Value of endoscopic features for diagnosis of *Helicobacter pylori* induced gastritis and their correlation with histologic aspects

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Abstract

Background: *Helicobacter pylori* infection is a major risk factor for a variety of gastric diseases. Although many tests were developed for its diagnosis, unfortunately all of them have their limitations and issues. Recent studies highlighted the usefulness of macroscopic findings during endoscopy in diagnosis of *H. pylori*. However, the results were contradictory and confusing.

Objectives: Thus, we conducted this study to determine the value of endoscopy in this regard, and to define a correlation between endoscopic findings and histologic findings.

Methods: We started a prospective study on 200 endoscopies done for adult patients in Al- Zahraa Hospital University Medical Center (ZHUMC) beginning from January 1st, 2018 to June 30th, 2018. Patients included are those undergoing diagnostic EGD for dyspeptia. Patients having previous history of *H. pylori* infection or being treated with anti-secretory medications or antibiotics within last four weeks were excluded.

Abnormal endoscopic findings were classified as erythema, edema, erosion (flat/raised); rugal hypertrophy, rugal atrophy, nodularity and mosaic pattern (cobblestone appearance).

Histologic examination was made by one pathologist and results were classified as antral inflammation, mucosal atrophy, intestinal metaplasia and neutrophil activity.

Results: Out of 200 patients, 121 were excluded, and in the 79 remaining, we found that only the mosaic pattern showed high diagnostic yield with a specificity, sensitivity and PPV of 100%.

However, all endoscopic findings failed to predict a specific histomorphological pattern.

Conclusion: We suggest that the mosaic appearance is a reliable indicator for the presence *H. pylori* infection without predicting a specific underlying histological pattern.

Introduction

H.pylori infection is a common chronic bacterial infection residing in the stomach of more than 50% of humans worldwide [1,2]. It is contracted in the early childhood and persists indefinitely unless specific treatment is applied [3,4].

Thousands of researches about *H. pylori*, conducted through 30 years, demonstrated that this bacterium, by its colonization of the human stomach, induces mucosal inflammation and a variety of upper gastrointestinal disorders, such as chronic gastritis, peptic ulcer disease in particular duodenal ulcer, gastric mucosa-associated lymphoid tissue (MALT) lymphoma, non-ulcer dyspepsia, gastric cancer and other rare gastric conditions. But its culpability is suspected yet not been approved in other clinical settings, especially non-ulcer (functional) dyspepsia, unexplained iron deficiency anemia, rosacea, coronary artery disease, hepatic encephalopathy, psoriasis, idiopathic thrombocytopenic purpura (ITP) [7,12].

Objectives

As we previously discussed in this work, *Helicobacter pylori* infection appears to be the key risk factor for a variety of gastric lesions and diseases mainly gastritis, and lately it was classified as carcinogen bacterium because of its proven role in the development of gastric adenocarcinoma.

However, this infection can be cured successfully in 90% of cases with an antibiotic regimen, thereby healing definitely multiple disease states, decreasing their recurrence rate and eliminating the risk for developing one of the most fatal neoplasms.

Therefore, it became an urge need to get a diagnostic tool characterized by a low cost so it can be applied for diagnosis and screening of millions of people worldwide, also it should be simple, reliable, giving reproducible, accurate and rapid results.

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Although many tests were developed for this purpose and were been continuously improving in the last decades, unfortunately all of them have their limitations and issues.

Recent studies highlighted that some macroscopic findings noted during EGD were highly related to some histomorphological changes and were highly suggestive of the presence of *H.pylori* infection but unfortunately their results were confusing and non conclusive.

In our study, we try to determine the value of endoscopic macroscopic diagnosis of *H. pylori* infection, so if the endoscopists could determine the infection state of his patient on the field, the patient can be discharged immediately from the endoscopy section with the accurate treatment, thereby decreasing time and money wasting, improving management and rendering the situation easier for the physician.

Another objective of our study is to determine an association, if such one is present, between macroscopic findings on EGD and histomorphological findings on biopsy.

Material and methods

Subjects

A total of 200 endoscopies done for adult patients in ZHUMC beginning from January 1st, 2018 to June 30th , 2018 were interpreted prospectively. The cases were randomly chosen (inpatient or outpatient, from both sexes, no specific socioeconomic status and no specific region in lebanon) on the basis of the only inclusion criteria: undergoing a diagnostic EGD for dyspepsia. A patient suffers from dyspepsia if he has either epigastric pain, heartbun, nausea, vomiting, flatulence, eructation, fullness after meals, early satiety or abdominal distention, regardless of the severity of these symptoms.

According to our predetermined protocol, every patient having the below criteria was excluded from the sudy:

The exclusion criteria are:

- Previous history of *H.pylori* infection.

- Antisecretory medication use within last four weeks to the EGD including PPI, Anti-H2 medications or bismuth containing compound.

- Antibiotic (against *H.pylori*) treatment within last four weeks.

- After review of endoscopic results, patients having gastric or duodenal ulcer on EGD, duodenitis or esophagitis were excluded from the study.

Patients with endoscopically normal looking mucosa were not also included in the study because the aim of our study is to determine endoscopic findings related to *H.pylori* induced gastritis.

Endoscopic procedure

Endoscopy was performed after sedation of the patient with 5 mg midazolam and local anesthesia of the oropharynx with 1% xylocaine spray.

A full endoscopic evaluation of the esophagus, stomach and duodenum were performed in all patients by single advanced physician (>5000 endoscopy).

Endoscopic findings were classified according to present criteria as erythema, edema, erosion (flat/raised), rugal hypertrophy, rugal atrophy, nodularity and mosaic pattern (cobblestone appearance).

The most common dyspeptic symptom was epigastric pain, followed by heartburn, fullness after meals, eructation, early satiety, and vomiting.

Diagnosis

H. pylori infection status was evaluated by histology and RUT in all patients.

For this purpose, two biopsies were obtained, one from the corpus, the other from the antrum. Before sending the biopsy specimens for histologic assessment, a piece of biopsy was used to accomplish RUT for diagnosis and confirmation of *H.pylori* infection status.

Histologic examination was made by one pathologist who was blind to the endoscopic findings. The purpose was to detect *H. pylori* infection, determine gastric histomorphological changes induced by the infection, and classify them according to the updated Sydney System as antral inflammation, mucosal atrophy, intestinal metaplasia and neutrophil activity.

Statistical analysis

The results were analysed statistically, to determine the sensitivity, specificity, PPV, NPV and statistical significance (calculated by Chi square test) of macroscopic features in diagnosing *H. pylori* status of infection and to determine any correlation between endoscopic findings and histomorphological findings.

Results

Of a total of 200 cases reviewed retrospectively over the period extending from January 1st, 2018 to June 30st, 2018, 83 patients were excluded from the study because they had one or more of the exclusion criteria described above. Another group of 31 patients was excluded because of missing data in their medical record.

7 patients had normal appearing mucosa on EGD and there were not included in statistical analysis.

Out of the 79 remaining patients, 33 (41.77%) were male and 46 (58.23%) were female with a female to male ratio of 1.4: 1.

The patient's age ranged from 15 years to 88 years with a mean age of 44.84 years (Figure 1).

As shown by the above diagram, the highest percentage of infection was found in the age groups [13-38] and [39-58] in both males and females (15.19% and 16.46% versus 21.52% and 18.99% respectively). On the other hand, extreme age groups [10-19] and [59-69] showed the less percentages of infection in both males and females (0.00% & 0.00% versus 6.33% & 1.27% respectively)

In our study, 29 (36.71%) patients were smokers and 50(63.29%) were nonsmokers; 4 patients (5.06%) were alcohol drinkers versus 75 (94.94%) were not drinkers.

45 patients (56.96%) were diagnosed to have *H. pylori* positive gastritis while 34(33.04%) were *H. pylori* negative gastritis.

Figure 2 summarizes the results described above, dividing the patients in two groups:

H.pylori positive and *H.pylori* negative gastritis; and showing their distribution according to: gender; age class; tobacco smoking and alcohol consumption.
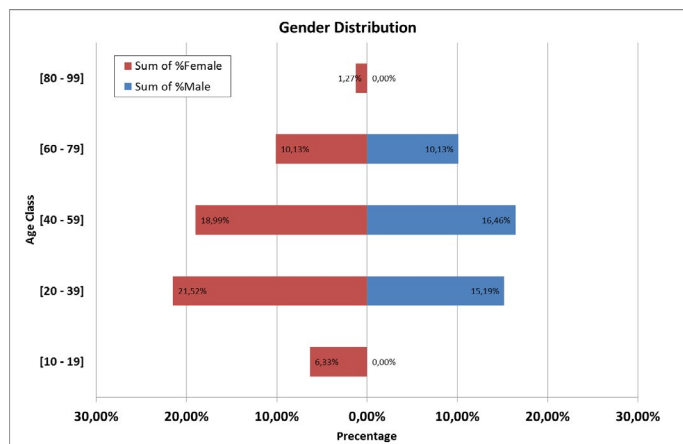
Figure 1. Diagram showing patient's distribution based on gender and age class, and the percentage of each class

Figure 2. Distribution of patients according to infection status, gender, age, tobacco, and alcohol consumption

As shown by the above figure 2, *H. pylori* induced gastritis and non-*H. pylori* gastritis have been found in similar percentages in females (52.17% versus 47.83%). In males, gastritis was found mainly due to *H. pylori* (63.63% versus 36.37% in non *H. pylori* gastritis, respectively).

Based on age group criteria, gastritis was also found mainly due to *H. pylori* in [20-38] and [39-58] (58.62% and 64.28% versus 41.38 and 35.72% in non *H. pylori* gastritis, respectively). Whereas in extreme age groups [10-19] and [58-69] no *H. pylori* was found (0%), therefore all gastritis were non *H. pylori* (100%)

In smoker and non-smoker patients, gastritis was found mainly due to *H. pylori* (55.17% and 58% versus 44.83% and 42% in non *H. pylori* gastritis, respectively).

Also, in alcoholic and non-alcoholic patients, gastritis was found mainly due to *H. pylori*, with wide discrepancy compared to non *H. pylori* gastritis (75% and 66% versus 25% and 44%, respectively).

In the *H. pylori* positive gastritis group, the endoscopic and the histologic findings were distributed as following (Figure 3).

- Endoscopic findings: erythema (62%); mixed findings (more than one finding in the same patient) (22%); raised erosion (7%); nodularity (5%); mosaic pattern (2%); flat erosion (2%).

- Histologic findings: Neutrophil activity (73%); mucosal atrophy (16%); intestinal metaplasia (9%); antral inflammation (2%) (Figure 4).

- In the *H. pylori* negative gastritis group, the distribution is as following: (Figure 12)

- Endoscopic findings: erythema (70%); edema (12%); nodularity (9%); flat erosion (3%); raised erosion (3%); mixed findings (3%).

- Histologic findings: Antral inflammation (50%); intestinal metaplasia (32%); mucosal atrophy (18%).

- The diagnostic value (sensitivity; specificity, positive and negative predictive values) of macroscopic findings is shown in table 1.

Subjects with mosaic pattern showed specificity, sensitivity and PPV of 100%, while NPV was only 66%.

In the other hand, patients with raised erosion showed high specificity of 100% while sensitivity was only about 6%. The correlation between endoscopic and histologic findings are shown in table 2. Neutrophil activity is highly associated with mosaic pattern in 93% of cases.

Discussion

In previous studies treating the value of endoscopic diagnosis of *H. pylori* infection, only one test was used for the diagnosis. However accurate diagnosis of this infection is difficult, and one test used could have significant false results; thus, in our study, we combined two tests for this purpose: histology and RUT making the results more accurate and reliable.

In our study, and because no video-based evaluation was performed, we could not observe detailed mucosal patterns and we could not conduct a blind comparison between endoscopic evaluation of mucosa by more endoscopists, which is a limitation of our study.

In the other hand, one of the inconvenient of histologic diagnosis is its intra- and inter-observer variations, and in our study, histologic interpretation was performed by one single pathologist, which is another limitation of the study.

Reviewing some of previous studies, we noted that results have been contradictory. Khakoo et al. [67] evaluated the significance of
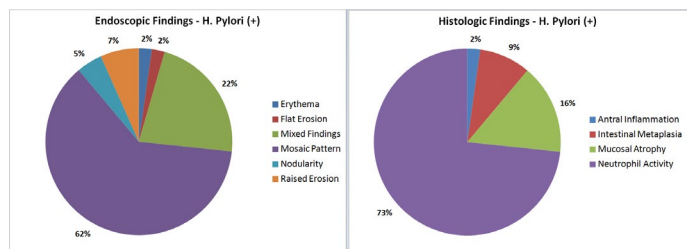

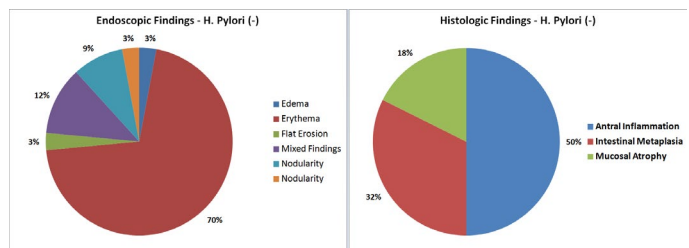**Figure 3.** Distribution of and Endoscopic and Histologic Findings in H. pylori positive patients

Figure 4. Distribution of Endoscopic and Histologic Findings in H. pylori negative patients

Table 1. Diagnostic value of endoscopic findings

Endoscopic Finding	Sensitivity	Specificity	PPV	NPV
Mosaic Pattern	100%	100%	100%	66%
Erythema	2%	29%	4%	18%
Mixed Findings	22%	88%	71%	46%
Nodularity	4%	88%	33%	41%
Raised Erosion	6%	100%	100%	44%
Flat Erosion	2%	97%	50%	42%
Edema	0%	97%	0%	42%

Table 2. Correlation between endoscopic and histologic findings

Endoscopic Findings	Histological Findings				
	Neutrophil Activity	Antral Inflammation	Intestinal Metaplasia	Mucosal Atrophy	Total
Mosaic Pattern	26	0	1	1	28
Erythema	0	17	3	5	25
Mixed findings	3	1	5	5	14
Nodularity	1	0	5	0	6
Raised Erosions	2	0	0	1	3
Flat Erosions	1	0	1	0	2
Edema	0	0	0	1	1
Total	33	18	15	13	79

the endoscopic classification of gastritis by the updated Sydney system (USS) criteria and obtained a low diagnostic yield of 41.8%. They concluded the inappropriateness of an endoscopic diagnosis of gastritis. Belair et al. [68], and Redeen et al. [69] also concluded inappropriate value of endoscopy in making the diagnosis.

But a higher diagnostic yield of 79.5% was obtained by Mihara. In fact, their study was conducted in high endemic area. So, the inconsistency in diagnostic yields might be explained by differences in regional disease prevalence.

In the present study, diagnostic yield was relatively high for only one endoscopic feature: the mosaic pattern. Mosaic pattern was the commonest single endoscopic finding (35%) described.

H. pylori was found in 100% of cases, making this finding specific and sensitive with a high statistical significance (p-value <0.001). Also, we found that this pattern was highly linked to the neutrophil activity histologic pattern (92.8%). However, the result was statistically insignificant (p-value 0.2).

The other findings failed to have a statistical significance in the prediction of *H. pylori* infection status, and in the prediction of histomorphological changes, despite that one pattern, the raised erosion pattern had 100% specificity.

Conclusion

As a summary, our study revealed that the diagnostic yield for *H. pylori* infection status was high only for the mosaic appearance pattern, but results were not conclusive for the other patterns. All endoscopic findings failed to predict a specific histomorphological pattern. We suggest that the mosaic appearance on endoscopy is a reliable indicator of the underlying *H. pylori* induced gastritis.

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