

Factors affecting mortality in emergency surgery in cases of complicated colorectal cancer

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ABSTRACT

Aim To evaluate retrospectively demographic, clinical and histopathological variables effective on mortality in patients who had undergone emergency surgery due to complicated colorectal cancer.

Methods A total of 39 patients underwent urgent surgical interventions due to complicated colorectal cancer at the Department of General Surgery, Dursun Odabaş Medical Center, between January 2010 and January 2015. Thirty three of these were included in the study. Six patients were excluded because complete medical records had been missing. Medical records of the 33 cases were retrospectively reviewed.

Results There were 14 (42.5%) male and 19 (57.5%) female patients. Mean age was 60 years (range: 32- 83 years); 14 (42.5%) patients were less than 60 years old , while 19 (57.5%) were 60 years old or older. Operations were performed due to perforation (39.3%) and obstruction (60.6%) in 13 and 20 patients, respectively. Tumor localization was in the right and transverse colon in nine (21.2%) and in the left colon in 24 cases (72.7%). Eleven (33.3%) patients underwent resection and anastomosis, 13 (39.3%) resection and ostomy, and nine (27.2%) patients underwent ostomy alone without any resection. Postoperative mortality occurred in nine cases (27.2%).

Conclusions High mortality should be expected in females older than 60 years with a left sided colon tumor or with another synchronous tumor and in perforated tumors. Unnecessary major resections should be avoided and primary pathology should be in the focus of treatment in order to decrease the mortality and morbidity rates.

Key words: colorectal cancer, perforation, obstruction, mortality

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INTRODUCTION

Colorectal carcinomas (CRC) are the third most frequently diagnosed cancers worldwide (1). Weakness, fatigue, weight loss, iron deficiency anemia and abdominal pain are seen frequently in patients with colon cancer diagnosed in advanced stages. Symptoms depend on the stage of the tumor, early or advanced and its localization (2). Right colon tumors are demonstrated with anemia, while left colon tumors cause abdominal pain, rectal bleeding and obstruction (3).

Colonoscopy is the gold standard modality in screening for colon cancer. Its advantages include high sensitivity, its capability of performing biopsy from the suspected areas and possibility of polypectomy, when a polyp is seen. Other screening tests include fecal occult blood test, flexible sigmoidoscopy and computed tomographic colonography (virtual colonoscopy) (4).

Most of the resections for CRC are performed electively, however 15-30% of those necessitate emergency surgical intervention (1). Obstruction, perforation and bleeding are the most frequently encountered conditions requiring surgery (1,5,6). Metabolic, cardiovascular, infectious or respiratory comorbidities may develop in patients with complicated colorectal cancer. These conditions substantially increase mortality (7).

The aim of this study was to investigate factors affecting mortality in patients who had undergone emergency surgical interventions due to complicated colorectal cancer. In this study, we aimed to argue the possible outcomes of complicated colorectal cancer with data from our region and as a result we intended to present factors affecting mortality.

PATIENTS AND METHODS

Patient selection

A total number of 39 patients underwent urgent surgical interventions due to complicated colorectal cancer at the School of Medicine, University of Van Yuzuncuyil, Department of General Surgery between January 2010 and January 2015. Thirty three of these cases were included in this study (six cases were excluded because complete medical records were missing). Medical records of the 33 cases were retrospectively reviewed.

Effects of age (years), gender, time passed from the presentation to operation (hours), white blood cell count (WBC, $\times 10^9/L$), and serum creatinine level at presentation (mg/dL), type of presentation (perforation or obstruction), localization (right colon and transverse colon, left colon, tumor with two synchronized foci) and stage of the primary tumor (TNM Staging of the American Joint Committee on Cancer: AJCC) (8), type of the operation performed (resection and anastomosis, resection andostomy, ostomy alone), histological type (adenocarcinoma, diffuse B cell lymphoma) and differentiation (well differentiated, intermediate differentiation, poor differentiation) of the primary tumor, lymphovascular invasion (LVI) (Yes, No), perineural invasion (PNI) (Yes, No), and distant organ metastasis (Yes, No) on mortality were analyzed.

Postoperative mortality was assumed as the first 30 days after the operation.

Perforation and obstruction are the reasons for the urgent surgery in colorectal cancer despite that non-complicated primary colorectal cancer surgery is elective in our clinic. The cases presented in this study were complicated colorectal cancer cases presented to our emergency service with obstruction and perforation. To improve the cases with poor general condition and cases presenting electrolyte imbalance, or to prevent the etiology, or after insertion of nasogastric tube for ileus cases, the patients waited for a while, and accordingly the effect of the time between admittance and operation on mortality was studied.

Obstruction and perforation caused by the primary tumor is defined as complicated colorectal cancer.

A total of 21 (of the 33) cases had colon tumor, and 12 rectal tumor. An approval for the study was obtained from the Ethics Board of University of Yuzuncuyil, School of Medicine.

Statistical analysis

For the statistical analysis, descriptive analysis expressed in mean, standard deviation, minimum and maximum were used for continuous variables, while categorical variables were expressed in numbers and percentages. Non-parametric group means were compared using Mann-Whitney U test. Chi-Square test was used to define the association between mortality and categorical variables. The level of significance was accepted as 5%.

RESULTS

There were 14 (42.5%) male and 19 (57.5%) female patients. Mean age was 60 years (range: 32-83 years); 14 (42.5%) patients were less than 60 years old, while 19(57.5%) were 60 years old or older. Operations were performed due to perforation (39.3%) and obstruction (60.6%) in 13 and 20 patients, respectively. Tumor localization was the right and transverse colon in nine (21.2%) and left colon in 24 (72.7%) patients (Table 1).

Eleven (33.3%) patients underwent resection and anastomosis, 13(39.3%) resection and ostomy and nine patients (27.2%) underwent ostomy alone without any resection.

Histology of 32 (96.9%) cases showed adenocarcinoma and in one (3.0%) case diffuse B cell lymphoma. In fifteen (45.4%) cases tumor was well differentiated, in 12 (36.3%) it was intermediately differentiated and in five (15.1%) cases it was poorly differentiated. Lymphovascular

Table 1. Factors affecting mortality according to gender, age, type of tumor presentation, localization, duration passed from presentation to operation, white blood cell count, and preoperative creatinine concentration

Characteristics/ values	Mortality			p	
	No (%) of patients	Mortality rate % (No of patients)	No mortality		
Gender	Females	19 (57.5)	31.5 (6)	0.51	
	Males	14 (42.5)	21.4 (3)		
Age	<60	14 (42.5)	14.2 (2)	0.09	
	≥60	19 (57.5)	36.8 (7)		
Total		33 (100)	27.2 (9)	24	
Type of tumor presentation	Perforation	12 (36.3)	50(6)	8	
	Obstruction	21 (3.6)	14.2 (3)	16	
Tumor localization	Cecum	4 (12.1)	25 (1)	3	
	Right + transverse colon	Ascending colon	0	0	0
		Hepatic flexure	1 (3.0)	0	1
		Transverse colon	2 (6.0)	0	2
		Splenic flexure	0	0	0
	Left colon	Descending colon	1 (3.0)	1 (100)	0
		Sigmoid colon	10 (30.3)	3 (30)	7
	Rectum	12 (36.3)	3 (25)	9	
	Tumor with two synchronized foci*		1 (33.3)	2	
			Mortality	No mortality	
Mean duration passed from presentation to operation (hours)			62	86	0.93
Preoperative white blood cell count (Mean WBC count x10⁹/L)			14.4	11.4	0.07
Mean preoperative creatinine (mg/dL)			1.6	1.0	0.13

* sigmoid+descending colon; cecum+hepatic flexure; cecum +ascending colon

Table 2. Factors affecting mortality according to tumor operation type, histological type and differentiation, lymphovascular and perineural invasion, stage of the tumor, and distant organ metastasis

Characteristics	No of patients	Mortality		p
		Mortality rate % (No of patients)	No mortality	
Type of operation	Resection + anastomosis	11	27.2 (3)	0.36
	Resection + ostomy	13	38.4 (5)	
	Ostomy alone	9	11.1 (1)	
Histologic type and differentiation	Adenocarcinoma	32	8 (25)	0.09
	Diffuse B cell lymphoma	1	100 (1)	
	Well differentiated	15	46.6 (7)	
	Intermediate differentiation	12	0	
Lymphovascular invasion	Poor differentiation	5	20 (1)	0.02
	Present	13	46.1 (6)	
Perineural invasion	None	17	5.8 (1)	0.01
	Present	8	37.5 (3)	
Stage of the tumor	None	22	18.1 (4)	0.26
	Stage 0/1	0	0	
	Stage 2	15	20 (3)	
	Stage 3	11	27.2 (3)	
	Stage 4	5	20 (1)	
	Cannot be staged	2	100 (2)	
Distant organ metastasis	Present	5	20 (1)	0.52
	None	28	28.5 (8)	

invasion (LVI) was present in 13 (39.3%) cases, while 17 (51.5%) cases had no LVI; LVI could not be evaluated in three (9.0%) cases. Perineural invasion (PNI) was present in eight (24.2%), it was absent in 22 (66.6%) cases and could not be determined in three (9.0%) cases. Tumor staging was not possible to determine for two (6.0%) cases because one case was diffuse B cell lymphoma and in one case ostomy was opened before resection.

In 15 (45.4%) cases stage 2 was found, 11 (33.3%) cases were determined as stage 3, and five (15.1%) cases were stage 4. Distant metastasis was presented in only five (15.1%) cases.

Postoperative mortality was encountered in nine (27.2%) patients (Table 2).

DISCUSSION

The present study verifies the high rate of mortality in complicated colorectal cancer surgery similarly to other reports (9,10).

Operative mortality following operations performed due to obstruction or perforation of colorectal cancer has been reported to be 16-38% (11,12). In this present study, overall operative mortality of 27.2% was found. Mado et al. reported mortality rate due to colorectal perforation of 14.9% (13). In our study, mortality in colorectal cancer perforations and obstruction was 38.4% and 20%, respectively. This difference might be attributed to the fecal contamination, diffuse peritonitis, sepsis and multiple organ dysfunction syndrome (MODS) that are all associated with perforation (14).

Variable results have been reported in different studies related to patient's gender. McArdle and Hole reported that mortality was higher in males in elective surgery, while disease course was fatal in high frequency in females following emergency surgery (14). In the present study, mortality was higher in females (31.5%) compared to the males (21.4%). Although not statistically significant, it should be considered that complicated colorectal cancers may show a fatal course in female gender.

Similarly to other studies (7), the effect of age on mortality in the present study was analyzed using the cut-off age set as 60 years. Mean age was 60 years among our cases, the mean age of the cases

with and without mortality was 66 years and 58 years, respectively; three fourths of patients with a fatal course were at the age of 60 years or older. We found increasing mortality rate with age, although without statistical significance. Comorbidity diseases such as metabolic, cardiovascular, infectious or respiratory conditions have been reported as the cause of high mortality in cases with an age of 60 or older (7).

Mortality rate in this study increased with increased WBC (without statistical significance), as well as no statistically significant effect of preoperative creatinine level on postoperative mortality was found. We believe that the probability of mortality should not be determined based on laboratory results. It is our understanding that patients' situation should be evaluated as a whole.

In the present study a mean duration from presentation to emergency service and time of operation was 80 hours, 62 hours and 86 hours in the overall series, in cases with mortality and in cases without mortality, respectively; time to operation was not found to be effective on mortality. Despite these results, we think that patients should be admitted for surgical intervention as soon as possible.

When the association of the type of operation and mortality was evaluated, mortality was found to be lowest in cases with ostomy alone (11.1%) and the highest mortality occurred in cases with resection and ostomy (38.4%). According to the results of our study, only ostomy is preferable for patients with poor general conditions.

Cases that undergo emergency surgery due to complicated colorectal cancer are advanced stage cancers as reported in the literature (American Joint Committee on Cancer (AJCC) stages III and IV) (8). In those cases, T3-T4 tumors and N1-N2 lymph node involvement are seen more frequently compared to elective operations (15,16). A great majority of the patients with development of mortality were stage 2 and stage 3 in the present study. This was considered to be due to regional differences in colorectal cancer and tumor biology (4).

Tumor grade (high grade disease) and presence of extramural vascular invasion and perineural invasion among the pathological specifications have been reported to be poor prognostic factors

(17,18). In this present study, mortality occurred in cases with well-differentiated tumors but not in the intermediately or poorly differentiated cases. Mortality rate was higher in the presence of LVI compared to the cases without LVI. No effect of PNI was found on postoperative mortality.

A British pilot study has demonstrated a dramatic decrease in the emergency presentations in colorectal cancers with the screening with fecal occult blood test. However, a subsequently published local Canadian study and a study from the United Kingdom reported that emergency presentations due to colorectal cancers stayed high in spite of colorectal screening programs and health care services (19-21).

The region in which we provide health services is socioeconomically disadvantaged and cigarette consumption in the region is high. If referred to the literature, it can be seen that rates of cigarette smoking and alcohol use are high among the cases with complicated colorectal cancers presenting to the emergency services (22,23). In addition, low socioeconomic level, low level of health care literacy and inadequate health care services are associated with complicated colorectal cancers (25). Individuals with a low socioeconomic level may disregard some symptoms and do not present to health care facilities for the symptoms

they find to be simple. Those individuals are reluctant to request medical assistance until their symptoms become so severe that they could not be ignored. Therefore, the primary localization of presentation of those patients with more aggressive and advanced disease happens to be the emergency services (22-25).

In conclusion, one of the major problems of the health care systems is the lack of diagnosis of colorectal cancer in early stages. Colorectal cancers diagnosed in advanced stages are complicated and result in high mortality rates. High mortality should be expected in female cases older than 60 years with a left sided colon tumor and in cases with another synchronous tumor or a perforated tumor. Surgeons should act more attentively to decide for the most appropriate strategy. Unnecessary major resections should be avoided and primary pathology should be in the focus of treatment in order to decrease the mortality and morbidity rates.

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TRANSPARENCY DECLARATION

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