Original Article

Stenting as a Bridge to Curative Surgery for Obstructive Colorectal Cancer: A Single-center Experience

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Key Words
Self-expanding metallic stent;
Bridge to curative surgery;
Malignant colorectal obstruction

Purpose. The aim of this study was to assess the effectiveness of colonic stents used as a bridge to surgery.
Methods. A retrospective chart review of 24 patients who underwent self-expanding metallic stent placement as a bridge to curative surgery for obstructive colorectal cancer between April 2013 and December 2016 at Changhua Christian Hospital was conducted.
Results. The technical success rate was 92% and the clinical success rate was 88%. Stent-related complications occurred in 12% of patients and included 1 case of migration (4%), 1 case of continued occlusion (4%), and 1 case of perforation (4%). The patients whose occlusion and perforation did not resolve underwent immediate open curative surgery with loop colostomy. The median time to surgery after stenting was 16 ± 8 days. All clinically successful cases underwent laparoscopic curative surgery without fecal diversion. No mortalities or anastomotic leakages occurred within 30 days of the procedure.
Conclusion. Colonic stenting as a bridge to surgery provides surgical advantages, with a fair surgical success rate and a low overall stoma rate, and without a high risk of anastomotic leakage or intra-abdominal abscess. However, the oncologic outcomes require further evaluation.
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Colorectal carcinomas can present with acute intestinal obstruction in 7%-30% of cases, especially if the tumor is located at, or distal to, the splenic flexure.[1,2] In such cases, emergent surgical decompression becomes mandatory and is the traditional treatment option,[2] which involves a defunctioning stoma with or without primary resection of the obstructing tumor.[3] An alternative to surgery is endoluminal decompression, which has the advantages of less morbidity and the avoidance of stoma complications.[4] A previous study demonstrated the safety of colonic stents in malignant colorectal obstruction. Colorectal stents can be successfully placed in the majority of cases with good clinical results.[4] Colonic stents have 2 indications for use in colorectal malignancies: palliative dilatation in advanced disease, and preoperative decompression as a bridge to surgery.[4] The present study aimed to assess the effectiveness of colonic stents used as a bridge to surgery.

Materials and Methods

Patients and follow-up

Twenty-four patients with colorectal cancer who

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underwent colorectal stent placement at Changhua Christian Hospital over a 3-year period, from January 2013 to December 2016, were retrospectively reviewed. The obstruction was diagnosed clinically and radiologically (Fig. 1a). A histopathological diagnosis was achieved endoscopically. Symptoms, patient characteristics, and clinicopathological data were obtained from medical records. The stage of the disease was determined from the pathological and clinical findings. All patients were staged according to the American Joint Committee on Cancer (7th edition) tumor node metastasis staging manual.

Endoscopic stenting procedure

Briefly, all self-expanding metallic stent (SEMS) placement procedures were performed by experienced endoscopists using a colonoscope with fluoroscopic guidance. Water-soluble contrast material was injected through a catheter to visualize the stricture. The stent luminal diameter varied, reaching 25 mm, and the length varied from 9 to 12 cm. A total of 17 uncovered and 7 covered SEMS were placed in all patients (Fig. 1b-d). Routine checks with direct radiography were performed after the procedure was completed (Fig. 1e).

All patients were allowed to take liquid one day after the procedure, and were discharged after their symptoms improved. A liquid and semi-solid diet was recommended for the first week. The curative surgery was also arranged and the specimen with stent was found (Fig. 1f).

The technical success rate was defined as the proportion of patients with a correctly-placed SEMS across the entire stricture length relative to the total number of patients. The clinical success rate was defined as the proportion of patients with technical success and successful maintenance of stent function before the elective surgery relative to the total number of patients. The surgical success rate of colorectal stent placement as a bridge to surgery was defined as the proportion of patients with successful surgical procedures. Unsuccessful surgical outcomes were defined as those related to insufficient colonic decompression.

Results

Demographics and patient characteristics

A total of 24 patients with colorectal cancer were evaluated (58% male and 42% female). The median age was 66 years (range, 41 to 87 years). The disease stage was clinically categorized as stage 2 in 4 patients (17%) and stage 3 in 15 patients (62%); 5 patients (21%) had metastatic disease. The obstruction

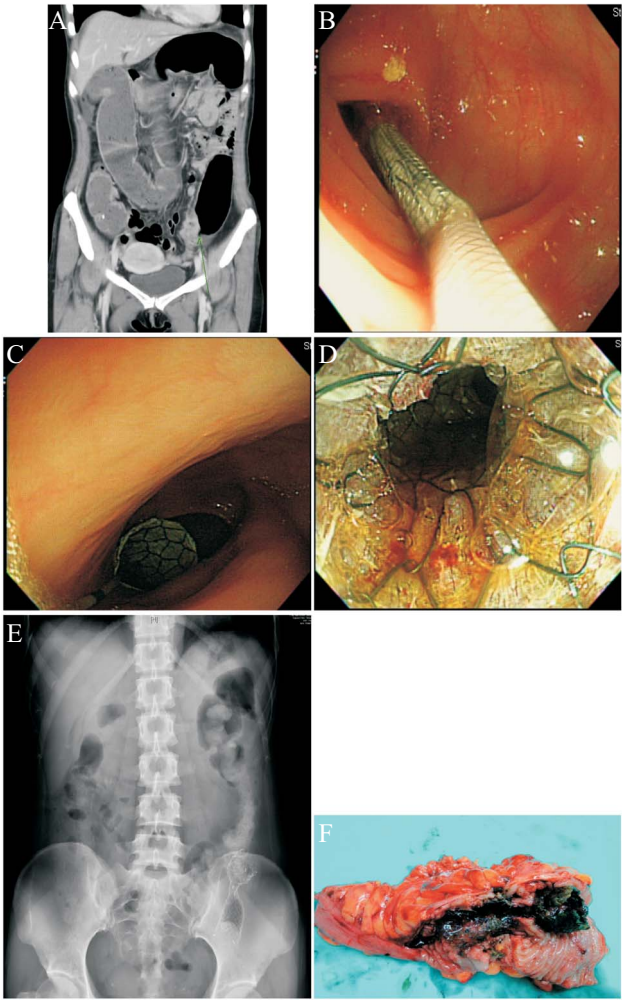

Fig. 1. (a) Abdominal computed tomography image of a patient with a sigmoid colon tumor with obstruction before stent placement. (b) Cannulation of the stenotic segment using a guidewire. (c) The stent is placed through the channel of the endoscope and expands when in position. (d) Colonic decompression after stent placement. (e) Direct radiography after the procedure was completed. (f) Colon with stent after curative resection.

was located in the ascending colon in 1 patient, transverse colon in 3, descending region in 4, sigmoid region in 13, and rectosigmoid colon in 3. None of the patients received chemotherapy before stenting. The clinicopathological characteristics are shown in Table 1.

Stent-related outcomes

SEMS placement was technically successful in 92% of cases and was clinically successful in 88% of cases. Stent-related complication rate was 12%, with 1 case of migration (4%), 1 continued occlusion (4%), and 1 perforation (4%) (Table 2).

Migration occurred in a patient with sigmoid colon cancer. Three days after stent insertion, the patient still complained of abdominal distension, and stent migration was observed on follow-up imaging. Subsequently, loop colostomy was performed. One month later, the patient underwent open anterior resection for sigmoid colon cancer.

Perforation occurred in a patient with a tumor located in the sigmoid colon. During the procedure, the patient complained of progressive abdominal pain. The abdominal computed tomography scan revealed a large amount of free air, and colon perforation was highly suspected. The patient immediately underwent open curative surgery. Loop colostomy was also performed.

Continued occlusion occurred in a patient with sigmoid colon cancer. During the procedure, the stent failed to adequately expand. Due to the continued occlusion, the patient immediately underwent open curative surgery.

Surgical outcomes

The median time to surgery after stenting was 16 ± 8 days. All clinically successful cases underwent laparoscopic curative surgery without fecal diversion. No mortality or anastomotic leakage was observed within 30 days of the procedure (Table 3).

Discussion

Endoscopic stenting has become an established intervention for patients with colorectal obstruction.[5,6] Stenting has gained acceptance as an alternative to

Table 1. Patient demographics

Number of patients	24
Sex	
Male	14
Female	10
Median age, years (range)	66 (41-87)
Median time to surgery, days	16 ± 8
Obstruction grade	
Complete	18 (75%)
Incomplete	6 (25%)
Tumor site	
Ascending colon	1 (4%)
Transverse colon	3 (12.5%)
Descending colon	3 (12.5%)
Sigmoid	14 (58.5%)
Rectosigmoid junction	3 (12.5%)
Rectum	0 (0%)
Clinical stage	
I	0 (0%)
II	4 (17%)
III	15 (62%)
IV	5 (21%)

Table 2. Technical and clinical success rates of stent placement

	N = 24 (%)
Technical success rate	22 (92%)
Occlusion	1 (4%)
Perforation	1 (4%)
Clinical success rate	21 (88%)
Occlusion	1 (4%)
Migration	1 (4%)
Perforation	1 (4%)

Table 3. Surgical outcomes

	N = 24 (%)
Laparoscopic resection	21 (88%)
Conversion rate	0 (0%)
Stoma creation	0 (0%)
Anastomotic leakage	0 (0%)
Laparotomy resection	3 (12%)
Stoma creation	2 (8%)
Anastomotic leakage	0 (0%)
Wound infection	2 (8%)

surgical intervention in the emergency setting due to the increased risks associated with surgery under such circumstances. Endoscopic stenting has numerous short-term benefits over surgical intervention, including a shorter recovery time, lower morbidity, and lower mortality.[7] The technique is also increasingly used as a practical solution for malignant obstruction, as it provides symptomatic relief and is well-tolerated by patients.[8]

Complete obstruction renders stent placement more difficult and has been suggested as a risk factor for stent-related complications because the expansion of the stent in a completely-occluded bowel may cause microperforations in friable tissues.[9,10] However, in a previous report, colonic stenting had high technical (98.4%) and clinical (89.9%) success rates when used for palliation or as a bridge to surgery in patients with colorectal cancer,[11] consistent with the results of the present study and those of previous large-scale meta-analyses (88% to 100% technical success rate; 84% to 94% clinical success rate). Furthermore, the spectrum of major complications observed in the present study, namely, perforation (4%), stent migration (4%), and re-obstruction (4%), is consistent with that previously reported (3.7%-9% for perforation, 2.1%-11.8% for migration, and 2.1%-9% for occlusion).[6,10,12]

The favorable stenting results in the present study included a high success rate and low stent-related complication rate. However, it should be noted that stent placement works well in experienced hands, and less so in centers that do not routinely perform this procedure.[13-15] In addition, the present study's results suggest that stent placement as a bridge to surgery achieves a high laparoscopic resection rate with low conversion and morbidity rates, particularly wound infection. However, colon stenting failed to show a clinical advantage over emergency surgery in a recent randomized study. Those authors concluded that it should be used as an alternative treatment with caution due to concerns regarding perforation-related tumor spread.[16] In contrast, there were no significant unfavorable outcomes in the present study.

The main limitations of the present study include its retrospective design and limited number of patients. Therefore, the reported results should be interpreted with caution. Furthermore, oncologic outcome data were not available to allow us to assess survival differences between the successful and unsuccessful groups.

Conclusions

In our experience, colonic stenting as a bridge to surgery provides surgical advantages, with a fair surgical success rate and low overall stoma rate, and without a high risk of anastomotic leakage or intra-abdominal abscess. However, the oncologic outcomes associated with colonic stenting as a bridge to surgery require further evaluation.

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原　著

金屬支架作為阻塞性惡性結腸直腸癌銜接根除性手術：單一醫院經驗分享

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目的　評估自擴張金屬支架放置對阻塞性惡性結腸直腸癌銜接根除性手術的安全性和有效性。

方法　自 2013 年 4 月至 2016 年 12 月 24 名惡性結腸直腸癌阻塞患者接受自擴張金屬支架放置後進行根除性手術的回顧性研究。

結果　技術和臨床成功率分別為 92% 和 88%。與支架置放相關的併發症共 12%，包括穿孔 (4%)，支架移位 (4%) 及再阻塞 (4%)。再阻塞與穿孔的病人接受立即傳統剖腹腫瘤根除手術併施作人工肛門。支架置放後平均約 16 ± 8 天進行根除性手術。所有臨床成功的患者皆順利的接受腹腔鏡根除手術，無須人工肛門，也無任何手術後 30 天內相關併發症或死亡。

結論　自擴張金屬支架作為阻塞性惡性結腸直腸癌銜接根除性手術是有功效和安全的，唯腫瘤相關預後還需進一步評估。

關鍵詞　自擴張金屬支架、銜接根除性手術、惡性結腸直腸阻塞。