Section: Pathology

Original Research Article

A STUDY OF HISTOMORPHOLOGICAL SPECTRUM OF ENDOSCOPIC DUODENAL BIOPSIES AT TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Duodenal biopsies obtained during upper gastrointestinal endoscopy play a pivotal role in diagnosing a wide range of inflammatory, infectious, malabsorptive, and neoplastic disorders. Owing to nonspecific clinical presentation and overlapping endoscopic findings, histopathological examination remains the gold standard for definitive diagnosis. This study was undertaken to evaluate the histomorphological spectrum of endoscopic duodenal biopsies at a tertiary care hospital and to correlate histological findings with clinical, endoscopic, and immunohistochemical features.

Materials and Methods: An 18-month retrospective observational study conducted at tertiary care hospital.

Results: Of 200 cases, age ranged from 7 months to 89 years with slight male predominance. The most common presenting symptom was abdominal pain (33%). Endoscopically, duodenitis (44%) were the most frequent findings. Histopathological, chronic nonspecific duodenitis (44%) was the most common diagnosis, followed by chronic active duodenitis (21%). Celiac disease accounted for 5.5% of cases. Neoplastic lesions comprised 6.5% of biopsies. Immunohistochemistry aided in accurate classification of neuroendocrine tumors, carcinomas, lymphoma, and Helicobacter pylori infection.

Conclusion: Chronic inflammatory lesions constitute the majority of duodenal biopsies, with a smaller but significant proportion of malabsorptive and neoplastic conditions. Histopathological evaluation, supplemented by immunohistochemistry, is essential for accurate diagnosis and optimal patient management.

Keywords: Duodenal biopsy, Duodenitis, Histopathology, Immunohistochemistry.

INTRODUCTION

Duodenal biopsies play a pivotal role in the diagnostic evaluation of patients presenting with upper gastrointestinal symptoms such as dyspepsia, chronic diarrhea, anemia, weight loss, and malabsorption.[1]

With increasing use of upper gastrointestinal endoscopy, histopathological examination of duodenal mucosal biopsies has become an integral component of routine diagnostic practice, particularly at tertiary care centers.[2]

Historically, duodenal pathology was predominantly associated with infectious and acid- peptic injury and infections, Helicobacter pylori playing an indirect role through increased gastric acid secretion. However, changing clinical patterns, improved hygiene, and widespread antibiotic use have led to a declining prevalence of H. pylori–related pathology in certain populations.[3]

In contrast, non-specific inflammatory changes, immune-mediated conditions, and malabsorptive disorders such as celiac disease are recognize commonly in duodenal biopsies.[4]

Histomorphological assessment of duodenal biopsies is essential for identifying malabsorptive disorders through evaluation of villous architecture, crypt morphology, and intraepithelial lymphocyte counts.[5] It also aids in the detection of inflammatory and infectious etiologies, including parasitic infestations, and in distinguishing specific from non-specific duodenitis.[6]

Additionally, duodenal biopsies are valuable in diagnosing lymphoproliferative and other neoplastic conditions by identifying abnormal lymphoid infiltrates and architectural distortion.[7]

Accurate interpretation of duodenal biopsy findings requires careful correlation with clinical presentation, serological parameters, and endoscopic features to ensure appropriate diagnosis and management.[8]

Given the broad histopathological spectrum and overlapping features of duodenal diseases, systematic evaluation of endoscopic duodenal biopsies is essential. The present study aims to analyze the histomorphological patterns observed in duodenal biopsies at a tertiary care hospital and correlate these findings with available clinical and endoscopic data.

MATERIALS AND METHODS

Study Design: Retrospective observational study.

Study Population

All duodenal biopsy specimens received in the Department of Pathology over the study period of January 2024 to June 2025 (n ≈ 200).

Data Collection:

- Clinical details including symptoms, age, and sex recorded from the biopsy register.
- H&E-stained slides, IHC slides (where available) and special stains retrieved from the archives.
- Cases of all age groups and both sexes were included.

Histopathological Evaluation:

H&E-stained sections examined for villous architecture, villous crypt ratio, and lamina propria inflammation, IEL (intraepithelial lymphocytes) at villous tip, presence of neutrophil and eosinophils in lamina propria and presence of microorganism.

RESULTS

Age and Sex Distribution.

Table 1: Age distribution (n=200)

Age	No. of Patients	Percentage
0-10	7	(3.5%)
11-20	18	(9%)
21-30	33	(16.5%)
31-40	34	(17%)
41-50	24	(12%)
51-60	27	(13.5%)
61-70	25	(12.5%)
71-80	22	(11%)
81-90	10	(5%)
Total	200	(100%)

Age Distribution:

Total 200 duodenal biopsies analyzed.

The age ranged from 7 months to 89 years, with a mean age of 40.01 ± 19.50 years. The maximum number of cases belonged to the 21–40-year age group.

Sex Distribution:

Male114 cases (57%) and Female cases 86 (43%). There was a slight male predominance, with a Male: Female ratio of 1.32:1.

Table 2: Clinical Presentation: (cases n=200)

Clinical Presentation	No of Cases (N)	Percentage (%)
Abdominal Pain	66	33%
Epigastric Pain	52	26%
Vomiting	44	22%
Abdominal Fullness	40	20%
Burning Sensation	38	19%
Chronic Constipation	37	18.5%
Bloating sensation	35	17.5%
Regurgitation of Food	29	14.5%
Belching	26	13%
Black Coloured Stools	25	12.5%
Diarrhea	20	10%
Hematemesis	13	6.5%
Dysphagia	10	5%
Total	200	100%

Abdominal pain was the most common presenting symptom, reported in approximately one-third of patients. Other common symptoms included epigastric pain, vomiting, abdominal fullness,

burning sensation, bloating sensation, belching, black coloured stools, altered bowel habits and regurgitation of food. Many patients exhibited multiple overlapping symptoms, reflecting nonspecific nature of duodenal pathology.

Table 3: Endoscopic findings: (cases n=200)

Endoscopic Finding	Frequency	Percentage
Normal study	62	31%
Duodenitis	88	44%
Duodenal ulcer and erosion	21	10.5%
Duodenal mass	16	8%
Polyp	13	6.5%
Total	200	100%

Endoscopic findings were available for most cases. The most common abnormalities observed were changes of duodenitis, followed by duodenal ulcer with erosion, mass and polyp.

Table 4: Duodenal biopsy interpretation

Histopathological diagnosis	Number of cases	Percentage
Chronic nonspecific duodenitis	88	44%
Chronic active duodenitis	42	21%
Celiac disease	11	5.5%
Duodenal polyp	21	10.5%
Duodenal Ulcer	14	7%
Malignancy	11	5.5%
lymphagictesia	4	2%
Adenoma	2	1%
Giardia	5	2.5%
H. Pylori	2	1%
Total	200	100%

Neoplastic lesions

Benign lesions were 1% and it includes 2 cases of adenomas with low grade dysplasia. Malignant lesions were 5.5%, including: 3 cases of Well differentiated neuroendocrine tumor, Grade – 1, 3 cases of Moderately differentiated adenocarcinoma, 2 cases of Poorly differentiated carcinoma, 1 case of Moderately differentiated periampullary adenocarcinoma, 1 cases of Gastrointestinal stromal tumor, and 1case of Follicular lymphoma - duodenal type, low grade (grade -1).

Table 5: Correlation of endoscopic and histological diagnosis

Endoscopic findings Histopathological Diagnosis	Normal Study	Duodenitis	Duodenal Ulcer	Duodenal Mass	Duodenal Polyp	Total
Chronic nonspecific duodenitis	56	32	-	-	-	88
Chronic active duodenitis	-	30	8	-	4	42
Celiac disease	6	5	-	-	-	11
Duodenal polyp	-	13	-	-	8	21
Duodenal Ulcer	-	1	13	-	-	14
Malignancy	-	-	-	11	-	11
lymphagictesia	-	-	-	3	1	4
Adenoma	-			2	-	2
Giardia	-	5	-	-	-	5
H. Pylori	-	2	-	-	-	2
Total	62	88	21	16	13	200

Immunohistochemistry Findings

IHC performed in eight cases out of 200 cases to confirm or exclude specific diagnostic entities.

- Well-differentiated Neuroendocrine Tumor (NET):
- The tumor cells showed strong positivity for Chromogranin and Synaptophysin, with a low Ki-67 index, confirming a well-differentiated NET.
- Poorly Differentiated Carcinoma:
- IHC showed positivity for CDX2, and negative for SATB2, Synaptophysin and INMS1 supporting an intestinal-type poorly differentiated adenocarcinoma. Ki-67 showed a high proliferative index.

Follicular Lymphoma

- Lymphoid follicles demonstrated positivity for CD10, Bcl-2, with a monotonous B-cell population (CD20-positive), confirming follicular lymphoma.

H. pylori Gastritis / Duodenitis

H. pylori IHC highlighted curved bacilli along the mucosal surface, confirming the infection in cases where organisms were scanty or not visible on H&E.

Overall, IHC aided in accurately classifying neoplastic lesions and confirming infectious and inflammatory etiologies.

DISCUSSION

Duodenal biopsy is a crucial diagnostic tool for evaluating a wide spectrum of inflammatory, infectious, malabsorptive, and neoplastic conditions of the upper gastrointestinal tract.[1,6,12] The present study analyzes the histomorphological spectrum of 200 endoscopic duodenal biopsies at a tertiary care hospital and correlates the findings with clinical presentation, endoscopic features, and immunohistochemical analysis where required.

In the present study, patients ranged from 7 months to 89 years, with a mean age of 40.01 ± 19.50 years, and the majority of cases observed in the 21–40-year age group. This reflects that duodenal pathology commonly affects individuals in the productive age group, possibly due to dietary habits, Helicobacter pylori infection, acid-peptic disease, and functional gastrointestinal disorders.

A slight male predominance (Male: Female = 1.32:1) was noted, which is comparable to findings in Zafar et al, where a male predominance of 1.3:1 was observed.[9] However, Sarma et al. reported a female predominance, especially in cases of celiac disease, highlighting regional and referral-based variations in disease patterns.[10]

Abdominal pain was the most common presenting complaint in the present study (33%), followed by epigastric pain (26%) and vomiting (22%). Other symptoms such as abdominal fullness, burning sensation, bloating, altered bowel habits, melena, and hematemesis also noted. Importantly, many patients exhibited overlapping symptoms, emphasizing the nonspecific clinical presentation of duodenal diseases.

These findings are consistent with Usha Sharma et al. and Zafar et al,[11] where dyspepsia and abdominal pain were the most frequent presenting symptoms. The nonspecific nature of symptoms underlines the importance of endoscopic biopsy with histopathological evaluation for definitive diagnosis. Many studies have shown that unsuspected duodenal pathology may be found in routine duodenal biopsies.[13,14]

In the present study, the most common endoscopic findings were duodenitis (44%), and duodenal ucer (10.5%). While cases showed a normal endoscopic appearance was (31%), reinforcing that subtle mucosal abnormalities frequently detected during endoscopy.

Histopathological chronic nonspecific duodenitis was the most common diagnosis (44%), followed by chronic active duodenitis (21%). These findings are in concordance with Sarma et al. where nonspecific duodenitis constituted the majority of abnormal biopsies after excluding celiac disease.[10] Similarly, Zafar et al. demonstrated high concordance between endoscopic duodenitis and histological confirmation, underscoring the reliability of biopsy in evaluating inflammatory duodenal lesions.[9]

Celiac disease accounted for 5.5% of cases in the present study. This is lower than the 28.93% prevalence reported in Sarma et al., where Marsh grading was extensively applied. The lower prevalence in our study attributed to differences in referral patterns, clinical suspicion, and biopsy indications, as well as the inclusion of a broader spectrum of non-malabsorptive duodenal conditions.

Additionally, cases of intestinal lymphangiectasis (2%), and Giardia infestation (2.5%) identified, highlighting the importance of careful histological examination for uncommon but clinically significant entities. Routine procurement of duodenal biopsy specimens is valuable for recognition of atypical presentations of patients with Giardia lamblia and avoiding delays in diagnosis.[14]

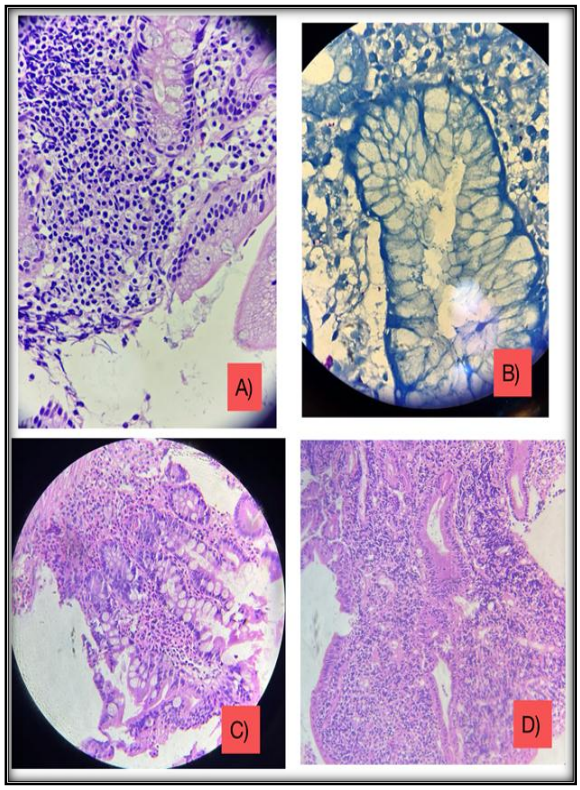

Figure 1: A) H&E x40 Giardia trophozoites attached to duodenal mucosa B) Giemsa stain x100 - Helicobacter pylori organisms highlighted along mucosal surface C) H&E x20 Eosinophilic duodenitis showing dense eosinophilic infiltrate in lamina propria D) H&E x20 - Follicular lymphoma showing neoplastic lymphoid follicles in duodenal mucosa.

Neoplastic lesions constituted 6.5% of cases in the present study. These included benign and malignant lesions. Benign lesions include adenoma with low grade dysplasia and malignant lesions includes well-differentiated neuroendocrine tumors, adenocarcinomas, poorly differentiated carcinomas, gastrointestinal stromal tumor (GIST), and follicular lymphoma of duodenal type. This proportion is comparable to Zafar et al., where duodenal

neoplasms, though infrequent, were consistently identified.[9]

The diversity of neoplastic lesions in our study emphasizes the heterogeneous nature of duodenal tumors and the diagnostic challenges posed by small biopsy samples. In our study total 16 cases presented with duodenal mass on endoscopic findings, out of which 13 cases were diagnosed neoplastic in origin by histopathological examination. These findings suggest a good association between endoscopic and histopathological impression in cases of neoplastic lesions. Choudhary M and Yadav S also showed a good association between endoscopy and histology of malignant cases.[15]

Immunohistochemistry (IHC) performed in eight selected cases in the present study and played a pivotal role in confirming neoplastic and infectious diagnoses. Neuroendocrine tumors showed strong Chromogranin and Synaptophysin positivity with low Ki-67 index, confirming well-differentiated NETs. Poorly differentiated carcinomas demonstrated CDX2 positivity and high Ki-67 index, supporting intestinal-type adenocarcinoma.

Follicular lymphoma cases showed characteristic CD10, Bcl-2, and CD20 positivity, aiding in precise classification. Additionally, H. pylori IHC was useful in cases where organisms were scanty on routine

H&E staining. Similar utility of IHC in resolving diagnostic dilemmas has been highlighted in Zafar et al., reinforcing its indispensability in modern gastrointestinal pathology.[9]

Comparison with Previous Studies

Compared to earlier studies, the present study stands out as

- A larger exclusive duodenal biopsy cohort (n=200)
- Inclusion of a wide age range, including pediatric patients
- Detailed clinicopathological and endoscopic correlation
- Use of IHC for definitive diagnosis in selected cases

While inflammatory lesions predominated across all studies, variations in the prevalence of celiac disease and neoplastic lesions reflect geographical, dietary, and referral-based differences.

Limitations

The study limited by its single-center design and lack of long-term clinical follow-up. Marsh grading and IEL quantification not uniformly applied to all cases, which may have influenced the detection rate of early celiac disease.

CONCLUSION

The present study highlights that chronic inflammatory lesions, particularly chronic nonspecfic duodenitis and chronic active duodenitis constituted the most frequent duodenal pathologies, while celiac disease and neoplastic lesions represented a smaller but clinically significant proportion. Histopathology continues to play a pivotal role in accurate diagnosis, especially where endoscopic findings are inconclusive.

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