Original paper

Perforated colorectal cancers: clinical outcomes of 18 patients who underwent emergency surgery

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Abstract

Introduction: Although colon cancer perforations are rare among acute abdominal syndromes, it is a clinical picture with high mortality that requires urgent treatment.

Aim: In this study, the clinical results of patients who were operated in emergency conditions due to colorectal cancer perforation were evaluated.

Material and methods: The data of 18 patients treated for colorectal cancer perforation in our clinic between February 2014 and February 2017 were retrospectively reviewed. The following data were evaluated: demographic features of the patients, location of the tumour, metastasis, stage of the tumour, number of lymph nodes dissected, survival, type, and prognosis of the surgery.

Results: Eight (44%) of 18 patients with perforated colon cancers were female and 10 (56%) were male. The mean age was 65.2 (31–104) years. Four of the patients had liver metastasis only, and 5 had multiple metastases. All cases had sudden abdominal pain and acute abdominal clinical findings. Fourteen of the patients underwent full resection, and 4 of them underwent partial resection and trephine stoma (colostomy). Perioperative mortality was not observed. The long-term mortality rate in our study was 77.7% (n = 14), and the operative mortality rate was 44% (n = 8). Additional organ injuries occurred during resection in 2 patients.

Conclusions: Colorectal cancer perforation seen in advanced ages is one of the causes of acute abdominal syndrome, which can be fatal. The general condition of the patient and the size and localization of the perforation should be taken into consideration in the choice of treatment. Curative surgery can also be performed in perforated colorectal cancers. However, partial resection and trephine colostomy should be performed in patients with multiple metastases and poor general condition.

Introduction

Mortality in colorectal surgeries performed under emergency conditions is higher than in elective surgeries. Perforated colon cancers are rarely seen among the causes of acute abdominal syndrome but have a high mortality rate. In recent years, an increase in colorectal cancer perforations has been observed [1]. Faecal peritonitis, which develops as a result of gastrointestinal contamination in the abdominal cavity, requires urgent surgical intervention due to its mortality. The perforated colonic segment should be resected to prevent the patient from being exposed to faecal contents. This resection is necessary for faecal content, as well as for tumour cells not to spill into the abdominal cavity [2]. The general condition of the patient, advanced age, concomitant diseases, the degree of spreading of the faecaloma, and the localization and size of the perforation seriously affect the prognosis. Mortality rates in these patients are much higher compared to patients with colorectal cancer who have been operated urgently or electively due to mechanical bowel obstruction [3]. One of the biggest problems in these patients is delayed diagnosis. Sepsis and related complications cause the general condition of the patient to worsen and the mortality rate to increase [4]. The choice of surgical procedures in these patients is still controversial.

Aim

In this study, we presented the clinical results of patients who were operated in emergency conditions due to colorectal cancer perforation.

Material and methods

The data of patients admitted to Kartal Dr Lütfi Kırdar Training and Research Hospital, Istanbul, Turkey with acute abdominal syndrome due to colorectal cancer perforation between February 2014 and February 2017 were retrospectively analysed. All cases had sudden abdominal pain and acute abdominal clinical findings. Computed tomography was performed in all cases in the emergency service. Patients' age, gender, localization of the tumour, location of perforation, pathology results, number of lymph nodes dissected, surgical margin, presence of residual tissue, distant metastasis, method of surgery, surveys, mortality and morbidity rates, and perioperative complications were determined. Surgical intervention was performed in all patients following preoperative third-generation cephalosporin prophylaxis. American Society of Anesthesiologists (ASA) scoring was evaluated for risk assessment. Patients who died within 30 days postoperatively were defined as "operative mortality".

Ethics Committee Approval

Authors declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects".

Statistical analysis

To determine the factors affecting mortality and morbidity, risk factors were identified and grouped first. Statistical differences between groups were analysed using the χ^2 test. For those with a statistically significant difference in these tests, logistic regression testing was applied and factors affecting mortality and morbidity were determined. When $p < 0.05$ was found in all statistical studies, the result was considered significant. The statistical analyses were performed using SPSS (Statistical Package for the Social Sciences ver. 11.5, SPSS Inc, Chicago, Illinois, USA) computer software.

Results

Eight (44%) of the 18 patients were female and 10 (56%) were male. The mean age was 65.2 (31–104) years. All cases had sudden abdominal pain and acute abdominal clinical findings. When the patients were admitted to the emergency clinic, the mean white blood cells (WBC) count was 17.400/mm^3 (7400–28000) and the mean level of C-reactive protein was 12.1 mg/l (6.2–24.9). Fourteen patients were ASA-4 and 4 were ASA-3. The most common location of tumours was the rectosigmoid junction. In 8 (44%) cases, the tumour was in the sigmoid colon, 7 (38.8%) in the cecum, 1 (0.5%) in the hepatic flexure, and 2 (1.1%) in the splenic flexure. Two (11%) of the cases were reoperated due to recurrent rectal cancer. The mean number of lymph nodes dissected was 12.4 (2–26). In 7 (38.8%) cases, the number of metastatic lymph nodes was between 1 and 3 (N1), and 11 (61.1%) had more than 3 (N2). In 3 (16.6%) of the resected cases, the surgical margin was positive. Perioperative mortality was not observed. While primary tumour was resected in 14 (77.57%) cases, trephine colostomy was performed in 4 cases in which resection was not possible. In 6 (33%) patients residual tumours were left. In 10 (56%) cases primary intestinal anastomosis was performed after resection. In 8 of the cases undergoing anastomosis a protective ileostomy was performed. Postoperative anastomosis leakage was observed in 2 (20%) of 10 cases with primary anastomosis. There was no protective ileostomy in 2 patients with anastomosis leak. Distant metastasis was present in 8 (44%) of the cases. All of the cases were T4 tumours. Perioperative additional organ injuries developed in 2 cases. One patient had left renal vein injury, and so primary vascular repair was performed. Splenic injury occurred in 1 patient, and so splenectomy was performed. None of the patients underwent liver resection or metastasectomy. The postoperative morbidity rate was 27.7% ($n = 5$). Postoperative mortality developed in 8 (44%) of the cases. In 7 (38.8%) cases the cause of postoperative mortality was sepsis and multiple organ failure, while in 1 (5.5%) case it was acute thromboembolism. Postoperative mortality was observed in 4 (50%) of 8 cases without gastrointestinal anastomosis and in 4 (40%) of 10 cases with anastomosis ($p = 0.602$). Tumour resection was performed in all of the resectable cases. Postoperative mortality was observed in 2 of 4 nonresectable cases ($p = 0.043$). Histopathological examination of all patients was evaluated as adenocarcinoma. Eight (44%) of the patients received chemotherapy when they applied to the emergency department. Two received neoadjuvant radiotherapy. The clinical features of the cases are shown in Tables I and II.

Discussion

Colorectal cancers are among the most common tumours of the gastrointestinal tract. The most common cause of colon perforations (58–63%) is colon diverticulum, and the second most common cause is colon

Table I. Characteristics and surgical procedures of the patients

Age gender	ASA	Residue tm	Anastomosis	Protective ileostomy	Stage	CT	RT	Additional organ injury
61 M	4	Unresectable	–	–	Multiple metastasis	+	+	–
78 F	4	+	+	+	T4	–	–	Small bowel serosa injury + splenectomy
60 M	4	–	+	–	T4	–	–	–
87 F	4	+	–	–	T4 + Hepatic metastasis	–	–	Left renal vein injury
104 M	4	+	–	–	T4	–	–	–
83 F	3	+	–	+	T4 + Paraaortic lymph nodes	–	–	–
85 M	4	–	+	–	T4	–	–	–
48 M	4	+	–	–	Hepatic metastasis + Paraaortic lymph nodes	–	–	–
74 M	4	–	+	+	T4	+	–	–
59 M	4	–	+	+	T4 + Hepatic metastasis	+	–	–
31 F	4	Unresectable	–	–	Multiple metastasis	+	–	–
43 F	3	–	+	+	T4	+	–	–
77 F	4	+	+	+	T4	–	–	–
64 F	4	Unresectable	–	–	T4 + Multiple metastasis	–	–	–
56 M	4	Unresectable	–	–	T4 + Multiple metastasis	–	–	–
45 F	4	–	+	+	T4	–	–	–
60 M	4	–	+	–	T4	–	–	–
60 M	4	–	+	+	T4	–	+	–

CT – chemotherapy, RT – radiotherapy.

tumour perforations (14.1–21%) [5]. Treatment of perforated colorectal cancer is complicated, and the prognosis is rarely good. Colorectal cancer-related perforation is considered an advanced stage due to the potential of tumour cells to spread to the peritoneum throughout the perforation region [6].

The rate of malignant perforation due to colorectal tumours is between 1.2% and 9%, and the mortality rate is between 12% and 48% despite modern developments in the management of intensive care services [7]. Many studies have demonstrated that patients with perforated colon and rectum tumours have high perioperative mortality, and long-term survival is poor. This poor result is based on many risk factors such as advanced age of patients, degree of peritonitis, septic stage, location of perforation, stage of tumour, cardiopulmonary comorbidities, ASA degree, and presence of distant metastasis [8]. In the study by Mandava *et al.* [9], 5-year disease-free survival was 14%. In our study the mean follow-up period was 4.2 years and the 3-year survival rate was 44.4% (n = 8).

It is necessary to take the perforated colon tumour out of the abdominal cavity with the related bowel loops. In these cases, because the disease is usually at an advanced stage, resection of tumours requires a very difficult surgical procedure [10]. In our study, perforated tumours could be resected in 77.7% of the cases. However, residual tumour tissue was left in 42.8% of these cases. In surgical procedures to be performed by leaving the intestine segment with perforated tumour in the abdomen, almost all of these cases progress due to infection-related complications. Sepsis was the most common cause of mortality in the hospital. Although chemotherapy has significantly improved recently, it may cause thromboembolism, delayed wound healing, bleeding, and perforation, especially in the anastomosis area [11]. Postoperative mortality was observed in 25% (n = 2) of our patients who received chemotherapy.

Table II. Operative and postoperative outcomes

Age gender	Diagnosis	Resection (1 – full/ 2 – partial)	Number of lymph nodes	Number of positive lymph nodes	Surgical border	Mortality	Operative mortality	*P*-value
61 M	Recurrent rectum ca	2	22	6	–	+	_	
78 F	Rectum ca	1	20	0	–	+	+	0.062
60 M	Rectum ca	1	15	1	–	_	_	
87 F	Splenic flexure ca	1	5	2	–	+	+	
104 M	Cecum ca	1	12	3	–	+	+	
83 F	Cecum ca	1	18	4	–	_	_	
85 M	Cecum ca	1	6	0	–	+	_	
48 M	Cecum ca	1	26	5	+	+	+	
74 M	Rectum ca	2	1	0	+	_	_	
59 M	Sigmoid ca	1	15	3	–	+	+	
31 F	Recurrent rectum ca	2	15	4	–	_	_	
43 F	Rectosigmoid ca	1	7	0	–	+	_	
77 F	Cecum ca	2	2	1	+	+	_	
64 F	Cecum ca	1	15	7	–	+	+	0.043
56 M	Cecum ca	1	4	0	–	+	+	
45 F	Hepatic flexure ca	1	12	3	–	+	+	
60 M	Splenic flexure ca	1	13	5	–	+	_	
60 M	Rectum ca	1	15	4	–	+	_	

The issue of performing anastomosis in the same session after resection in patients with perforated colon cancer is controversial. The reason for this situation is that the operation is performed in emergency conditions, so the contamination of the anastomosis area, the risk of anastomosis leakage, and as a result the morbidity and mortality rates are high [12]. There are studies suggesting use of the Hartmann procedure after perforated left colon cancer surgeries or colostomy after resection. After right hemicolectomy surgeries, primary anastomosis is recommended in the same session [13, 14]. There are also studies indicating otherwise. Biondo *et al.* [15] reported that primary anastomosis can be performed after resection, except for in patients with high comorbidity, sepsis with faecal peritonitis, and in patients with immune deficiency. Even in cases with diffuse peritonitis, it was reported that primary anastomosis can be performed safely, and mortality and morbidity rates in cases with primary anastomosis do not differ greatly from multi-stage surgical procedures. However, the most important problem in these patients, whose general condition is very bad and systemic effects of intraabdominal infection are seen, is anastomosis leak [16]. Our approach in this regard has been to avoid primary anastomosis in patients with faecal peritonitis. In cases with localized peritonitis, primary anastomosis was preferred.

Eight (80%) of 10 cases with anastomosis leakage had protective ileostomy; also, 20% (n = 2) had primary anastomosis. In the study conducted by Isbister [17], the rate of anastomosis leakage in patients with perforated colorectal cancer was reported as 6.3%. In contrast, the rate of anastomosis leakage in uncomplicated colorectal cancers is reported in the literature below 5%. The overall mortality rate in these patients is very high and is often associated with intra-abdominal infection [18, 19]. In our study 8 of the patients developed postoperative mortality. Postoperative mortality occurred in half of 4 unresectable cases.

Spontaneous perforation of colon and rectum cancers occurs either in advanced tumours or in cases that have been neglected and remained away from treatment. Faecal contents and tumour cells leaking from perforated bowel loops into the abdominal cavity cause high mortality. Therefore, these patients must be operated. In resected cases, multi-step surgeries involving anastomosis + protective ileostomy reduce postoperative mortality rates [20]. However, in our series the operative mortality rate was 37.5% (n = 3) in patients undergoing protective ileostomy. In addition, unpredict-

able risks of stoma closure may increase the morbidity rate in multi-step surgeries involving protective ileostomy [21, 22].

Conclusions

Colorectal cancer perforations have a high risk of postoperative mortality. In order not to spread the disease further by pouring the tumour cells from the faecal content and perforation area into the abdominal cavity, the tumoural colonic segment must be resected in these patients. When determining the surgical method, the general condition of the patient, the estimated time from the onset of perforation and the localization of the perforation should be taken into consideration. Partial resection and trephine colostomy should be performed in patients with multiple metastases and poor general condition.

Conflict of interest

The authors declare no conflict of interest.

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