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CASE SERIES

Histomorphological Spectrum of Crohn's Disease on Colonoscopy Biopsies: A Case Series Of 21 Patients

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ABSTRACT

Background: Crohn's disease (CD) is a long-standing inflammatory disorder affecting the gastrointestinal tract, characterized by diverse histological patterns. Evaluation of biopsy samples obtained during endoscopy plays a key role in diagnosis, particularly in regions where other granulomatous or infectious conditions may closely resemble inflammatory bowel disease.
Aim: To analyze the range of histomorphological features in colonoscopic biopsy specimens of Crohn's disease and to correlate these findings with clinical presentation and endoscopic observations in 21 patients.
Materials and Methods: This retrospective descriptive study included 21 confirmed cases of Crohn's disease. Clinical records and colonoscopic findings were reviewed. Biopsy specimens were examined for architectural distortion, inflammatory changes, granulomas, and additional diagnostic features. The data were analyzed descriptively.
Results: The mean patient age was 35.3 years with nearly equal male and female distribution. The most common symptoms were abdominal pain and chronic diarrhea. Ileocolonic involvement was the predominant endoscopic finding. Microscopic examination frequently showed chronic inflammatory infiltrates and distortion of crypt architecture. Non-caseating granulomas were identified in 42.86% of cases. Correlation of clinical, endoscopic, and pathological findings supported the diagnosis in the majority of patients.
Conclusion: Histopathological evaluation of colonoscopic biopsies provides important diagnostic clues in Crohn's disease when interpreted alongside clinical and endoscopic data. Although granulomas are a characteristic feature, they are not universally present; therefore, diagnosis often depends on recognizing a constellation of histological findings.

Keywords*: Crohn's, histopathological, Colonoscopy, biopsies.*

INTRODUCTION

Crohn's disease is a chronic inflammatory condition categorized under inflammatory bowel diseases, characterized by segmental and relapsing inflammation that may involve any part of the gastrointestinal tract, most commonly the terminal ileum and colon [1,2].

Microscopic evaluation of mucosal biopsies obtained during endoscopy plays a key role in confirming the diagnosis and assessing disease activity. It also aids in differentiating Crohn's disease from other conditions such as ulcerative colitis, intestinal tuberculosis, ischemic colitis, and infectious colitis [3,4].

Unlike ulcerative colitis, Crohn's disease is typically associated with transmural inflammation. However, since endoscopic biopsies usually include only mucosal layers, histological findings may appear focal and patchy, especially in early or treated disease [1,5].

Therefore, diagnosis relies on identifying a combination of histological features such as crypt distortion, chronic inflammatory infiltrates, focal active inflammation, discontinuous mucosal involvement, and granuloma formation, interpreted in conjunction with clinical and endoscopic findings [2,5].

Crohn's Disease
Crohn's disease is an immune-mediated inflammatory disorder affecting the gastrointestinal tract, characterized by transmural inflammation that can involve any segment from the mouth to the anus [6].

Involvement of the ileum or ileocolonic region is associated with a higher risk of complications such as strictures and fistulas [7]. The disease typically follows a chronic, relapsing course with symptoms including abdominal pain, diarrhea, nausea, vomiting, and systemic features such as weight loss and fatigue [8].

Epidemiology
Crohn's disease is most prevalent in North America, Northern Europe, and New Zealand, with a bimodal age distribution affecting individuals between 15–30 years and 40–60 years [9,10].

The disease is more common in urban populations and among individuals of Northern European descent. Although historically less common in Asia and Africa, recent studies indicate an increasing incidence in these regions [10].

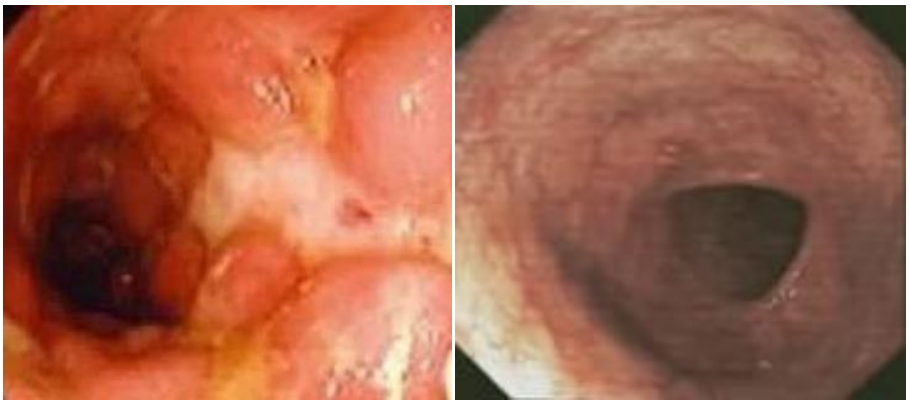
Pathophysiology
Genetic predisposition plays a role in the complex nature of Crohn's disease, infectiousagents, immune dysregulation, environmental exposures, and dietary habits. Its pathogenesisinvolves an exaggerated immune response driven by both innate and adaptive mechanisms. Principal components comprise intestinal macrophages, neutrophils, and helper T cells (Th1 and Th17), which secrete proinflammatory mediators including tumour necrosis factor-alpha (TNF-α). Colonic lesions in Crohn's disease correlate with increased concentrations of cytokines, such as interferon-γ and interleukins. (IL-2, IL-12, and IL-18). [11]

In the early stages, inflammation may present with nonspecific symptoms like fever and malaise.As the disease progresses, intestinal injury leads to more specific symptoms such as diarrhea andabdominal pain. Pain in the right lower quadrant (RLQ) is frequently associated with ileocecal involvement, but injury to the terminal ileum can lead to malabsorption and vitamin shortages. Anaemia may arise from a shortage of vitamin B12 or from prolonged blood loss, depending upon the affected area. Persistent inflammation may also lead to fistula formation, affecting adjacentorgans. Extraintestinal manifestations, often driven by systemic inflammation, can includearthritis, uveitis, pericholangitis, and renal complications. These symptoms may precedegastrointestinal signs. In rare cases, systemic amyloidosis can occur as a late-stage complication.[12]

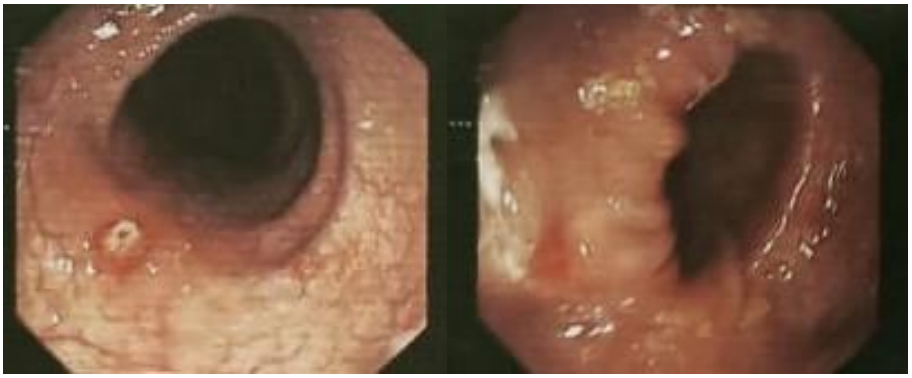
Diagnosis[13]
Most individuals diagnosed with Crohn's disease initially consult a healthcare provider due to persistent diarrhea, abdominal cramping, or unexplained weight loss. During the diagnostic process, they are commonly referred to a gastroenterologist, an expert indigestive system issues, for additional assessment and treatment.

Laboratory Investigations:
Blood tests may reveal anemia, leukocytosis, and elevated inflammatory markers such as C-reactive protein, indicating active disease.

Colonoscopy
In a colonoscopy, a long flexible tube (endoscope) is inserted through the rectum to examine the colon and terminal ileum. Biopsies may be taken to detect white blood cells and assess tissue inflammation.



A. B.



C. D.

A. Cobblestone, B, C,D: Transmural Inflammation

Histopathological features in colonoscopy biopsy

1. Architectural abnormalities

- Focal or patchy **crypt architectural distortion**
- Irregular crypt spacing, shortening, and branching
- Villous blunting in ileal biopsies

2. Chronic inflammation

- Patchy increase in lymphocytes and plasma cells within the lamina propria
- **Basal plasmacytosis**, usually focal rather than diffuse

3. Active inflammation

- **Focal cryptitis** and crypt abscesses
- Neutrophilic inflammation showing discontinuous distribution

4. Granulomas

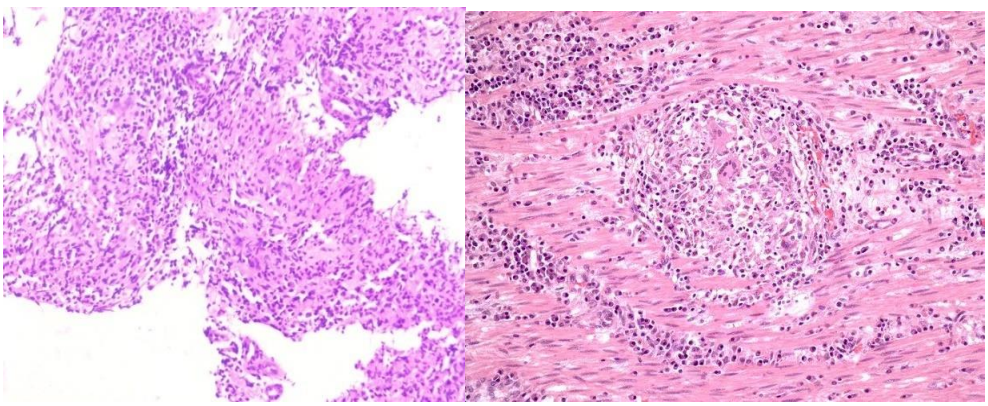
- **Non-caseating epithelioid granulomas**, unrelated to crypt rupture
- Considered highly suggestive of Crohn's disease
- Identified in only **15–30%** of mucosal biopsies
-

5. Discontinuous involvement

- Alternating areas of normal and inflamed mucosa
- Reflects the characteristic **"skip lesions"** of Crohn's disease

6. Surface epithelial changes

- Aphthous ulcers and focal erosions
- Patchy mucin depletion



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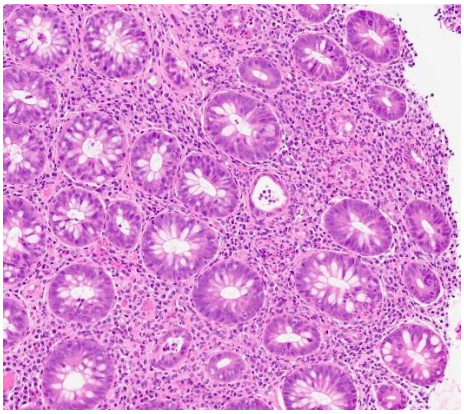


C.

A. Patchy increase in lymphocytes and plasma cells within the lamina propria.
B. Non-caseating epithelioid granulomas
C. Crptitis and crypt abscess

MATERIALS AND METHODS

Study Design

Retrospective observational study conducted in the Department of Pathology at a tertiary care center.

Study Material

Thirty cases diagnosed as Crohn's disease over a defined period were included. Multiple endoscopic biopsy fragments from ileum and/or colon were available in all cases.

Inclusion Criteria

- Cases clinically and endoscopically suspected as Crohn's disease
- Availability of adequate endoscopic biopsy material

Exclusion Criteria

- Ulcerative colitis and indeterminate colitis
- Confirmed intestinal tuberculosis or infective colitis
- Inadequate biopsies

Histopathological Evaluation

Histological sections stained with hematoxylin and eosin were evaluated for crypt architecture, inflammatory infiltrates, granulomas, lymphoid aggregates, and ulceration. Special stains were used when required to exclude infectious etiologies [15].

Limitations of endoscopic biopsy

- Transmural features such as **deep fissuring ulcers, fistula formation, fibrosis, and neural hyperplasia** are usually not represented in mucosal biopsies
- Absence of granulomas does **not exclude** Crohn's disease

RESULTS

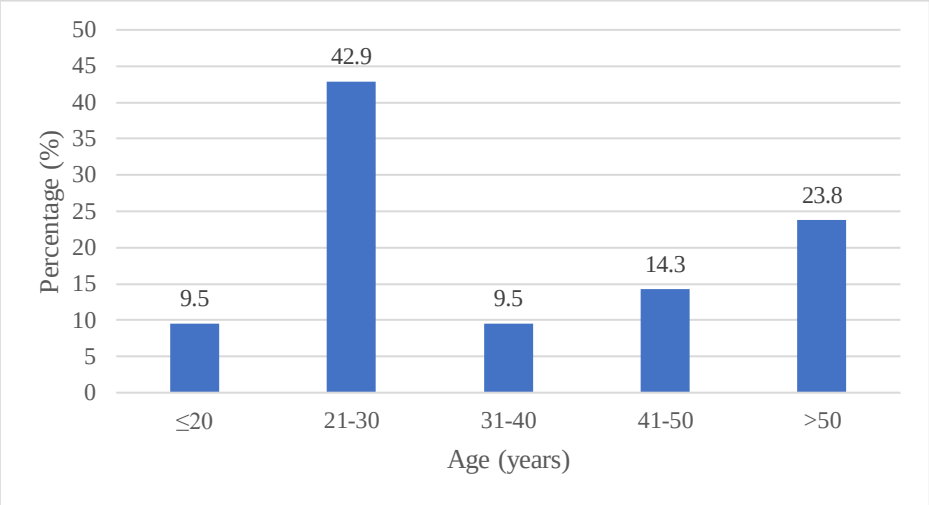
Distribution of age in Crohn's disease

The majority of patients with Crohn's disease belonged to the 21–30 year's age group, constituting 42.90% (n = 9) of cases. This was followed by patients aged above 50 years, who accounted for 23.80% (n = 5). The 41–50 year's age group comprised 14.30% (n = 3) of patients. Both the ≤20 years and 31–40 year's age groups represented 9.50% (n = 2) each (Table 1 and Figure 1).

Table 1. Distribution of age in Crohn's disease

Age (years)	Frequency (n)	Percentage (%)
≤20	2	9.50
21-30	9	42.90
31-40	2	9.50
41-50	3	14.30
>50	5	23.80
Total	21	100.00

Figure 1. Distribution of age in Crohns disease



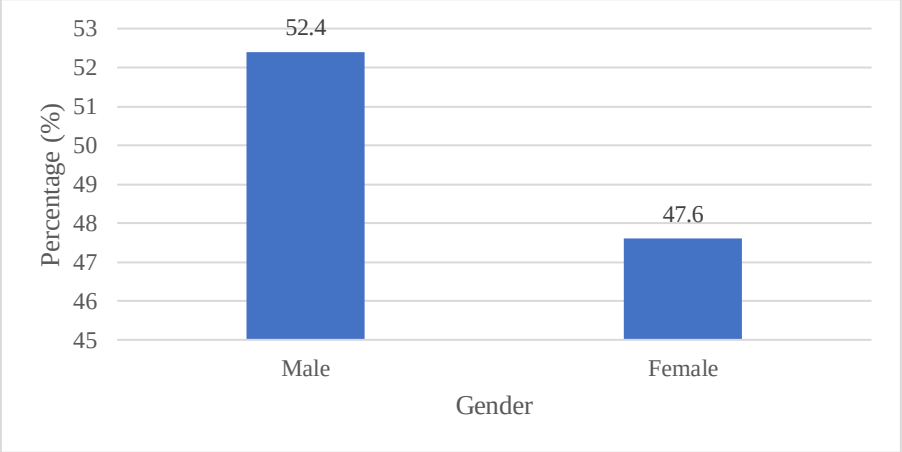
Distribution of gender in Crohn's disease

Among the 21 patients with Crohn's disease, 11 (52.40%) were males and 10 (47.60%) were females, indicating a slight male predominance. The male-to-female ratio in this group was approximately 1.1:1 (Table 2 and Figure 2).

Table 2. Distribution of gender in Crohns disease

Gender	Frequency (n)	Percentage (%)
Male	11	52.40
Female	10	47.60
Total	21	100.00

Figure 2. Distribution of gender in Crohn's disease



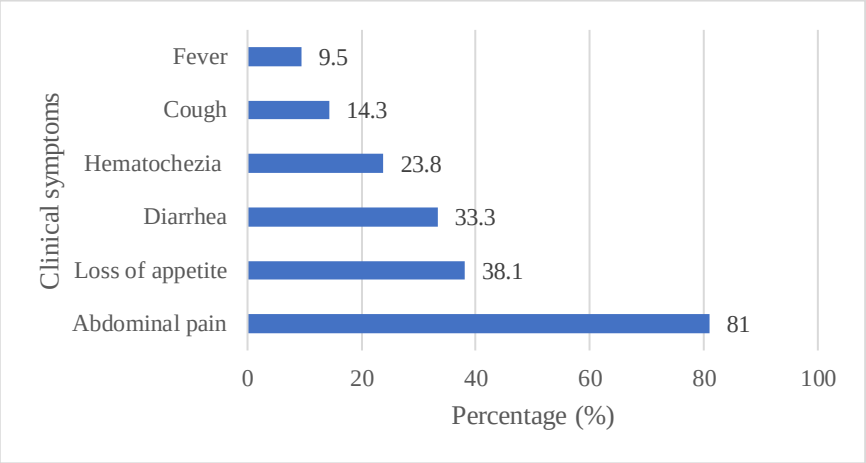
Distribution of clinical symptoms in Crohn's disease

The most common presenting symptom was abdominal pain, reported in 81.00% (n = 17) of patients. This was followed by loss of appetite in 38.10% (n = 8) and diarrhea in 33.30% (n = 7) of cases. Hematochezia was observed in 23.80% (n = 5) of patients. Cough was present in 14.30% (n = 3) of cases, while fever was noted in 9.50% (n = 2) of patients (Table 3 and Figure 3).

Table 3. Distribution of clinical symptoms in Crohn's disease

Clinical symptoms	Frequency (n)	Percentage (%)
Abdominal pain	17	81.00
Loss of appetite	8	38.10
Diarrhea	7	33.30
Hematochezia	5	23.80
Cough	3	14.30
Fever	2	9.50

Figure 3. Distribution of clinical symptoms in Crohn's disease



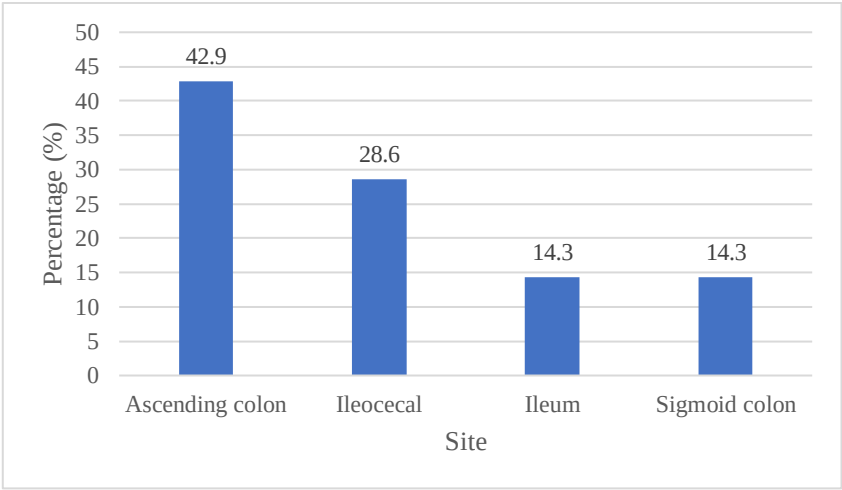
Distribution of site in Crohn's disease

The ascending colon was the most commonly involved site, accounting for 42.90% (n = 9) of cases. This was followed by involvement of the ileocecal region in 28.60% (n = 6) of patients. The ileum alone was affected in 14.30% (n = 3) of cases, while sigmoid colon of involvement were observed in 14.30% (n = 3) of patients (Table 4 and Figure 4).

Table 4. Distribution of site in Crohn's disease

Site	Frequency (n)	Percentage (%)
Ascending colon	9	42.90
Ileocecal	6	28.60
Ileum	3	14.30
Sigmoid colon	3	14.30
Total	21	100.00

Figure 4. Distribution of site in Crohn's disease



Distribution endoscopic findings in Crohn's disease

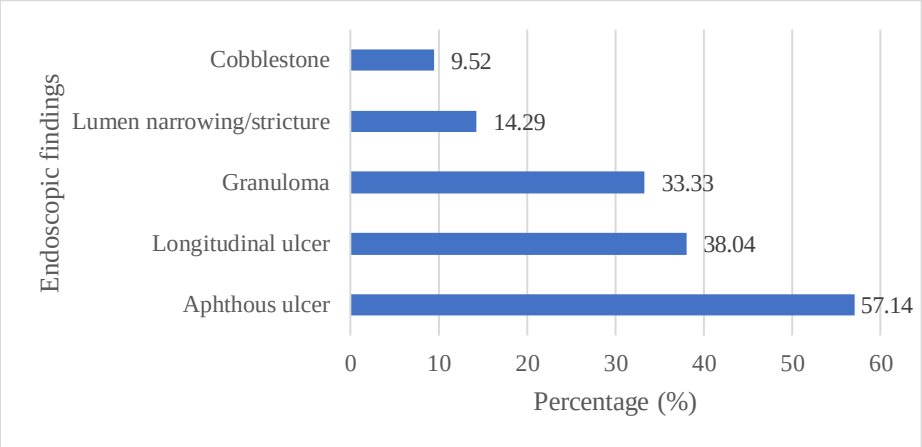
Among Crohn's disease, aphthous ulcers were the most common endoscopic finding, observed in 57.14% (n = 12) of cases, while longitudinal ulcers were noted in 38.04% (n = 8) of patients. Endoscopically visible granulomas were identified in 33.33% (n = 7) of cases. Luminal narrowing or stricture formation was seen in 14.29% (n = 3) of patients, indicating chronic or advanced disease. Cobblestone were the least common finding, present in 9.52% (n = 2) of the study population (Table 5 and Figure 5).

Table 5. Distribution endoscopic findings in Crohn's disease

Endoscopic findings	Frequency (n)	Percentage (%)
Aphthous ulcer	12	57.14
Longitudinal ulcer	8	38.04

Granuloma	7	33.33
Lumen narrowing/stricture	3	14.29
Cobblestone	2	9.52

Figure 5. Distribution endoscopic findings in Crohn's disease



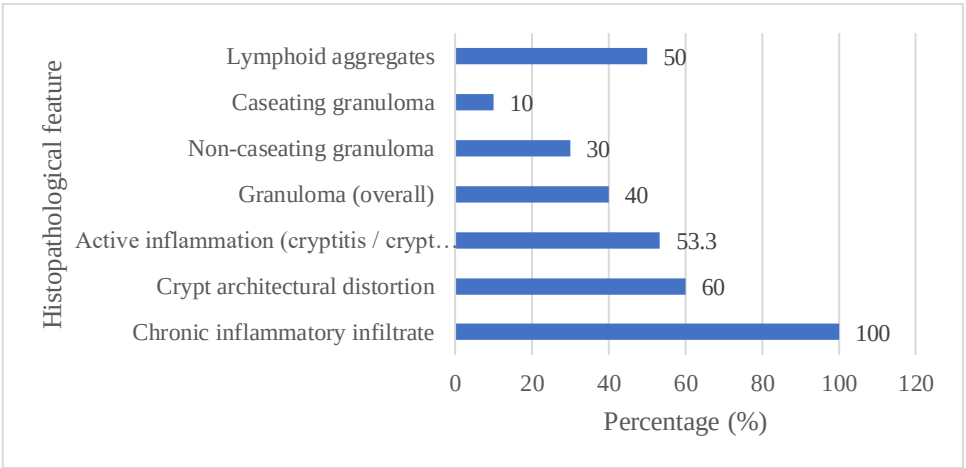
Histopathological Features

Chronic inflammatory infiltrates were present in all cases (100%). Crypt architectural distortion was observed in 85.71% of biopsies, while active inflammation in the form of cryptitis or crypt abscess was noted in 76.19% of cases. Non-caseating granuloma were seen in 42.86%. Lymphoid aggregates were present in 85.71% of cases (Table 6 and Figure 6).

Table 6. Distribution of histopathological features

Histopathological feature	Frequency (n)	Percentage (%)
Chronic inflammatory infiltrate	21	100.00
Crypt architectural distortion	18	85.71
Active inflammation (cryptitis / crypt abscess)	16	76.19
Non-caseating granuloma	9	42.86
Lymphoid aggregates	18	85.71

Figure 6. Distribution of histopathological features



DISCUSSION

Crohn's disease is a chronic granulomatous inflammatory disorder that demonstrates considerable variation in both clinical presentation and histopathological appearance. In the present study, the largest proportion of patients (42.90%) belonged to the 21–30-year age group, which is consistent with the commonly reported peak incidence of the disease in young adults. A slight predominance of males was also observed in the study population.

Among the presenting symptoms, abdominal pain was the most frequent complaint, followed by loss of appetite and diarrhea. These findings correspond with the typical clinical manifestations reported in Crohn's disease, where chronic abdominal discomfort and altered bowel habits are common features.

Regarding anatomical distribution, the ileocecal region and ascending colon were the most frequently involved sites. This pattern is widely recognized in Crohn's disease, as the terminal ileum and adjacent colon are commonly affected due to the characteristic segmental distribution of inflammation.

On colonoscopy, aphthous ulcers were the most commonly observed abnormality, followed by longitudinal ulceration. Other features such as luminal narrowing and cobblestone appearance were identified in a smaller proportion of patients, suggesting more advanced or longstanding disease.

Histopathological examination revealed chronic inflammatory infiltrates in all cases, making it the most consistent microscopic feature. Crypt architectural distortion and active inflammatory changes such as cryptitis and crypt abscesses were also frequently encountered. Non-caseating granulomas were detected in 42.86% of biopsies. Although granulomas are considered highly suggestive of Crohn's disease, they are not present in every case. Their absence therefore does not exclude the diagnosis and highlights the importance of integrating clinical, endoscopic, and pathological findings when evaluating patients, particularly in regions where intestinal tuberculosis is prevalent.[15]

CONCLUSION

The histopathological diagnosis of Crohn's disease on endoscopic biopsy specimens can be challenging because mucosal samples do not capture the full thickness of the bowel wall and the disease often shows a patchy distribution. In this study, chronic inflammatory infiltrates and crypt architectural abnormalities were the most consistently observed features. Although non-caseating granulomas are regarded as a characteristic finding, they were identified in less than half of the cases, which is consistent with previously reported frequencies in mucosal biopsies.

Overall, colonoscopic biopsy evaluation demonstrates a broad spectrum of histomorphological changes. While the presence of granulomas strongly supports the diagnosis, their absence does not rule out Crohn's disease. Accurate diagnosis therefore requires careful correlation of histopathological findings with clinical presentation and endoscopic observations.

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