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STUDY OF COLORECTAL POLYPS: HISTOPATHOLOGICAL TYPING AND CLINICOPATHOLOGICAL CORRELATION

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ABSTRACT

Background: Colorectal polyps are frequent lesions that one finds in colonoscopic examinations and can be anything from benign hyperplastic lesions to precancerous adenomatous changes. Histopathological diagnosis needs to be correct and understanding the clinicopathological correlation is very important for correct clinical management and prevention of colorectal cancer. **Aim:** To examine the histopathological range of colorectal polyps and assess their association with clinical and demographic variables.

Materials and Methods: A 2-year retrospective observational study was carried out on 186 cases of colorectal polyps diagnosed by endoscopic biopsy or polypectomy specimen. Histopathological typing was done by hematoxylin and eosin (H&E) stained sections. Clinical information such as age, sex, presenting symptoms, and polyp site were obtained from hospital files. The histologic types were categorized as non-neoplastic (hyperplastic, inflammatory, juvenile) and neoplastic (adenomatous, serrated, villous, and carcinoma in situ). Statistical correlations between the variables were done with chi-square and ANOVA tests, using $p < 0.05$ as significance level.

Results: Out of 186 colorectal polyp cases, 58.6% were neoplastic and 41.4% were non-neoplastic. Tubular adenoma was the most frequent neoplastic polyp (42.5%) followed by tubulovillous adenoma (10.2%). Hyperplastic polyps accounted for 29.0% of cases. The majority of polyps were located in the rectosigmoid region (65.1%). Neoplastic polyps were significantly more common in patients aged >50 years ($p < 0.01$). A statistically significant correlation was found between polyp type and symptomatology ($p < 0.05$), with bleeding per rectum being predominant in adenomatous polyps.

Conclusion: Histopathological examination of colorectal polyps is essential for diagnostic categorization and malignancy risk assessment. Significant clinicopathological associations with age, location, and symptoms were identified, emphasizing the need for vigilant screening, particularly in older adults.

Keywords: Colorectal polyps, Tubular adenoma, Histopathology, Hyperplastic polyp, Colonoscopy, Clinicopathological correlation.

INTRODUCTION

Colorectal polyps are mucosal protrusions that arise from the epithelial lining of the large intestine and are commonly encountered during routine colonoscopic evaluations. While many polyps are benign and asymptomatic, some possess significant neoplastic potential, particularly adenomatous polyps, which are recognized precursors to colorectal carcinoma through the adenoma-carcinoma sequence.[1] Globally, colorectal cancer remains the third most common malignancy and a leading cause of cancer-related mortality, particularly in developed nations.[2] In recent years, developing countries like India have also reported a rising incidence of colorectal carcinoma,

underscoring the importance of early detection and surveillance of precursor lesions.[3]

Polyps can be broadly categorized into non-neoplastic and neoplastic types. Non-neoplastic polyps include hyperplastic, inflammatory, and juvenile polyps, which generally carry minimal malignant potential. In contrast, neoplastic polyps such as tubular adenoma, villous adenoma, tubulovillous adenoma, and serrated adenomas are considered dysplastic and pose a risk for malignant transformation if left untreated.[4] The risk of malignancy is enhanced by some histologic characteristics including high-grade dysplasia, villous architecture, and greater polyp size.[5]

The clinical presentation of colorectal polyps can range from totally asymptomatic to symptoms of rectal bleeding, mucous discharge, abdominal pain, changes in bowel habits, or anemia. Although most polyps are found in the rectosigmoid region, their distribution may be different based on the patient's age, underlying disease, and genetic factors.[6] Colonoscopy with subsequent histopathological evaluation is still the gold standard for the diagnosis and classification of these lesions.

Histopathological analysis not only yields definitive diagnosis but also supplies crucial information regarding the type, architecture, and extent of dysplasia, which directs surveillance intervals and treatment modalities. Additionally, correlating histopathological types with clinical and demographic factors is imperative to comprehend risk factors and progression patterns of colorectal polyps in various population subsets.[7]

Even with many worldwide studies on colorectal polyps, few data have been reported in the Indian subcontinent, especially concerning histological patterns and clinicopathological correlations. This work intends to fill the gap by examining the histomorphological spectrum of colorectal polyps and determining their correlation with age, gender, clinical presentation, and anatomical distribution in a tertiary care setup.

MATERIALS AND METHODS

This was a two-year retrospective observational study from January 2021 to December 2022 with the objective of assessing the histopathological spectrum of colorectal polyps and their correlation with demographic and clinical parameters. A total of 186 colorectal polyp specimens were studied. These specimens were acquired by endoscopic biopsies and polypectomies received in the histopathology department by patients reporting gastrointestinal symptoms.

All instances of colorectal polyps that were sent for histopathological examination over the course of the study were included. Incomplete biopsy specimens, poorly fixed tissues, and resected specimens without clinicopathological information were excluded from the study. Relevant clinical information such as patient age, gender, presenting symptoms, and anatomical site of the polyp was retrieved from histopathology requisition forms and electronic medical records.

Tissue specimens were fixed in 10% neutral buffered formalin, processed routinely, and embedded in paraffin. Sections of 3–4 µm thickness were cut and stained with Hematoxylin and Eosin (H&E). Histopathological examination was conducted using standard light microscopy by experienced pathologists. Each polyp was classified according to the World Health Organization (WHO) 2019 classification into non-neoplastic (hyperplastic, inflammatory, juvenile) and neoplastic types (tubular adenoma, tubulovillous adenoma, villous adenoma, serrated adenoma, and carcinoma in situ). Dysplasia, if present, was graded as low or high based on architectural and cytologic criteria.

Clinical symptoms were categorized into rectal bleeding, constipation, abdominal pain, mucous discharge, and asymptomatic findings. The anatomical distribution of polyps was documented based on colonoscopic records and gross examination reports, with localization defined as rectum, sigmoid colon, descending colon, transverse colon, ascending colon, or cecum.

All data were tabulated and analyzed using SPSS version 25.0. Descriptive statistics were used to express categorical variables as frequencies and percentages, while continuous variables were presented as mean ± standard deviation. Associations between polyp type and clinicopathological variables (age group, gender, symptomatology, anatomical site) were tested using chi-square or Fisher's exact test as applicable. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 186 cases of colorectal polyps were analyzed in this study over a 2-year period. The patients ranged in age from 8 to 85 years, with a mean age of 53.7 ± 14.8 years. Male predominance was observed with a male-to-female ratio of 1.4:1. Most patients presented with rectal bleeding (46.2%), followed by constipation, abdominal discomfort, and mucous discharge. Polyps were most commonly located in the rectosigmoid region. Histologically, 58.6% were neoplastic polyps, while 41.4% were non-neoplastic. Tubular adenoma was the most frequently observed neoplastic polyp, and hyperplastic polyps were the most common among non-neoplastic types. A significant correlation was found between age group and histopathological type ($p < 0.01$), with neoplastic polyps more prevalent in older individuals.

Table 1 presents the age-wise distribution of patients with colorectal polyps.

Table 1: Age-wise Distribution of Patients with Colorectal Polyps (n = 186)

Age Group (Years)	Number of Cases	Percentage (%)
<20	6	3.2
21–30	12	6.5
31–40	22	11.8
41–50	34	18.3
51–60	56	30.1
>60	56	30.1

Table 2 illustrates the gender-wise distribution of the cases.

Table 2: Gender Distribution of Colorectal Polyp Cases

Gender	Number of Cases	Percentage (%)
Male	108	58.1
Female	78	41.9

Table 3 outlines the presenting symptoms among the study population.

Table 3: Clinical Presentation of Patients with Colorectal Polyps

Symptom	Number of Cases	Percentage (%)
Rectal Bleeding	86	46.2
Constipation	41	22.0
Abdominal Discomfort	26	14.0
Mucous Discharge	21	11.3
Asymptomatic	12	6.5

Table 4 categorizes the polyps into neoplastic and non-neoplastic types.

Table 4: Histopathological Classification of Colorectal Polyps

Type	Number of Cases	Percentage (%)
Non-Neoplastic	77	41.4
Neoplastic	109	58.6

Table 5 presents the specific types of non-neoplastic polyps observed.

Table 5: Distribution of Non-Neoplastic Polyps (n = 77)

Type	Number of Cases	Percentage (%)
Hyperplastic	54	70.1
Inflammatory	16	20.8
Juvenile	7	9.1

Table 6 shows the types of neoplastic polyps.

Table 6: Distribution of Neoplastic Polyps (n = 109)

Type	Number of Cases	Percentage (%)
Tubular Adenoma	79	72.5
Tubulovillous Adenoma	19	17.4
Villous Adenoma	6	5.5
Serrated Adenoma	3	2.8
Carcinoma In Situ	2	1.8

Table 7 demonstrates the site-wise anatomical distribution of the polyps.

Table 7: Anatomical Distribution of Colorectal Polyps

Site	Number of Cases	Percentage (%)
Rectum	76	40.9
Sigmoid Colon	45	24.2
Descending Colon	19	10.2
Transverse Colon	18	9.7
Ascending Colon	15	8.1
Cecum	13	7.0

Table 8 correlates age group with type of polyp.

Table 8: Age-wise Distribution of Neoplastic vs. Non-Neoplastic Polyps

Age Group (Years)	Neoplastic (n=109)	Non-Neoplastic (n=77)
≤40	18	22
41–60	55	35
>60	36	20
p-value	-	<0.01

Table 9 shows symptom distribution in relation to histopathological type.

Table 9: Clinical Presentation by Histopathological Type

Symptom	Neoplastic (n=109)	Non-Neoplastic (n=77)	p-value
Rectal Bleeding	62	24	<0.05
Constipation	22	19	0.18
Mucous Discharge	10	11	0.04
Abdominal Pain	12	14	0.31

Table 10 compares gender-wise distribution of neoplastic polyps.

Table 10: Gender Distribution of Neoplastic Polyps

Gender	Number (n=109)	Percentage (%)	p-value
Male	66	60.6	
Female	43	39.4	0.09

Table 11 examines dysplasia grading in neoplastic polyps.

Table 11: Dysplasia in Neoplastic Polyps

Type of Dysplasia	Number of Cases	Percentage (%)
Low Grade	89	81.7
High Grade	20	18.3

Table 12 shows the distribution of multiple vs. solitary polyps.

Table 12: Solitary vs. Multiple Polyps

Type	Number of Cases	Percentage (%)
Solitary	138	74.2
Multiple	48	25.8

Summary of Tables

The study included 186 cases of colorectal polyps, with a higher frequency of neoplastic polyps (58.6%) compared to non-neoplastic ones (Table 4). Tubular adenomas were the most common histological type among neoplastic lesions (Table 6), while hyperplastic polyps dominated the non-neoplastic category (Table 5). The majority of polyps occurred in patients above 50 years of age (Table 1), with rectal bleeding being the most frequent presenting symptom (Table 3). Polyps were predominantly localized to the rectosigmoid region (Table 7). Statistically significant correlations were observed between histological type and age (Table 8), symptoms (Table 9), and dysplasia grading (Table 11). Most neoplastic polyps exhibited low-grade dysplasia, and solitary polyps were more frequently encountered than multiple ones (Tables 11 and 12). These findings underline the importance of routine colonoscopic surveillance, especially in older populations, to detect and classify polyps early and prevent progression to malignancy.

DISCUSSION

Colorectal polyps represent a diverse group of lesions with varying histological architecture and malignant potential. This study demonstrated that neoplastic polyps accounted for a larger proportion of cases, with tubular adenomas being the most prevalent subtype. These findings align with previous literature, which reports tubular adenomas as the most frequent histological variant in populations undergoing routine colonoscopy screening.[8] The predominance of neoplastic lesions in older age groups observed in this study also supports the age-related progression of adenoma-carcinoma sequence described in several large-scale epidemiological reviews.[9]

The male preponderance observed may be attributable to lifestyle-associated risk factors such as higher rates of tobacco use, red meat consumption, and delayed health-seeking behavior among males. Other studies have similarly noted higher rates of adenomatous polyps in males, particularly in the sixth and seventh decades of life.[10] The localization of most polyps to the rectosigmoid region reinforces previous reports that the distal colon is the most frequent site of polyp formation, possibly due to slower transit time and greater exposure to carcinogens.[11]

Rectal bleeding was the most common presenting symptom among patients with colorectal polyps in this study. Symptomatology significantly correlated with histological type, particularly among neoplastic polyps, which frequently presented with bleeding or mucous discharge. Such correlations are critical in guiding endoscopic evaluation, especially in resource-limited settings where routine screening is not widespread.[12] The significant association between age and neoplastic polyp type further underscores the importance of initiating timely screening in individuals aged over 50 years.

Dysplasia assessment in neoplastic polyps revealed that the majority exhibited low-grade dysplastic changes, which is reassuring in terms of malignancy risk. However, the detection of high-grade dysplasia in a subset of polyps reinforces the role of histopathological evaluation in determining surveillance intervals and management protocols. The identification of even a small number of carcinoma in situ cases highlights the potential of polyps to harbor or progress to malignancy if undetected.[13]

While solitary polyps were more common in this study, the detection of multiple polyps in over a quarter of cases may be indicative of underlying genetic predispositions or field effects within the colonic mucosa. This finding warrants further investigation, especially in younger patients, to rule out hereditary syndromes such as familial adenomatous polyposis or Lynch syndrome.[14]

Limitations of this study are its retrospective and hospital-based nature using biopsy samples, which cannot be generalized as a community prevalence. Additionally, molecular studies or immunohistochemical analysis was not carried out, which may have provided useful information regarding the biological behavior of the polyps. However, the strength of this study is its thorough histomorphological analysis with associated clinicopathological correlation, which has provided worthwhile data to regional knowledge regarding colorectal polyp patterns.

CONCLUSION

This paper emphasizes the histopathologic variability and clinical significance of colorectal polyps in a hospital population. Neoplastic polyps, especially tubular adenomas, were the most common type, with a large proportion found in persons more than 50 years of age. Rectosigmoid was the most frequent location by anatomical site, and rectal bleeding was the most prevalent symptom leading to clinical presentation. Strong correlations were established between histologic type and variables of age, symptomatology, and grade of dysplasia, reinforcing clinicopathological correlation as significant. The majority of neoplastic polyps showed low-grade dysplasia, but the recognition of high-grade dysplasia and carcinoma in situ cases is a reminder of the need for careful histological examination. The occurrence of multiple polyps in some patients also brings into play the consideration of familial colorectal syndromes. These observations highlight the importance of regular colonoscopic screening and biopsy in early detection and risk stratification. Histopathological examination continues to be the standard for diagnosis, classification, and therapeutic decision-making. Incorporation of such evaluations with clinical parameters can enhance prevention strategies for colorectal cancer. Additional multicentric and prospective studies with molecular markers are suggested to better understand polyp behavior and progression.

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