RESEARCH ARTICLE

Emergency Surgery of Obstructed Carcinoma of the Left Colon with Perforation of the Cecum: Colectomy and Anastomosis Series

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ABSTRACT

Aim: The operation of choice for obstructed carcinoma of the left-side colon with perforation on the cecum is controversial. This study evaluated the timing of subtotal/total colectomy in acutely obstructed carcinoma of the left-side colon with perforation on the cecum.

Method: Twelve patients with cecal perforation due to obstructed left-side colon tumor were included in this study. The patients were evaluated for age, gender, application time, presence of systemic diseases, Acute Physiology and Chronic Health Evaluation II scores, primary tumor localization, tumor stage, type of surgical operation, Mannheim Peritonitis Index, morbidity, and mortality.

Results: Seven adenocarcinomas were localized on the left colon, three were localized on the midsigmoid, and two were localized on the rectosigmoid junction. All patients had a massively distended colon with perforation on the cecum. Seven patients underwent subtotal colectomy, while five patients underwent total colectomy. After the resection, anastomosis was performed using a circular stapler. After anastomosis, loop ileostomy was performed on the right side of the abdomen for all patients for anastomosis safety.

Conclusion: This study suggests that resection, anastomosis, and protective loop ileostomy are viable surgical alternatives, even in emergency conditions, if they can be performed together with decompression and peritoneal lavage in the surgical treatment of cecum perforation due to obstructed left colon tumors.

Keywords: Cecum perforation, colectomy, left colon, tumor obstruction

Introduction

The operation of choice for acutely obstructed carcinoma of the left colon with a massively distended and fecal-loaded colon with ischemic lesions and serosal tears or perforation on the cecum is controversial. Mechanical large bowel obstruction causes bowel dilation, mucosal edema, and impaired venous and arterial blood flow to the bowel. If the ileocecal valve is competent, colonic distention is greater, which increases the risk of ischemia and perforation. In patients with a competent ileocecal valve, the areas at risk for perforation are the cecum and the primary tumor. Left-side colonic carcinomas cause colonic obstruction much earlier in their development because the colon is narrower and the stool is harder in that area. According to the law of

Laplace, in a long pliable tube, the site of the largest diameter requires the least pressure to distend. Therefore, the cecum is the most common site of perforation in patients with distal large bowel obstruction in the setting of a competent ileocecal valve. Subtotal or total colectomy with anastomosis is indicated in patients with right-sided concomitant tumors or ischemic lesions or serosal tears on the cecum. Performing subtotal or total colectomy for left bowel obstruction without these indications is seen as controversial.[1-4]

The incidence of colorectal cancer was estimated to be 84/100,000 people per year during 2012-2016. Acute colorectal obstruction is associated with tumors in the left flexure and descending colon. Between 8% and 29% of patients with colon cancer present with large bowel

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obstruction, and 3-8% of patients have perforation and peritonitis, while bleeding is less common.[5,6]

This study aims to explore acute obstructive carcinoma of the left colon with perforation of the cecum.

Materials and Methods

Between 2008 and 2020, 178 patients with tumor-related colonic obstruction presented to the surgical department. The patients had distended abdomens without passing gasses, and there were signs of peritonitis with clinical signs of rebound test positive. In 12 patients, cecal perforation was noticed during abdominal exploration. The patients were evaluated for age, gender, hospital application time, presence of systemic diseases, Acute Physiology and Chronic Health Evaluation (APACHE) II scores,[7] primary tumor localization, tumor stage (TNM staging systems),[8] operative findings, type of surgical operation, Mannheim Peritonitis Index (MPI),[9] and causes and rates of morbidity and mortality. The APACHE II and MPI scores were calculated on the day of laparotomy, and consent was provided by all patients. Furthermore, permission was obtained by the Memorial Diyarbakır Hospital Ethics Committee for this retrospective study (approval number: 2022/103, date: 01.12.2022).

After the patients were evaluated through physical examination, they underwent routine blood tests, erect abdominal X-rays, whole abdomen ultrasonography, and contrast-enhanced whole abdomen computed tomography (CT).

Operative mortality was defined as death that occurred within one month or operation-related death during hospitalization.

After the preoperative preparations were completed, all patients were operated on under emergency conditions using a median incision. Furthermore, all patients were operated on under general anesthesia, and decompression was applied to empty the contents of the colon. Isotonic sodium chloride solution was used for peritoneal lavage and drains were placed in the peritoneal cavity. All patients were moved to the intensive care unit after the operation. The intraoperative damage control method and the surgical technique to be applied for the tumors were left to the decision and clinical approach of the operating surgeon. When subtotal colectomy was performed, the colon, after mobilization, was resected from the terminal ileum distal to the tumor (minimum distance to the tumor was 5 cm). In total colectomy, the colon was resected from the terminal ileum distal to the upper rectum. Moreover, after resection, anastomosis was performed using a circular stapler. After anastomosis, a loop ileostomy was performed on the right

side of the abdomen for all patients for anastomosis safety. Total or subtotal colectomy was preferred according to the location of the tumor.

All patients received standard life-supporting resuscitation protocols, and postoperative patients were moved to the intensive care unit. The patients received a combination of third-generation cephalosporin and anti-anaerobic antibiotics preoperatively. In patients with septic complications, antibiotic therapy was continued based on the culture antibiogram result. Sequential compression devices were placed in all patients for deep venous thrombosis prophylaxis, and they were started on low-molecular-weight heparin.

Statistical Analysis

Continuous variables were expressed as mean ± standard deviation, except where otherwise stated.

Results

Table 1 shows demographic and clinical data on age, gender, hospital application time, APACHE II score, MPI, TNM staging systems, tumor location, morbidity, and mortality.

The mean age of the 12 patients was 62±9.21 (41-72) years, and there were 7 male and 5 female patients. The average hospital application time was 3.14±1.34 (1-5) days. In six patients, systemic diseases were also present, and diabetes mellitus was the most common among them. The mean score of APACHE II was 27.2±8.26 (17-41), and the mean score of MPI was 30±5.68 (22-38).

Seven adenocarcinomas were localized on the left colon, three were localized on the midsigmoid, and two were localized on the rectosigmoid junction. All patients had a massively distended colon with perforation on the cecum. Seven patients underwent subtotal colectomy, while five patients underwent total colectomy. No macroscopic peritoneal or liver metastases were observed in any of the patients.

Pathological examination of the specimens confirmed colonic carcinoma in all patients (stage 2: three cases, stage 3: seven cases, and stage 4: two cases). The mean number of examined lymph nodes was 21±4.3, with a 17-28 range. One of the sigmoid carcinoma patients died due to intra-abdominal sepsis and multiple organ failure on postoperative day four. No postoperative anastomotic leakage or fistula was accounted for, and intra-abdominal abscess developed in three patients within the first month. Additionally, CT-guided percutaneous drainage was performed, and wound infections developed in five patients, but they healed without any problems. The average hospital stay was 10±1.32 days, with an 8-14 days range.

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Table 1. Characteristics of the patients

Patient	Age	Operation interval (day)	APACHE II	MPI	TNM stage	Tumor location	Mortality	Morbidity
1	65	3	25	29	II	Left	-	WI
2	58	2	17	24	III	Sigmoid	-	IAA + WI
3	44	4	21	22	III	Left	-	-
4	76	4	35	38	III	Rectosigmoid	-	IAA + WI
5	73	3	24	32	III	Left	-	WI
6	62	1	28	30	IV	Sigmoid	-	-
7	70	5	41	35	III	Left	IA sepsis	-
8	68	3	32	32	III	Left	-	IAA + WI
9	70	2	35	36	III	Left	-	-
10	69	1	28	30	IV	Sigmoid	-	-
11	66	2	30	32	II	Left	-	-
12	72	2	32	30	II	Rectosigmoid	-	-

MPI: Mannheim Peritonitis Index, IA: Intra-abdominal, WI: Wound Infection, IAA: Intra-abdominal abscess, APACHE II: Acute Physiology and Chronic Health Evaluation II

Discussion

Distal obstructions of the colon, in the presence of a competent ileocecal valve, may result in colonic perforation. The law of Laplace dictates that the tension required to distend a hollow tube is lowest at the widest point. Clinically, this explains why the cecum is the most common site of perforation in distal large bowel obstruction.[2]

Increased wall tension in the cecum due to closed loop large bowel obstruction causes ischemia to the bowel wall and longitudinal splitting of the serosa with a herniation of the mucosa through the diastasis of muscle. Cecal perforation is typically present on the anterior longitudinal axis, with sharp uninflamed margins,[2,4] and its risk increases with a diameter of more than 12 cm and intraluminal pressure greater than 80 mmHg.[10] Primary tumor localization in the left flexure had the highest obstruction rate (34%). Studies have found that almost half of the tumors with this localization result in obstruction.[11,12]

Albers et al.[13] printed a study on the perforation of the cecum in 1956. They said that the causes of perforation of the cecum are trauma, obstruction of the colon, inflammatory disease, and malignant tumors of the cecum. Among 72 patients, cecal perforation due to large bowel obstruction was observed in 18 patients, and the mortality rate was 72%. The researchers showed the typical clinical picture as an elderly patient who complained of abdominal pain for 6-10 days and presented marked distention and right lower quadrant tenderness. Free intraperitoneal air was noted using a roentgenogram in 31% of the patients. In the operative management of obstructive perforations of the cecum, exteriorization of the cecum with

adequate, early decompression was the procedure of choice. Decompression at the time of surgery not only improved the patients' survival rate but also made the cecum easier to exteriorize. Exteriorized cecostomy was used in 10 patients: 6 patients died, and tube cecostomy was not exteriorized in three patients, who also died. This study performed subtotal or total colectomy under emergency conditions for the surgical treatment of cecum perforation due to left colon tumors with the presence of obstruction. The American Society of Colon and Rectal Surgeons recently established guidelines for colon cancer surgery as follows: 1) the extent of bowel resection and margins (5-10 cm of the normal bowel on either side of the primary tumor); 2) en-bloc resection of adherent tumors for clinically T4 lesions; and 3) lymphadenectomy (at least a minimum of 15 nodes must be examined).[5] In this study, the number of lymph nodes was consistent with the literature. Moreover, one patient died due to multiple organ failure.

In the study of Perrier et al.[14], 113 colonic obstructions caused by cancer were treated initially using tube cecostomy, and second operations were performed on the 98 surviving patients. The researchers pointed out that cecostomy decreased the mortality rate of the following operations. Therefore, cecostomy was a useful and less invasive surgical procedure for patients presenting with colonic obstruction caused by cancer. Tube cecostomy was supported in the management of acute left colonic obstruction with minor or no deaths.[15-17] This study does not recommend cecostomy (tube cecostomy or exteriorization) as a routine method in the treatment of acute left-sided obstructive colon

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cancer with cecal perforation. In the presence of extensive peritoneal contamination, cecostomy can be applied in emergency cases where colectomy is not possible and the general condition is poor.

One-stage emergency subtotal or total colectomy to relieve bowel obstruction and tumor resection in a massively distended and fecal-loaded colon with ischemic lesions and serosal tears on the cecum is supported in previous studies.[1-3]

Segmental resection and anastomosis can be the preferred option in patients with malignant left-sided bowel obstruction without cecal perforation.[1] If cecal perforation is not present, subtotal colectomy should not be performed. Subtotal colectomy was compared with segmental resection after intraoperative lavage in patients with malignant left-sided obstructed tumors.[18] Segmental resection following intraoperative irrigation is the preferred option, except when there is cecal perforation or synchronous neoplasms in the colon. In this case, subtotal colectomy is more appropriate. The mortality and complication rates did not differ between the groups, but in the fourth postoperative month, the number of bowel movements was significantly higher in the subtotal colectomy group. In this study, there was an increase in the number of defecations during the follow up of patients.

In the study of Ngu et al.[19], 10 (16.7%) of 60 patients presenting with acute malignant left colon obstruction underwent CT scans. The presence of cecal wall pneumatosis was evaluated as CT evidence of possible perforation.[19] This study used CT as the imaging method, and free fluid and free air were observed in the patients' reports.

Hennekinne-Mucci et al.[3] reported 27 cases of cecal serosal tears among 156 patients with acute left colonic obstruction: 2 cases presented with wall (17.3%) and significant diastatic perforation (0.13%). In the prospective study of Anwar et al.[20], it was reported that 10 (1.31%) of 762 consecutive patients with colon tumors presented with acute perforation proximal to the tumor. In a retrospective study by Lee et al.[21], 7 (0.57%) of 1,227 patients with colorectal tumors reported a proximal perforation rate of. The study of Ozogul et al.[22] reported that in 26 (11.6%) of 223 patients with colon cancer, colonic perforation proximal to the tumor was applied. This rate was the highest in the literature, and in this study, the rate was 6.74%.

Conclusion

This study suggests that resection, anastomosis, and protective loop ileostomy are viable surgical alternatives, even in emergency conditions, if they can be performed together with decompression and peritoneal lavage in the surgical treatment of cecum perforation due to obstructed left colon tumors.

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