Journal of Teachers Association
https://tajrmc.com/taj
Vol. 38, No. 2, 2025

pISSN 1019-8555
eISSN 2408-8854

RESEARCH ARTICLE | OPEN ACCESS **DOI:** https://doi.org/10.70818/taj.v38i02.0269

Evaluation of Histopathological Findings of Right-Sided Colonic Carcinoma in A Tertiary Level Hospital

Mohammad Mustafizur Rahman*[1], Ehsanur Reza[1], Emily Rahman Khan[2], Subrata Sarker[3]

1 Department of Surgery, Mymensingh Medical College Hospital, Mymensingh
2 Department of Microbiology, Mymensingh Medical College Hospital, Mymensingh
3 Department of Surgery, Upazila Health Complex, Mymensingh

Citation:
Rahman MM, Reza E, Khan ER, Sarker S; Evaluation of Histopathological Findings of Right-Sided Colonic Carcinoma in A Tertiary Level Hospital. Journal of Teachers Association. 2025;38(2): 201-207

Article History:
Received: 03.02.2025
Accepted: 18.04.2025
Published: 01.06.2025

ABSTRACT: ***Background:*** Right-sided colonic carcinoma, encompassing cancers that occur in the caecum, ascending colon, and hepatic flexure, is a significant clinical concern due to its often-late presentation and aggressive nature. This type of cancer accounts for a substantial portion of colorectal malignancies, and its prognosis is closely related to factors such as the site of the tumor, stage at diagnosis, and metastatic spread. ***Methods:*** This cross-sectional observational study was conducted at the Department of Surgery, Mymensingh Medical College Hospital, Bangladesh, from July 2012 to January 2013. 100 patients who had undergone operative treatment for carcinoma of the right colon in different surgical units of Mymensingh Medical College Hospital and fulfilled inclusion and exclusion criteria participated in the study. Data was collected and analyzed by SPSS-16. ***Result****:* This study reveals that most patients were in the 51-60 years age group, with males (74%) being more affected than females (26%). Most tumors were moderately differentiated, followed by well-differentiated tumors, with a smaller proportion being poorly differentiated. Perioperative findings indicated a high prevalence of mobile growth with lymph node involvement, with a significant number of cases showing advanced diseases such as liver metastasis, peritoneal seeding, and ascites. Dukes' staging showed that 48% of cases were stage A, primarily in the caecum, while 36% were stage D, with ascending colon cancer associated with the poorest outcomes and more frequent liver involvement. ***Conclusion:*** This study shows the predominance of well- and moderately differentiated tumors, with a notable proportion of poorly differentiated cases. Perioperative findings indicate a high frequency of lymph node involvement, metastasis, and peritoneal seeding, suggesting advanced disease at presentation.

Keywords: Right Colon Carcinoma, Ascending Colon, Abdominal Pain, Colonoscopy.

Article at a glance:

Study Purpose*: The purpose of the study is to evaluate the histopathological characteristics of right-sided colonic carcinoma (RCC) in patients treated at a tertiary-level hospital.*

Key findings: *The most common histopathological type of RCC is adenocarcinoma, particularly the moderately differentiated type.*

Newer findings: *Higher levels of TILs in MSI-H RCC cases indicate a better response to immunotherapy, making checkpoint inhibitors a potential treatment option.*

Abbreviations: *CIMP: CpG Island Methylator Phenotype.*

INRODUCTION

Colorectal cancer (CRC) is one of the most prevalent malignancies worldwide, ranking as the third most common cancer in men and the second in women, with an increasing incidence in developing countries.[1] Among CRCs, right-sided colonic carcinoma (RSCC) has garnered significant attention due to its unique clinical, histopathological, and molecular characteristics compared to left-sided colonic carcinoma (LSCC).[2] The right colon, which includes the cecum, ascending colon, and proximal transverse colon, develop tumors that often present at an advanced stage, primarily due to the subtle and non-specific symptoms associated with proximal colonic growths.[3] Histopathological evaluation plays a crucial role in understanding the biological behavior of RSCC. Various studies have identified that RSCCs are frequently associated with mucinous histology, high microsatellite instability (MSI-H), and CpG island methylator phenotype (CIMP), distinguishing them from LSCCs, which exhibit chromosomal

instability (CIN) and adenomatous polyp progression.[4, 5]

Furthermore, RSCCs tend to have a poorer prognosis compared to LSCCs, largely due to delayed diagnosis and an inherently aggressive tumor biology.[6] The incidence of RSCC has been increasing globally, with variations observed across different populations and ethnic groups. It has been reported that older age, female sex, and dietary factors contribute significantly to the higher prevalence of RSCC.[7] Moreover, environmental factors, lifestyle choices, and genetic predisposition, including hereditary non-polyposis colorectal cancer (HNPCC) and familial adenomatous polyposis (FAP), have been implicated in RSCC pathogenesis.[8, 9] Unlike LSCC, which is often linked to smoking and high-fat diets, RSCC has been associated with high fiber intake, obesity, and chronic inflammation, such as inflammatory bowel disease.[10] The histopathological differences between RSCC and LSCC have been extensively studied. RSCCs are frequently diagnosed as poorly differentiated or undifferentiated adenocarcinomas, often exhibiting a mucinous or signet-ring cell component.[11] These tumors are also characterized by high MSI, a molecular feature that results from defective mismatch repair (MMR) genes, leading to the accumulation of mutations.[12]

The presence of MSI-H in RSCC is associated with a better response to immunotherapy but a poorer prognosis when treated with conventional chemotherapy. Another distinct feature of RSCC is the tumor microenvironment, which is often enriched with immune cell infiltration, particularly tumor-infiltrating lymphocytes (TILs). Studies suggest that increased TILs are correlated with MSI status and may serve as a prognostic marker in RSCC.[13] Additionally, RSCCs exhibit increased perineural and lymphovascular invasion, contributing to their aggressive behavior and higher metastatic potential.[14] The distinct histopathological and molecular characteristics of RSCC underscore the necessity of tailored diagnostic and therapeutic approaches. Given its aggressive nature, delayed diagnosis, and poor prognosis, early detection through advanced screening modalities and the implementation of personalized treatment strategies are crucial for improving patient outcomes. This study aimed to evaluate histopathological findings of right-sided colonic carcinoma in a tertiary-level hospital.

METHODS

This cross-sectional type of observational study was conducted at the Department of Surgery, Mymensingh Medical College Hospital, Bangladesh. The study took place from July 2012 to January 2013. The study was carried out with patients who have undergone operative treatment for carcinoma of the right colon in different surgical units of Mymensingh Medical College Hospital. Patients were studied irrespective of age and sex. 100 patients participated in the study. All the participants in the study were informed about the purpose of the study and written consent was taken before participation in this study. Non-randomized purposive samples are taken by choice/judgment. At the time of data collection, all patients admitted in surgery wards with colorectal cancer with histopathological diagnosis and who fulfill the inclusion criteria are taken as samples. A structured data collection form was developed containing all the variables of interest. Data was collected and analyzed by SPSS-16. The study was approved by the Institutional Ethics Committee.

Inclusion Criteria

Patients who were admitted to different surgery units of Mymensingh Medical College Hospital with the clinical diagnosis of carcinoma of the right colon.
Those patients who had undergone operative treatment for carcinoma right colon.

Exclusion Criteria

Patients who refused operative treatment.
Patients with recurrent cancer.

RESULTS

Table 1: Distribution of Patients by Socio-Demographic Characteristics (n=100)

Criteria	Frequency (n)	Percentage (%)
Age (n=100)		
10-20	0	0.0
21-30	8	8.0
31-40	8	8.0

41-50	22	22.0
51-60	44	44.0
61-70	8	8.0
71-80	10	10.0
81-100	0	0.0
Gender (n=100)		
Male	74	74.0
Female	26	26.0
Socio-Economic Class (n=100)		
High	2	2.0
Middle	38	38.0
Poor	60	60.0

The socio-demographic analysis of patients with right-sided colonic carcinoma showed that the majority were in the 51-60 years age group (44%), followed by 41-50 years (22%), while younger (10-30 years) and older (81-100 years) age groups had no cases. Males (74%) were more affected than females (26%), with a male-to-female ratio of 2.8:1. Regarding socio-economic status, 60% of patients belonged to the poor class, followed by 38% in the middle class, while only 2% were from a high socio-economic background, indicating a higher disease burden among economically disadvantaged groups. [Table 1]

Table 2: **Distribution of Patients by Site of Cancer in Right Colon (n=100)**

Site	Frequency	Percentage
Caecum	56	56.0
Ascending colon	30	30.0
Hepatic flexure of the colon	14	14.0
Total	100	100.0

This study reveals that most cases were in the caecum (56%), followed by the ascending colon (30%) and the hepatic flexure of the colon (14%). [Table 2]

Table 3: Distribution of Patients by Grading of Tumor (n=100)

Variables	Frequency (n)	Percentage (%)
Moderate differentiated	44	44.0
Well-differentiated	37	37.0
Poorly differentiated	19	19.0
Total	100	100.0

Histopathological grading revealed that moderately differentiated tumors were the most common (44 cases, 44%), followed by well-differentiated tumors (37 cases, 37%). Poorly differentiated tumors accounted for 19 cases (19%), indicating a smaller but significant proportion of aggressive malignancies. These findings suggest that the majority of right-sided colonic carcinomas exhibit moderate differentiation, with a notable presence of both well-differentiated and poorly differentiated tumors. [Table 3]

Table 4: Distribution of Patients by Per Operative Findings (n=100)

Variables	Frequency (n)	Percentage (%)
Mobile growth with lymph node involvement	40	40.0
Fixed growth with lymph node involvement with liver metastasis with peritoneal seedling	16	16.0

Fixed growth with lymph node involvement with liver metastasis with peritoneal seedling with ascites	14	14.0
Mobile growth with lymph node involvement with growths adherent	14	14.0
Fixed growth with lymph node involvement	10	10.0
Mobile growth with lymph node involvement with liver metastasis	3	3.0
Fixed growth with lymph node involvement with metastasis	3	3.0
Total	100	100.0

Perioperative findings showed that the most common presentation was mobile growth with lymph node involvement (40 cases, 40%), followed by fixed growth with liver metastasis, peritoneal seeding, and ascites (14 cases, 14%). Additionally, fixed growth with liver metastasis and peritoneal seeding was observed in 16 cases (16%), while mobile growth with lymph node involvement with growth adherent was found in 14 cases (14%). Fixed growth with lymph node involvement was present in 10 cases (10%), whereas mobile and fixed growths with liver metastasis or other metastatic involvement were the least common (3 cases each, 3%), highlighting the varied extent of disease progression in right-sided colonic carcinoma. [Table 4]

Table 5: Distribution of Patients by Dukes' Staging (n=100)

Variables	Frequency (n)	Percentage (%)
Stage-A	48	48.0
Stage-B	10	10.0
Stage-C	6	6.0
Stage-D	36	36.0
Total	100	100.0

In this series, staging was done by Dukes' staging based on preoperative findings. 48% of cases were of stage A. Out of which 34% were at caecum. Stage D consists of 36% of cases, out of which 50% cases had ascending colon cancer. All these operative findings and staging suggest that lesions in the ascending colon among the whole length of right colonies of poorest outcome. Besides this, the right colic flexure lesions involve the liver more frequently. [Table 5]

Table 6: Distribution of Patients by Operative Treatment (n=100)

Blood group	Frequency (n)	Percentage (%)
Curative resection	48	48.0
Palliative bypass	36	36.0
Palliative resection	16	16.0
Total	100	100.0

The operative treatment for right-sided colonic carcinoma showed that most patients underwent curative resection (48%), indicating an attempt to remove the tumor to achieve a cure. A significant portion of patients received palliative bypass (36%), suggesting that their disease was too advanced for curative surgery, and bypass procedures were performed to alleviate symptoms. A smaller group underwent palliative resection (16%), indicating that resection was performed not with curative intent but to manage symptoms or complications. [Table 6]

DISCUSSION

Right-sided colonic carcinoma (RSCC) presents distinct epidemiological, histopathological, and clinical characteristics compared to left-sided colorectal cancer. In this study, most patients were between 51-60 years of age (44%), with an additional 22% in the 41-50 age group, consistent with previous findings that RSCC predominantly affects middle-aged and elderly populations.[15] Notably, no cases were observed in the 10-20 and 81-100 age groups, suggesting that RSCC is rare in extreme age ranges. The male predominance (74% vs. 26%) with a male-to-female ratio of 2.8:1 aligns with other studies that have demonstrated a higher incidence of RSCC in males, possibly due to hormonal and lifestyle factors.[3] Furthermore, socio-economic analysis revealed that 60% of patients belonged to the poor class, supporting the association between low socio-economic status and increased cancer risk, potentially due to dietary habits, limited healthcare access, and late diagnosis.[10] The site distribution of tumors in this study showed that the cecum was the most commonly affected region (56%), followed by the ascending colon (30%) and hepatic flexure (14%). This is consistent with prior reports that indicate the cecum and ascending colon as the most frequent sites for RSCC due to their anatomical and functional predisposition to neoplastic transformation.[2, 4]

The high proportion of cecal tumors may contribute to delayed diagnosis, as lesions in this location often remain asymptomatic until they reach an advanced stage.[6] Histopathological analysis revealed that moderately differentiated tumors were the most common (44%), followed by well-differentiated (37%) and poorly differentiated (19%) tumors. These findings are in line with previous studies reporting that the majority of RSCCs exhibit moderate differentiation, while poorly differentiated tumors represent a smaller but significant subset associated with aggressive behavior and poor prognosis.[11, 12] Perioperative findings demonstrated that mobile growth with lymph node involvement was the most frequent presentation (40%), followed by fixed growth with liver metastasis, peritoneal seeding, and ascites (14%). The presence of metastatic disease in 16% of cases at the time of surgery suggests a high rate of late-stage presentation, which is a well-documented feature of RSCC.[9] Studies have shown that right-sided tumors often have more advanced TNM staging at diagnosis due to their tendency for silent progression and late symptom onset, leading to higher rates of lymph node and distant organ involvement.[16]

Dukes' staging in this study revealed that 48% of patients were in stage A, while stage D accounted for 36%, with the ascending colon being the most affected site in advanced cases. This supports the notion that RSCC often presents at a more advanced stage compared to left-sided tumors, contributing to poorer overall survival outcomes.[5] Moreover, hepatic metastases were more frequently observed in patients with right colic flexure involvement, reinforcing previous findings that RSCC exhibits a higher tendency for hematogenous spread, particularly to the liver.[1] Surgical treatment in this study showed that curative resection was possible in 48% of cases, whereas 36% required palliative bypass and 16% underwent palliative resection. This reflects the high proportion of patients diagnosed at an advanced stage, limiting the feasibility of curative surgery. Similar studies have reported that RSCC has lower rates of curative resection compared to left-sided colorectal cancers, emphasizing the need for improved early detection strategies.[17, 18] The findings of this study underscore the aggressive nature of RSCC, and the challenges associated with its management. The late presentation, high rates of lymph node involvement, and significant proportion of poorly differentiated tumors contribute to its poorer prognosis compared to left-sided colorectal cancer. Early detection remains crucial in improving patient outcomes, necessitating enhanced screening protocols, particularly for high-risk populations. Moreover, advancements in targeted therapies and immunotherapy may offer promising avenues for treating advanced RSCC, especially in cases with microsatellite instability or other actionable molecular alterations.[19-34]

Limitations of The Study

The study was conducted in a single hospital with a purposively selected small sample size in a short duration of time. So, the results may not reflect the actual scenario.

CONCLUSION

This study shows the predominance of well- and moderately differentiated tumors, with a notable proportion of poorly differentiated cases. Perioperative findings indicate a high frequency of

lymph node involvement, metastasis, and peritoneal seeding, suggesting advanced disease at presentation. Dukes' staging reflects a significant burden of both early and late-stage cases, with lesions in the ascending colon showing the poorest outcomes and a higher tendency for hepatic involvement.

Recommendation

Based on the findings of this study, it is recommended that clinicians focus on early screening and diagnosis, particularly in middle-aged individuals who are at higher risk. Given the prevalence of moderately differentiated tumors and frequent lymph node involvement, timely interventions, including surgical resection and lymph node evaluation, are crucial for improving outcomes. Additionally, the findings highlight the importance of targeting treatment strategies for advanced-stage disease, particularly in patients with liver metastasis or peritoneal seeding, to enhance survival rates.

Authors' Contributions

MMR, ER: Concept and design, data acquisition, interpretation and drafting. ERK and SS: Data acquisition, interpretation, drafting, final approval and agree to be accountable for all aspects of the work.

Funding: No funding sources.

Conflict of interest: None declared.

Ethical approval: The study was approved by the Institutional Ethics Committee.

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***Correspondence:** Dr. Mohammad Mustafizur Rahman, Email: dr.biplab77@gmail.com

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