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Outcomes of Palliative Colonic Stent Placement in Malignant Colonic Obstruction: Experience from a Tertiary Care Oncology Center in India

Sridhar Sundaram[1] Raosaheb Rathod[1] Prachi Patil[1] Kiran Mane[1] Vishal Seth[1] Avanish Saklani[2] Ashwin Desouza[2] Shaesta Mehta[1]

[1] Department of Digestive Diseases and Clinical Nutrition, Tata Memorial Hospital, Homi Bhabha National Institute, Mumbai, Maharashtra, India
[2] Department of Surgical Oncology, Tata Memorial Hospital, Homi Bhabha National Institute, Mumbai, Maharashtra, India

Address for correspondence Prachi Patil, MD, DNB, Department of Digestive Diseases and Clinical Nutrition, Tata Memorial Hospital, Homi Bhabha National Institute, Dr. E Borges Road, Parel, Mumbai, Maharashtra, 400012, India (e-mail: prachipatil@gmail.com).

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Abstract

Introduction Colonic self-expanding metal stent (SEMS) placement is the preferred method for palliation of malignant colonic obstruction. We analyzed outcomes of patients who underwent colonic SEMS placement for palliation at a tertiary care oncology center in Western India.

Methods Retrospective review of the endoscopy database was done for patients who underwent colonic SEMS placement at our center between January 2013 and September 2021. Demographic details, intent of stent placement, site of obstruction, length of stricture, technical success of stenting, clinical success, and complications (both immediate and long term) were noted.

Results Sixty-one patients underwent colonic SEMS placement during the study period (mean age 53.6 years, 50.7% men). Obstruction was due to primary colonic malignancy in 43 (70.5%) patients and extracolonic malignancies in 18 (29.5%) patients. Most common extracolonic malignancy was gallbladder cancer in 8 (44.4%) patients. Most common site of obstruction was sigmoid colon in 18 (29.5%) patients. Proximal colonic obstruction was seen in 17 (27.9%) patients. Peritoneal metastases were seen in 26 (42.6%) patients. Colonoscopy revealed an impassable stenosis in 58 (95.1%) patients. Median length of stricture was 5 cm (range 2–9 cm). Technical success was achieved in 98.3% (60/61). Clinical success was achieved in 51 (86.4%) patients. Perforation during colonic SEMS placement was seen in 2 (3.4%) patients. Stent migration was seen in 3 (5.9%) patients, needing surgery for retrieval in all 3 patients. Over a median follow-up of 9 months (0–21 months), stent block was seen in 7 (13.7%) patients. Stent block developed after a median period of 6 months. Of these patients, three patients underwent SEMS placement within the SEMS and the other four patients underwent surgery.

Conclusion Colonic SEMS placement achieves good palliation of malignant colonic obstruction in approximately 87% patients. Long-term complications like obstruction occur in a few patients after a median duration of 6 months.

Keywords
- obstruction
- colorectal neoplasia
- stents
- treatment outcome

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Introduction

Colorectal cancer (CRC) is the third most common cancer and second most common cause of cancer-related deaths in the world.[1] Colonic obstruction usually occurs as a late complication of advanced colorectal carcinoma. Clinical bowel obstruction occurs in 8 to 29% of CRC patients and may require emergency surgery.[2] The surgery of choice is emergency laparotomy with colostomy, which is associated with significant morbidity.[3] Use of self-expanding metallic stent (SEMS) was first described for the treatment of colonic obstruction by Spinelli et al in 1992.[4] Colonic stent placement can be done either as a palliative measure for patients with advanced CRC which is not amenable to surgery or as a bridge to curative surgery (BCS).[5,6] In a previous study by Small et al, colonic stenting was shown to have technical and clinical success rates of 96 and 99% in the palliative setting and 95 and 98% in the curative setting, respectively.[7] Colonic SEMS have a lower rate of complications, lower cost, associated shorter length of hospital stay, reduced stoma rate, and decreased short-term mortality rate as compared with emergent surgery.[8] Uncovered colonic SEMS are used usually because of the high rate of migration associated with partially covered SEMS. The stent is removed along with the diseased bowel segment during surgery in case of BCS and left in situ in cases with palliative intent.[6,9] Colonic SEMS can also be used to treat colonic obstructions associated with advanced extracolonic malignancy.[10] Data on outcomes of colonic SEMS placement from the Indian subcontinent is sparse. We aimed to assess our experience of colonic SEMS placement for palliation of colonic obstruction.

Materials and Methods

This is a retrospective observational study of the patients who underwent colonic stenting for malignant colorectal obstruction at our tertiary care referral oncology institute between January 2013 and September 2021. Patients who underwent colonic stenting were identified from the prospectively maintained endoscopy database and details were collected from hospital's electronic medical record. All patients had age >18 years and underwent colonic SEMS placement for malignant large bowel obstruction (both acute and subacute). Demographic details including age, sex, and comorbidities with American Society of Anesthesiologists (ASA) grade were recorded. Disease characteristics like primary malignancy, degree of obstruction, site of obstruction, stage of disease, imaging details, and presence or absence of peritoneal disease were recorded. Treatment details including previous surgery and chemoradiation were noted. Interventional variables like intent of stenting (palliative or BCS), duration between diagnosis and stenting, length of stricture, size and type of SEMS used for colonic stenting, technical success of stenting, clinical success, and complications (both immediate and long term) were noted. For patients with subsequent surgery, details of surgery such as anastomosis, stoma creation, postoperative complications, and length of hospital stay were also noted.

All colonic stenting procedures were performed by endoscopists with experience of more than 1,000 independent colonoscopies, under conscious sedation or general anesthesia. All patients were given bowel preparation with enema as oral bowel preparation is contraindicated in symptomatic bowel obstruction.[9,11] After passing scope till the site of narrowing, a guidewire (Tracer Metro, Cook Medical Inc, Bloomington, Indiana, United States) with an endoscopic retrograde cholangiopancreatography cannula (Tandem XL, Boston Scientific, Marlborough, Massachusetts, United States) was initially passed through the stenotic tumor under fluoroscopic guidance. Length of stenosis was confirmed by contrast injection through the cannula. Choice and size of stent was based on endoscopist's discretion. Attempt was made to bridge the stricture with at least 2 cm length of stent on either end being free from the tumor segment. Through-the-scope colonic SEMS (WallFlex SEMS, Boston Scientific) was placed across stricture under fluoroscopic and endoscopic vision (►**Figs. 1** and **2**). After the procedure, all patients were monitored clinically and radiologically for evidence of resolution of symptoms and bowel decompression to determine clinical success. All patients were admitted for observation to confirm relief of obstruction.

Primary outcome was technical and clinical success of colonic stent placement. Technical success was defined as the successful placement of the stent across the length of the stricture. Clinical success was defined as the clinical and radiological evidence of bowel decompression at day 2 post-stenting. Secondary outcome measures were short- and long-term complications after stent placement with need for surgery.

Statistical analysis: Continuous variables were represented using mean with standard deviation or median with interquartile range, and comparison was made using independent *t*-test or Mann–Whitney *U* test. Categorical variables were represented using percentage and comparison between categorical variables was made using chi-square test or Fisher's exact test. Factors associated with clinical success were assessed. Statistical analysis was done using SPSS version 26.0 (IBM, Armonk, New York, United States).

Results

Sixty-one patients underwent colonic SEMS placement for malignant large bowel obstruction during the study period. The mean age of patients was 53.61 ± 13.96 years (range 19–85 years) with 50.8% (31/61) patients being male. On pre-procedure assessment, 52.4% (32/61) were ASA I, 31.1% (19/61) were ASA II, 14.7% (9/61) were ASA III, and 2 patients were ASA IV. Subacute intestinal obstruction (SAIO) was the presenting complaint in 45 (73.7%) patients, while 15 (24.6%) patients had acute obstruction and 1 (1.6%) patient had gastrocolic fistula with partially obstructing colonic growth. All 61 patients had clinical and radiological evidence of obstruction. Primary colonic malignancy causing obstruction was seen in 43 (70.5%) patients, whereas extracolonic malignancy was seen in 18 (29.5%) patients. Among the 18 patients of extracolonic malignancy causing bowel obstruction, gallbladder cancer was the most common cause, seen in 8 (43%) patients. Most common site of obstruction was in the

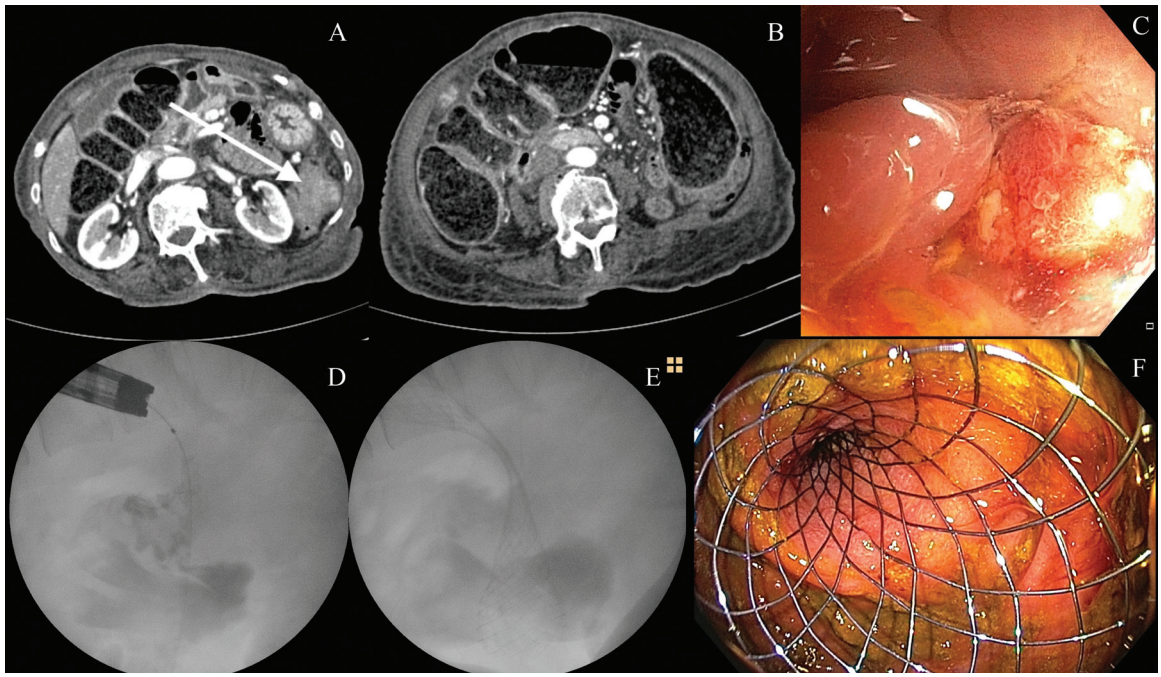

Fig. 1 (**A**) Computed tomography (CT) image of obstructive lesion in left colon (arrow). (**B**) CT showing dilated bowel loops loaded with stools. (**C**) Infiltrative impassable narrowing in the region of left colon. (**D**) Fluoroscopy showing guidewire passed across narrowing with contrast delineating stricture. (**E**) Colonic stent placement across the tumor as seen on fluoroscopy. (**F**) Colonic stent as seen inside the lumen.

sigmoid colon in 18 (29.5%) patients and descending colon in 12 (19.7%) patients. Proximal colonic obstruction (right and transverse) was seen in 17 (27.9%) patients. Peritoneal metastases were present in 26 (42.6%) patients. Intent of stenting was palliative in all patients.

Midazolam and fentanyl were used most commonly (73.7%) for sedation, while rest of the procedures were performed under Monitored Anesthesia Care. Median duration from diagnosis of obstruction till stenting was 24 hours (range 12–168 hours). Two patients underwent colonic decompression tube placement prior to stenting on emergency basis due to financial constraints. On colonoscopy, nonnegotiable stricture was found in 58 (95.1%) patients, and in 3 (4.9%) patients, scope was negotiated beyond stricture with moderate difficulty. Median length of stricture delineated on fluoroscopy during procedure was 5 cm (range 2–9 cm). Uncovered colonic SEMS (WallFlex stent, Boston Scientific) was used in 59 (98.3%) patient and partially covered SEMS (Niti-S enteral colonic stent, Taewoong Medical, South Korea) was used in a single patient with gastrocolic fistula. Three patients underwent duodenal SEMS placement for gastric outlet obstruction (GOO) after few days of colonic SEMS placement (►**Fig. 3**). Two patients underwent concomitant biliary SEMS for biliary obstruction. One patient, case of gallbladder cancer underwent triple stent placement (colonic SEMS for SAIO, duodenal SEMS for GOO, and biliary SEMS for obstructive jaundice).

Technical success rate was 98.3% (60/61) in our study. After controlled release of stent, distal end of the stent was visualized endoscopically and position across the stricture and expansion of stent was confirmed under fluoroscopy. Clinical success could be assessed in 59 patients as one patient died postprocedure on the same day due to cardiorespiratory complications. Complete clinical success was achieved in 51/59 (86.44%) at 1 week, while 5 (8.5%) patients had a partial clinical success as they again developed obstructive symptoms within a week ultimately needing surgery. Two (3.1%) patients had clinical failure of stent placement, with one patient developing a bowel perforation on day 3 after stenting needing emergency surgery. There was no correlation between peritoneal disease with clinical success ($p = 1.0$) and proximal colonic obstruction with

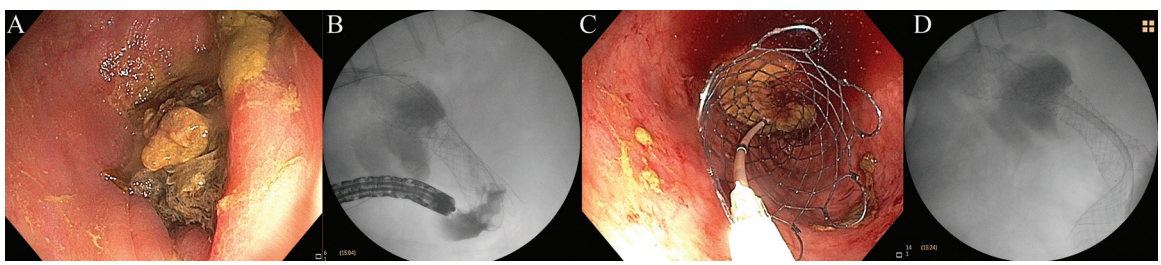

Fig. 2 (**A**) Obstructed self-expanding metallic stent (SEMS) in a patient with carcinoma gallbladder. (**B**) Guidewire passed across the obstructed SEMS under fluoroscopy. (**C**) SEMS placement done across existing SEMS to relieve obstruction. (**D**) SEMS within SEMS as seen on fluoroscopy.

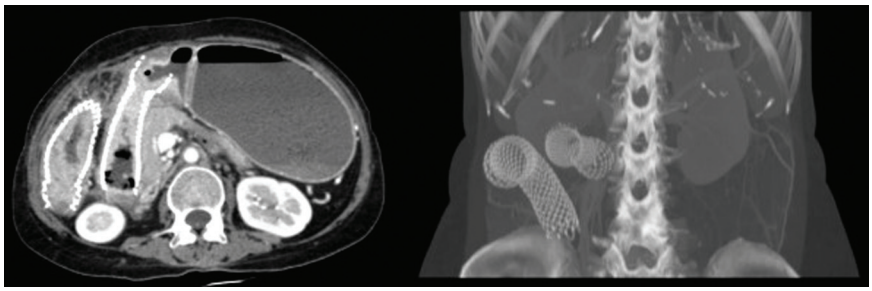

Fig. 3 Computed tomography (CT) image of concomitant duodenal and colonic stent placement in a patient with carcinoma gallbladder invading the duodenum and colonic lumen.

clinical success ($p = 0.422$). None of the patients had multiple sites of obstruction as evidenced by cross-sectional imaging with computed tomography (CT) scan.

Median duration of hospital stay was 2 days after colonic SEMS placement (range 1–12 days). Two (3.4%) patients had colonic perforation poststent placement. The first patient presented with pain in left iliac fossa on day 3 of stenting, diagnosed as having perforation at proximal end, underwent exploratory laparotomy with Hartmann's procedure. Second patient had abdominal pain 25 days after stent placement with CT scan showing extravasation of contrast at the mid-stent level. The patient underwent exploratory laparotomy with diversion stoma. Stent migration was seen in 3 (5.9%) patients (►**Fig. 4**). All three underwent surgical retrieval of SEMS with surgery for the colonic obstruction as well. Median follow-up period was 9 months (0–21 months). Colonic stent block with recurrent features of obstruction were noted in 13.7% (7/51) patients. Stent block developed after a median period of 6 months. While six cases of stent block were seen in left-sided stent placements, one was seen in proximal colonic obstruction. Of these patients, three patients underwent SEMS placement within the SEMS and four patients underwent transverse colostomy. Mortality within 3 months after stent placement was seen in 7 (11.4%) patients; however, there were no deaths related to recurrent bowel obstruction or complications of stent placement. ►**Table 1** and ►**Fig. 5** summarize the results.

Discussion

This is the first series describing outcomes of colonic SEMS placement from the Indian subcontinent. Colonic stent placement is a safe and effective method for palliation of malignant colonic obstruction with high technical success and clinical success of approximately 87%. Technical failures are mostly due to the inability to locate the lumen and inability to pass the guidewire across stricture. In our series, technical success was achieved in 98.3% patients. Clinical failure in our study with inadequate decompression was likely due to associated peritoneal disease with tight stricture. We performed through the scope stent placement in all cases.

While previous studies have shown comparable results between radiologic and combined modalities of stent placement, there is a trend toward higher technical success with endoscopic or combined endoscopic and radiologic methods.[12,13] In a previous meta-analysis, it was shown that colonic stents were safe and effective as a bridge to surgery in acute left-sided colonic obstruction, reducing need for permanent stoma, risk of wound infection, and overall complications.[14] However, in our series, all patients underwent stenting with palliative intent.

Watt et al showed that colonic stenting had shorter hospital stays and lower postprocedural complication rates and is less risky than emergency surgery in the palliative setting. In their study, technical success rate was 96.2% and clinical success rate was 92.0%. They also showed that stenting followed by elective surgery was safer and more effective than emergency surgery in the bridge to surgery setting.[15] In another series of 201 patients by Manes et al, technical and clinical success rates of colonic stenting was 91 and 89%, respectively.[16] A previous systematic review by Sebastian et al including 54 studies with 1,198 patients, colonic SEMS placement was associated with technical success of 94% and clinical success of 91%.[17] Our results are in conjunction with these studies. Colonic stenting had advantages of being less

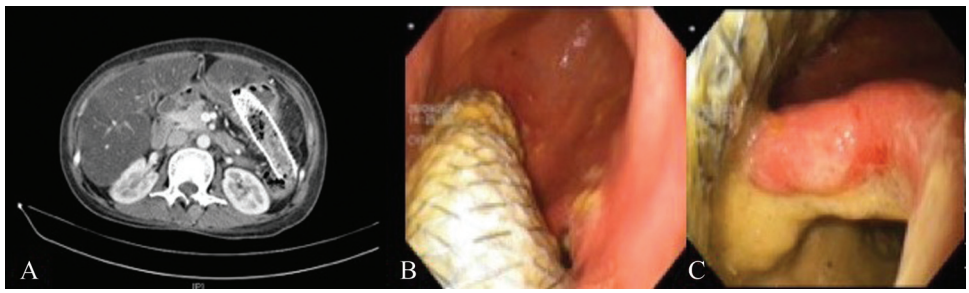

Fig. 4 (**A**) Computed tomography (CT) image of stent migrated into stomach from colon. (**B**) Self-expanding metallic stent (SEMS) seen protruding into the stomach through a gastrocolic fistula in a patient with carcinoma pancreas. (**C**) Large malignant fistulous opening seen.

Table 1 Summary of results

Age (y)	53.61 ± 13.96 (range 19–85)
Sex	Male 31/61 (50.7%) Female 30/61 (49.3%)
Site of malignancy	Colonic 43/61 (70.5%) Extracolonic 18/61 (29.5%)
Extracolonic malignancy leading to obstruction	Gallbladder 8/18 (44.4%) Stomach 3/18 (16.6%) Ovary 3/18 (16.6%) Pancreas 2/18 (11.1%) Endometrium 1/18 (5.5%) Vagina 1/18 (5.5%)
Stage of disease	Metastatic 54/61 (88.5%) Locally advanced 7/61 (11.5%)
Site of obstruction	Rectum and rectosigmoid 10/61 (16.4%) Sigmoid colon 18/61 (29.5%) Descending colon and splenic flexure 16/61 (26.2%) Transverse colon 6/61 (9.8%) Hepatic flexure and distal right colon 11/61 (18%)
Technical success	60/61 (8.3%)
Clinical success	51/59 (86.4%)
Complications	Perforation 2/59 (3.4%) Stent migration 3/51 (5.9%) Stent block 7/51 (13.7%)

invasive, shorter hospital stay as compared with traditional emergency surgery, and with long-term success also comparable to surgery. We had 2 (3.4%) patients who developed perforation poststent placement, which is comparable to previous studies showing 5.88% risk of perforation.[2]

Median duration of hospital stay was 2 days in the patients who underwent colonic SEMS. This was lesser than a previous Cochrane systematic review, where it was 11.53 days, lesser than the surgical group where it was 17.15 days.[2] The duration of hospital stay, unlike our study, was high, despite clinical relief in symptoms occurring at 0.66 days in the colonic stent group and at 3.5 days in the surgery group. In our series, 3 (5.9%) patients had stent migration and 7 (13.7%) patient had stent block. Stent block occurred due to in-growth of tumor. Distal migration of two stents occurred during chemotherapy, likely related to decrease in disease

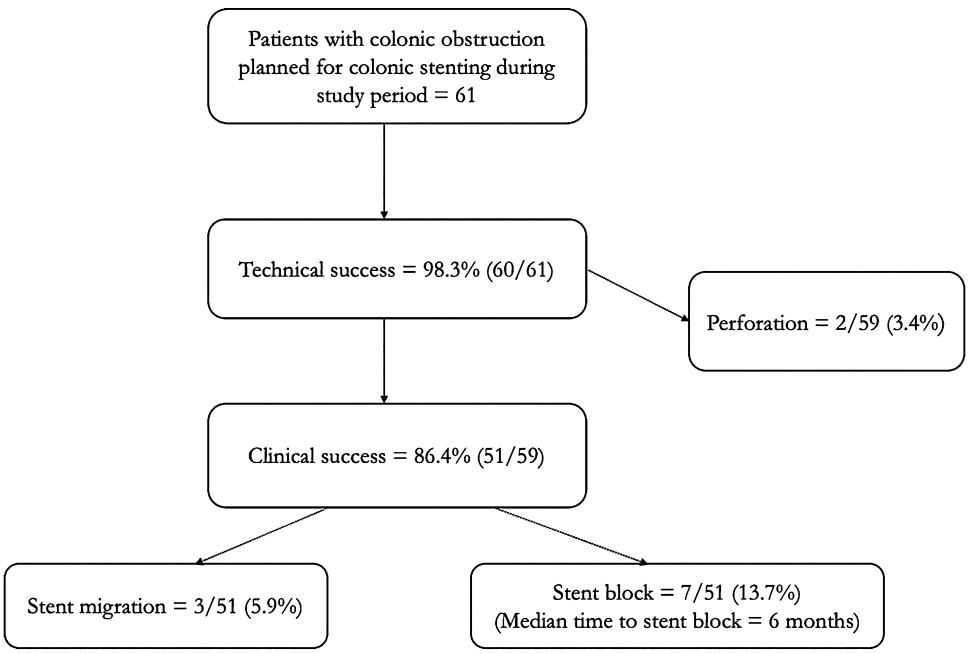

Fig. 5 Summary of outcomes of colonic stenting.

burden during chemotherapy. In a study by Luigiano et al, stent migration occurred in 2.8% of patients and stent block in 22.8% of the cases. Rectosigmoid was the most common site for stent migration.[18] Migration is more common in patients with stent diameter less than 25 mm in size.[16] We used stents with 25 mm diameter in all patients. Based on Kaplan–Meier analysis, the stent patency rate was 82.1% at 6 months in the series by Manes et al.[16] In our series, stent patency at 6 months was 92.1% with 7 (13.7%) patients developing stent obstruction over a median of 6 months. The rate of stent patency may be higher in our series due to higher rates of extracolonic malignancy, which may have been associated with lower rates of tumor in-growth.

Mortality within 3 months was seen in 7 (11.4%) patients in our series. In a previous study from our center, the most common site of distant metastases was liver (33%) followed by peritoneum (25%).[19] The 3-year survival in that series was 19% in those with stage IV disease at presentation. Most of the patients referred for stenting were metastatic at presentation with large proportion (43%) having peritoneal metastases. This may be the reason for higher referral toward colonic stent placement and avoiding surgery in these patients.

The strength of our study is that we have a real-world representative population from an oncology center with significant proportion of extracolonic malignancies as well. The limitations include the retrospective nature of the study and lack of long-term follow-up. Also, we did not have a comparator group and could not objectively assess quality of life. All patients underwent stent placement with palliative intent and hence role of colonic stenting as bridge to surgery could not be assessed.

To conclude, colonic SEMS placement is safe and effective treatment modality for relieving large bowel malignant obstruction in the palliative setting. It can be performed with high technical success in both left-sided and right-sided colonic obstruction in expert hands. Colonic stents eliminate the need for palliative surgery in significant number of metastatic patients who presented with large intestinal malignant obstruction and should be the standard of care in this setting.

Conflict of Interest

None declared.

Acknowledgments

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References

1 Jung KW, Won YJ, Hong S, Kong HJ, Lee ES. Prediction of cancer incidence and mortality in Korea, 2020. Cancer Res Treat 2020;52 (02):351–358
2 Sagar J. Colorectal stents for the management of malignant colonic obstructions. Cochrane Database Syst Rev 2011;2011 (11):CD007378
3 Leitman IM, Sullivan JD, Brams D, DeCosse JJ. Multivariate analysis of morbidity and mortality from the initial surgical management of obstructing carcinoma of the colon. Surg Gynecol Obstet 1992; 174(06):513–518
4 Spinelli P, Dal Fante M, Mancini A. Self-expanding mesh stent for endoscopic palliation of rectal obstructing tumors: a preliminary report. Surg Endosc 1992;6(02):72–74
5 Simmons DT, Baron TH. Technology insight: enteral stenting and new technology. Nat Clin Pract Gastroenterol Hepatol 2005;2 (08):365–374, quiz 1, 374
6 Baron TH. Expandable gastrointestinal stents. Gastroenterology 2007;133(05):1407–1411
7 Small AJ, Coelho-Prabhu N, Baron TH. Endoscopic placement of self-expandable metal stents for malignant colonic obstruction: long-term outcomes and complication factors. Gastrointest Endosc 2010;71(03):560–572
8 Xinopoulos D, Dimitroulopoulos D, Theodosopoulos T, et al. Stenting or stoma creation for patients with inoperable malignant colonic obstructions? Results of a study and cost-effectiveness analysis. Surg Endosc 2004;18(03):421–426
9 van Hooft JE, Veld JV, Arnold D, et al. Self-expandable metal stents for obstructing colonic and extracolonic cancer: European Society of Gastrointestinal Endoscopy (ESGE) Guideline - Update 2020. Endoscopy 2020;52(05):389–407
10 Kim JY, Kim SG, Im JP, Kim JS, Jung HC. Comparison of treatment outcomes of endoscopic stenting for colonic and extracolonic malignant obstruction. Surg Endosc 2013;27(01):272–277
11 Kuwai T, Yamaguchi T, Imagawa H, et al. Factors related to difficult self-expandable metallic stent placement for malignant colonic obstruction: a post-hoc analysis of a multicenter study across Japan. Dig Endosc 2019;31(01):51–58
12 Kim JW, Jeong JB, Lee KL, et al. Comparison of clinical outcomes between endoscopic and radiologic placement of self-expandable metal stent in patients with malignant colorectal obstruction. Korean J Gastroenterol 2013;61(01):22–29
13 Geraghty J, Sarkar S, Cox T, et al. Management of large bowel obstruction with self-expanding metal stents. A multicentre retrospective study of factors determining outcome. Colorectal Dis 2014;16(06):476–483
14 Huang X, Lv B, Zhang S, Meng L. Preoperative colonic stents versus emergency surgery for acute left-sided malignant colonic obstruction: a meta-analysis. J Gastrointest Surg 2014;18(03): 584–591
15 Watt AM, Faragher IG, Griffin TT, Rieger NA, Maddern GJ. Self-expanding metallic stents for relieving malignant colorectal obstruction: a systematic review. Ann Surg 2007;246(01): 24–30
16 Manes G, de Bellis M, Fuccio L, et al. Endoscopic palliation in patients with incurable malignant colorectal obstruction by means of self-expanding metal stent: analysis of results and predictors of outcomes in a large multicenter series. Arch Surg 2011;146(10):1157–1162
17 Sebastian S, Johnston S, Geoghegan T, Torreggiani W, Buckley M. Pooled analysis of the efficacy and safety of self-expanding metal stenting in malignant colorectal obstruction. Am J Gastroenterol 2004;99(10):2051–2057
18 Luigiano C, Ferrara F, Fabbri C, et al. Through-the-scope large diameter self-expanding metal stent placement as a safe and effective technique for palliation of malignant colorectal obstruction: a single center experience with a long-term follow-up. Scand J Gastroenterol 2011;46(05):591–596
19 Noronha J, deSouza A, Patil P, et al. Management of colon cancer at a tertiary referral center in India - patterns of presentation, treatment, and survival outcomes. Indian J Cancer 2019;56(04): 297–301