Section: General Surgery

Original Research Article

CLINICOPATHOLOGICAL STUDY OF COLORECTAL CARCINOMA

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ABSTRACT

Background: Colorectal carcinoma is one of the most frequent malignancies in the world. Recent Indian study shows that there is a significant increase in incidence of colonic carcinoma but the incidence of rectal carcinoma remains steady. **Aim:** The clinico-pathological study of colorectal carcinoma in a tertiary referral institute of India and to compare the above data with the data from the western world.

Materials and Methods: The prospective observational study carried out in hospital in Eastern India. from July 2017 to October 2019. All patients who were diagnosed as a case of colorectal carcinoma were included in the study. Detailed history of the patients was recorded including chief complaints like pain in abdomen & per rectal bleed. On examination bleeding per rectum, mass per rectum and pallor, growth and types of surgery performed.

Results: 40 patients were included in this study of which 11 were 41years. The mean age of this series was 50.90 ± 14.82 years. The M:F ratio of 2.75:1.25. 92.5% of patients clinically presented with altered bowel habits 72.5% of patients had pain in abdomen, 60% patients had per rectal bleeding followed by mass per rectum (52.5%) and lump in abdomen (30%) subsequently. Most common histological type, irrespective of age, was adenocarcinoma (93.8%). histopathological type, 47.5% cases showed a well differentiated type, 15% showed moderately differentiated type and 12% showed poorly differentiated types.

Conclusion: However, the success rate of detecting early stage colorectal cancer is poor in our country as compared to western world. This is mainly because the symptomatology of colorectal cancer and benign colorectal diseases often overlap second, routine screening programs to detect early colorectal cancer are not followed religiously. However, early detection of colorectal malignancy and radical surgery well benefit the patients before they become grossly symptomatic.

Keywords: colon, rectum, malignancy, srCEA.

INTRODUCTION

Colorectal carcinoma (CRC) is one of the most frequently diagnosed malignancies worldwide and remains a major cause of cancer-related morbidity and mortality. It encompasses malignant tumors arising from the epithelial lining of the colon and rectum, with adenocarcinoma accounting for more than 90% of all cases. Although historically considered a disease of developed countries, the incidence of colorectal carcinoma has been steadily increasing in many low- and middle-income nations, including India, owing to urbanization, westernized dietary habits, sedentary lifestyles, obesity, and an aging population.[1,2]

The development of colorectal carcinoma is a multistep process involving the progressive accumulation of genetic and epigenetic alterations that transform normal colonic mucosa into adenomatous polyps and eventually invasive

carcinoma. Mutations involving the APC, KRAS, TP53, and mismatch repair genes play a central role in colorectal carcinogenesis. While the adenoma–carcinoma sequence remains the predominant pathway, microsatellite instability and serrated neoplastic pathways have also been recognized as important mechanisms in tumor development.[3,4]

Several environmental and hereditary risk factors contribute to the occurrence of colorectal carcinoma. Increasing age remains the strongest non-modifiable risk factor, with most patients diagnosed after 50 years of age. However, an alarming rise in early-onset colorectal carcinoma among younger adults has been reported globally over the past decade. Lifestyle-related factors such as diets rich in red and processed meat, low dietary fiber intake, obesity, smoking, alcohol consumption, physical inactivity, and type 2 diabetes mellitus significantly increase disease risk. Inherited syndromes such as Lynch syndrome and familial adenomatous polyposis, along with chronic inflammatory bowel diseases, further predispose individuals to colorectal malignancy.[2,5]

Clinically, colorectal carcinoma often presents with nonspecific symptoms including altered bowel habits, rectal bleeding, abdominal pain, unexplained weight loss, anemia, and intestinal obstruction. Unfortunately, many patients remain asymptomatic during the early stages, leading to delayed diagnosis and presentation with advanced disease. The widespread implementation of screening programs using fecal occult blood testing and colonoscopy has significantly reduced mortality in many developed countries through early detection and removal of premalignant lesions. However, organized screening remains limited in several developing countries, resulting in delayed diagnosis and poorer clinical outcomes.[4,6]

Histopathological examination remains the gold standard for diagnosis and provides valuable prognostic information regarding tumor type, grade, lymphovascular invasion, perineural invasion, lymph node involvement, and surgical margin status. The clinicopathological characteristics of colorectal carcinoma are closely associated with disease progression, treatment planning, and patient survival. The Tumor-Node-Metastasis (TNM) staging system continues to serve as the cornerstone for prognostication and therapeutic decision-making.[7,8]

Recent advances in molecular pathology, immunohistochemistry, targeted therapy, and immunotherapy have considerably improved the management of colorectal carcinoma. Molecular biomarkers such as KRAS, NRAS, BRAF mutations, microsatellite instability (MSI), and mismatch repair deficiency (dMMR) now play an increasingly important role in individualized treatment strategies and prediction of therapeutic response.[4,9]

Despite these advances, colorectal carcinoma continues to pose a significant public health challenge because of its increasing incidence, late presentation, and considerable disease burden. In India, regional variations in clinicopathological patterns, stage at diagnosis, and treatment outcomes necessitate further research. A comprehensive clinicopathological evaluation of colorectal carcinoma can improve understanding of disease characteristics, facilitate early diagnosis, guide appropriate therapeutic interventions, and ultimately enhance patient survival. Therefore, the present study was undertaken to analyze the clinicopathological profile of patients diagnosed with colorectal carcinoma in a tertiary care hospital.[10]

The present study was undertaken to evaluate the clinical, pathological, and treatment outcomes of patients with colorectal carcinoma presenting in Eastern India. The study aimed to assess the clinicopathological profile of these patients by analyzing their demographic characteristics, clinical presentation, tumor location, histopathological findings, and disease stage. It also sought to evaluate the outcomes of surgical and chemotherapeutic management in terms of postoperative recovery, complications, and treatment response. Furthermore, the study intended to determine the correlation between the clinical presentation and the pathological stage of colorectal carcinoma, thereby providing insights into disease progression and facilitating early diagnosis, appropriate treatment planning, and improved patient outcomes.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of General Surgery in Eastern India, over a period of 28 months from July 2019 to October 2022. The study included 40 consecutive patients of either sex who were diagnosed with colorectal carcinoma and fulfilled the eligibility criteria. Ethical approval was obtained from the Institutional Ethics Committee, and informed written consent was obtained from all participants prior to enrolment.

A detailed clinical history was recorded for each patient, including demographic characteristics, presenting complaints such as abdominal pain, bleeding per rectum, altered bowel habits, abdominal lump, weight loss, and duration of symptoms. All patients underwent a thorough general and systemic physical examination, with particular attention to pallor, abdominal mass, per rectal examination findings, and other relevant clinical features.

All enrolled patients were subjected to a standardized diagnostic workup. Ultrasonography (USG) of the abdomen was performed to evaluate liver metastasis, regional lymph node involvement, and other intra-abdominal abnormalities. Colonoscopy was carried out to determine the site,

extent, and morphology of the lesion, and colonoscopic biopsy specimens were obtained for histopathological confirmation. In patients with rectal growths, tissue biopsy was obtained for definitive diagnosis. Contrast-enhanced computed tomography (CECT) of the abdomen and pelvis was performed to assess the location, size, bowel wall involvement, lymphovascular invasion, adjacent organ infiltration, distant metastasis, ascites, and overall disease staging.

Following evaluation, all cases were discussed in the multidisciplinary tumour board. Patients with resectable disease underwent appropriate surgical resection according to standard oncological principles, whereas patients with unresectable or advanced disease received chemotherapy and/or radiotherapy as recommended by the tumour board. Resected specimens were subjected to detailed histopathological examination to determine tumour type, histological grade, pathological stage, lymph node involvement, resection margin status, and other prognostic parameters.

Patients were followed up according to the recommendations of the American Society of Clinical Oncology (ASCO) at 1 month, 3 months, and 6 months after completion of treatment. During the first and third follow-up visits, clinical assessment, abdominal ultrasonography, and serum carcinoembryonic antigen (CEA) estimation were performed to detect recurrence or metastasis. At the six-month follow-up, contrast-enhanced CT scanning was additionally performed along with routine clinical evaluation.

Study Design: Prospective observational study.

Study Population: Patients diagnosed with histopathologically confirmed colorectal carcinoma presenting to Hospital in Eastern India.

Inclusion Criteria

- All patients presenting with symptoms suggestive of colorectal malignancy and diagnosed with colorectal carcinoma in Eastern India.
- Patients of either sex who provided informed consent for participation.

Exclusion Criteria

- Patients previously diagnosed and treated for colorectal carcinoma with surgery, chemotherapy, radiotherapy, or chemoradiotherapy at another institution.
- Patients unwilling to participate or unavailable for follow-up.

Statistical Analysis: The collected data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) software version 24.0. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean ± standard deviation (SD). Associations between categorical variables were assessed using the Chi-square test or Fisher's exact test wherever appropriate. A p-value <0.05 was considered statistically significant. The results were presented in the form of tables, graphs, and appropriate statistical summaries.

RESULTS

Table 1: Distribution of Patients According to Age

Age Group (Years)	Number of Patients (n)	Percentage (%)
21–30	4	10
31–40	7	17.5
41–50	9	22.5
51–60	12	30
>60	8	20
Total	**40**	**100**
Mean age	50.90 ± 14.82 years	

Table 2: Distribution of Patients According to Gender

Gender	Number of Patients (n)	Percentage (%)
Male	28	70
Female	12	30
Total	**40**	**100**
Male: Female ratio	**2.33: 1**	

Table 3: Distribution of Patients According to Chief Complaints

Chief Complaint	Present, n (%)	Absent, n (%)
Lump in abdomen	12 (30.0)	28 (70.0)
Per rectal bleeding	24 (60.0)	16 (40.0)
Mass per rectum	21 (52.5)	19 (47.5)
Altered bowel habits	37 (92.5)	3 (7.5)
Pain in abdomen	29 (72.5)	11 (27.5)

Table 4: Distribution of Patients According to Histopathological Type

Histopathological Type	Number of Patients (n)	Percentage (%)
Well-differentiated adenocarcinoma	20	50

Moderately differentiated adenocarcinoma	8	20
Poorly differentiated adenocarcinoma	5	12.5
Signet ring cell carcinoma	5	12.5
Neoplastic polyp	1	2.5
Adenocarcinoma with pseudomyxomatous features	1	2.5
Total	**40**	**100**

Table 5: Distribution of Patients According to TNM Stage

TNM Stage	TNM Classification	Number of Patients (n)	Percentage (%)
Stage I	T2N0M0 / T2N1MX	11	27.5
Stage II	T2–T3aN0MX	3	7.5
Stage III	T3N1MX / T3aN2M	14	35
Stage IV	T4aN2M1 / T4bN2bM1	12	30
Total	—	**40**	**100**

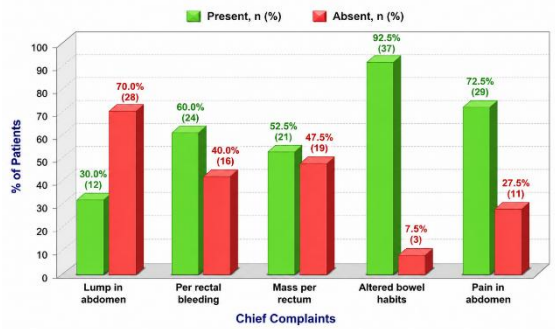

Figure: 1: Distribution of Patients According to Chief Complaints

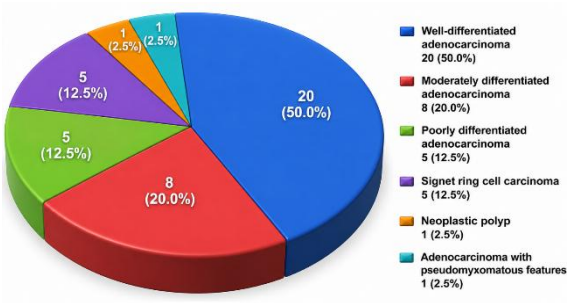

Figure 2: Distribution of Patients According to Histopathological Type

The age of the study participants ranged from 24 to 87 years, with a mean age of 50.90 ± 14.82 years. The largest proportion of patients belonged to the 51–60 years age group, accounting for 12 (30.0%) cases, followed by the 41–50 years age group with 9 (22.5%) patients. Patients aged >60 years constituted 8 (20.0%) of the study population, while 7 (17.5%) patients were in the 31–40 years age group. The youngest age group (21–30 years) comprised 4 (10.0%) patients. These findings indicate that colorectal carcinoma was predominantly observed among middle-aged and older adults, with the highest incidence occurring in the sixth decade of life.

Among the 40 patients included in the study, 28 (70.0%) were males and 12 (30.0%) were females, resulting in a male-to-female ratio of 2.33:1. The findings demonstrate a clear male predominance among patients with colorectal carcinoma, suggesting that the disease occurred more frequently in men than women in the present study population.

Altered bowel habits were the most common presenting complaint, reported by 37 (92.5%) patients, highlighting it as the predominant clinical manifestation of colorectal carcinoma. This was followed by pain in the abdomen, which was present in 29 (72.5%) patients. Per rectal bleeding was observed in 24 (60.0%) patients, while mass per rectum was detected in 21 (52.5%) patients. An abdominal lump was the least frequent presenting complaint and was noted in 12 (30.0%) patients. Conversely, altered bowel habits were absent in only 3 (7.5%) patients, pain in the abdomen was absent in 11 (27.5%), per rectal bleeding in 16 (40.0%), mass per rectum in 19 (47.5%), and abdominal lump in 28 (70.0%) patients. Overall, bowel-related symptoms and abdominal pain constituted the most frequent clinical presentations in patients with colorectal carcinoma.

Histopathological examination revealed that well-differentiated adenocarcinoma was the most common tumor type, identified in 20 (50.0%) patients. Moderately differentiated adenocarcinoma was observed in 8 (20.0%) patients, while poorly differentiated adenocarcinoma accounted for 5 (12.5%) cases. An equal proportion (5; 12.5%) of patients were diagnosed with signet ring cell carcinoma. Less common histological variants included neoplastic polyp and adenocarcinoma with pseudomyxomatous features, each observed in 1 (2.5%) patient. These findings indicate that well-differentiated adenocarcinoma was the predominant histopathological subtype among patients with colorectal carcinoma in the present study.

Assessment of disease stage according to the TNM classification showed that Stage III disease was the most common presentation, accounting for 14 (35.0%) patients. Stage IV disease was observed in 12 (30.0%) patients, indicating that a substantial proportion of patients presented with advanced disease. Stage I carcinoma was diagnosed in 11 (27.5%) patients, whereas Stage II disease was the least common, occurring in only 3 (7.5%) patients. Overall, 65.0% of patients presented with advanced-stage disease (Stage III and Stage IV), while 35.0% were diagnosed in the early stages (Stage I and Stage II), suggesting delayed presentation and diagnosis among a majority of patients in the present study.

DISCUSSION

AGE

In the present study, the age of patients with colorectal carcinoma ranged from 24 to 87 years, with a mean age of 50.90 ± 14.82 years. Most patients belonged to the 51–60 years age group, suggesting that colorectal carcinoma predominantly affects middle-aged and elderly individuals. Although traditionally regarded as a disease of older adults, the inclusion of younger patients in the present study reflects the increasing incidence of early-onset colorectal carcinoma reported worldwide.

Similar observations were reported by Abdelsattar et al,[11] who analyzed patients with colorectal carcinoma and found that the majority of cases occurred after the fifth decade of life, although the incidence among younger adults had increased significantly over recent years. Araghi et al,[12] in the GLOBOCAN-based global analysis, also demonstrated that colorectal cancer incidence rises steadily with advancing age, with the highest burden observed among individuals aged 50 years and above. Likewise, Biller and Schrag,[13] emphasized that while colorectal carcinoma predominantly affects older adults, the growing incidence among patients younger than 50 years represents an emerging global health concern. The relatively younger mean age observed in the present study compared with Western populations may reflect differences in demographic characteristics, genetic susceptibility, environmental exposures, and healthcare accessibility in the Indian population.

GENDER

The present study demonstrated a clear male predominance, with males accounting for 70% of patients and a male-to-female ratio of 2.33:1. This finding suggests that men may be at greater risk of developing colorectal carcinoma, possibly because of greater exposure to modifiable lifestyle risk factors such as smoking, alcohol consumption, obesity, and dietary habits.

Comparable findings have been reported by Xi and Xu,[14] who observed a consistently higher incidence of colorectal carcinoma among males across most geographic regions. Sung et al,[15] in the GLOBOCAN 2020 cancer statistics, similarly reported that colorectal carcinoma occurs more frequently in men than women, with higher age-standardized incidence rates among males worldwide. Murphy et al,[16] also demonstrated male predominance in colorectal carcinoma and suggested that hormonal influences, behavioral factors, and differences in screening uptake may contribute to gender disparities in disease occurrence. The findings of the present study therefore support existing epidemiological evidence indicating that colorectal carcinoma remains more common among men.

CHIEF COMPLAINTS

Altered bowel habits constituted the most frequent presenting symptom in the present study, followed by abdominal pain, per rectal bleeding, mass per rectum, and abdominal lump. These findings indicate that colorectal carcinoma commonly presents with symptoms related to bowel dysfunction and local tumor growth. However, because these symptoms are often nonspecific, many patients delay seeking medical attention until the disease has progressed.

Dekker et al,[17] reported that changes in bowel habits, rectal bleeding, abdominal discomfort, and unexplained anemia are the most common presenting manifestations of colorectal carcinoma, particularly in left-sided tumors. Keum and Giovannucci,[18] similarly observed that abdominal pain, altered bowel habits, and rectal bleeding remain the predominant symptoms worldwide, although symptom patterns vary according to tumor location and disease stage. Arnold et al,[19] further emphasized that delayed recognition of these symptoms contributes substantially to advanced-stage diagnosis in many low- and middle-income countries. The higher frequency of altered bowel habits observed in the present study may be related to the predominance of distal colorectal lesions and delayed clinical presentation, highlighting the need for greater public awareness regarding early warning symptoms.

HISTOPATHOLOGICAL TYPE

Histopathological examination in the present study revealed that well-differentiated adenocarcinoma was the predominant subtype, followed by moderately differentiated adenocarcinoma. Poorly differentiated adenocarcinoma and signet ring cell carcinoma constituted a smaller proportion of cases, while uncommon histological variants such as pseudomyxomatous adenocarcinoma and neoplastic polyps were infrequently encountered.

Nagtegaal et al,[20] reported that conventional adenocarcinoma remains the predominant histological subtype of colorectal carcinoma worldwide, with tumor differentiation serving as an important predictor of prognosis and survival. Well- and moderately differentiated adenocarcinomas generally exhibit more favorable outcomes than poorly differentiated tumors, which are associated with aggressive biological behavior and higher metastatic potential. Recent pathological studies have similarly demonstrated that signet ring cell carcinoma represents a rare but highly aggressive histological subtype characterized by younger age at presentation, diffuse infiltration, advanced stage at diagnosis, and poorer survival outcomes. The predominance of well-differentiated adenocarcinoma observed in the present study therefore suggests relatively favorable tumor differentiation among a substantial proportion of patients, although continued vigilance remains necessary because aggressive variants were also encountered.

TNM STAGING

The present study demonstrated that Stage III disease was the most common presentation, followed by Stage IV disease, indicating that nearly two-thirds of patients presented with advanced-stage colorectal carcinoma. Only a small proportion of patients were diagnosed during the early stages, emphasizing the persistent challenge of delayed diagnosis.

Global epidemiological analyses have consistently shown that advanced-stage presentation remains common in developing countries where organized colorectal cancer screening programs are limited. Araghi et al,[12] reported that delayed diagnosis contributes significantly to poor survival in low-resource settings, whereas countries with established screening programs demonstrate substantially higher proportions of Stage I and II disease at diagnosis. Dekker et al,[17] similarly emphasized that implementation of population-based screening and timely colonoscopic evaluation has significantly increased early-stage detection and improved survival outcomes in developed nations. Murphy et a,[16] also highlighted that advanced TNM stage remains the strongest independent predictor of mortality, recurrence, and long-term prognosis. The findings of the present study therefore reinforce the urgent need to improve public awareness, strengthen screening strategies, and promote earlier diagnosis to reduce the burden of advanced colorectal carcinoma.

CONCLUSION

The incidence of colorectal cancer is lower in India as compared to the westerncountries where in the leading cause of mortality is second cause of cancer mortality.

However, the success rate of detecting early-stage colorectal cancer is poor in our countryas compared to western world. This is mainly because the symptomatology of colorectalcancer and benign colorectal diseases often overlap second, routine screening programs to detect early colorectal cancer are not followed religiously. The incidence of geneticallytransmitted colorectal cancer is not common amongst the Indian population, especially inour area. However, early detection of colorectal malignancyand radical surgery well benefit the patients before they become grossly symptomatic.

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