Section: Pathology

Original Research Article

HISTOPATHOLOGICAL SPECTRUM AND CLINICOPATHOLOGICAL CORRELATION OF UPPER GASTROINTESTINAL LESIONS IN ENDOSCOPIC BIOPSIES: A CROSS-SECTIONAL STUDY FROM A TERTIARY CARE CENTER

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ABSTRACT

Background: Upper gastrointestinal (UGI) lesions are commonly encountered in clinical practice and range from benign inflammatory conditions to malignancies. Histopathological evaluation of endoscopic biopsies provides definitive diagnosis, guides treatment, and facilitates early detection of neoplastic changes.

Materials and Methods: This observational, cross-sectional study was conducted at the Department of Pathology, Esic Medical College, from March 2023 to February 2024. A total of 110 patients who underwent UGI endoscopic biopsies were included. Biopsies were obtained from the esophagus, stomach, and duodenum and subjected to histopathological examination. Relevant clinical, endoscopic, and demographic data were analyzed.

Results: The most commonly biopsied site was the stomach (59.1%), followed by the esophagus (27.3%) and duodenum (13.6%). Chronic gastritis (25.5%) was the most frequent diagnosis, followed by H. pylori-associated gastritis (13.6%) and intestinal metaplasia (9.1%). Malignant lesions accounted for 13.6% of all cases, with gastric adenocarcinoma being the most common. Esophageal biopsies had the highest malignancy rate (20%). H. pylori was detected in 35.4% of gastric biopsies. Concordance between endoscopic and histopathological findings was highest in suspected malignancies (90.9%).

Conclusion: Histopathological analysis of endoscopic biopsies reveals a wide spectrum of UGI lesions and plays a critical role in detecting early malignancy, even when endoscopic findings are non-specific. Routine biopsy remains essential for diagnosis, particularly in high-risk patients.

Keywords: Upper gastrointestinal tract, endoscopy, histopathology, gastric cancer, H. pylori, chronic gastritis, biopsy, esophageal carcinoma, intestinal metaplasia.

INTRODUCTION

Disorders of the upper gastrointestinal (UGI) tract are a major global health concern, encompassing a wide range of clinical entities from benign inflammatory conditions to premalignant and malignant neoplasms. The esophagus, stomach, and duodenum are particularly vulnerable to pathological changes that may present with vague or overlapping symptoms such as dyspepsia, upper abdominal pain, bloating, and hematemesis. In such cases, accurate diagnosis is crucial for effective treatment planning and prognostication.

The advent of upper gastrointestinal endoscopy (esophagogastroduodenoscopy or EGD) has significantly transformed the diagnostic landscape by enabling direct visualization of mucosal abnormalities and facilitating targeted biopsy for histopathological analysis. Histopathological examination continues to be the gold standard for

establishing definitive diagnoses, classifying lesions, and distinguishing between benign and malignant processes.[1,2]

Among gastric pathologies, chronic gastritis remains one of the most prevalent histological findings worldwide. It is often associated with Helicobacter pylori infection, which has been implicated in the pathogenesis of peptic ulcer disease, gastric adenocarcinoma, and mucosa-associated lymphoid tissue (MALT) lymphoma.[3,4] Recent studies have shown that H. pylori infection affects more than 50% of the global population, and up to 90% in certain developing regions, reinforcing the need for its histological identification and prompt treatment.[5]

In the esophagus, common findings include reflux esophagitis, Barrett's esophagus, and squamous or adenocarcinoma. Barrett's esophagus, in particular, is of concern due to its malignant potential. It involves metaplastic transformation of the normal squamous epithelium into columnar-lined mucosa, increasing the risk for esophageal adenocarcinoma, especially in individuals with chronic gastro-esophageal reflux disease (GERD).[6,7] Surveillance endoscopy with biopsy remains the cornerstone for detecting dysplastic changes early.

Duodenal lesions, while less frequent, are clinically relevant. Non-specific duodenitis, celiac disease, and peptic duodenal ulcers are commonly encountered. Histological features of celiac disease, such as villous atrophy, crypt hyperplasia, and intraepithelial lymphocytosis, are key to diagnosis and disease monitoring. Recent global trends suggest a rising awareness and detection rate of celiac disease due to improved endoscopic screening protocols.[8,9]

The histopathological spectrum of UGI lesions varies by geographical region, dietary habits, H. pylori prevalence, and access to healthcare services. While malignant lesions are more common in elderly individuals, benign and reactive conditions can affect all age groups. Numerous studies from South Asia and the Middle East have reported chronic gastritis and intestinal metaplasia as the most frequent gastric biopsy findings, followed by adenocarcinomas, which tend to occur in later stages due to delayed diagnosis.[10,11]

Histological classification not only confirms clinical and endoscopic suspicions but also uncovers incidental or subclinical lesions that may be missed during gross inspection. A study by Al-Akwaa et al. showed that histopathology significantly altered initial clinical impressions in 17% of endoscopic biopsies, demonstrating the diagnostic value of microscopic evaluation.[12] Moreover, the concordance rate between endoscopic and histopathological findings in UGI biopsies has been reported to vary between 70–85%, depending on the quality of tissue sampling and expertise.[13]

Despite advances in diagnostic imaging and serological markers, biopsy-based histopathology remains indispensable. It is especially critical in distinguishing reactive inflammatory changes from early neoplastic transformation, particularly in gastric and esophageal mucosa. As the prevalence of lifestyle-related disorders and H. pylori infection continues to rise, it is imperative for clinicians and pathologists to recognize evolving histological patterns.

Aim of the Study: To evaluate the histopathological spectrum of upper gastrointestinal tract lesions in patients undergoing upper gastrointestinal endoscopic biopsies and assess their correlation with clinical and endoscopic findings.

MATERIALS AND METHODS

This retrospective, descriptive observational study was conducted in the Department of Pathology, Esic Medical College, a tertiary care teaching institution in India. The study period spanned from April 2023 to March 2024, encompassing a total of 124 patients who underwent upper gastrointestinal (UGI) endoscopic biopsies during the defined timeframe.

All patients referred for UGI endoscopy who underwent biopsy of mucosal lesions from the esophagus, stomach, and duodenum were included in the study. The primary indications for endoscopy included dyspepsia, epigastric discomfort, heartburn, upper abdominal pain, persistent vomiting, unexplained weight loss, anemia, and gastrointestinal bleeding. Patients who had a clear mucosal lesion visualized during endoscopy and from whom adequate biopsy material was obtained were included.

Inclusion criteria:

- Patients aged 18 years and above.
- Patients who underwent UGI endoscopic biopsy with sufficient tissue for histopathological evaluation.
- Biopsies received from the esophagus, stomach, and duodenum.

Exclusion criteria:

- Biopsies with inadequate tissue material.
- Repeat biopsies from previously diagnosed lesions.
- Biopsies from the lower GI tract or other non-UGI sites.

Data were retrieved from departmental archives and endoscopy records. The clinical history, presenting symptoms, provisional diagnosis, and endoscopic findings were noted from the referral forms. All biopsy specimens were fixed in 10% buffered formalin, routinely processed, and embedded in paraffin wax. Serial sections of 4–5 microns thickness were stained with hematoxylin and eosin (H&E). Special stains like Giemsa and periodic acid–Schiff (PAS) were used wherever necessary, particularly for detection of Helicobacter pylori and mucinous changes.

Each biopsy was examined under light microscopy by two independent pathologists to reduce inter-observer variability. The evaluation included:

- Site of biopsy (esophagus, stomach, or duodenum).

- Nature of lesion (inflammatory, hyperplastic, metaplastic, neoplastic).
- Grading and staging (when applicable).
- Presence or absence of H. pylori, intestinal metaplasia, dysplasia, or carcinoma.

Gastric biopsies were classified according to the Updated Sydney System, which incorporates grading of chronic inflammation, activity (neutrophilic infiltration), atrophy, intestinal metaplasia, and H. pylori density. Barrett's esophagus was confirmed by the presence of specialized intestinal metaplasia with goblet cells in esophageal mucosa. Duodenal biopsies were evaluated for architectural changes, villous atrophy, crypt hyperplasia, and intraepithelial lymphocytosis as per modified Marsh criteria for celiac disease.

All data were entered into Microsoft Excel and analyzed using IBM SPSS software version 25. Descriptive statistics were used to calculate frequencies and percentages. The histopathological spectrum was tabulated according to site-wise distribution. Concordance between endoscopic and histological diagnosis was evaluated.

RESULTS

Table 1: Age-wise Distribution of UGI Lesions

Age Group (years)	Number of Patients	Most Common Diagnosis	Percentage (%)
18–30	20	Reflux esophagitis	18.2%
31–45	30	Chronic gastritis	27.3%
46–60	35	H. pylori-associated gastritis	31.8%
>60	25	Gastric adenocarcinoma	22.7%

Table 2: Gender-wise Distribution

Gender	Number of Patients	Percentage (%)
Male	65	59.1%
Female	45	40.9%

Table 3: Site-wise Biopsy Distribution

Biopsy Site	Number of Cases	Percentage (%)
Esophagus	30	27.3%
Stomach	65	59.1%
Duodenum	15	13.6%

Table 4: Histopathological Spectrum of UGI Lesions

Histopathological Diagnosis	Number of Cases	Percentage (%)
Chronic gastritis	28	25.5%
H. pylori-associated gastritis	15	13.6%
Reflux esophagitis	8	7.3%
Intestinal metaplasia	10	9.1%
Gastric adenocarcinoma	7	6.4%
Esophageal squamous carcinoma	6	5.5%
Barrett’s esophagus	5	4.5%
Non-specific duodenitis	9	8.2%
Celiac disease	2	1.8%
Duodenal adenocarcinoma	2	1.8%
Normal/Non-specific findings	18	16.3%
Total	110	100.0

Table 5: Concordance Between Endoscopic and Histopathological Findings (n = 91)

Endoscopic Impression	Concordant Cases	Discordant Cases	Total Cases	Concordance Rate (%)
Erosive gastritis	22	5	27	81.5
Normal mucosa	9	7	16	56.3
Suspicious malignancy	10	1	11	90.9
Duodenitis	7	2	9	77.8
Reflux esophagitis	6	1	7	85.7

Table 6: Frequency of Malignant vs. Benign Lesions by Site

Site	Benign Lesions	Malignant Lesions
Esophagus	24	6
Stomach	58	7
Duodenum	13	2

Table 7: H. pylori Status Among Gastric Biopsies (n = 65)

H. pylori Status	Number of Cases	Percentage (%)
Positive	23	35.4
Negative	42	64.6

A total of 110 patients who underwent upper gastrointestinal (UGI) endoscopic biopsy were included in this study. The study population comprised 65 males (59.1%) and 45 females (40.9%), yielding a male-to-female ratio of approximately 1.4:1 [Table 2]. The age of patients ranged from 18 to over 60 years, with the highest concentration (31.8%) falling within the 46–60 years age group, followed by 31–45 years (27.3%) [Table 1]. Benign conditions such as reflux esophagitis and chronic gastritis were more common in younger patients, whereas malignancies such as gastric adenocarcinoma and esophageal squamous cell carcinoma were predominantly diagnosed in patients aged above 60 years.

In terms of biopsy location, the stomach was the most frequently sampled site (59.1%), followed by the esophagus (27.3%) and duodenum (13.6%) [Table 3]. This pattern reflects the clinical predominance of gastric symptoms in patients undergoing UGI endoscopy.

The most common histopathological diagnosis was chronic gastritis, accounting for 25.5% of cases, followed by H. pylori-associated gastritis (13.6%), and intestinal metaplasia (9.1%) [Table 4]. Malignant lesions, including gastric adenocarcinoma (6.4%), esophageal squamous cell carcinoma (5.5%), and duodenal adenocarcinoma (1.8%), collectively constituted approximately 13.6% of the total cases. Barrett's esophagus (4.5%) and reflux esophagitis (7.3%) were other notable findings, especially in younger patients with gastroesophageal reflux symptoms. Celiac disease and non-specific duodenitis, both diagnosed via duodenal biopsies, were seen in a minority of patients.

Assessment of endoscopic impression versus histopathological diagnosis demonstrated a high concordance for suspected malignancies (90.9%) and reflux esophagitis (85.7%). In contrast, cases with normal-appearing mucosa on endoscopy had a much lower histological correlation (56.3%), underscoring the importance of routine biopsies even when no gross mucosal abnormalities are visualized [Table 5].

The site-specific distribution of malignant lesions revealed the esophagus as the most affected location, with a 20.0% malignancy rate, followed by the duodenum (13.3%) and stomach (10.8%) [Table 6]. Despite the relatively lower number of esophageal biopsies, the high yield of malignancies from this region necessitates careful surveillance in high-risk individuals, particularly elderly males presenting with dysphagia.

Among the 65 gastric biopsies, 23 patients (35.4%) tested positive for H. pylori. The bacterium was predominantly associated with cases of active gastritis, intestinal metaplasia, and a few early gastric neoplasms [Table 7]. This supports the widely acknowledged role of H. pylori as a carcinogenic factor in gastric pathology.

Overall, benign lesions vastly outnumbered malignant ones in this cohort. However, the frequency of malignancy in older patients and high-risk anatomical sites highlights the continued relevance of histological assessment in early detection, risk stratification, and oncological referral. These findings emphasize the role of upper gastrointestinal biopsies not only in symptomatic evaluation but also in the proactive identification of premalignant and malignant conditions.

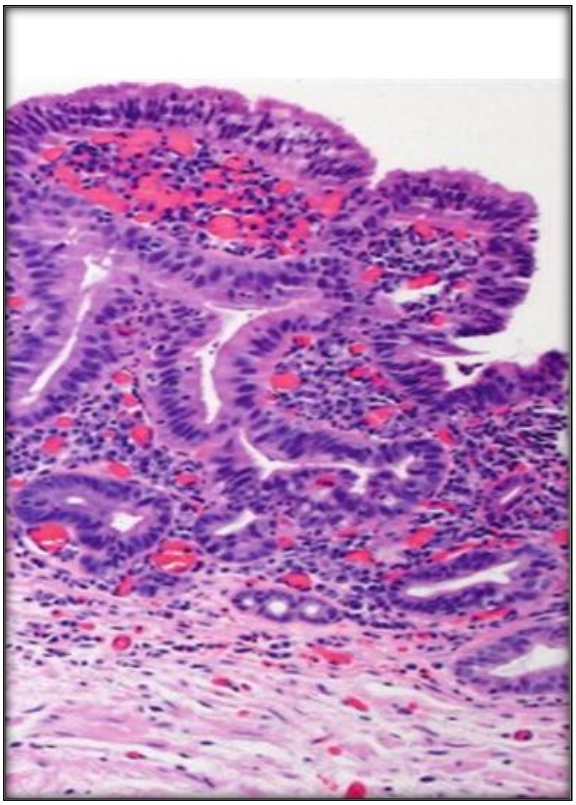

Figure 1: HPE of Barrett's esophagus

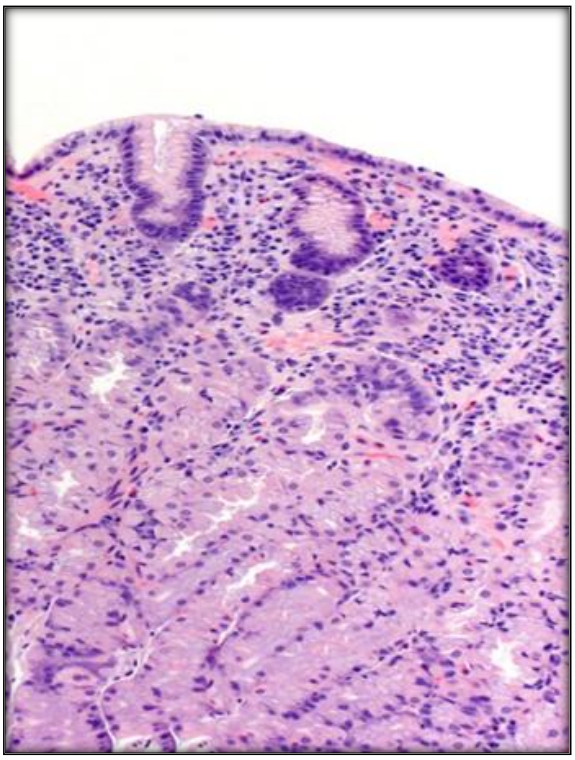

Figure 2: HPE of H. Pylori associated gastritis

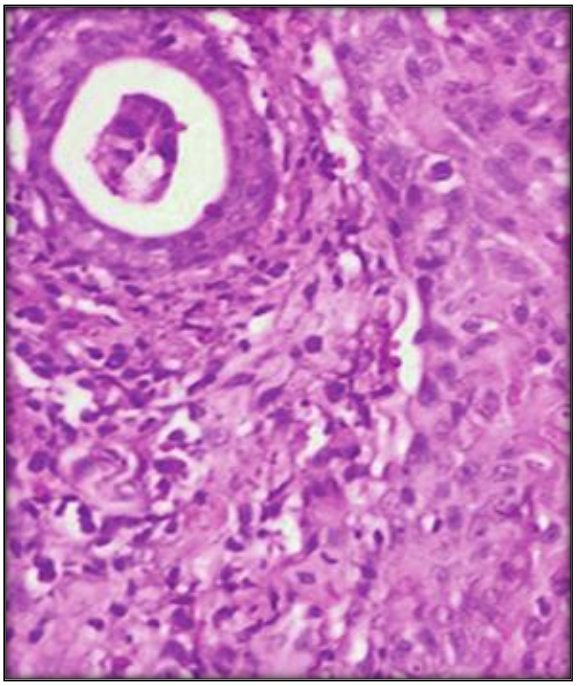

Figure 3: HPE of esophageal squamous cell carcinoma

DISCUSSION

Upper gastrointestinal (UGI) diseases are among the most common causes of clinical morbidity, particularly in developing countries where dietary habits, delayed healthcare access, and infectious etiologies contribute significantly to disease burden. Histopathological evaluation of endoscopic biopsies remains pivotal in confirming diagnoses, guiding treatment, and detecting early neoplastic changes. This study aimed to analyze the histological spectrum of UGI lesions in patients undergoing biopsy and correlate the findings with demographic and endoscopic profiles.

In the present study, the highest number of cases belonged to the 46–60 years age group (31.8%), followed by those aged 31–45 years (27.3%). Patients over 60 years accounted for 22.7% of cases, and malignancies were predominantly observed in this group. This age-wise pattern is comparable to the findings of Lahner et al,[14] who noted that most significant UGI pathologies, including malignancies, peak after the fifth decade of life, particularly gastric and esophageal cancers. Similarly, a study by Kocsmár et al,[15] emphasized that patients over 60 were significantly more likely to harbor intestinal metaplasia and dysplasia in gastric biopsies.

Gender-wise, there was a male predominance in our cohort (59.1%), aligning with the observations made by Hameed et al,[16] who found 61% of their endoscopic biopsy cases were male, attributing this to higher exposure to risk factors such as smoking and NSAID use. Another study by Basak et al,[17] also reported a male-to-female ratio of 1.6:1 among UGI biopsy patients, similar to our finding of 1.4:1.

The stomach was the most common biopsy site in this study (59.1%), followed by the esophagus (27.3%) and duodenum (13.6%). A study by Shrestha et al,[18] similarly reported that over 60% of UGI biopsies were obtained from the stomach, citing high rates of dyspepsia and suspicion of chronic gastritis in their region.

Histologically, chronic gastritis was the most frequently encountered diagnosis (25.5%), followed by H. pylori-associated gastritis (13.6%). These findings are in agreement with those of Kaleem et al,[19] who identified chronic gastritis in 28% of their cohort and H. pylori positivity in 31% of cases. Adlekha et al,[20] also highlighted a high burden of gastritis (30.2%) and found H. pylori in 35% of gastric biopsies, consistent with our finding of 35.4% positivity.

Reflux esophagitis was noted in 7.3% of our patients, predominantly among younger individuals. Ghoshal et al,[21] observed a similar age distribution in their Indian cohort, reporting that reflux and Barrett's esophagus were more common in patients under 50, often linked to obesity and GERD. Barrett's esophagus was seen in 4.5% of patients, comparable to a study by Sharma et al., who found a prevalence of 4–5% in patients undergoing esophageal biopsy for reflux symptoms.[22]

Malignancies constituted 13.6% of all cases in our study. Gastric adenocarcinoma (6.4%) was the most common cancer, followed by esophageal squamous cell carcinoma (5.5%) and duodenal adenocarcinoma (1.8%). These figures closely align with the work of Shukla et al,[23] who reported that gastric and esophageal cancers accounted for nearly 10–15% of all UGI lesions in a tertiary care center in northern India. Zali et al,[24] also reported a malignancy rate of 14% in UGI biopsies, with stomach and esophagus being the most commonly affected sites.

Importantly, in our site-wise analysis, the esophagus had the highest malignancy rate (20.0%), followed by the duodenum (13.3%) and stomach (10.8%). Ghosh et al,[25] confirmed a similar trend, showing that esophageal lesions often present late and carry a higher malignant burden than gastric lesions due to delayed symptom recognition and rapid progression.

Concordance between endoscopic and histological findings was highest in suspected malignancy cases (90.9%) and reflux esophagitis (85.7%). However, normal mucosa on endoscopy had a low histological match (56.3%), reflecting the need for biopsy even in macroscopically normal tissue. Jani et al,[26] emphasized this point, stating that routine biopsies from "normal-appearing" mucosa can yield important diagnoses such as lymphocytic gastritis, early metaplasia, or celiac changes.

Finally, the detection of H. pylori in 35.4% of gastric biopsies reinforces its well-documented role in chronic gastritis, intestinal metaplasia, and gastric carcinoma. Wroblewski et al,[27] described H. pylori as a class I carcinogen, with strong causal links to gastric neoplasia and chronic inflammatory cascades. Sugano et al,[28] further advocated for early eradication strategies to reduce cancer risk, especially in high-prevalence populations.

CONCLUSION

This study underscores the essential role of histopathological evaluation in the diagnosis and management of upper gastrointestinal tract lesions. The most frequently encountered conditions were benign inflammatory lesions, such as chronic gastritis and H. pylori-associated gastritis, with a significant burden in middle-aged adults. Malignant lesions, including gastric adenocarcinoma and esophageal squamous cell carcinoma, were observed predominantly in patients above 60 years, reinforcing the importance of early endoscopic assessment in elderly individuals.

A high concordance was observed between endoscopic suspicion and histopathological confirmation in cases of suspected malignancy, while discrepancies were notable in endoscopically normal-appearing mucosa, highlighting the diagnostic yield of routine biopsy. H. pylori infection emerged as a major contributor to gastric pathology, underlining the need for routine testing and eradication strategies.

These findings highlight the spectrum of pathologies detectable through endoscopic biopsy and reinforce the critical need for timely histological assessment in both symptomatic and high-risk patients. Early detection of premalignant and malignant lesions through such protocols can have a substantial impact on long-term clinical outcomes and cancer prevention strategies.

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