Experience With Endoluminal Colonic Wall Stents for the Management of Large Bowel Obstruction for Benign and Malignant Disease

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Hypothesis: To assess the applicability and efficacy of endoluminal colonic wall stents (ECWSs) in the management of large bowel obstruction (LBO).

Design: Inception cohort study.

Setting: University-based tertiary medical center.

Patients: Eleven consecutive patients with LBO in the absence of peritonitis.

Intervention: Placement of ECWS under endoscopic and fluoroscopic guidance.

Main Outcome Measures: The success rate in ECWS placement, the efficacy in decompressing the obstruction, and the patency rate of the ECWS.

Results: Successful placement of ECWSs was obtainable in 10 of 11 patients. Once placed, all 10 patients achieved immediate decompression of their LBO. Eight patients had malignant obstructions associated with distant spread of disease; 3 patients had diverticular disease. Among those with malignant obstruction, 6 patients had successful and lasting palliation without colostomy, 1 patient underwent 1-stage resection 1 month later with no evidence of obstruction, and 1 patient could not be stented so diversion was done. None of the patients with diverticular disease required diversion: 2 had complete bowel preparation followed by resection with primary anastomosis, whereas the third declined surgery. Four of the 10 patients required overlapping ECWSs to bridge the stricture. One patient required a second ECWS secondary to recurrence of obstruction after stent migration and has continued palliation of his stage 4 rectal cancer for the last 11 months. No other complications were encountered.

Conclusions: Urgent surgery with colostomy for LBO was avoided in 10 of 11 patients because of successful placement of ECWSs. We believe that endoscopic colonic stenting is safe, effective, and lasting, and should be considered as initial nonoperative management in all patients seen with LBO in the absence of peritonitis.


LARGE BOWEL obstruction (LBO) is a common surgical problem caused by colorectal carcinoma, diverticular disease, and metastatic genitourinary tumors.\(^1\,^2\) Traditionally, treatment options include emergency decompressing colostomy or resection with or without anastomosis. Urgent surgery performed on acutely ill, obstructed patients carries a high price. The mortality and morbidity rates of performing decompressive colostomy are 5% and 16%, respectively.\(^4\) Similar high mortality and complication rates occur in patients fit enough for resection.\(^5\) In addition to the risks associated with their formation, diverting colostomies are associated with long-term problems such as hernia, prolapse, and dehydration, and cause considerable psychological distress. Because of many factors, these colostomies end up being permanent in up to 40% of patients.\(^4\)

Recently several alternative treatments for LBO have been reported, including cryotherapy,\(^6\) photodynamic therapy,\(^7\) electrocoagulation,\(^8\) laser coagulation,\(^9\) and balloon dilatation.\(^10\) Expandable endoluminal stents, which are widely used in treating biliary\(^11\) and esophageal strictures,\(^12\) have been used successfully to treat LBO in patients with malignant strictures with low morbidity rates.\(^13\,^15\) These early results prompted us to try this new treatment approach for all patients initially seen with LBO. Our goal in treating these patients was to avoid emergent surgery and colostomy formation. In patients with end-stage malignant neoplasms, stent placement was used as long-term palliation. In patients with diverticular stricture, or resectable colonic malignancy, the stent allowed bowel preparation and 1-stage resection.

From the Departments of Surgery (Drs Tamim, Ghellai, Counihan, Swanson and Sweeney) and Radiology (Dr Colby), University of Massachusetts Medical School, Worcester.
PATIENTS AND METHODS

All patients hospitalized with acute LBO referred to 1 of 3 surgeons (T.C.C., R.S.S., or W.B.S.) at a university medical center were offered endoluminal colonic wall stents (ECWSs). All 3 surgeons were experienced in complex colonoscopy prior to attempting stent placement. Patients who had signs of peritonitis were taken to the operating room and were not considered for this procedure. Over 2½ years, 11 consecutive patients were enrolled in this study and 10 underwent ECWS under colonoscopic and fluoroscopic guidance; 10 patients had successful placement and they are the subject of our study. Patients were considered to have an LBO by the clinical history of not passing stool or gas via the rectum and having signs of complete obstruction on plain radiography, computed tomographic scan, or contrast-enhanced enema. No patient refused attempted ECWS placement. One patient underwent endoscopy, but complete obstruction prohibited passing a guidewire. Stenting was performed urgently, usually within 24 hours of admission to the hospital.

The procedure for endoluminal stenting involved conscious sedation with midazolam hydrochloride and fentanyl citrate and colonoscopy to the point of obstruction. A guide wire was negotiated through the stricture into the proximal dilated bowel under colonoscopic and fluoroscopic guidance. A catheter was placed over the guide wire, and a small amount of water-soluble contrast was injected to accurately define the proximal aspect of the obstruction. The catheter was then withdrawn while the guide wire was kept in place. With the colonoscope in place, a 22 × 90-mm or 22 × 60-mm wall stent enteral endoprosthesis (Boston Scientific, Boston, Mass) was introduced over the guide wire beyond the proximal end of the stricture. Under fluoroscopy, the ECWS was slowly deployed. If the stricture was longer than 8 cm, an additional stent (90 × 22 mm or 60 × 22 mm) was deployed with a generous overlap with the first stent. Endoscopic evaluation during ECWS deployment ensured a good relation between the distal aspect of the obstruction and the ECWS, and documented relief of the obstruction. Endoscopic photographs show placement of the ECWS and decompression (Figure 1). Plain abdominal radiography was performed after the procedure to exclude perforation and document baseline ECWS position. Figure 2 shows plain radiographs before and immediately after ECWS placement.

RESULTS

Over 2½ years, 14 ECWSs were placed in 10 patients initially seen with acute LBO using a combined endoscopic and fluoroscopic technique. In 4 patients (40%), 2 overlapping stents were used to bridge the stricture. In 1 patient with LBO the guide wire could not be passed through the blockage; and therefore, no ECWS was placed. There were 5 male and 5 female patients, whose mean age was 64 years (age range, 37-80 years). Seven patients had malignant disease: 3 patients with sigmoid adenocarcinoma, 1 patient with rectal adenocarcinoma, 1 patient with splenic flexure adenocarcinoma, 1 patient with recurrent rectal adenocarcinoma, and 1 patient with small cell carcinoma with pelvic wall metastasis. Five patients had liver metastasis and 1 patient had lung metastasis. The other 3 patients had diverticular strictures of the sigmoid colon. All patients had immediate decompression after ECWS deployment and had marked radiographic and clinical improvement of their condition. One stent migrated proximally, and obstruction recurred 5 days after the initial ECWS placement. This was treated with a second ECWS placement. The procedure was palliative in 6 patients, 5 of whom died of their disease with no evidence of obstruction 2, 60, 113, 133, and 315 days after the surgical procedure. One patient is still alive with the ECWS in place for more than 11 months. The procedure served as a bridge to surgical resection in 3 patients, 2 patients with diverticular disease and 1 patient with adenocarcinoma. The presence of the ECWS did not complicate resection in any of the 3 patients. The patients with diverticular disease were operated on 7 days and 6 weeks after ECWS placement. The patient with adenocarcinoma was operated on 22 days following stent placement. One patient with diverticular disease refused surgical resection after decompression.

Emergent decompressive colostomy or colonic resection has been associated with high mortality and morbidity rates for various reasons. Placement of ECWSs avoids urgent surgery in this high-risk group of patients. Other authors15-18 have had good results with this technique (Table). Endoluminal colonic wall stenting is associated with a lower complication rate than emergent surgery, but there are several concerns specific to this technique. The first is failure to relieve obstruction due to the inability to get a guide wire through the mass. This occurs up to 36% of the time in 1 series,19 but with more experience, this may be less of a problem. The second technical issue is perforation. This endoscopic technique is clearly a high-risk procedure given the presence of tumor or inflammation. Although 1 series had 2 perforations for a rate of 15.4%,15 the overall rate seems to be less then 5%. With early diagnosis of perforation, patients are treated essentially the same as if stenting were unavailable. Finally, the complication of tenesmus, which occurs when the stent is in contact with the sphincter complex, is a completely avoidable problem. Our tendency if faced by a very low rectal tumor would be to use an alternative method of decompression such as dilatation or laser therapy.

Five series,15-18 other than our own, are listed in the Table. From these 5 series, 142 colon stents were placed for malignancy and only 1 stent was placed for benign disease. In our series 3 patients with benign disease had ECWS placement without complications. From our experience, we believe any patient who is initially seen with LBO should be offered a colon stent as initial therapy; there is no need to document a malignant stricture prior to placing a stent. This approach simplifies the manage-
ment of a patient who initially was seen emergently with LBO. After stent placement, the patient’s condition can be evaluated further. If appropriate, resection of the affected colon can be performed as a 1-stage procedure.

The long-term complications of recurrent obstruction and stent migration may be limiting factors in the use of this technique for long-term palliation of malignant disease. In one study, up to 30.8% of patients developed recurrent obstruction. This problem will be dependent on the disease process and length of follow-up time. Many patients will die before recurrent obstruction becomes an issue. Stent migration can occur in diverticular disease as inflammation resolves, but this implies a colonic lumen that can support normal bowel function without a stent. Similarly, stents may migrate in the presence of malignant disease that is treated with palliative chemotherapy or radiotherapy after stent placement.

In our series, we placed a total of 14 ECWSs in 10 patients with acute LBO. The ECWS allowed us to adequately decompress the obstructing lesion. The patients could then undergo further resuscitation, begin nutritional therapy, and have proper evaluation of the extent of their disease. One-stage surgical resection then could be considered for appropriate candidates. Six of our patients underwent ECWS placement as their definitive treatment because of either disseminated tumor spread or prohibitive medical risk. One of these patients tolerating a regular diet died 2 days after ECWS placement of an unrelated cause. Another patient from our group had recurrence of obstructive symptoms 5 days after ECWS placement, despite initial decompression. On endoscopy, the ECWS appeared shorter than the obstructive lesion and had migrated proximally. Two overlapping stents were placed, the initial ECWS was retrieved and the patient is doing well 5 months after the surgical procedure.

Four patients compose a second group, 2 of them had obstruction secondary to diverticular stricture, and 2 had potentially resectable adenocarcinoma. Three of these patients in this group underwent decompressive ECWS placement followed by bowel cleansing and 1-stage surgical resection. One patient with diverticular disease refused surgery and remains symptom free. In this group 2-stage surgical treatment was avoided, with ECWS serving as a bridge to safe elective 1-stage resection.

Except for migration of 1 stent leading to recurrent obstruction in that patient, there were no complications. Tenesmus, as seen by other authors, is a potential complication in patients with low rectal tumors where the edge of a bridging stent may irritate the anal sphincter. The patency rate and durability of ECWS is encouraging. In our series, 6 patients received palliative ECWSs, all of whom either died with functioning ECWSs in place or are alive without recurrent obstruction. One patient has had an ECWS for longer than 14 months with no complications. In addition to the short-term benefits, ECWS may also be cost-effective. One recent study showed an overall cost savings of 20% in patients treated for palliation and 29% in patients who ultimately undergo resection. Endoluminal colonic wall stents avoid at least 1 and sometimes 2 major operations, potentially lowering hospital charges and overall cost. The physical, economical, and psychological stress of colostomy to the patient is also avoided by using an ECWS.

Figure 1. Endoscopic view shows placement of endoluminal colonic wall stent (A and C) and resultant decompression (B and D).
In conclusion, 10 patients avoided emergent surgery with colostomy because of successful placement of ECWSs. We believe that endoscopic colonic wall stenting is safe and effective, and thus, should be considered as initial treatment in all patients with benign or malignant disease seen with LBO in the absence of peritonitis.


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* Ellipses indicate not applicable.

**REFERENCES**

Paul C. Shellito, MD, Boston, Mass: For patients with obstructing left-sided colon tumors, there is much to recommend the maneuver described in this article. Emergency surgery can be avoided for those with resectable cancer, and surgery can probably be avoided entirely for patients with widespread malignant neoplasms. Elective surgery, of course, is associated with a much more favorable morbidity and mortality rate and is easier on the surgeon. Furthermore, in an elective situation, and in the absence of bowel dilatation, probably a technically better cancer operation can be accomplished. Most important, the patient can have a single operation, instead of multiple-staged laparotomies including a colostomy (and many patients with malignant obstruction of the left colon). Br J Surg. 1995;82:232-235.

A major cost saving is likely. After acute obstruction is relieved with a stent, the patient’s condition can then be more thoroughly evaluated. Colonoscopy can be performed to rule out synchronous neoplasms. A CT scan might show locally advanced rectal cancer, which would be appropriate for neo-adjuvant chemoradiation. It might also unexpectedly show multiple liver metastases, in which case the stent could be left in place indefinitely for palliation as was done in some patients described in this article. The major disadvantage of this approach is the necessity of having readily available experienced endoscopists, interventional radiologists, and ancillary personnel for these emergencies. It is a fairly small study population, as had been the 10 or so previous similar reports in the literature. The rates of 91% success, 9% stent migration, 0% perforation, and 0% tenesmus compare very favorably with others. Before wire mesh stents were available, tumor recanalization was accomplished in some medical centers by endoscopic laser vaporization. This was an inferior approach I believe, however, because of the greater risk of serious bleeding and perforation and fistula, and the need for repeated treatments to maintain a lumen. It was also technically very unsatisfactory doing a difficult endoscopy amid stool, smoke, blood, and charred necrotic tissue.

These skilled interventionalists have admirably managed a difficult problem nonoperatively. They have confirmed that ECWS for large bowel obstruction are feasible, effective, and safe. In a larger sense, it is another illustration of how patients with complex problems can benefit from the collaboration of endoscopists, radiologists, and surgeons. The challenge now will be to make it more widely available and to select patients appropriately. Some similarly treated patients for “obstruction” in previous reports actually have had only obstructive symptoms, but not a complete obstruction, and probably could have been managed simply by semiurgent single-stage surgery (eg, sometimes in previous reports, the colonscope could be passed completely through the tumor). Patients with LBO might have concomitant colonic perforation, small bowel obstruction, or a synchronous stenosing cancer, which would contraindicate nonoperative treatment. Finally, in patients treated for palliation with stents, although obstruction can be nicely overcome, palliation of other symptoms such as pain, tenesmus, incontinence, discharge, and cachexia is unlikely to last more than about 6 months, due to extraluminal tumor growth.

I have 2 questions for the authors. First, how did you define LBO and how urgently after referral or diagnosis did you carry out the procedure? Second, in some medical centers this procedure has been carried out by interventional radiologists alone, which simplifies matters somewhat. How necessary is the colonoscopy component?

Frederick Bagley, MD, Rutland, VT: How far proximal in the colon would you attempt this procedure?

Dr Tamim: First in terms of definition of LBO, the way we defined it was based on KUB [kidney, ureter, and bladder] and single–contrast-enhanced enema which showed the obstruction. In addition, the patient had obstructive symptoms. So it was a clinical and radiographic diagnosis.

In terms of peritonitis, we made sure that the patient does not have generalized peritonitis as mentioned and the patient does not have high fevers or a very elevated white blood cell count.

In terms of the question on timing of the procedure, most of the time it took us around probably 24 to 48 hours after being called. This period gives us time (1) for diagnosis and to undergo the diagnostic procedure, tests and (2) to allow for some hydration at times if you need antibiotics to decrease the risk of translocation. So most of the time we did the procedure around 48 hours after we were consulted, unless we needed to do it earlier.

Now on the question on the need for colonoscopy. Actually this is a very sensitive issue. You are right, in the literature the reports from Spain came from interventional radiologists. Even here from the University of Alabama, Birmingham, it was done by gastroenterologists and interventional radiologists. Actually we believe the contrary. We believe that a surgeon or an experienced gastroenterologist should be involved. The reason for it is that you want to have somebody who is technically skilled to do the procedure, take care of the complications that happen which is perforation, and at the same time we believe that you really need the scope in there to be able to do the procedure safely. Doing it with fluoroscopic guidance, in our minds, is not safe enough. You really need to see the scope so that you know where your guide wire is going and you are really not causing any injuries to the bowel which is very friable and inflamed in these patients. And actually going to see the complications from the literature, we see that the perforations were reported mostly by the reports that came from the radiologists.

For the second question about the proximal distance of the tumor, in our population which is small, most of the lesions were in the rectosigmoid area so they were distal. However, in the literature there have been attempts at stenting lesions in the proximal descending colon as well as in the transverse colon and, I think, as this technology improves, and the expertise improves, there is a role to stent any lesion in any part of the colon.