Management of Colonic Obstruction: A Review

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Abstract

Keywords

- large bowel obstruction
- management
- colostomy
- colectomy
- endoscopic stent

Large bowel obstruction is a common problem with many different causes, the most common being colorectal adenocarcinoma, extracolonic adenocarcinoma, diverticular disease, volvulus, and inflammatory bowel disease. The nature of the obstruction can influence the best management. Historically, treatment of obstruction consisted of surgical removal of the obstruction if possible and decompression of the bowel with an ostomy. Other strategies for managing obstruction have evolved as alternatives to stomas, including primary resection with anastomosis and endoscopic stent placement. The choice of treatment can therefore be tailored to the individual patient with good success.

Objectives: On completion of this article, the reader should be able to rapidly assess a patient with large bowel obstruction as well as describe surgical and endoscopic treatments for this condition.

Acute obstruction of the large intestine can be a challenging problem to manage. Between 7 to 29%^{1,2} of patients with colorectal adenocarcinoma will present with obstruction. Obstruction can also be caused by other conditions, including (in decreasing order of frequency) diverticular disease, volvulus, and inflammatory bowel diseases. Historically, treatment consisted of relief of obstruction, usually with some form of stoma, along with resection of the primary problem, if feasible. More recently, new technologies such as self-expanding metal stents have evolved, which give surgeons more options in treating acute obstruction.

Causes of Acute Large Bowel Obstruction

The causes of acute large bowel obstruction can be classified in several ways: benign and malignant (→ **Table 1**), and functional conditions and mechanical sources. Examples of functional causes are adynamic ileus, often related to narcotic usage, but also to other systemic illnesses such as sepsis and toxic megacolon, which can be related to *Clostridium difficile* infection or severe acute colitis as in ulcerative colitis. In many cases, treatment of the underlying functional cause will improve the manifestation of bowel obstruction. Mechanical blockages can be either intrinsic to the bowel lumen, as in

colorectal adenocarcinoma, or an external compression force, as with carcinomatosis, adhesive bowel disease, and hernia. These are unlikely to resolve without intervention. Not surprisingly, the nature of the obstruction influences what the best choice of treatment may be.

Initial Assessment

Patients may present with a wide spectrum of symptoms and signs, ranging from subtle to profound. Many will note having had a preceding period of bloating, obstipation or “constipation,” narrowing caliber stools, or increasing cramping abdominal pain. Vomiting is considered to be a relatively late finding with large bowel obstruction unless there is associated small bowel obstruction. Patients may be found to have signs of hypovolemia due to fluid losses into the dilated intestine, as well as various electrolyte imbalances. Those who present with signs of point-tenderness, peritonitis, or shock likely have more advanced obstruction with possible ischemic proximal bowel. Assessment of these patients should include a focused history and physical, blood work including complete blood count, complete chemistry evaluation including lactate level, and flat and upright abdominal x-ray studies. This can rapidly help to establish the nature of the obstruction and whether there may be bowel ischemia. Volvulus can be readily diagnosed and frequently differentiated into a cecal or sigmoid cause by plain x-ray, with a sigmoid volvulus pointing toward the right upper quadrant versus a cecal volvulus pointing toward the left.

Table 1 Causes of Colorectal Obstruction

Benign	
	Diverticulitis
	Fecal impaction
	Hernia
	Ileus
	Inflammatory bowel disease
	Intussusception
	Pseudo-obstruction
	Postoperative complication (anastomotic stricture, adhesions)
	Volvulus
Malignant	
	Carcinoid
	Colorectal adenocarcinoma
	Gastrointestinal stromal tumor (GIST)
	Lymphoma
	Peritoneal carcinomatosis

Bowel ischemia can be present with rather vague symptoms (classically, pain out of proportion to the exam), but should be considered if there is evidence of sepsis, an elevated serum lactate level, or a dilated cecum. The cutoff for cecal dilation has long been cited as 12 cm,^{3–5} above which the risk of ischemia and perforation increases. This should be regarded as a general guideline; however, there is no direct correlation between cecal diameter and risk of perforation, and reports of perforation occurring at smaller diameters have been made.⁶ Cecal diameter can be measured on plain x-ray and can be followed serially.

For patients who are stable and do not have an urgent indication for surgical exploration, other more advanced radiologic imaging is helpful. A contrast enema exam, using either barium or a water-soluble agent, can easily delineate the level of the obstruction. In cases of fecal impaction, it may further prove to be therapeutic. An abdominal and pelvis computed tomography (CT) scan can provide additional valuable information. This can help determine if there is diverticular disease, suggest an apple core lesion or obstructing mass in the case of a colorectal adenocarcinoma, as well as diagnose various types of hernias. CT has been shown to be accurate in diagnosing the cause of large bowel obstruction,⁷ and is generally more readily available at any time of day than the contrast enema.⁸ For these reasons, there is some suggestion that CT is gradually replacing the use of the contrast enema.

Endoscopy is also an important tool in evaluating the patient with bowel obstruction, particularly if the obstruction is not complete. It is the best way to obtain biopsies to diagnose a colorectal adenocarcinoma. It can be a diagnostic tool for sigmoid volvulus, where the “swirl sign” may be demonstrated; it may additionally be therapeutic in reducing a volvulus, although this should be avoided if there is evi-

dence of necrosis on endoscopy, and recurrent volvulus is a frequent risk if surgical resection of the redundant colon is not performed. Although obstruction has been shown to be a risk factor for perforation during colonoscopy, this remains a rare event with an incidence generally under 1%.^{9,10}

Management

Initial treatment should consist of fluid resuscitation of the patient, correcting any electrolyte abnormalities, gastrointestinal decompression with a nasogastric tube placed to suction, as well as close monitoring of urine production, usually with the insertion of a urinary catheter. Following these early steps, there are many options for managing bowel obstruction. For an obstructive process extrinsic to the colon, such as hernia, surgical correction of the underlying problem should be undertaken as appropriate. The remainder of this review will focus on interventions for causes of obstruction intrinsic to the colon. The choices include both surgical and endoscopic techniques. Selecting from among these depends on the patient's condition, the surgeon's expertise, and what resources may be available.

Colostomy

Patients who are acutely ill with signs of peritonitis or sepsis will likely need an urgent operation. Traditionally, surgical management of large bowel obstruction included mandatory colostomy. This could be either an end colostomy, with resection of the distal obstruction if possible, or more proximal loop colostomy. This approach has the benefits of usually shorter operative times and no risk of anastomotic leak. It remains the procedure of choice for most surgeons in patients with hemodynamic instability, gross contamination of the operative field from perforation, or other significant barriers to healing such as severe malnutrition or an immunocompromised state. Unfortunately, colostomies have the accompanying morbidities of frequent parastomal hernias, decreased quality of life, and relatively low rates of closure.¹¹ Purchase of colostomy supplies is an additional expense for many patients and can be a hardship. Many surgeons and patients therefore would prefer to avoid stoma formation when possible. Fortunately, there are several options for avoiding colostomy formation. Operative choices include segmental colectomy and subtotal colectomy, with or without on-table decompression of the proximal bowel.

Segmental Colectomy

A segmental colectomy is a reasonable procedure in selected situations. Right-sided obstruction is often treated with a right hemicolectomy with ileocolic anastomosis. Outcomes of urgent right hemicolectomy for obstruction with primary anastomosis are generally good with relatively low rates of anastomotic leak.¹² This operation may be approached laparoscopically if the surgeon is proficient in the technique, the patient is hemodynamically stable, and the proximal bowel is not overly dilated. Otherwise, it should be performed in an open fashion.

Segmental colectomy has not been customarily used in a left-sided obstruction because of reported rates of complications, including a fairly high rate of anastomotic leakage, approaching 20%.¹³ However, more recently, primary anastomosis has been reconsidered as appropriate for left-sided lesions, particularly if the proximal colon is not severely dilated and the patient is deemed to be “good risk.”^{14–16} Other studies, albeit retrospective reviews, have demonstrated similar rates of anastomotic leak and operative mortality between right- and left-sided segmental colectomies.^{12,17} In these studies, surgeons used on-table lavage to decompress the colon when performing an anastomosis in a left-sided obstruction.

The use of on-table lavage seems to be preferred in surveys of surgeons performing resection with primary anastomosis for a left-sided obstruction.^{14–16} This technique involves mobilization of the colon and its division proximal to the site of obstruction, with placement of the proximal bowel end into a basin or sleeve; an appendicostomy is created and a 16-Fr balloon catheter is inserted into the cecum, using a purse string suture at the appendix to secure the catheter. The colon is then flushed with multiple liters of saline until clear, at which point the catheter is removed, the appendicostomy closed, and the operation proceeds on to creation of a primary anastomosis.¹⁸ Proponents cite a lower anastomotic leak rate and reduced incidence of wound infection.^{17,18} However, other surgeons, particularly in North America, seem to find the procedure of on-table lavage cumbersome and are more likely to perform a stoma for decompression.^{2,16,19}

Subtotal Colectomy

Another strategy to avoid stoma creation in patients with left-sided obstructing lesion is to perform a subtotal colectomy with ileosigmoid or ileorectal anastomosis. This has the advantage of removing any possibly compromised, dilated colon; avoiding size discrepancy in luminal diameter between the two ends of bowel to be anastomosed; and in the case of malignancies, can remove any proximal synchronous lesions.¹⁹ There are a few drawbacks to this operation. In a review of over 500 patients comparing segmental colectomy to extended resection with either ileosigmoid or ileorectal anastomosis performed for a variety of indications, there was a clear decrease in postoperative quality of life for patients with a more extensive resection.²⁰ Patients generally have more frequent bowel movements than prior to the operation and are at risk for dehydration. Additionally, with extended colon resections, more patients tend to require dietary restrictions and changes in general activity levels compared with those with a limited resection. It may be helpful to have a sense of what the patient's preoperative bowel function is, as well as their overall functional status, before selecting this procedure.

Self-Expanding Metal Stent Placement

One increasingly accepted strategy to manage colorectal obstruction, particularly in the case of colorectal cancers, is endoscopic stenting. Colonic stents for malignancy were first

used in the early 1990s.^{21,22} Since that time, multiple authors have described their experience with stents and their use both in providing palliation for patients with incurable disease and acting as a bridge to surgery. The latter is a phrase used to describe the practice of using a stent to relieve the obstruction, allowing for decompression of the proximal colon over a period of days to weeks, bowel preparation, and in some cases more proximal endoscopic evaluation for synchronous lesions, followed by semielective resection and usually primary anastomosis. An elective approach is associated with significantly lower morbidity and mortality rates compared with urgent procedures, even with modern anesthesia and other medical care. A recent review of 1129 patients undergoing treatment for colon cancer demonstrated that for the 279 who presented emergently, the mortality rate was 10% and general complication rate 38%, compared with 3.5% and 24% for those having elective resections.²³ With such a difference in outcomes, there is a clear incentive to try to convert an emergent operation to a more-elective setting. Stents are frequently successful at achieving this goal. Studies generally quote the rates of technically and clinically successful stent deployment around 90% of patients.^{24,25}

The procedure does carry some risks, however. A systematic review of 88 studies found the most common complications to be stent migration (11%, range 0–50%), regrowth into the stent causing obstruction (12%, 1–92%), and perforation (4.5%, 0–83%).²⁵ Because of the risk of perforation, which would be potentially catastrophic for a patient with otherwise localized colorectal cancer, stenting has been more readily accepted for relief of obstruction in patients with known metastatic disease (i.e., stenting for palliation). Its role as a bridge to surgery has therefore been somewhat more controversial.

A head-to-head comparison of urgent surgery and stenting for colorectal cancer has been difficult to accomplish. Two randomized controlled trials have been reported with one favoring stenting²⁶ and the other offering a more circumspect opinion.²⁷ The former, which looked at 48 patients with left-sided obstructing lesions, all at a single institution, allotted to either stent followed by laparoscopic resection or emergency open surgery, found that those who underwent stenting had less intraoperative blood loss, lower postoperative pain scores, lower incidence of anastomotic leak, fewer wound infections, and an overall lower rate of permanent stoma formation than those who underwent emergency open surgery.²⁶ The second study was a larger, multicenter trial involving 25 hospitals in The Netherlands.²⁷ This study looked at 98 patients randomized to colonic stenting ($n = 47$) or emergency surgery ($n = 51$). At interim analysis after 60 patients had been enrolled, it was found that the 30-day morbidity rate was higher in the stent group and the study was suspended before it reached its target accrual ($n = 120$). In the final analysis, the study found there was no difference in 30-day mortality, global health score, or presence of stoma at latest follow-up. Because of the lack of differences, the authors concluded that stenting did not offer any advantage over emergency surgery and only carried additional risk of perforation. The authors also acknowledged that they had a

higher rate of patients presenting with complete obstruction (70%) compared with other published series (54%), as well as a lower rate of technically successful stent placement (70%) compared with other studies (on the order of 90%). Perhaps because of these caveats with the Dutch study, as well as other series' high rates of success,^{25,28} expert opinion currently favors use of stents as a bridge to surgery.²⁹

Stents have also been used for some benign causes of bowel obstruction, particularly diverticular disease, although this is somewhat controversial.^{30,31} There tend to be relatively high overall rates of major complications, between 38–44%,^{30,31} including migration, reobstruction, and perforation. For these reasons, stenting is not seen as a long-term solution to benign causes of obstruction, but may be helpful in providing a bridge to surgery.

Conclusions

Large bowel obstruction is a complex condition. Patients can present with a variety of symptoms ranging from subtle to extreme, and their status is often the most significant determinant in management of this problem. Multiple methods exist to treat colorectal obstruction, including both surgical and endoscopic approaches. This gives the surgeon flexibility to tailor the approach to achieve the best outcome for the individual patient.

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