Original Article

Histopathological Spectrum of Gastric Lesions in Endoscopic Biopsies at a Tertiary Care Centre

Suhani Patel[1], Zeel Thakkar[1], Chahat Shah[1]

[1]Third Year Resident, Department of Pathology, GMERS Medical College and Hospital, Sola, Ahmedababd, Gujarat, India

Abstract

Background: Gastric biopsy specimens demonstrate a wide spectrum of inflammatory, reactive, premalignant and malignant lesions. Histopathological examination is essential for establishing the definitive diagnosis and identifying clinically significant mucosal abnormalities. The aim is to determine the histopathological spectrum of gastric lesions at a tertiary care hospital. **Material and Methods:** An observational study was conducted in the Department of Pathology, GMERS Medical College and Hospital, Sola, Ahemdabad, Gujarat, India for the duration of 3 years. A total of 90 gastric biopsy specimens received during the study period were included. Specimens were routinely fixed in 10% neutral buffered formalin, processed and embedded in paraffin wax. Sections were stained with hematoxylin and eosin, with additional special stains performed whenever required. The biopsies were evaluated microscopically for inflammatory, reactive, premalignant and neoplastic changes, including H. pylori-associated gastritis, chronic gastritis, dysplasia and gastric carcinoma. The findings were recorded and analyzed using descriptive statistics. **Results:** Among 90 gastric biopsy specimens, chronic active gastritis (H. pylori negative) and chronic non-specific gastritis were the most common findings, each accounting for 25 cases (27.77%), followed by H. pylori-associated chronic active gastritis in 24 cases (26.66%). Unremarkable histopathology was observed in 11 cases (12.22%). Dysplasia, follicular gastritis and chronic caseating granulomatous inflammation were each identified in one case (1.11%). Malignancy was detected in two cases (2.22%), comprising signet-ring cell carcinoma and intestinal-type gastric carcinoma. **Conclusion:** Inflammatory lesions predominated among gastric biopsy specimens, while premalignant and malignant lesions were relatively uncommon. Histopathological examination remains essential for accurate diagnosis, identification of H. pylori-associated pathology and early detection of clinically significant gastric lesions.

Keywords: Gastric biopsy, histopathology, chronic gastritis, Helicobacter pylori, dysplasia, gastric carcinoma.

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Introduction

Gastric disorders are not rare diseases that are commonly seen in the clinic and include a broad range of inflammatory, reactive, premalignant and malignant conditions. A patient with gastric lesions typically has a nonspecific clinical picture including epigastric pain, dyspepsia, nausea, vomiting, loss of appetite, gastrointestinal bleeding and weight loss. These clinical descriptions can be similar with various gastric diseases and sometimes poor diagnostic criteria can be established by clinical and endoscopic means alone. Histopathological examination of gastric biopsy specimens is thus a key part in identifying the underlying gastric pathology and subsequently appropriate management of the patient.[1]

Upper gastrointestinal endoscopy with the aid of mucosal biopsy has proven to be an important diagnostic tool to evaluate gastric lesions. During the endoscopic exam the gastric mucosa can be directly visualized and abnormalities like erythema, erosions, ulcers, nodules, polyps, thickening of the intestinal mucosa, and growths can be detected. But lesions may have differing histopathological findings while having identical endoscopic features. Therefore, microscopic examination will still be crucial for confirmation and characterization of gastric pathology, even after clinical and gross examination.[2]

Chronic gastritis is one of the most common abnormalities of gastric biopsy specimens. Gastritis histologically is characterized by a variable extent of chornic inflammatory infiltrate, chornic activity, glandular chornic atrophy, and intestinal metaplasia. It is essential to have some degree of standardization to ensure consistency in histopathological reporting when making such assessments of these morphological features. The Updated Sydney System establishes a hierarchically organized system for the grading of chronic inflammation, neutrophilic activity, glandular atrophy, intestinal metaplasia, and the degree of Helicobacter pylori colonization of the stomach, all of which can be assessed from biopsy specimens from the stomach.[1,2]

There is a well-established relationship between H. pylori infection with chronic gastritis and gastric malignancy, and it is

Address for correspondence: Dr. Suhani Patel
Third Year Resident, Department of Pathology, GMERS Medical College and Hospital, Sola, Ahmedababd, Gujarat, India
E-mail: suhani.a.patel@gmail.com

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an important etiological factor in the development of peptic ulcer disease. Histopathological examination will not only reveal the typical inflammatory reaction seen with H. pylori but will also help to identify H. pylori directly in the gastric mucosa. Gastric mucosal biopsies have also been assessed in a number of studies, which have shown that there is significant burden of inflammatory/HP-associated lesions, thus warranting meticulous examination and interpretation of gastric mucosal biopsies in routine practice.[3,4]

Persistent gastric mucosal inflammation can initiate progressive morphological alterations involving glandular atrophy, intestinal metaplasia, dysplasia, and eventually carcinoma in susceptible individuals. This series of histological events is the key to understanding the gastric precancerous cascade and the need for early diagnosis of premalignant lesions in the stomach.[5,6] Gastric biopsy may then offer the chance for follow-up and intervention before the development of a malignant invasion, if the tissue shows signs of intestinal metaplasia, atrophic gastritis and dysplastic changes.

Gastric malignancy is an important differential for the diagnosis, especially in patients with worrisome lesions seen on endoscopy. In general, gastric adenocarcinoma is the most common type of malignant epithelial tumor of the stomach, and can show significant morphological heterogeneity. Histopathology is essential in confirming malignancy, in determining histological type and differentiation and to distinguish malignant lesions from benign inflammatory/reactive lesions.[7,8] The proper diagnosis in biopsies from the endoscopy is therefore important in determining the next steps of therapy.

The range of gastric pathologies seen in histopathological practice can differ between parts of the world, based on population, diet and environmental influences, the presence of H. pylori infection and referral practices. Studies conducted at tertiary care centres have demonstrated a broad spectrum ranging from chronic gastritis and other benign conditions to premalignant alterations and gastric neoplasms.[9-11] Evaluation of the local histopathological pattern is therefore useful in understanding the relative frequency and distribution of gastric diseases within a particular population.

Histopathological evaluation of gastric biopsies provides valuable information regarding both non-neoplastic and neoplastic diseases and complements clinical and endoscopic assessment. Systematic analysis of these specimens can facilitate early recognition of clinically significant lesions and improve diagnostic accuracy. Hence, the present study was undertaken to determine the histopathological spectrum of gastric lesions diagnosed on gastric biopsy specimens received at a tertiary care hospital.

Materials and Methods

The present study was conducted as an observational study in the Department of Pathology, GMERS Medical College and Hospital, Sola, Ahmedabad, Gujarat, India over a period of three years. A total of 90 gastric biopsy specimens received in the histopathology laboratory during the defined study period were included. Gastric biopsy specimens obtained from patients undergoing upper gastrointestinal endoscopy for various clinical indications and submitted for histopathological examination were considered for inclusion in the study. Biopsy specimens with adequate gastric mucosal tissue for histopathological assessment were included irrespective of the age and sex of the patient. Inadequate, poorly preserved, autolysed specimens and specimens lacking sufficient gastric mucosa for a definitive histopathological diagnosis were excluded from the study. Repeat biopsies from the same lesion, wherever identified, were also excluded to avoid duplication.

Relevant demographic and clinical information including age, sex, presenting complaints, clinical diagnosis, indication for endoscopy, anatomical site of biopsy, and available endoscopic findings was obtained from histopathology requisition forms, endoscopy records, and hospital records. Patient confidentiality was maintained throughout data collection and analysis.

All gastric biopsy specimens were received in appropriately labelled containers containing 10% neutral buffered formalin and were allowed adequate fixation. After fixation, they were processed according to standard tissue processing procedure. The tissues were dehydrated in ascending grades of alcohol, cleared with xylene and then embedded in paraffin wax. Parraffin embedded tissue blocks were sectioned at 3-5 µm, and stained routinely with hematoxylin and eosin. Extra sections and special stains were used as needed for additional characterization of the lesion or to demonstrate organisms.

The stained parts were systematically studied under microscope light beam. Each biopsy was evaluated for mucosal architecture, epithelial changes, inflammatory cell infiltrate, neutrophilic activity, glandular alterations, mucosal atrophy, intestinal metaplasia, dysplasia, ulceration, and evidence of neoplasia. In all cases of gastritis, the presence and levels of chronic inflammation, activity, atrophy and intestinal metaplasia as well as the presence of H. pylori organisms were evaluated wherever possible based on well-established histopathological principles. A special effort was made to detect the organism H. pylori on the surface epithelium and in the gastric pits in the morphologically doubtful cases.

The lesions were divided into non-neoplastic and neoplastic lesions on microscopic examination. Non-neoplastic lesions comprised inflammatory and reactive lesions including acute gastritis, chronic gastritis, chronic active gastritis, H. pylori associated gastritis, erosive or ulcerative changes, atrophic changes, intestinal metaplasia and other benign lesions observed throughout the study. When present, the premalignant epithelial changes, which are termed dysplasia, were recorded separately. The neoplastic lesions were then classified with reference to their histomorphological characteristics, and malignant epithelial tumours according to the pattern of the observed microscopic features and degree of differentiation, provided this was possible.

The diagnosis of the pathological sample was recorded in a data collection sheet to be structured. Lesions were distributed and their age, sex, anatomical location and histopathological diagnosis were used to evaluate it. The relative frequencies of each gastric lesion and proportions of non-neoplastic, premalignant and neoplastic lesions were calculated. Any data entered was coded into a spreadsheet and analysed by using

suitable descriptive statistical methods. For categorical variables, frequencies and percentages were used and for continuous variables, such as age, the mean and standard deviation were reported or other measures of central tendency and dispersion were used. Categorical variables were compared as to association when appropriate using Chi-square test and Fisher's exact test, respectively, with a p value of less than 0.05 being considered statistically significant.

Results

[Table 1] shows the sex-wise distribution of the 90 study cases. Of the total cases, 40 (44.44%) were males and 50 (55.56%) were females, indicating a slight female predominance in the study population.

[Table 2] presents the histopathological distribution of gastric lesions among 90 endoscopic biopsy cases. Chronic active gastritis (H. pylori negative) and chronic non-specific gastritis were the most frequently observed findings, each accounting for 25 cases (27.77%). Helicobacter pylori-associated chronic active gastritis was identified in 24 cases (26.66%). Unremarkable histopathological findings were observed in 11 cases (12.22%). Less frequently encountered lesions included dysplasia, follicular gastritis, and chronic caseating granulomatous inflammation, each reported in one case (1.11%). Malignant lesions comprised signet-ring cell gastric carcinoma and intestinal-type gastric carcinoma, with one case (1.11%) of each. Overall, inflammatory gastric lesions predominated, while dysplastic and malignant lesions constituted a relatively small proportion of the study cases.

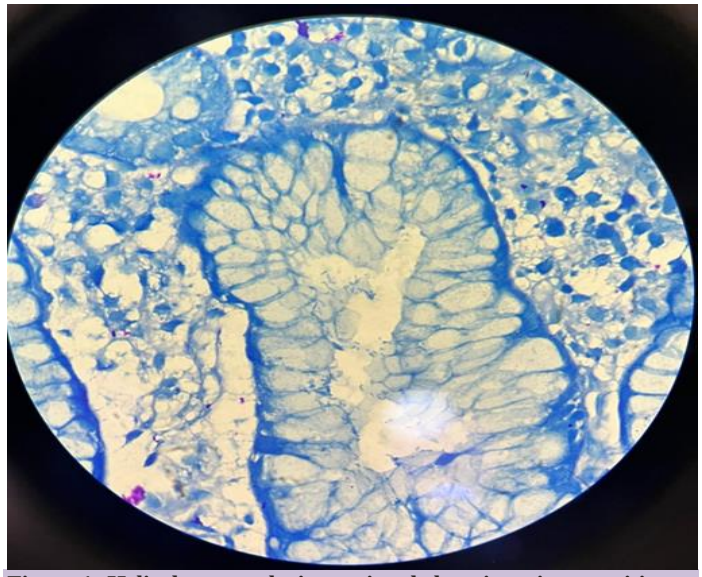


Figure 1: Helicobacter pylori-associated chronic active gastritis

Table 1: Distribution of study cases according to sex

Sex	No. of cases	Percentage (%)
Male	40	44.44
Female	50	55.56
Total	90	100.00

Table 2: Histopathological spectrum of gastric lesions

Sr. No.	Gastric Lesion	No. of cases	Percentage (%)
1	H. pylori associated chronic active gastritis	24	26.66
2	Chronic active gastritis (H. pylori negative)	25	27.77
3	Dysplasia	1	1.11
4	Chronic non-specific gastritis	25	27.77
5	Follicular gastritis	1	1.11
6	Chronic caseating granulomatous inflammation	1	1.11
7	Unremarkable pathology	11	12.22
8	Signet cell gastric carcinoma	1	1.11
9	Intestinal type gastric carcinoma	1	1.11
Total		90	100.00

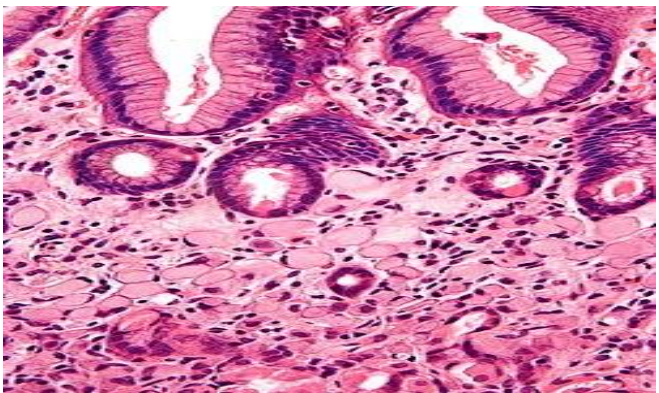


Figure 2: Signet-ring cell gastric carcinoma -Gastric biopsy showing poorly cohesive malignant cells with intracytoplasmic mucin displacing the nuclei toward the periphery

Discussion

The present study evaluated the histopathological spectrum of 90 gastric biopsy specimens received at a tertiary care hospital. The findings demonstrated a predominance of inflammatory gastric lesions, with chronic active gastritis (H. pylori negative) and chronic non-specific gastritis being the most frequently encountered diagnoses, each accounting for 25 cases (27.77%). Helicobacter pylori-associated chronic active gastritis was identified in 24 cases (26.66%). These findings indicate that inflammatory conditions constituted the major proportion of gastric lesions in the study population. Histopathological examination plays an important role in identifying the underlying nature of gastric mucosal abnormalities and differentiating inflammatory, premalignant and malignant conditions.

Helicobacter pylori-associated chronic active gastritis was observed in 24 cases (26.66%), representing one of the predominant histopathological findings. H. pylori infection is a well-established cause of chronic gastric inflammation and is associated with a spectrum of histological changes, ranging from chronic active gastritis to atrophic gastritis, intestinal metaplasia, dysplasia and gastric carcinoma. The presence of H. pylori-associated gastritis in approximately one-fourth of the study cases highlights the clinical importance of identifying this organism during routine histopathological examination. Recognition of H. pylori infection is essential because appropriate treatment may reduce persistent gastric inflammation and the risk of subsequent complications.[13]

One of the two most common diagnoses in the present study was chronic active gastritis without demonstrable H. pylori infection, which occurred in 25 patients (27.77%). Chronic active gastritis is inflammatory cell infiltration that is present for a long time with neutrophilic activity in the gastric mucosa. H. pylori is a significant etiological factor, but may not be found in all instances due to previous treatment, low numbers of bacteria, variation in specimens or alternative causes of gastric inflammation. Even if H. pylori cannot be detected, the diagnosis of prior or current infection cannot be ruled out. Clinico-histopathological evaluation is still crucial for the differential diagnosis of a gastritis, supported by further investigation (where needed) and clinical history.

Chronic non-specific gastritis was also reported in 25 cases (27.77%), suggesting that a good portion of the gastric biopsies showed chronic inflammatory changes with no definite pathological diagnosis. Chronic gastritis is a heterogeneous group of conditions in which there is infiltrative inflammation of the gastric mucosa. The amount of inflammation and the pattern of inflammation may differ based on the primary cause of the inflammation, the length of the disease process, and any mucosal changes that accompany the disease. A systematic histopathological evaluation is crucial to assess the inflammatory activity, glandular atrophy, intestinal metaplasia, associated changes, etc. The accepted histopathological classification systems of gastritis offers a standardized description of findings and the assessment of clinical significance of gastritis.[1,2]

In 1 case (1.11%) follicular gastritis was diagnosed. This is a condition that is marked histologically by the presence of prominent lymphoid follicles, frequently with germinal centres, in the gastric mucosa. Antigenic stimulation has been linked to follicular gastritis, especially in the presence of H. pylori infection. In the present study, the incidence of follicular gastritis was low, however, it is a distinctive pattern of gastric inflammatory processes and therefore, it is important to be identified. This lesion may lead to a careful examination for underlying H. pylori infection and other conditions.

In one case (1.11%) chronic caseating granulomatous inflammation was seen. This is a relatively uncommon form of granulomatous inflammation of the stomach and could be seen in infections and non-infections. The presence of caseating granulomas raises the possibility of an underlying infectious etiology, including tuberculosis, particularly in regions where tuberculosis is endemic. However, histopathological identification of caseation alone is insufficient to establish a specific etiological diagnosis. Correlation with clinical findings, microbiological investigations and appropriate ancillary tests is necessary. The identification of this uncommon lesion highlights the importance of careful microscopic examination in detecting unusual gastric pathologies.

Gastric dysplasia was identified in one case (1.11%). Although its frequency was relatively low, dysplasia is an important histopathological finding because it represents a premalignant epithelial alteration associated with an increased risk of gastric carcinoma. The multistep pathway of gastric carcinogenesis involves progressive mucosal changes, including chronic gastritis, atrophy, intestinal metaplasia, dysplasia and invasive carcinoma. Recognition of dysplastic changes during routine gastric biopsy examination is therefore essential for appropriate clinical management and surveillance. Previous studies have emphasized the significance of premalignant gastric lesions and their association with the development of gastric carcinoma.[6,12,14]

In the present study, two (2.22%) cases of malignant gastric lesions included one signet-ring cell gastric carcinoma (1.11%) and one intestinal-type gastric carcinoma (1.11%). In this study, malignant lesions were a small proportion of all cases studied, but their finding shows the need for histopathological examination for a definite diagnosis. The gastric carcinomas are morphologically very variable and the histologic classification is still useful for the description of tumour pattern. Gastric adenocarcinoma can be classified by Lauren's classification into intestinal type and diffuse type, each with different clinicopathological feature and morphological characteristics.[7] In India, variations in distribution of gastric carcinoma subsites had been also shown in previous studies. Sethi et al. presented intestinal type carcinoma as the most common type of cancer of the stomach among the classified cases of gastric cancer.[9]

The one gastric signet-ring type carcinoma found in this study is of special histopathological interest. Signet-ring cell carcinoma is poorly cohesive malignant epithelial cells with abundant intracytoplasmic mucin which pushes the nucleus towards the cytoplasmic edge of the cell resulting in the characteristic signet-ring appearance. The malignant cells can spread into the lining of the stomach over an extensive area, and can sometimes be hard to find in a small piece of tissue removed for a biopsy. In cases of diagnostic difficulty, microscopic examination and a proper ancillary diagnosis are therefore necessary for the correct diagnosis to be made.

One case (1.11%) was found to have intestinal type gastric carcinoma. In general, this histological subtype will show malignant glandular structures that resemble intestinal epithelium and often is accompanied by a patch of chronic mucosal injury and precursor changes. Chronic gastritis, intestinal metaplasia, dysplasia are well described in the literature and are known to be associated with intestinal-type gastric carcinoma.

Previous studies have demonstrated an association between intestinal metaplasia and gastric malignancy, reinforcing the importance of identifying premalignant mucosal changes during histopathological evaluation.[5,7] However, the small number of

malignant cases in the present study limits meaningful comparison of the relative frequencies of gastric carcinoma subtypes.

Unremarkable gastric histopathology was observed in 11 cases (12.22%). The presence of unremarkable gastric mucosa in patients undergoing endoscopic biopsy may be related to the absence of significant microscopic pathology in the sampled tissue or to differences between clinical, endoscopic and histopathological findings. Gastric mucosal abnormalities may have a patchy distribution, and the diagnostic yield of biopsy examination depends on the site, number and adequacy of tissue samples. Therefore, unremarkable histopathological findings should be interpreted in conjunction with the patient's clinical presentation and endoscopic observations. Inclusion of these cases provides a more comprehensive representation of the histopathological spectrum encountered in routine gastric biopsy practice.

The present study also demonstrated a slight female predominance, with 50 females (55.56%) and 40 males (44.44%). This distribution may reflect the demographic characteristics and referral patterns of the study population rather than a true sex-related difference in the occurrence of gastric lesions. Variations in sex distribution across published studies may be influenced by differences in geographical location, healthcare-seeking behaviour, indications for upper gastrointestinal endoscopy and institutional patient populations.

The predominance of inflammatory lesions and the relatively low frequency of malignant lesions in the present study may be explained by the inclusion of gastric biopsy specimens obtained for a broad range of clinical and endoscopic indications. Studies restricted to patients with endoscopically suspicious lesions or confirmed gastric malignancies are likely to demonstrate a higher proportion of neoplastic findings. Nevertheless, the identification of dysplasia and malignant lesions in a small number of cases underscores the importance of routine histopathological examination in detecting clinically significant abnormalities that may require further evaluation and management.

Rao and Bharath (2023) evaluated 100 gastroduodenal biopsies, including 81 gastric and 19 duodenal specimens, and reported chronic gastritis in 44 cases.[9] This supports the prominence of inflammatory gastric pathology in the present series, in which chronic non-specific gastritis, confirmed H. pylori-associated chronic active gastritis and H. pylori-negative chronic active gastritis accounted for 24, 25 and 25 cases, respectively. Rao and Bharath identified H. pylori in 15 of 44 chronic gastritis cases (34.09%), whereas the present study documented confirmed H. pylori-associated chronic active gastritis in 24 of all 90 gastric biopsies (26.66%). These percentages have different denominators and should not be interpreted as a direct difference in infection prevalence. Their series also contained 15 gastric adenocarcinomas, compared with two reported gastric carcinomas in the present study. Differences in referral patterns and biopsy indications may contribute to the variation.

Mahto et al. (2024) examined 250 upper gastrointestinal endoscopic biopsies, of which 149 were gastric specimens.[10] Gastritis was reported in 74 of 149 gastric biopsies (49.7%), supporting the importance of inflammatory lesions observed in the present series. Their broad gastritis category is not directly equivalent to the separately reported gastritis subtypes in our study. Normal gastric histology was found in 8 of 149 cases (5.4%), closely resembling the 11 of 90 unremarkable biopsies (12.22%) in the present study. Conversely, gastric adenocarcinoma was reported in 22 of 149 biopsies (14.8%), compared with the two gastric carcinomas currently documented in our series (2.22%). This descriptive difference may reflect differences in case selection and clinical indications; it cannot establish a difference in population-level cancer prevalence.

Choudhary et al. (2025) reported chronic gastritis in 18 of 57 gastric biopsies (31.6%), no significant pathology in 9 (15.8%) and adenocarcinoma in 11 (19.3%).[11] In the present study, chronic non-specific gastritis was obtained in 25 (27.77%) of 90 biopsies, unremarkable mucosa in 11 (12.22%) and gastric carcinoma in two (2.22%). The percentages given for chronic gastritis should be interpreted with caution, since there are several different types of gastritis which have been reported separately in our study. Both investigations illustrate the importance of biopsy examination to differentiate inflammatory, normal and malignant mucosae, although the relative proportions vary. There are also examples of lesions which were initially thought to be benign on endoscopy but were later diagnosed as malignant when biopsy was performed.[11] as found by Choudhary et al. The proportion of cases of carcinoma may be higher because this may be due to a different population referred for the study and sampling, or because diagnostic reconcilitations were not complete in our study.

In conclusion, the present study highlights the wide range of gastric biopsy patterns from normal gastric mucosa to common inflammatory reactions, and to granulomatous inflammation, dysplasia and malignant lesions of the stomach. H. pylori related chronic active gastritis underlines the need to identify and report H. pylori gastric pathologically. At the same time, identification of dysplasia and carcinoma, even in a small proportion of cases, demonstrates the diagnostic value of histopathological examination in detecting clinically significant lesions.

Conclusion

The present study has shown that inflammatory lesions were the most frequent type of lesions occurring in the stomach, among which the chronic active gastritis in which H. pylori was found was more prevalent. Chronic non-specific gastritis and chronic active gastritis with no evidence of H pylori were other common findings. Premalignant and malignant lesions were relatively rare however, signet ring cell carcinoma and intestinal-type gastric carcinoma highlights the need for careful histopathological examination of all gastric biopsies. Routine analysis of gastric biopsies which includes appropriate gastric biopsy evaluation for H. pylori, dysplasia and malignancy can help to early detect clinically important gastric disease and may assist in the appropriate management of the patient.

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Conflicts of interest
There are no conflicts of interest.

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