



Oncological Outcomes of Colorectal Cancer Based on Patients' Age Group

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Abstract

Background & objectives: A progressive and significant increase of colorectal cancer has been observed in younger people. Thus, this study evaluated oncological outcomes among patients with colorectal cancer according to their age groups.

Methods: This retrospective cross-sectional hospital-based study was performed from June 2013 to March 2024 at Rizgary Teaching Hospital and Zheen International Hospital on 183 patients with colorectal cancer using their medical records. A data spreadsheet was used to collect patients' data over eleven years, including gender, surgery, treatment protocol, lymph node status, histopathological findings, distribution of complications, metastasis, recurrences, preoperative and final stages, survival and mortality rates according to their age groups. Then, collected data were analyzed and outcomes were compared between age groups.

Results: Males with CRC constituted 50.3% of patients; of them 54.1% aged <60 years old. Elective surgery was done for 167 (91.2%) patients. Laparoscopic surgeries have been performed for 129 (70.5%) patients. Adjuvant therapy was administered to 27 (14.7%) patients. Lymph node metastasis was seen in 79 (43.2%) patients. Well-differentiated tumor was detected in most of the patients (81.4%). Complications were seen in 41 (22.4%) patients; recurrence was found in 16.9% of patients with colorectal cancer after treatment ($p>0.05$). The overall 5-year survival rate was 23.8% in the older age (≥ 60 years) group and 34.3% in younger patients (<60 years) ($p=0.109$). Colorectal cancer killed 30 (16.4%) of patients with no significant difference between the two age groups ($p=0.075$).

Conclusions: In our study, the oncological outcomes related to both morbidity and mortality from colorectal cancer were not affected by their age.

Keywords: Age group, Colorectal cancer, Hospital-based, Oncological outcomes, Retrospective study

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Introduction

Colorectal cancer (CRC) is recognized as a worldwide health problem and ranks the fourth most common cancer and the second most common cause of cancer death globally.¹ Currently, the largest percentage of people suffering from CRC falls within the 40-49 age group, approximately one in eight new cases of CRC and comprising an overall 10-12% of total CRC diagnoses.² It is widely postulated that most CRC cases (94%) are sporadic, and a minority could be attributed to hereditary predispositions (7-10), such as cases of familial adenomatous polyposis and Lynch syndrome. In comparison, the least frequent occur due to chronic inflammatory disorders.³ Colonoscopy is the preferred diagnostic method with the highest sensitivity (98.5%) and specificity (99.8%) compared to a fecal occult blood test (FOBT), sigmoidoscopy, barium enema (double contrast), and computed tomography (CT).^{4,5} The early diagnosis and removal of adenomatous polyps prevent their progression into invasive cancer and allow for the early detection of CRC, leading to more successful therapies, optimal outcomes, and improved survival.^{3,6} Treatment of CRC has the most favorable result when the disease is diagnosed at the earliest stages. However, because a patient with CRC may not experience any alarming symptoms for a long time, CRC is more often diagnosed at a stage when complex oncological care is needed.⁷ The estimated 5-year overall survival for colon cancer operated on with curative intent (stages I-III) ranged between 92% in stage I to 53% in stage III.⁸ Age is one of the critical risk factors in the onset of CRC, and in the last three decades, the incidence of CRC has increased among younger adults aged <50 years.^{9,10} The survival of CRC patients is inversely correlated with age; patients aged >50 years had a lower 5-year survival rate than younger age groups; however, the survival rates are different

across different age groups.¹¹ Also, the survival rate was lower in patients aged >60 years than in younger age groups, even in the same stage.¹¹ Some guidelines recommend that people >50 years have to perform a FOBT annually, and when the results are positive, further investigations must be performed, such as colonoscopy or barium enema. However, due to the low validity of FOBT, initiating screening in the population at 50 years is still under debate in the scientific community.¹² Currently, high incidence of more aggressive type of cancer can be seen in young age groups.¹³ Thus, we aimed to look at the effect of age among CRC patients' outcome after treatment in our locality.

Patients and methods

This retrospective cross-sectional study was performed on 183 patients from June 2013 to March 2024 at Rizgary Teaching Hospital and Zheen International Hospital, Erbil, Iraq using hospital medical records of CRC patients. Patients with CRC were registered and operated upon in the hospital, regardless of their age and gender. The patients' data were collected and transferred to the data collection sheet prepared by the main researcher, including the patient's age, gender, disease duration, type of surgery, mode of surgery (laparoscopic or open), type of the procedure performed, lymph node status, histopathology findings, postoperative complications, metastases, site of metastasis, recurrence rate, preoperative staging, final staging, survival and mortalities, and cause of death. Ethical approval was obtained from Hawler Medical University Scientific and Ethical Committees, and all official agreements were obtained from both hospitals' authorities. Patients' consent was not obtained because it is a retrospective study that used patients' data in hospital record. Statistical procedures were performed using the IBM Statistical Package for Social Sciences (SPSS), version 28. A chi-square





test for independence was applied to assess the association between age group and other categorical variables. At the same time, an exact t-test was used for non-categorical variables. A significance difference was set at a p-value of ≤ 0.05 .

Results

Completed and eligible hospital data of 183 patients with CRC were studied, in which 99 were aged <60 years old and 84 were aged ≥ 60 years old. About 50.3% of patients were males and 54.1% were aged <60 years old ($p=0.177$). Elective surgeries were performed in most cases of both age groups (89.9% versus 92.9% in patients <60 and ≥ 60 years of age respectively, $p = 0.618$). Laparoscopic

surgeries were performed in 72.7% of those aged <60 years and 67.9% of those aged ≥ 60 years ($p=0.499$), while open surgery was performed in the remaining patients. In 18 patients of both age groups, the operation was converted from laparoscopy to open, of which 50% were due to invasion, 39% due to obstruction, and 11% due to recurrence ($p=0.400$). Neoadjuvant treatment was administered in 61.6% in patients <60 years and 44% in patients ≥ 60 years ($p=0.014$), indicating that neoadjuvant treatment was more frequently administered in the younger age group. Adjuvant therapy was given to 16.1% and 6.8% in patients <60 and ≥ 60 years, respectively ($p=0.501$), as shown in Table (1).

Table (1): Surgery and treatment characteristics of patients according to age group

Variable		Age group (Years)				p-value
		< 60 (n=99)		≥ 60 (n=84)		
		No.	%	No.	%	
Gender	Male	45	45.5%	47	56.0%	0.177
	Female	54	54.5%	37	44.0%	
Type of surgery	Elective	89	89.9%	78	92.9%	0.618
	Emergency	10	10.1%	6	7.1%	
Mode of surgery	Laparoscopy	72	72.7%	57	67.9	0.499
	Open	27	27.3%	27	32.1%	
Conversion to open/ Cause of conversion	Invasion	4	50.0%	5	45.5%	1.00*
	Obstruction	3	37.5%	4	36.4%	
	Recurrence	1	12.5%	1	9.1%	
Neoadjuvant therapy		61	61.6%	37	44.0%	
Adjuvant therapy	Short	4	4.0%	5	5.7%	0.501*
	Long	12	12.1%	6	6.8%	

*Fisher's exact test, $p < 0.05$ using chi-square test, #: Significant difference

Positive lymph nodes were reported in 42.4% and 44% of patients aged <60 years and ≥ 60 years, respectively ($p=0.872$). In both age groups, the well-differentiated tumor was the most common histopathological finding found in 78.8% of patients aged <60 and 84.5% of those aged ≥ 60 years. Moderately

differentiated were reported in 15.2% and 9.5% of patients aged <60 years and ≥ 60 years, respectively, while poorly differentiated and complete resolution was less frequent in both groups ($p=0.185$), as shown in Table (2).





Table (2): Lymph node status and histopathological findings according to age group

Variable		Age group (Years)				p-value
		< 60 (n=99)		≥ 60 (n=84)		
		No.	%	No.	%	
Lymph node status	Positive	42	42.4	37	44.0	0.872
	Negative	57	57.6	47	56.0	
Histopathology	Well differentiated	78	78.8	71	84.5	0.185
	Moderately differentiated	15	15.2	8	9.5	
	Poorly differentiated	3	3.0	5	6.0	
	Complete resolution	3	3.0	0	0.0	

Additionally, 77.8% of patients aged <60 years and 77.4% aged ≥60 years did not develop operative or postoperative complications. Among patients aged >60 years, wound infection occurred in 13.1%, leak in 6.1%, ileus in 2.0%, and one patient had bleeding. Among patients of the older age group, 9.5% had wound infection, 6.0% had leak, 3.6% had ileus, and 3 patients (3.6%) had either bleeding, cardiovascular disorder, or fistula (p=0.700), Table (3). The overall complication rate among the studied

group was 22.4% (41 patients). Metastasis was reported in 7% of patients aged <60 years and 9.5% in the older age group (p=0.356). The liver was the main site of metastases. Recurrence was not found in most patients (80.8% in <60 years and 82.1% in ≥60 years) (p=0.375), as shown in Table (3). The patients were followed up by the consultant surgeon (second author) in his private clinic at Zheen International Hospital for about 5-years.

Table (3): Distribution of complications, metastasis and recurrences according to age group

Variable		Age group (Years)				p-value
		< 60 (n=99)		≥ 60 (n=84)		
		No.	%	No.	%	
Complications	None	77	77.8	65	77.4	0.700*
	Wound infection	13	13.1	8	9.5	
	Leak	6	6.1	5	6.0	
	Ileus	2	2.0	3	3.6	
	Others [#]	1	1.0	3	3.6	
Metastasis	Yes [§]	7	7.0	8.0	9.5	0.356
	None	92	93.0	76	90.5	
Recurrence	Yes	16	16.2	15	17.9	0.375*
	No	80	80.8	69	82.1	
	Unknown	3	3.0	0	0.0	

*Fisher's exact test and other variables were compared with Chi-square test

[#]: Bleeding, cardiovascular disorder, and fistula

[§]: Liver was the main site of metastasis

After treatment, there was down-staging of CRC in both groups (p>0.05), as shown in Table (4).





Table (4): Distribution of preoperative and final colorectal cancer stage according to age group

Variable		Age group (Years)				p-value
		< 60 (n=99)		≥ 60 (n=84)		
		No.	%	No.	%	
Preoperative Stage	Stage I	5	5.1	5.0	6.0	0.987
	Stage II	24	24.2	21	25.0	
	Stage III	63	63.6	51	60.7	
	Stage IV	7	7.1	7.0	8.3	
Final Stage	Stage 0	3	3.0	0.0	0.0	0.540
	Stage I	15	15.2	15	17.9	
	Stage II	33	33.3	27	32.1	
	Stage III	39	39.4	32	38.1	
	Stage IV	9	9.1	10	11.9	

The ≥5-year survival rate in younger patients was 34.3%, while it was 23.8% in the older age (p=0.109). Colorectal cancer was the direct cause of death in 16 (16.2%) of patients

aged <60, while 14 (16.7) patients within ≥60 years group died because of CRC (p=0.075). Details are found in Table (5).

Table (5): Survival and mortalities of colorectal cancer (CRC) according to age group

Variable		Age group (Years)				p-value
		< 60 (n=99)		≥ 60 (n=84)		
		No.	%	No.	%	
Survival rate (Years)	< 5	65	65.7	64	76.2	0.109
	≥ 5	34	34.3	20	23.8	
Cause of death	CRC	16	16.2	14	16.7	0.075*
	Others#	2	2.0	9	10.7	

*Fisher's exact test and other variables compared with chi-square test

#Cardiovascular disorder, such as myocardial infarction and cerebrovascular accident

Discussion

Our analysis revealed that patients' ages ranged between 19 - 92 years, with a mean of 56 years, and most were <60 years old. The higher proportion of younger patients may be attributed to the change in the incidence of CRC, where recent reports demonstrated an increase in the incidence of CRC among younger patients.¹⁴ On the contrary, Kotepui et al. found that the incidence of CRC was higher in patients >60 years, and the older patients developed more CRC features, including hyperplastic and adenomatous polyps.¹⁵ We did not find a significant difference between both genders across both

age groups. Although gender has an impact on the incidence of CRC, pathological features, outcomes and tolerance of anticancer therapies. Globally, males are more affected; however, right-sided malignancies are more frequent in females.¹⁶ There are some differences in treatment efficacy between males and females. Nonetheless, the treatment dosage does not consider these differences between both genders. The variation between both genders is still controversial, particularly in the effect of treatment.¹⁶ In the present study, elective surgeries were the most frequently performed, and most of these surgeries are





the first option for treating CRC, followed by other modalities of treatment with adjuvant and neoadjuvant therapies. Elective surgery is widely performed worldwide, and some surgeons prefer not to delay elective surgery >4 weeks of diagnosis to get better outcomes.¹⁷ Among the studied group, lymph node positivity was relatively less frequent among our patients, especially those aged <60 years that may be explained by the fact that assessment of lymph nodes became a quality measure of CRC and the higher number of examined lymph nodes positively associated with the survival of patients. In this regard, Vuik et al. observed more frequent positive lymph nodes in younger age groups, which might be related to that they included patients aged 20-50 years, while Guo et al. found that the risk of lymph node metastasis is lower in older patients, especially in those aged >80 years.^{13, 17} Histopathological findings of our patients revealed that in both age groups, the well-differentiated tumor was the commonest. In this regard, Vuik et al. concluded that poorly differentiated tumors were more frequent in patients aged 20 - 29 years than older patients. A study in Iraq by Homady et al. revealed that 56% of CRC patients had well-differentiated tumors, 28% moderate and 16% poorly differentiated, with no significant differences.^{17,18} Moreover, 22.4% of patients developed complications without significant differences across the age groups. Among these complications, wound infection was the most frequent among patients aged <60 years, followed by leak, while ileus was less frequent in this age group. Low complication rates in our study are considered to be the accepted levels. This could be attributed to the surgical procedures performed where laparoscopic intervention is used in most patients (70.5%), which helps to reduce complications. It has been widely postulated that laparoscopic surgeries had lower complication rates and adverse events.

Additionally, the surgical skills and experience of the surgeons play an essential role in reducing complications. Moreover, the development of complications may vary depending on the disease itself and the patient's condition.⁶ Furthermore, metastasis and recurrence were not significantly different among the two studied age groups, and the liver was the main site of metastases. These findings are supported by Emile et al. who reported that local recurrence and distal metastasis in colon cancer were more frequent in the older age group (>40 years).¹⁹ Additionally, we found CRC down-staging after treatment compared to preoperative staging in both age groups. These findings agree with those reported in previous studies, and it was not unexpected due to the effect of treatment and neoadjuvant chemotherapy.¹⁹ Nonetheless, some authors suggested that down-staging of local advanced rectal cancers was not related to the neoadjuvant chemotherapy but may be attributed to the tumor features.²⁰ Consequently, the current study's overall 5-year survival rate was not significantly different among the studied groups. Cancer was the primary cause of mortalities in both age groups (30 patients out of 41 total deaths) with no significant differences among the two subgroups. However, 10.7% of older patients died because of causes other than CRC. This reflected that in older patients, other causes of death (cardiovascular disorder, such as myocardial infarction and cerebrovascular accident) play an essential role in CRC, including comorbidities and other ageing diseases. Higher survival rates were reported in some previous studies, such as Aguiar et al. who reported an overall survival rate of 63.5% and Hong et al. who stated that 5-year survival varied according to the site of tumor; it is superior in rectal cancers than colonic, while Dulskas et al. documented the 5-year survival rate was slightly higher in rectal than colonic cancers.²¹⁻²³ Aguiar et al. concluded





that the risk of death was higher in patients aged 50-74 years, and the survival was better in younger age, which supported our findings.²¹

Conclusions

Colorectal cancer characteristics did not vary among patients in different age groups. No significant gender variation in the incidence of CRC among patients was observed. Thus, the oncological outcomes of patients with CRC were not affected by their age. We recommend conducting further studies, including larger sample sizes and multiple centers, for more precise conclusions.

Conflict of interest

The authors declared no conflict of interest.

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