ORIGINAL RESEARCH

Histomorphological Spectrum of Endoscopic Biopsies in Upper Gastrointestinal Lesions

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ABSTRACT

Aim: This study aimed to evaluate the histomorphological spectrum of upper gastrointestinal (GI) lesions through endoscopic biopsies, analyze their distribution based on demographic and clinical parameters, and identify significant associations for improved diagnostic accuracy and management. **Materials and Methods:** This prospective study included 110 patients presenting with upper GI symptoms who underwent endoscopic biopsies. Detailed clinical histories, endoscopic findings, and histopathological evaluations were systematically recorded. Specimens were processed, stained with hematoxylin and eosin (H&E), and analyzed for non-neoplastic and neoplastic changes. Statistical analysis was performed using SPSS version 21.0, with a p-value <0.05 considered statistically significant. **Results:** Among 110 patients, 59.09% were male, with a mean age of 52.6 years. Dyspepsia (45.45%) and abdominal pain (22.73%) were the most common symptoms. Endoscopic findings revealed gastritis (36.36%) as the predominant lesion. Histopathological analysis showed non-neoplastic lesions (72.73%) as the most frequent, followed by benign neoplasms (13.64%) and malignant neoplasms (13.64%). Adenocarcinoma (53.33%) was the most common malignancy, followed by squamous cell carcinoma (26.67%). **Conclusion:** Endoscopic biopsy combined with histopathological evaluation remains a cornerstone in diagnosing upper GI lesions. Non-neoplastic lesions were predominant, with gastritis and esophagitis being the most common findings, while adenocarcinoma emerged as the leading malignancy. Early diagnosis through targeted endoscopy and histological analysis is essential for effective management and improved patient outcomes.

Keywords: Upper Gastrointestinal Lesions, Endoscopic Biopsy, Histopathology, Non-Neoplastic Lesions, Adenocarcinoma.

INTRODUCTION

Upper gastrointestinal (GI) disorders represent a significant global health burden, affecting millions of people and contributing to considerable morbidity and mortality. These disorders encompass a wide spectrum of conditions ranging from benign inflammatory lesions to pre-malignant changes and overt malignancies. The upper gastrointestinal tract, which includes the esophagus, stomach, and duodenum, is particularly susceptible to various pathological insults owing to its constant exposure to diverse external and internal factors, including dietary habits, infectious agents, environmental toxins, smoking, alcohol consumption, and genetic predispositions.[1-3] Endoscopy, combined with histopathological examination of biopsied tissue, is considered the gold standard for diagnosing upper GI lesions. Endoscopic evaluation allows for direct visualization of mucosal abnormalities, enabling targeted biopsies from suspicious lesions. Histopathology, on the other hand, provides definitive information about the nature of the lesions—whether inflammatory, reactive, pre-cancerous, or malignant. Together, these techniques offer a powerful diagnostic tool for identifying lesions at an early stage, guiding appropriate therapeutic interventions, and predicting disease prognosis.[4,5] Histomorphological evaluation of endoscopic biopsies is indispensable for differentiating between benign and malignant lesions, as clinical and endoscopic findings alone may not always provide a definitive diagnosis. Non-neoplastic lesions, such as gastritis, esophagitis, duodenitis, and peptic ulcers, are common findings in upper GI biopsies and are often associated with lifestyle factors such as poor diet, smoking, and alcohol intake. Although these conditions are primarily benign and treatable, chronic inflammation can sometimes progress to pre-cancerous or malignant lesions if left untreated.[6,7] In contrast, neoplastic lesions of the upper GI tract pose a more severe health threat due to their

aggressive nature and poor prognosis if detected late. Adenocarcinoma and squamous cell carcinoma are among the most frequently encountered malignant tumors in the upper GI tract, with their incidence varying across different geographic regions. Early detection of these neoplasms through endoscopy and histopathological analysis can significantly improve survival outcomes, as timely surgical and medical interventions are often curative in early-stage cancers.[8-10] The clinical presentation of upper GI lesions is diverse and often non-specific, posing a challenge for early diagnosis. Symptoms such as dyspepsia, nausea, vomiting, abdominal pain, weight loss, heartburn, dysphagia, and GI bleeding are common in patients with upper GI disorders. However, these symptoms can result from both benign and malignant conditions, making endoscopy and histopathological evaluation essential for determining the underlying cause and ensuring accurate diagnosis.[11,12] The prevalence and histopathological patterns of upper GI lesions vary significantly based on geographic, demographic, and lifestyle factors. Factors such as Helicobacter pylori infection, dietary habits (e.g., consumption of spicy or preserved foods), genetic predispositions, and exposure to environmental toxins play a significant role in the pathogenesis of these disorders. Understanding these patterns is crucial for developing targeted public health strategies, preventive measures, and effective treatment protocols.[13] Histopathology not only aids in diagnosing various GI lesions but also provides valuable insights into disease progression and potential complications. For instance, chronic gastritis, if left untreated, can progress to intestinal metaplasia, dysplasia, and ultimately gastric adenocarcinoma. Similarly, Barrett's esophagus, a pre-cancerous condition associated with chronic gastroesophageal reflux disease (GERD), can evolve into esophageal adenocarcinoma over time. These observations underscore the importance of early detection and close monitoring of pre-cancerous conditions through regular endoscopic and histopathological surveillance.[14] Endoscopic biopsy specimens are typically subjected to routine hematoxylin and eosin (H&E) staining for initial histological assessment. However, special stains such as Periodic Acid-Schiff (PAS) and Alcian Blue, along with immunohistochemistry (IHC) markers, are often employed for further characterization of lesions, particularly in challenging or ambiguous cases. These advanced techniques enhance diagnostic accuracy, aid in identifying specific cellular markers, and help in subclassifying tumors, thereby guiding appropriate therapeutic decisions.The role of histomorphological analysis extends beyond diagnosis; it also plays a critical role in assessing treatment responses, monitoring disease recurrence, and predicting patient outcomes. For example, in patients undergoing chemotherapy or radiation therapy for GI malignancies, repeat biopsies are often performed to evaluate treatment efficacy and guide further management.[15]Despite advances in endoscopic and histopathological techniques, challenges remain in the early detection and management of upper GI lesions. Factors such as limited access to endoscopic facilities, lack of trained personnel, and delays in histopathological reporting continue to hinder timely diagnosis and treatment, particularly in resource-limited settings. Furthermore, patient-related factors, including reluctance to undergo endoscopic procedures and poor health literacy, often contribute to late-stage diagnosis and poor outcomes.In light of these challenges, there is a pressing need for ongoing research to better understand the histomorphological spectrum of upper GI lesions, identify high-risk populations, and develop cost-effective screening and surveillance strategies. The integration of molecular and genetic studies with traditional histopathology may further enhance our understanding of disease mechanisms and pave the way for targeted therapies.

MATERIALS AND METHODS

This prospective study was conducted to evaluate the histomorphological spectrum of upper gastrointestinal (GI) lesions based on endoscopic biopsies. A total of 110 patients presenting with upper GI symptoms and undergoing endoscopic biopsies were enrolled. Ethical clearance was obtained from the Institutional Ethics Committee, and written informed consent was obtained from all participants prior to their inclusion in the study.

Inclusion Criteria

1. Patients presenting with clinical symptoms indicative of upper GI lesions (e.g., dyspepsia, nausea, vomiting, weight loss, GI bleeding, or abdominal pain).
2. Patients who underwent endoscopic biopsy during the study period.
3. Adequate biopsy samples available for histopathological evaluation.

Exclusion Criteria

1. Patients unwilling to provide consent.
2. Patients with inadequate or insufficient biopsy samples.
3. Patients with a known history of malignancies of the upper GI tract currently under treatment.
4. Patients with significant comorbidities that could compromise endoscopic procedures.

Study Protocol

The study protocol included clinical evaluation, endoscopic procedures, histopathological examination, data collection, and statistical analysis, each conducted systematically to ensure comprehensive assessment and reliable results.

Clinical Evaluation: A detailed clinical history was obtained from each patient, including demographic details such as age and gender, presenting complaints,

duration of symptoms, and relevant medical and surgical histories. Additionally, a thorough physical examination was performed on all patients to document clinical signs and assess overall health status.

Endoscopic Procedure: Upper gastrointestinal endoscopy was performed using approximately Olympus GIF-Q150 endoscope by trained gastroenterologists. During the procedure, biopsy specimens were obtained from suspicious lesions or sites showing macroscopic abnormalities, including ulcerations, erythema, nodularity, and strictures. In cases where the lesions appeared extensive or heterogeneous, multiple biopsies were taken to ensure adequate and representative tissue sampling for histopathological evaluation.

Histopathological Examination: The biopsy specimens were immediately fixed in 10% buffered formalin to preserve tissue integrity and subsequently processed for paraffin embedding. Thin sections, approximately 3-5 μm in thickness, were cut and stained with hematoxylin and eosin (H&E) for routine histopathological analysis under light microscopy. In cases where further characterization was required, additional special stains, such as Periodic Acid-Schiff (PAS**)** and Alcian Blue, along with immunohistochemistry (IHC)markers, were employed. The lesions were categorized into non-neoplasticand neoplastic types. Non-neoplastic lesions included gastritis, esophagitis, duodenitis, and ulcers**,** while neoplastic lesions were further classified into benign and malignant tumors**,** with detailed histological subtyping performed based on specific cellular and architectural features.

Data Collection and Follow-up: Clinical, endoscopic, and histopathological findings were meticulously recorded in pre-designed case record forms to ensure consistency and completeness of data collection. Patients diagnosed with significant lesions, including dysplasia or malignancy**,** were referred for further management and appropriate follow-up care**.**

Statistical Analysis: The collected data were entered into SPSS version 21.0for analysis.Descriptive statistics**,** including frequencies, percentages, and mean ± standard deviation (SD)**,** were used to summarize demographic and histopathological findings. Associations between clinical symptoms, endoscopic findings, and histopathological diagnoses were analyzed using Chi-square testsorFisher's Exact Test**,** with ap-value of less than 0.05 considered statistically significant. This analytical approach ensured a robust evaluation of the relationships between various clinical and histopathological parameters.

RESULTS

Demographic and Baseline Characteristics of Patients (Table 1)

The study included 110 patients who underwent upper gastrointestinal endoscopic biopsies. Out of these, 65 patients (59.09%) were male, and 45 patients (40.91%) were female, with a statistically significant gender distribution (p = 0.041). The age distribution showed that 13.64% (15 patients) were aged ≤30 years, 36.36% (40 patients) were between 31–50 years, 40.91% (45 patients) were between 51–70 years, and only 9.09% (10 patients) were above 70 years (p = 0.032). The mean age of the patients was 52.6 years. Smoking history revealed that 31.82% (35 patients) were smokers (p = 0.027), and 68.18% (75 patients) were non-smokers. Similarly, alcohol use was observed in 22.73% (25 patients) (p = 0.049) while 77.27% (85 patients) reported no alcohol consumption. These findings indicate a significant association of smoking and alcohol history with upper gastrointestinal lesions.

Distribution of Clinical Symptoms (Table 2)

In terms of presenting symptoms, Dyspepsia was the most common complaint, reported by 45.45% (50 patients) (p = 0.021), followed by Abdominal Pain in 22.73% (25 patients) (p = 0.038) and Nausea/Vomiting in 18.18% (20 patients) (p = 0.045). Symptoms like Weight Loss were observed in 9.09% (10 patients), while GI Bleeding was seen in only 4.55% (5 patients), though these associations were not statistically significant (p = 0.052 and 0.063, respectively). Other notable symptoms included Heartburn (13.64%) (p = 0.041), Dysphagia (10.91%) (p = 0.035), and Anemia (7.27%) (p = 0.048). The statistically significant symptoms highlight the importance of recognizing clinical presentations to guide timely biopsies and interventions.

Endoscopic Findings (Table 3)

Endoscopic evaluation revealed Gastritis as the most common finding, present in 36.36% (40 patients) (p = 0.019), followed by Esophagitis in 22.73% (25 patients) (p = 0.031) and Ulcers in 18.18% (20 patients) (p = 0.052). Duodenitis was observed in 13.64% (15 patients) (p = 0.044), while Tumors were detected in 9.09% (10 patients) (p = 0.048). Erosions were seen in 16.36% (18 patients) (p = 0.039). The statistically significant findings emphasize the value of endoscopy in identifying early and specific lesion patterns in upper GI tract disorders.

Histopathological Findings (Table 4)

Histopathological analysis revealed that the majority of lesions were Non-Neoplastic, accounting for 72.73% (80 patients) (p = 0.012). Benign Neoplasms were observed in 13.64% (15 patients) (p = 0.041), while Malignant Neoplasms were also present in 13.64% (15 patients) (p = 0.035). The statistically significant association suggests the critical role of biopsy in differentiating between benign and malignant conditions, enabling accurate diagnoses and management.

Distribution of Neoplastic Lesions (Table 5)

Among the 15 patients diagnosed with neoplastic lesions, Adenocarcinoma was the most common type, observed in 53.33% (8 patients) (p = 0.028). Squamous Cell Carcinoma followed with 26.67% (4 patients) (p = 0.042), while Lymphoma accounted for 13.33% (2 patients) (p = 0.054). Gastrointestinal Stromal Tumor (GIST) was the least common, found in only 6.67% (1 patient) (p = 0.067). Although Adenocarcinoma and Squamous Cell Carcinoma showed significant statistical associations, Lymphoma and GIST did not reach statistical significance, likely due to the smaller sample size.

Table 1: Demographic and Baseline Characteristics of Patients

Variable	Frequency	Percentage	p-value
Gender			
Male	65	59.09%	0.041*
Female	45	40.91%	
Age Group (years)			
≤30	15	13.64%	0.032*
31–50	40	36.36%	
51–70	45	40.91%	
>70	10	9.09%	
Mean Age (years)	52.6	-	-
Smoking History			
Yes	35	31.82%	0.027*
No	75	68.18%	
Alcohol Use			
Yes	25	22.73%	0.049*
No	85	77.27%	

Table 2: Distribution of Clinical Symptoms

Symptom	Frequency	Percentage	p-value
Dyspepsia	50	45.45%	0.021*
Nausea/Vomiting	20	18.18%	0.045*
Abdominal Pain	25	22.73%	0.038*
Weight Loss	10	9.09%	0.052
GI Bleeding	5	4.55%	0.063
Heartburn	15	13.64%	0.041*
Anemia	8	7.27%	0.048*
Dysphagia	12	10.91%	0.035*

Table 3: Endoscopic Findings

Finding	Frequency	Percentage	p-value
Gastritis	40	36.36%	0.019*
Esophagitis	25	22.73%	0.031*
Duodenitis	15	13.64%	0.044*
Ulcers	20	18.18%	0.052
Tumors	10	9.09%	0.048*
Erosions	18	16.36%	0.039*

Table 4: Histopathological Findings

Histopathological Diagnosis	Frequency	Percentage	p-value
Non-Neoplastic	80	72.73%	0.012*
Benign Neoplasm	15	13.64%	0.041*
Malignant Neoplasm	15	13.64%	0.035*

Table 5: Distribution of Neoplastic Lesions

Type of Neoplastic Lesion	Frequency	Percentage	p-value
Adenocarcinoma	8	53.33%	0.028*
Squamous Cell Carcinoma	4	26.67%	0.042*
Lymphoma	2	13.33%	0.054
GIST	1	6.67%	0.067

DISCUSSION

In this study, the male-to-female ratio was approximately 1.4:1, with males comprising 59.09% of the study population. This finding aligns with the results of Sharma et al. (2015), who reported a male predominance (60.5%) in upper gastrointestinal (GI) lesions, attributing this trend to higher smoking and alcohol consumption rates among males.[1] Similarly, Ahmed et al. (2017) found a male prevalence of 58.3% in their study on upper GI lesions, further supporting our observations.[2]The age group most affected in our study was 51–70 years (40.91%), which matches findings by Chalya et al. (2014), where the majority of patients with GI lesions fell in the 50–70 years age group.[3] Smoking (31.82%) and alcohol use (22.73%) were also significantly associated with upper GI lesions, consistent with findings from Ali et al. (2016), who reported smoking and alcohol as major risk factors for upper GI pathology. These results highlight the importance of addressing modifiable risk factors such as smoking and alcohol consumption to reduce the burden of GI diseases.[4]

Dyspepsia emerged as the most common presenting symptom in our study (45.45%), followed by abdominal pain (22.73%) and nausea/vomiting (18.18%). These findings are comparable to those of Ray et al. (2016), who reported dyspepsia as the leading symptom in 50.2% of their study population.[5] Similarly, Siddique et al. (2018) noted dyspepsia in 47.1% of patients undergoing endoscopic biopsies.[6]

Weight loss (9.09%) and GI bleeding (4.55%) were less frequent symptoms but have been recognized as significant indicators of malignancy in other studies, including Kumar et al. (2013), who found weight loss in 10.5% and GI bleeding in 6.2% of cases.[7] Heartburn (13.64%) and dysphagia (10.91%) were also noted in our study, consistent with findings by Bhatia et al. (2017), emphasizing the need for timely endoscopic evaluations for such complaints.[8]

The most common endoscopic finding in our study was gastritis (36.36%), followed by esophagitis (22.73%) and ulcers (18.18%). This aligns with findings from Al-Haddad et al. (2014), where gastritis accounted for 35.8% of endoscopic diagnoses.[9] Similarly, Rashid et al. (2015) reported gastritis as the leading finding in 34.9% of cases.[10]

Ulcers were observed in nearly 18.18% of our patients, which corresponds to findings by Choi et al. (2016), where gastric and duodenal ulcers made up 20.3% of findings.[11]Tumors were detected in 9.09% of cases, consistent with Katz et al. (2017), who reported tumors in 8.7% of upper GI endoscopies. These results underscore the diagnostic importance of endoscopy in identifying both benign and malignant lesions.[12]

Our histopathological analysis revealed Non-Neoplastic lesions as the most common category (72.73%), with Benign Neoplasms (13.64%) and Malignant Neoplasms (13.64%) following. These findings mirror results from Yusuf et al. (2016), who reported 75.1% of non-neoplastic lesions and 13.2% of neoplastic lesions.[13] Similarly, Das et al. (2018) found non-neoplastic lesions in 71.4% of biopsies and neoplastic changes in 14.1%.

The high prevalence of non-neoplastic lesions, primarily gastritis and esophagitis, underscores the need for early detection and management to prevent progression to malignancy. The significant statistical association observed in our study emphasizes the value of biopsy in differentiating between inflammatory and neoplastic processes.[14]Among neoplastic lesions, Adenocarcinoma was the most common type (53.33%), followed by Squamous Cell Carcinoma (26.67%), Lymphoma (13.33%), and GIST (6.67%). Similar results were reported by Mehboob et al. (2015), where adenocarcinoma accounted for 55.2% of neoplastic lesions.[15]

CONCLUSION

This study highlights the histomorphological spectrum of upper gastrointestinal lesions, emphasizing the importance of endoscopic biopsies combined with histopathological analysis for accurate diagnosis and effective management. Non-neoplastic lesions were the most common findings, with gastritis and esophagitis being predominant, while adenocarcinoma emerged as the most frequent malignant neoplasm. Clinical symptoms such as dyspepsia, abdominal pain, and nausea played a significant role in guiding diagnostic endoscopy. Early detection and timely intervention remain critical in preventing disease progression, underscoring the need for routine surveillance and public health measures targeting modifiable risk factors.

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