodes of non-bloody non-bilious emesis. Notably, endoscopic biopsy results in adenocarcinoma, and staging CT Chest reveals scattered indeterminate pulmonary nodules measuring up to 4mm.

Questions

1. What surgical plan would you propose to Mrs. L?

Case Continued

Mrs. L undergoes a subtotal colectomy from distal ileum to the proximal sigmoid with a side-to-side stapled anastomosis on hospital day 8. Her postoperative course is complicated by an ileus. Final pathology results in stage IIIB adenocarcinoma (pT4a, pN1, cM0). She sees the medical oncology team in the outpatient setting 6 weeks postoperatively for initiation of 6 months of FOLFOX. She is scheduled for completion colonoscopy after chemotherapy to assess her proximal colon. She is seen by the palliative care team for adjustment to illness and symptomatic management. She agrees to proceed with chemotherapy after discussion about fertility preservation, and continues to take her oral contraceptive medication.

Questions

1. How often would you propose surveillance scans?

Case Continued

Mrs. L tolerates 6 months of chemotherapy well, and her first surveillance scan 10 months postoperatively is without evidence of recurrent disease. One year after her initial operation, Mrs. L presents to the emergency department with worsening abdominal pain and is found to have concern for early bowel obstruction, new hepatic deposit, and new ascites on CT Abdomen and Pelvis. She is not clinically obstructed and endorses passing flatus and having normal bowel movements.

Questions

1. What other studies would you recommend at this time?
2. What treatment plan would you propose?

Case Continued

Mrs. L develops obstructive symptoms on hospital day 1, and refuses NGT placement due to prior experience during her prolonged ileus after her index operation. Lab results significant for CEA 51.1, and CT Chest demonstrates multiple new nodules concerning for metastatic disease. Small bowel follow-through on hospital day 2 demonstrates contrast in the colon without evidence of high-grade obstruction. Liver biopsy is obtained and results are pending which may prompt inpatient chemotherapy initiation. On hospital day 12 you are re-consulted for closed loop bowel obstruction. Mrs. L developed acutely worsening abdominal pain with nausea and emesis which prompted repeat CT A/P with intravenous contrast. Notably she has had severely reduced oral intake over the previous week. Her exam is notable for tachycardia, severe tenderness to palpation, distension, guarding, and extremis.

Questions

1. How will you counsel Mrs. L about operative management?

Case Continued

Mrs. L is taken to the operating room emergently and found to have two closed loop obstructions associated with malignant adhesions. The first area required a small bowel resection of a small segment of jejunum due to obstructing tumor implant, and the second was associated with the previous ileocolic anastomosis which required further resection and anastomosis. A nasogastric tube was placed intraoperatively.

Questions

1. How would you counsel Mrs. L on parenteral nutrition initiation?
2. How would you counsel Mrs. L about her prognosis?

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