

MOSAIC APPEARANCE OF GASTRIC MUCOSA AS A PREDICTOR FOR HELICOBACTER PYLORI INFECTION

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Abstract

Experimental evidence supports a significant association between *H. pylori* infection and mosaic appearance of gastric mucosa. This study was carried out to find the significance of gastric mosaic mucosal pattern as a predictor of *H. pylori* related infection.

A total of one hundred consecutive patients were selected from those attending endoscopy unit at Al-Sader Teaching Hospital for various dyspeptic symptoms; fifty with mosaic gastric mucosa as patients and fifty with normal gastric mucosa as controls. They were classified according to their ages, gender, and smoking habits.

Two endoscopic biopsies from the antrum and corpus were taken from each patient and control and were tested for *H. pylori* by rapid urease test.

Mosaic gastric mucosal pattern was significantly associated with *H. pylori* infection, as compared with normal mucosa. Age was an important determinant for mosaic mucosal pattern and *H. pylori* infection, however; gender did not contribute to mosaic mucosal appearances and *H. pylori* infection, while smoking can contribute to mosaic mucosal appearance but not *H. pylori* infection.

In conclusion, mosaic mucosal pattern is a good indicator in predicting *H. pylori* related infection.

Introduction

Helicobacter pylori (*H. pylori*) are gastric organisms were first observed more than 100 years ago and their association with gastritis has been recognized since the 1970s¹. The true implication of these microbes was not fully realized, however, until 1982 when Marshall and Warren identified and subsequently cultured the gastric bacterium, *Campylobacter pyloridis*, later reclassified as *H. pylori*².

Colonization with this organism is the main risk factor for gastritis, peptic ulceration, gastric adenocarcinoma and gastric MALT (mucosa-associated lymphoid tissue) lymphoma³.

H. pylori is the most common chronic bacterial infection in humans⁴⁻⁵. It has been demonstrated worldwide and in individuals of all ages. Conservative

estimates suggest that 50% of the world's population are affected⁶.

In addition to its morphologic characterization, the organism can be biochemically characterized as catalase, oxidase, and urease positive. Urease appears to be vital for its survival and colonization. Bacterial urease activity is clinically important because it forms the basis for several invasive and noninvasive tests to diagnose infection⁶.

Although endoscopic features of *H. pylori* have been reported in the literatures, there is still some debate over whether *H. pylori*-related gastritis can be diagnosed via endoscopic features alone⁷. Most studies concluded that it is possible to diagnose *H. pylori*-related gastritis on the basis of high resolution magnification endoscopy⁸⁻¹¹. If specific mucosal patterns

of *H. pylori*-related gastritis can be identified using standard endoscopy, they may be applicable to targeted biopsy of suspected *H. pylori* infection in daily practice⁷. The previously observed endoscopic mucosal morphology of the gastric body was classified into 4 patterns; a cleft-like appearance mainly extending along the longitudinal axis of gastric body, a regular arrangement of red dots, the mosaic mucosal pattern without a focal area of hyperemia, and the mosaic pattern with a focal area of hyperemia⁷ (figure 1 A, B, C, and D). The first 2 types were not associated with *H. pylori* infection but the last two was significantly associated with *H. pylori* infection⁷.

Gastric biopsies can be tested for urease activity. With this technique, one or two pieces of tissue are placed in a urease solution which contains urea and a pH reagent. Urease cleaves urea to liberate ammonia, producing an alkaline pH and a resultant color change. The test may become positive as early as one hour after collection, but a final reading at 24 hours is recommended. The sensitivity of biopsy urease tests is approximately 90 to 95 percent, and specificity is 95 to 100 percent¹².

False positive tests are unusual. However, false negative results can occur in patients with recent gastrointestinal bleeding or with the use of proton pump inhibitors (PPIs), anti- *H. pylori* antibiotics, or bismuth containing compounds. Obtaining tissue samples from the antrum and the fundus may increase the sensitivity of the test¹³.

This study was aimed to find the significance of gastric mosaic mucosal pattern as a predictor for *H. pylori* infection.

Patients and Methods

A comparative study was conducted from January 2011 to September 2012. A total of 100 consecutive patients were selected from those attending Endoscopy Unit for various dyspeptic symptoms. Twenty

eight males and 22 females with mosaic mucosal pattern as patients (group A), and 20 males and 30 females with normal looking gastric mucosa as controls (group B) were enrolled in the study. The study was carried out in the Endoscopy Unit at Al-Sader Teaching Hospital, Basrah; Southern Iraq. Ages of (group A) patients were ranging from 21–66 years with a mean age of 38.42 year, while those of (group B) ranged from 20–80 years with a mean age of 33.26 years. Patients were classified according to their ages as

groups of

20 – 39 years.

40 – 59 years.

60 years and above.

Patients of both groups receiving NSAIDs, proton pump inhibitors, antibiotics for *H. pylori* eradication, or with bleeding tendency, previous gastric surgery, gastric or duodenal ulcer, gastric malignancy were excluded from the study. Gender and smoking habits were reported and correlated with endoscopic findings. Current smoking was considered present if the patient had smoked any number of cigarettes with in the previous one month. Endoscopic examination was performed by one endoscopist using upper GI video scope (Olympus CLV 260). The whole stomach and duodenum were examined first, then gastric body (corpus) was chosen and only the mucosal morphology of mosaic pattern with or without a focal area of hyperemia was considered for the study.

Two endoscopic gastric biopsies from antrum and gastric body (corpus) were taken from each patient with normal and mosaic gastric mucosa and tested for *H. pylori* by rapid urease test. Urease test was read one and 24 hours after biopsy specimen insertion into the reagent. Patients with normal and mosaic gastric mucosa were considered as *H. pylori* positive when the color of the reagent changed from faint yellow to bright pink in the test tube. Statistical analysis was done by using the SPSS V 20 multilingual

software. P-value less than 0.05 was considered to be significant.

Results

Number of patients with mosaic gastric mucosa and normal mucosa at the age group of 20–39 years were 24 (13 males and 11 females), and 38 (12 males and 26 females) respectively. At the age group of 40–59 years, were 18 (11 males and 7 females), and 10 (7 males and 3 females) patients respectively, while at the age group of 60 years and above were 8 (4 males and 4 females) patients with mosaic gastric mucosa, and 2 (1 male and 1 female) patients with normal gastric mucosa as shown in table (IA, IB).

Thirty six (72%) patients with mosaic gastric mucosa had *H. pylori* infection as shown by positive urease test, and 14 (28%) of them were *H. pylori* negative. 19 (38%) patients with normal gastric mucosa had *H. pylori*, and 31 (62%) of them were negative. These differences were significant $P=0.001$ as shown in table (II).

In the age group (20–39 years), out of 24 patients with mosaic gastric mucosa 15 (62.5%) patients were infected with *H. pylori* while out of 38 patients with normal looking gastric mucosa 14 (36.8%) were infected, the differences were significant $P=0.049$. In the age group (40–59 years), out of 18 patients with mosaic gastric mucosa 17 (94.4%) patients were infected while out of 10 patients with normal gastric mucosal appearance, 4 (40%) were infected. The differences were highly significant $P=0.001$. In the age group of 60 years and above, out of 8 patients with mosaic mucosal appearance, 4 (50%) patient was infected, and out of 2 patients with normal gastric mucosal appearance, 1 (50%) patients were infected. The differences were not significant $P=1.0$ (see table (III)).

Out of 48 studied males, 26 (54.17%) patients were infected with *H. pylori* while out of 52 females 29 (55.7%) were infected. The difference were insignificant

$P=0.872$. Out of 48 males 28 (58.33%) had mosaic appearance of their gastric mucosa, and from the 52 studied females 22 (42.3%) had mosaic gastric mucosa. The difference here where insignificant $P = 0.109$ as shown in table (IVA, and IVB). Out of 32 smoker patients; 19 (59.38%) were infected with *H. pylori* while out of 68 non-smokers; 36 (52.94%) patients were infected with *H. pylori*. The difference were insignificant $P=0.546$. On the contrary, out of 32 smokers, 21 (65.63%) had mosaic gastric mucosa, and 29 (42.65%) of non-smokers had mosaic appearance. The difference were significant $P=0.023$ as described in table (VA, and VB).

Discussion

One study has addressed the endoscopic mucosal abnormalities as features of *Helicobacter*-related gastropathy and infection⁷, however; some of the studies concluded that *H. pylori* infection cannot be diagnosed based on endoscopic findings alone⁸⁻¹¹. Recently, Yagi et al¹⁴ first described the characteristic magnification endoscopic findings of *H. pylori*-negative stomach. Further, Anagnostopoulos et al¹⁵ demonstrated the usefulness of magnifying endoscopy in the identification of *H. pylori*-associated gastritis in a western population. However, practicing magnification endoscopy takes more examination time and needs more training and experience. It is therefore not feasible to practice magnification endoscopy in daily endoscopy examinations⁷.

Mosaic gastric mucosa was a predictor for *H. pylori* infection as proved in this study which was supported by Sheng-Lei Yan and his colleagues who proved that mosaic gastric mucosa was statistically significant in predicting *H. pylori* positive status as compared with normal and other mucosal types⁷.

There was a significant association between the age groups of (20–39) years, and (40–59) years and mosaic mucosal

appearance, and hence, *H. pylori* infection. This result was supported by a study done in northern Iraq¹⁶.

Both males and females had neither significant association with mosaic gastric mucosa or *H. pylori* infection, therefore sex seems not to contribute to mosaic gastric mucosa. This was agreed with other studies¹⁷⁻¹⁸.

Khouri K et al assumed that smoking carries significant association with both mosaic gastric mucosa and *H. pylori* infection¹⁹. In this study, however; both smokers and non-smokers had significant association with mosaic gastric mucosa but not *H. pylori* infection, therefore

smoking seems to contribute to mosaic gastric mucosal appearance.

Conclusion

This study suggests that mosaic mucosal pattern of gastric mucosa seems to be a good indicator in predicting *H. pylori* infection.

Age and smoking can contribute to mosaic gastric mucosal appearance but not gender.

Recommendation

It is recommended that endoscopists need to be aware of mucosal changes of *H. pylori* infection, and therefore guide them to targeted biopsy of suspected *H. pylori* infection.

Table IA: The distribution of patients according to age group

Age group			Patients		Total 62
			Mosaic mucosa	Normal mucosa	
	20 – 39 years	No.	24	38	62.0%
%		48.0%	76.0%		
40 – 59 years	No.	18	10	28	
	%	36.0%	20.0%	28.0%	
60+ years	No.	8	2	10	
	%	16.0%	4.0%	10.0%	
Total	No.	50	50	100	
	%	100.0%	100.0%	100.0%	

Table IB: The distribution of patients according to gender

Gender			Patients		Total 48
			Mosaic mucosa	Normal mucosa	
	Male	No.	28	20	48.0%
%		56.0%	40.0%		
Female	No.	22	30	52	
	%	44.0%	60.0%	52.0%	
Total	No.	50	50	100	
	%	100.0%	100.0%	100.0%	

Table II: H. pylori infection in patients with normal and mosaic gastric mucosa

			H. pylori infection		Total
			Positive	negative	
Gastric mucosa	Mosaic	No.	36	14	50
		%	72 %	28%	100%
	Normal	No.	19	31	50
		%	38%	62%	100%
	Total	No.	55	45	100
		%	55%	45%	100%
P – value		0.001			

Table III: H. pylori infection as correlated to age groups in patients with normal and mosaic gastric mucosa

Age Group			H. pylori infection		Total	P value
			Positive	Negative		
20 – 39 years	Mosaic	No	15	9	24	0.049
		%	62.5%	37.5%	100%	
	Normal	No	14	24	38	
		%	36.8%	63.2%	100%	
	Total	No	29	33	62	
		%	46.8%	53.2%	100%	
40 – 59 years	Mosaic	No.	17	1	18	0.001
		%	94.4%	5.6%	100%	
	Normal	No	4	6	10	
		%	40%	60%	100%	
	Total	No	21	7	28	
		%	75%	25%	100%	
60+ years	Mosaic	No	4	4	8	1.00
		%	50%	50%	100%	
	Normal	No.	1	1	2	
		%	50%	50%	100%	
	Total	No.	5	5	10	
		%	50%	50%	100%	

Table IVA: The correlation between H. pylori infection and gender

			H. pylori infection		Total	P – value
			Positive	Negative		
Gender	Male	No.	26	22	48	0.872
		%	54.17%	45.83%	100%	
	Female	No.	29	23	52	
		%	55.77%	44.23%	100%	
	Total	No.	55	45	100	
		%	55%	45%	100.0%	

Table IVB: The correlation between mosaic gastric mucosa and gender

			Mosaic gastric mucosa		Total	P – value
			Positive	Negative		
Gender	Male	No.	28	20	48	0.109
		%	58.33%	41.67%	100%	
	Female	No.	22	30	52	
		%	42.3%	57.7%	100%	
	Total	No.	50	50	100	
		%	50%	50%	100%	

Table VA: H. pylori infection as correlated to smoking

			H. pylori infection		Total	P – value
			Positive	Negative		
Smoking habit	Smoker	No.	19	13	32	0.546
		%	59.38%	40.62%	100%	
	Non smoker	No.	36	32	68	
		%	52.94%	47.06%	100%	
	Total	No.	55	45	100	
		%	55%	45%	100%	

Table VB: Mosaic appearance of the gastric mucosa as correlated to smoking

			Mosaic gastric mucosa		Total	P – value
			Positive	Negative		
Smoking habit	Smoker	No.	21	11	32	0.023
		%	65.63%	34.37%	100%	
	Non smoker	No.	29	39	68	
		%	42.65%	57.35%	100%	
	Total	No.	50	50	100	
		%	50%	50%	100%	

The observed mucosal morphology of the gastric body in *H. pylori* associated infection as seen by upper GI endoscopy (Figure 1).

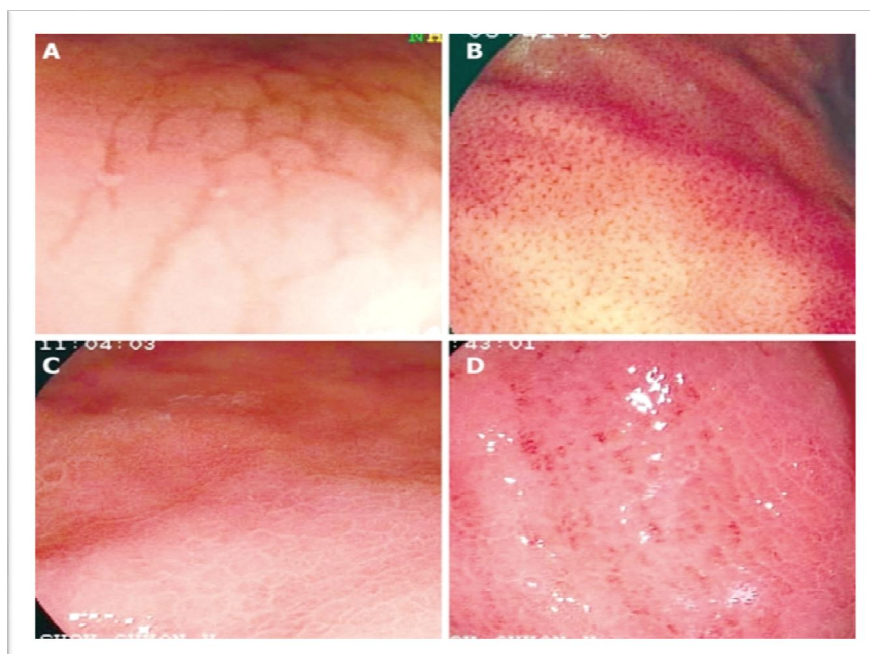


Figure 1: Endoscopic mucosal morphology in *H. pylori* infection⁷:

- A cleft-like appearance mainly extending along the longitudinal axis of gastric body.
- A regular arrangement of red dots.
- The mosaic mucosal pattern without a focal area of hyperemia.
- The mosaic pattern with a focal area of hyperemia.

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