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*Original Article***Histopathological and Clinical Differences between Right and Left Sided Colorectal Carcinoma (CRC) in a Group of Patients**Raza AKMM^{1*}, Rahman DMA², Israt T³, Hossain N⁴, Ahmed Z⁵

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Corresponding Author*Abstract**

Introduction: Colorectal cancer (CRC) is the third most common cancer and the second for mortality over the world. Some researchers suggest that cancers located in the right vs. the left side of the colon are different and they can be regarded as distinct disease entities. The aim of this study was to analyze differences in clinical, epidemiological and pathological features of patients with right-sided (RCC) and left-sided (LCC) colon cancer. **Materials and Methods:** A cross sectional observational study on a group of 50 patients of resected colon cancer was included from different hospitals of Dhaka and Kishoregonj. Parameters studied included age, sex, location of the tumour, histopathological subtype, grade, stage and lymphovascular (LVI) between LCC and RCC. **Results:** The age range was from 19 years to 84 years with mean age of 46.6 ± 14.8 years. Per rectal bleeding was the commonest symptom at the time of diagnosis. Male patients were presented more with left sided colon cancer. Left sided cancer tended to be more poorly differentiated and higher stage compared to right side colon cancer. Mucinous adenocarcinoma was seen in 6 (12%) cases. Rectum was the most common tumour subsite involved. **Conclusion:** Cancers of the right and left side of the colon vary according to clinical and pathological features. In our study, cancer of the left side of the colon (LCC) was more advanced stage and grade at diagnosis.

Keywords: Colorectal carcinoma (CRC), Stage, Grade, Right sided colon cancer, Left sided colon cancer.

Introduction

Colorectal cancer (CRC) is the third most common cancer in the world and the second leading cause of cancer related death.¹ The lifetime risk of developing CRC is about 6% or one in 18. Over 95% of these CRC is adenocarcinoma.² In 2040, the global cancer burden is anticipated to reach 28.4 million cases, and developing low-income countries are anticipated to register 64-95% of all these cases.³ The incidence of colorectal cancer in Bangladesh is not exactly known, it appears to be common and occur in younger age group with slight male preponderance. Average age at diagnosis is 10 years less than the developed countries.⁴ Researchers divides CRC into two groups based on the localization of the primary tumor into right-sided colon cancer (RCC) and left-sided colon cancer (LCC). Both of them have different embryological, genetic, and clinical characteristics

leading to differences in prognosis and in the outcome. Anatomically, the right colon includes the caecum, ascending colon, liver flexure, and transverse colon and the left colon includes the splenic flexure, descending colon, sigmoid colon and rectum. The proximal colon arises from the midgut and receives its major blood supply through the superior mesenteric artery. The distal colon arises from the hindgut and is supplied by the inferior mesenteric artery.⁵ Clinically, patients with RCC are older and more likely to be women. RCC clinically appears early with more advanced and poorly differentiated tumor grade and stages.⁶ Studies have reported that outcome of colon cancer are different according to the location of the tumor. However, some studies have suggested no difference between RCC and LCC.⁷ Two meta-analyses showed that survival is worse for patients with right-sided colon cancer.⁸

The aim of our study was to analyze differences in clinical, epidemiological and pathological features of patients with adenocarcinoma located in the right and left side of the colon and rectum.

Materials and Methods

It was a cross sectional observational study. A total of 50 cases of colorectal carcinoma surgically resected specimen were collected for study. 28 cases were collected from Bangabandhu Sheikh Mujib Medical University (BSMMU) during the period of 2009 to 2011 and 32 cases were from Jahurul Islam Medical College hospital from 2018 to 2022. The right sided colon cancer included all tumours located proximal to splenic flexure and those distal to it were part of left side colon cancer including rectosigmoid cancers. Variables included in study were: age, laterality, stage, histology type, histological grade and Lymphovascular Invasion (LVI). Clinical information was obtained by taking history and recorded in clinical proforma. Data was analyzed using Microsoft Excel and SPSS software.

Inclusion criteria

- Confirmed cases of adenocarcinoma of the colon.
- Cases with complete clinical information.
- Availability of fresh unfixed colorectal cancer specimen.

Exclusion criteria

- Clinically suspected colorectal carcinoma subsequently proved to be non-malignant lesions after histological examination.
- Non Hodgkin lymphoma and other non epithelial tumors of the colon.
- Cases without clinical data.

Results

The age range was from 19 to 84 years with mean age of 46.6 ± 14.8 years. The patients were divided into 8 groups on the basis of decades. Out of 50 cases maximum number 12 (24%) of patients belonged to the age group 50-59 years. 29 (58%) patients were male and 21 (42%) were female with male to female ratio of 1.4:1. Figure I show age distribution of colorectal cancer.

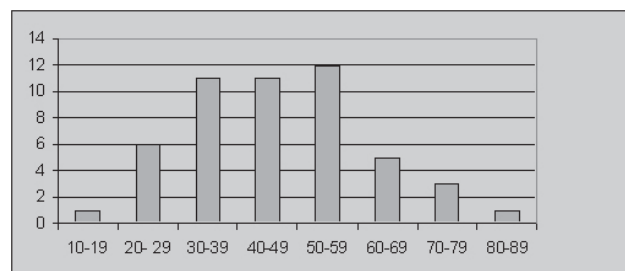


Figure I: Bar diagram showing age distribution of colorectal cancer.

At the time of first consultation, majority of the patients 20(40%) had per-rectal bleeding, 8(16%) had lower abdominal pain, 7(14%) had altered bowel habit, 6(12%) had generalized weakness, anorexia and pallor, 6(12%) had combined per rectal bleeding and abdominal pain and 3(6%) had palpable abdominal mass. Per rectal bleeding was commonest symptom in left sided colon and lower abdominal pain was in right sided colon cancer patient. Table I shows clinical presentation of colorectal cancer cases.

Table I: Clinical presentation with tumour location of colorectal cancer cases (n=50)

Symptoms	Cases N=50(%)	Site distribution	
		Right colon	Left colon
Per rectal bleeding	20 (40)	1	19
Lower abdominal pain	8 (16)	6	2
Altered bowel habit	7 (14)	4	3
Generalized weakness, anorexia and pallor	6(12)	4	2
Per rectal bleeding and abdominal pain	6(12)	4	2
Palpable abdominal mass	3(6)	2	1

Among the 50 cases, 33 (66%) case were in rectum, 6 (12%) were in the ascending colon, 3 (6%) in hepatic flexure of colon, 2 (4%) each in caecum, descending colon, sigmoid colon and in the transverse colon (Table II). Thirty seven (74%) patients were in the left colon (splenic flexure to rectum) and 13 (26%) patients were in the right colon (caecum to splenic flexure). In 29 male patients, 17 (34%) in rectum, 4 (8%) in ascending colon, 2 (4%) each in transverse colon, hepatic flexure of colon and caecum and one (2%)

each in sigmoid colon and descending colon. In 21 female cases, 16 (32%) cases were in rectum, 2 (4%) cases in ascending colon, one (2%) case each in sigmoid colon, descending colon and hepatic flexure of colon.

Table II: Site distribution of CRC from distal to proximal.

Variable	N=50	Male (%)	Female (%)
Rectum	33	17(34)	16(32)
Sigmoid colon	2	1(2)	1(2)
Descending colon	2	1(2)	1(2)
Transverse colon	2	2(4)	-
Hepatic flexure of colon	3	2(4)	1(2)
Ascending colon	6	4(8)	2(4)
Caecum	2	2(4)	-

of the 50 colorectal cancer cases, 39(78%) cases were moderately differentiated and 11(22%) cases were poorly differentiated. In this present study no well differentiated adenocarcinoma was observed. Male predominance was observed in both moderately differentiated and poorly differentiated cases. Among the 39 moderately differentiated cases, 22 cases were seen in male and 17 cases in female and of 11 poorly

differentiated cases, 7 cases were seen in male and 4 in female. Of thirty nine moderately differentiated cases, 10(20%) cases originated in right colon and 29 (58%) cases in the left colon. Of 11 poorly differentiated carcinomas, 4(8%) cases were in the right colon and 7(14%) cases were in the left colon. Table III shows histological grade of colorectal cancer in 50 cases with location and sex distribution.

Table III: Histological grading of colorectal cancer cases with gender and location

Tumour differentiation	Number (%)	Male (%)	Female (%)	Right colon (%)	Left colon (%)
Moderately differentiated	39(78)	22(44)	17(34)	10(20)	29(58)
Poorly differentiated	11(22)	7(14)	4(8)	4(8)	7(14)

Staging of colonic cancer were done in all the cases. It was done on the basis of TNM system.⁹ The maximum number of cases 22 (44%) were in stage III, 14 (28%) cases were in stage II, 13 (26%) cases in stage I and 1 (2%) case in stage IV. Out of 22 stage III cases, 11(22%) cases were male and 11(22%) cases were female. In 14(28%) cases of stage II, 9(18%) cases

were male and 5(10%) cases were female. In stage I cases, 8(16%) cases were male and 5(10%) cases were female. Among the total 23 cases of combined stage III and IV cases right colon were 9 (39%) cases and left colorectum were 14 (61%) cases. Table IV shows TNM stage in 50 colorectal cancer cases with sex distribution and location.

Table IV: TNM (Tumour, Node, Metastasis) stage with gender and location (n=50)

TNM stage	No. of cases (%)	Male (%)	Female (%)	Right colon (%)	Left colon (%)
Stage I	13(26)	8(16)	5(10)	2(4)	11(22)
Stage II	14(28)	9(18)	5(10)	6(12)	8(16)
Stage III	22(44)	11(22)	11(22)	8(16)	14(28)
Stage IV	1(2)	1(2)	-	1(2)	-

Lymphovascular invasion (LVI) and perineural invasion (PNI) and tumour border configurations were examined microscopically. LVI was seen in 18 cases and were absent in 32 cases. Among the 18 cases, 12 were cases were in left sided and 6 were in right sided colon cancer. Perineural invasion is seen in 6 cases of left sided and 3 cases of right sided colon cancer patients.

Discussion

The mean age of the 50 cases was 47 ± 14.8 years. The age range was from 19-84 years with male and female ratio of 1.4:1. 58% of the cases were below the age of 50 years. The mean age of colorectal cancer in this present study indicate that colorectal carcinoma is relatively common in lower age group in our country. Our population present mostly before 50 years of age, suggesting a possible hereditary etiology or earlier and persistent exposures to known risk factors like physical inactivity, improper diet and smoking.¹⁰ Male predominance was seen in our study with more females with left sided cancer than right sided, consistent with the other international reports.¹¹ However, Keating *et al* found equal gender distribution in their study.¹²

Rectal bleeding was the commonest presentation (40% cases) at the time of first consultation followed by abdominal pain (16% cases). Per rectal bleeding was observed in 17(85%) cases of left colon cancer. Most of the cases with per rectal bleeding, tumour were present in rectum which explains partly that per rectal bleeding may be most common symptoms in rectal cancer.

Abdominal pain was the commonest symptom in a study done in Saudi Arabia.¹³ In our study, 8(16%) cases had this feature possibly due to negligence on the part of the patient and frequent use of analgesics.

The sub site distribution of colorectal cancer in this study shows 37(74%) cases were in the left colon and 13(26%) cases in the right colon. In Among 37 cases of left colon cancer cases, 33 cases were in rectum. This shows higher percentage of rectal cancer in this study. Recent trend of shifting of CRC towards right colon

observed by Gomez *et al* is not supported by this present study.¹⁴ However, studies done by other researchers found left sided colon cancer more to the right sided colon cancer. This is shown in table V.

Table V: Distribution of RCC and LCC in other studies.

Investigator	Left colon cancer	Right colon cancer
Riddell et al(2003) ¹⁵	75	25
Leon et al (2004) ¹⁶	70	30
Ayyub et al (2002) ¹⁷	70	30
Hossain (2007) ⁴	63	37
Present study	74	26

On histological examination, 44(88%) of cases were adenocarcinoma NOS and 6(12%) cases were mucin secreting adenocarcinoma. 39(78%) cases were moderately differentiated and 11(22%) cases were poorly differentiated cancer. Of the thirty nine moderately differentiated cases, 10(26%) originated in right colon and 29 (74%) in the left colon. Of the 11 poorly differentiated carcinomas, 4 were in the right colon and 7 were in the left colon. In this study left colon cancer were less well differentiated than right side. Poorly differentiated cancers were more among the left sided cancer indicating bad prognosis of those patients. Keating *et al* found right sided tumour were less well differentiated than left sided tumour which is different from this study.¹⁸

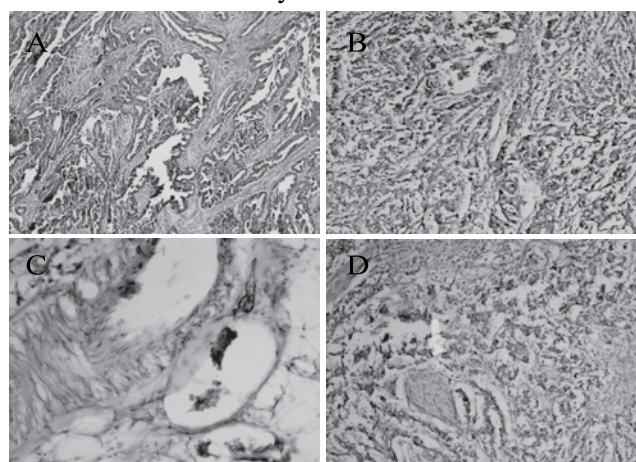


Figure: A, B, C, D

Figure: A: Moderately differentiated adenocarcinoma; B: Poorly differentiated adenocarcinoma; C: Lymphovascular invasion; D: Perinureal invasion. [A and B 40x, C and D 100x, H & E stain]

TNM Staging was done in all the cases. The maximum number of cases 22 (44%) were in stage III, 14 (28%) were in stage II and 13 (26%) in stage I and one (2%) in stage IV. This study show 44% cases diagnosed at stage III indicating advanced stage of the disease at diagnosis. Derwinger *et al* found 41% cases in stage III, which is consistent with our study.¹⁹ Twenty three (46%) of the stage III and IV cases, 14 cases were in left colon and 9 cases were in right colon indicating more advanced disease in the left colon at the time of diagnosis. This fact probably can be explained by a delay in the diagnosis of cancer in the right side of the colon. Disease in the right colon can give more subtle symptoms than cancer located on the left side colon as per rectal bleeding is the commonest symptoms in left sided colon cancer. Another fact is diagnosis by doing procto-colonoscopy followed by biopsy is easier in the left colorectal region. Lymphovascular invasion was present in 16 (32%) cases and absent in 34 (68%) cases. Out of 16 positive cases 12(75%) cases had stage III disease and 3(19%) cases had stage II and one (6%) case in stage IV disease, which indicates higher stage disease in lymphovascular invasion positive tumour.

Conclusion

Clinicopathological difference exists between right and left sided CRC cases. In our study most patients with left sided colon cancer were in higher grade and stage compared to right sided colon cancer. National programme for the early detection of CRC should be implemented to reduce mortality in our country.

Conflict of interest

The authors declare no conflict of interest.

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