

Endoscopy and Histopathological Findings of Gastric Fundus Mucosa in Patients with Hiatus Hernias

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Abstract

Background: Hiatal hernia remains a serious medical concern, which occurs quite frequently in the general population, and is characterized by a wide range of non-specific symptoms. Many studies have highlighted the association of hiatus hernia with changes in the distal oesophageal mucosa. Despite the burden of hiatus hernia, little is known about the endoscopic and histopathological changes in the gastric fundus mucosa in patients presenting with this condition and it is known that malignancies involving the fundus and cardia carry a worse prognosis.

Objective: To assess the endoscopic and histopathological findings of gastric fundus mucosa in patients diagnosed with Hiatus hernias at Endoscopy.

Methods: A cross-sectional descriptive study of 120 patients diagnosed with hiatus hernia at St. Francis hospital, Nsambya, Kampala was conducted from 1st August 2022 to 28th February 2023. Diagnosis of hiatus hernia at Gastrointestinal Endoscopy and a hill classification of hiatus hernia was documented. Biopsies were taken from the herniating part of the gastric fundus for histopathological assessment. Data on demographics, medical history, endoscopy and histopathological findings were collected using a pre-tested questionnaire. Data were analyzed using STATA version 16.0.

Results: Among the 120 patients diagnosed with hiatus hernia, 55% were male. The mean age was 42 ± 15.9 years. 72% had *H. pylori* infection. On endoscopy, 5 (4.2%) had normal endoscopy findings, 109 (95%) mucosal hyperemia, 43 (37%) ulcerations; 13 (11%) incarceration. Neither had gangrene nor tumors. None of the patients had normal histopathological findings: 11 (9%) atrophic (chronic) gastritis, 103 (86%) non-atrophic gastritis, 24 (20%) Gastric intestinal metaplasia.

Conclusion: Majority of patients diagnosed with hiatus hernia had abnormal gastric fundus endoscopy findings, and of concern were the 29% of patients that had Atrophic Gastritis and Gastric intestinal metaplasia that are both premalignant lesions.

Keywords: Gastrointestinal endoscopy • Esophageal hiatus • Gastroesophageal reflux disease

Introduction

Hiatus hernia, defined as the herniation of contents of the abdominal cavity through the esophageal hiatus of the diaphragm and into the mediastinum. It remains one of the most prevalent medical conditions worldwide. A hiatal hernia occurs when the upper part of the stomach or other internal organ bulges through the hiatus of the diaphragm. When there is laxity in esophageal hiatus, gastric contents back up in the oesophagus leading to Gastroesophageal reflux disease (GERD) and gastric fundus mucosal complications like ulcerations, necrosis and perforations can occur [1-7].

While most patients with hiatus hernia may be asymptomatic or present typically with symptoms of GERD, other atypical presentations may be as a result of complications of intestinal obstruction, gastric volvulus and gastric outlet obstruction [6]. Cases of hiatus hernia can be detected by endoscopy, radiology with barium swallow, or high-resolution manometry [7]. Hiatus hernia is diagnosed in approximately a fifth of routine upper gastrointestinal endoscopies [8], and is considered present when the gastroesophageal junction (GEJ) is

dislocated orally into the thoracic cavity, resulting in a discrepancy between the level of the GEJ and the diaphragmatic hiatus. Many studies have highlighted the association of hiatus hernia with changes in the distal oesophageal mucosa, the changes that occur in the gastric fundus mucosa in hiatus hernia patients have not been documented. Despite the burden of hiatus hernia, little is known about the endoscopic and histopathological changes in the herniating gastric fundus mucosa in patients presenting with this condition. We set out to establish the endoscopic and histopathological findings in herniating gastric fundus mucosa among patients diagnosed with hiatus hernia.

Methods

This was a cross-sectional descriptive study conducted at the Gastrointestinal Endoscopy unit and Histopathology unit of St. Francis Hospital, Nsambya, and Kampala, Uganda between 1st August 2022 to 28th February 2023. The study was conducted among patients indicated for endoscopy examination and diagnosed with hiatus hernia. All patients with upper GI symptoms referred for endoscopy at the gastrointestinal surgery unit were eligible to participate. Patients with previously diagnosed GIT malignancy at histology were excluded. Additionally, patients with a history of gastric procedures including gastrectomy, and bypass procedures were not enrolled into the study. Data on demographics, medical history, endoscopy and histopathological findings were collected using a pre-tested standardized questionnaire. In this study, the grading of hiatus hernia was based on the hill classification of hiatus hernia because of its superiority in comparison to axial length criterion [9]. An Endoscopist macroscopically assessed the fundus mucosa to report on the changes including hyperemia, ulcerations, incarcerations or tumors. Biopsies were taken for assessment by a Histopathologist. Ethical approval was obtained from the Research and Ethics Committee of St Francis Hospital Nsambya [9].

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Results

A total of 120 participants diagnosed with hiatus hernia were enrolled in the study. The majority of the participants were male (55%). Age ranged from 14–81 years with a mean of 42 ± 15.9 years. Mean Body mass index (BMI) was 28.8 ± 4. Among the 120 participants, 114 (95%) participants had at least one comorbidity: diabetes (5%), hypertension (20%), rheumatoid arthritis (16%), and hepatitis B (4%), and *H. pylori* infection (72%). The majority were taking anti-acid medication (71%). Nineteen (16%) had family history of cancer: colon (2), stomach (3), oesophageal (8), prostate (4); three could not recall the exact name of the cancer (Table 1).

The majority of participants diagnosed with hiatus hernia presented with dyspeptic symptoms (63%) including: epigastric burning (71%), epigastric pain (70%) and chest pain (65%) (Figure 1).

Endoscopy findings

Of 120 patients diagnosed with hiatus hernia, only 5 (4.2%) had normal

endoscopy findings of the fundus mucosa. Among the 115 (95.8) with abnormal endoscopy gastric fundus findings, 109 (95%) had mucosal hyperemia; 43 (37%) had ulcerations; 13 (11%) had incarceration, 9 (8%) had all mucosal hyperemia, ulcerations and incarceration. Neither of the patients had gangrene nor tumors (Figure 2). The majority (96%) of the patients who had *H. pylori* infection had abnormal endoscopy fundus mucosa findings. The most frequent grade of hernia on endoscopy was Hill III (48%), followed by Hill II (43%) 2, and Hill I (9%). None of the hernia was graded as Hill IV. There was no significant relationship between *H. pylori* infection, grade of hernia and endoscopy findings at the fundus mucosa.

Histopathological findings

None of the patients had normal histopathological findings of the fundus mucosa. Out of the 120 examined, 11 (9%) had atrophic gastritis; 103 (86%) had non-atrophic gastritis; 24 (20%) had Gastric Intestinal metaplasia; 5 (4%) had both atrophic gastritis and intestinal metaplasia while 14 (12%) had both non-atrophic gastritis and Gastric intestinal metaplasia (Figure 3). There was no significant relationship between medical history and histopathological findings; all patients had abnormal histopathological findings of the fundus. More than half of the participants presenting with symptoms of hiatus hernia including:

Table 1. Characteristics of 120 patients diagnosed with hiatus hernia who had gastric fundus mucosa biopsies taken.

	Characteristic (n=120)	Frequency	Percentage (%)
Age (years)	Mean ± SD	41.8 ± 15.9	
Sex	Male	66	55
	Female	54	45
Body Mass Index (BMI)	18–<25	20	16.7
	25–<30	73	60.8
	≥30	27	22.5
Anti-acid medication	Yes	85	70.8
	No	35	29.2
Underlying conditions	Diabetes	6	5
	Hypertension	24	20
	Rheumatoid arthritis	19	15.8
	Hepatitis B*	4	3.8
Family history of cancer	<i>H. pylori</i> *	74	71.2
	Yes	19	15.8
	No	101	84.2

*16 participants had not tested for Hepatitis B and *H. pylori*

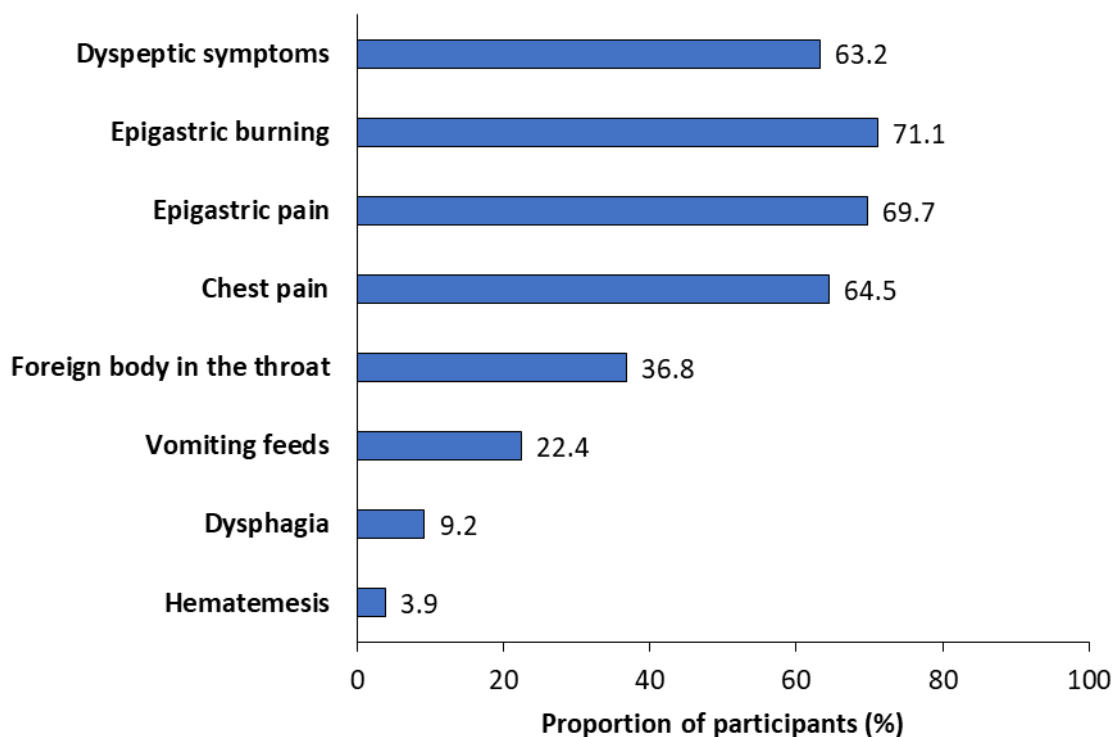


Figure 1. Presenting symptoms among patients diagnosed with hiatus hernia who had gastric fundus mucosa biopsy.

Table 2. Bivariate analysis between endoscopy and histopathological findings among 120 patients diagnosed with hiatus hernia who had Gastric fundus mucosa biopsy.

Endoscopy Findings	Histopathological findings					
	Atrophic Gastritis, n (%)	P value	Non-atrophic Gastritis, n (%)	P value	Metaplasia, n (%)	P value
Normal endoscopy, n=5	2 (40)	0.145	3 (60)	0.351	0	0.377
Mucosal hyperemia, n=109	10 (9.2)	0.636	94 (78.3)	0.275	19 (17.4)	0.112
Ulceration, n=43	6 (14)	0.221	34 (79.1)	0.165	11 (25.6)	0.336
Incarceration, n=13	0	0.337	11 (84.6)	0.855	5 (38.5)	0.19

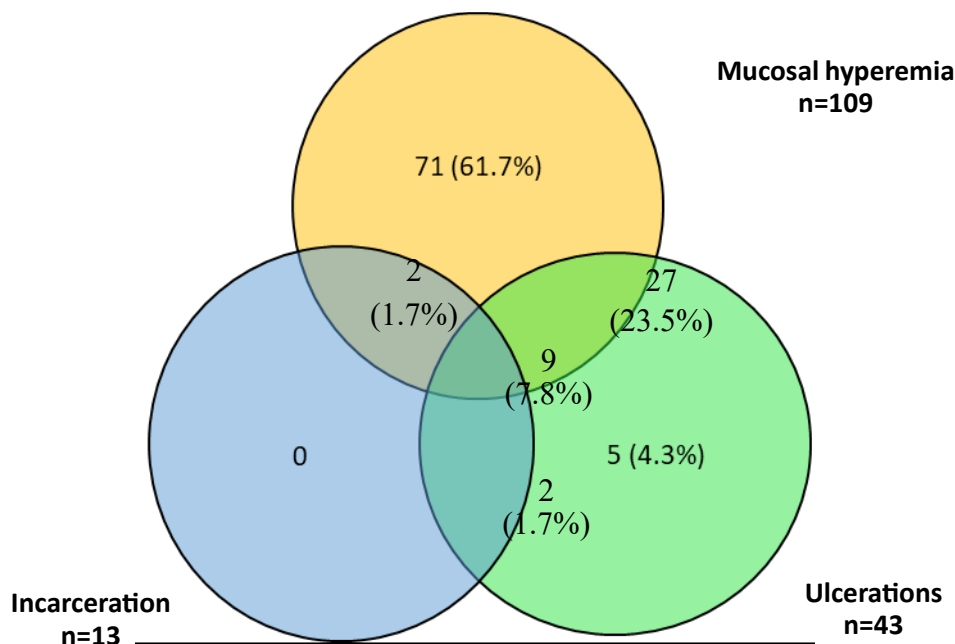


Figure 2. Endoscopy findings of 120 patients diagnosed with hiatus hernia who had Endoscopy and gastric fundus mucosa biopsy.

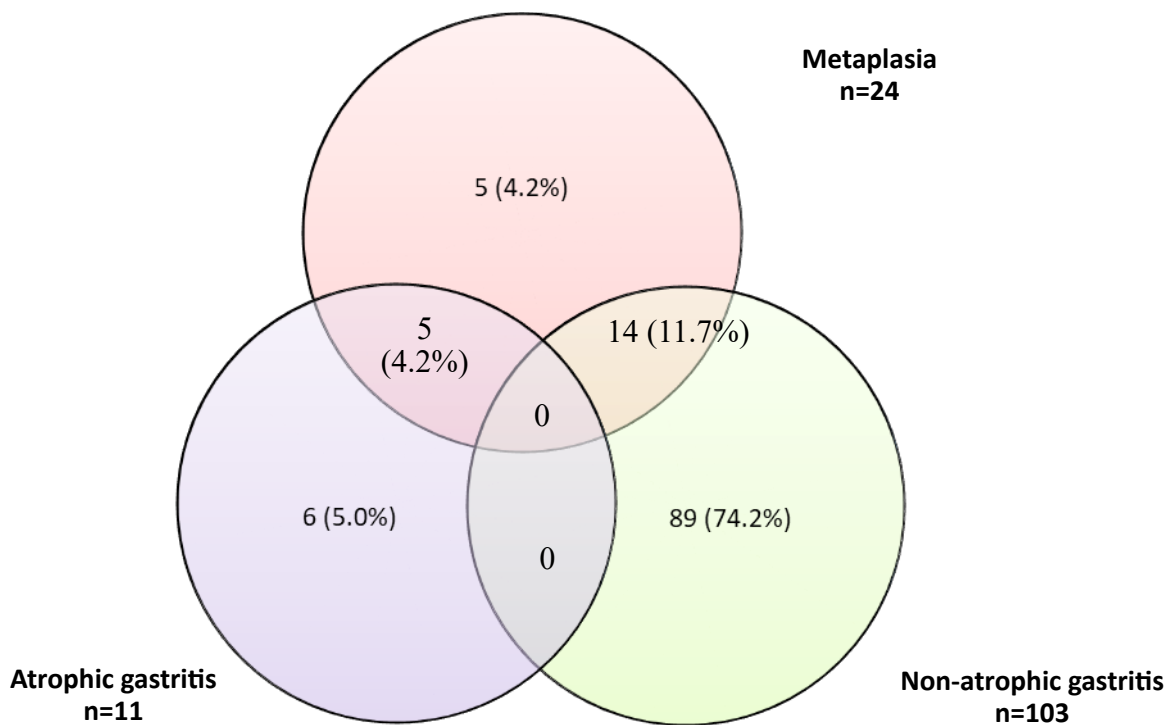


Figure 3. Histopathological findings among 120 patients diagnosed with hiatus hernia. Bivariate analysis of endoscopy and histopathological findings of the gastric fundus mucosa.

epigastric burning (87%), epigastric pain (91%), chest pain (92%), dyspeptic symptoms (94%), sensation of foreign body in throat (93%), vomiting feeds (94%), dysphagia (100%) had mucosal hyperemia on endoscopy (Figure 4). More than half of the participants presenting with symptoms of hiatus hernia including: epigastric burning (83%), epigastric pain (79%), chest pain (90%),

dyspeptic symptoms (88%), sensation of foreign body in throat (82%), vomiting feeds (88%), dysphagia (71%), hematemesis (67%) had non-atrophic gastritis (Figure 5).

All participants with normal gastric fundus endoscopy findings had gastritis; atrophic gastritis. Gastric intestinal Metaplasia was commonest among

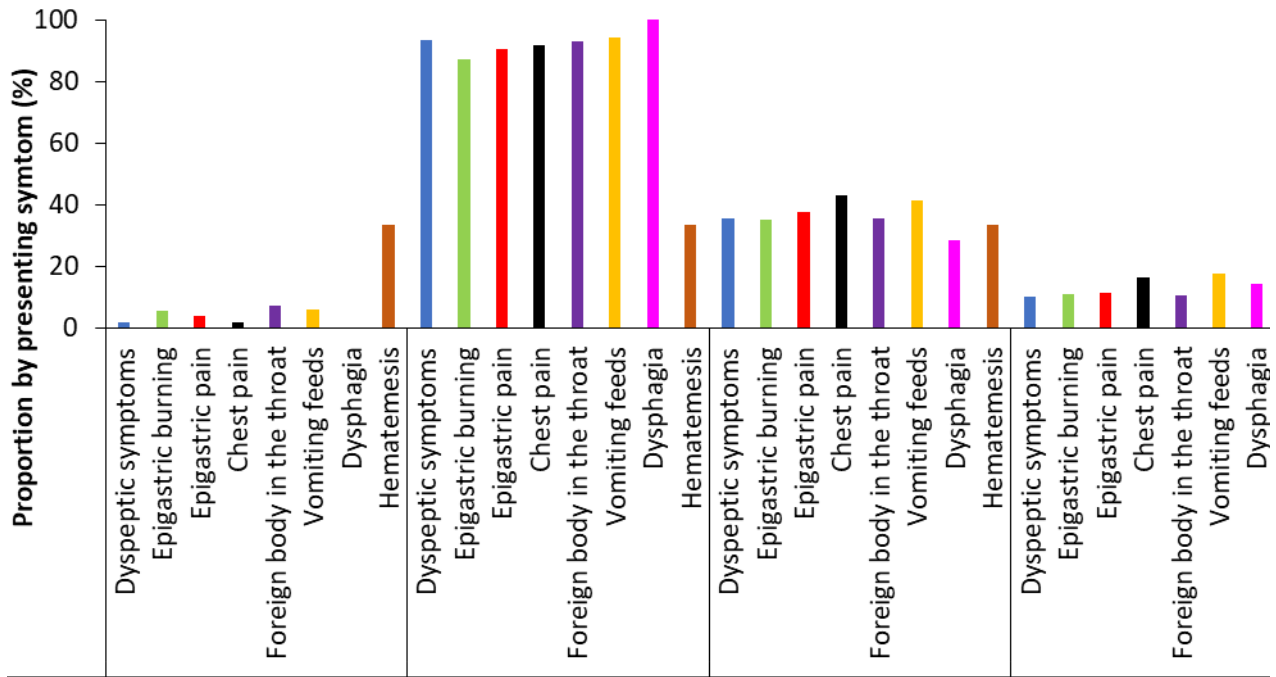


Figure 4. Endoscopy findings among 120 patients presenting with symptoms of hiatus hernia who underwent gastric fundus mucosa biopsy.

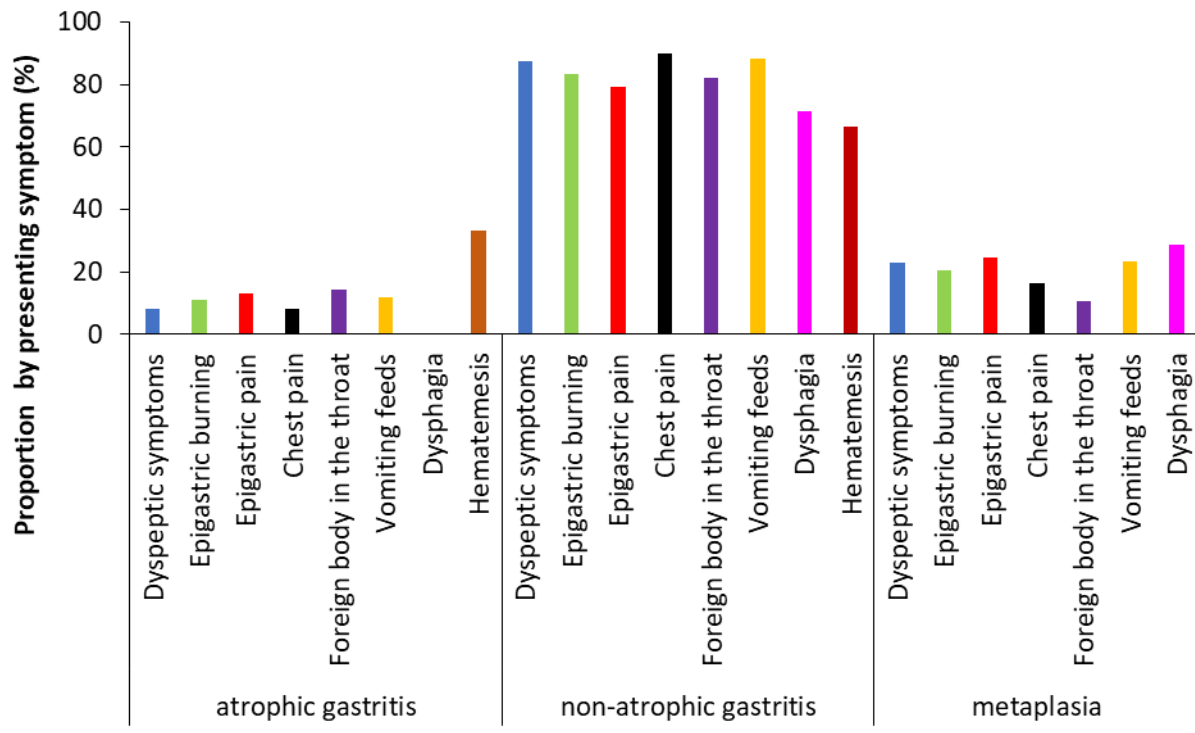


Figure 5. Histopathological findings of the gastric fundus mucosa among 120 patients presenting with symptoms of hiatus hernia.

participants with incarceration (Table 2).

Discussion

In our study, we assessed endoscopy and histopathological findings of the Gastric fundus mucosa in patients who were presenting with Hiatus hernias. Among the 120 patients diagnosed with hiatal hernia, 96% had abnormal endoscopy findings in the fundus while all patients had abnormal histopathological findings involving the herniating fundus. Mucosal hyperemia (95%), ulceration (37%) and incarceration (11%) were the observed endoscopy findings; 9 (8%) had a combination of mucosal hyperemia, ulcerations and incarceration. All patients had abnormal histopathological findings: non-atrophic gastritis (86%), atrophic

gastritis (9%) and metaplasia (20%) were the detected. Among these, 5 (4%) had both atrophic gastritis and metaplasia while 14 (12%) had both non-atrophic gastritis and metaplasia. Although the five hernia patients with normal endoscopy findings had abnormal histopathological findings; none had metaplasia.

Endoscopy findings

In our study, abnormal endoscopy findings included mucosal hyperemia, ulceration and incarceration. Neither of the patients had gangrene nor tumors. These findings could be due to mechanical irritation of the gastric fundus mucosa as it slides through the diaphragmatic hiatus especially in presence of incarcerations. However, among patients with ulcerations and/or hyperemia, the findings could be explained by either the mechanical irritation or from the ongoing global gastritis. These findings could also be associated with *H. pylori* infection

Table 3. Multivariate analysis of endoscopy and histopathological findings and *H. pylori* infection among patients diagnosed with hiatus hernia and had gastric fundus biopsy.

		<i>H. pylori</i> (n=74)	No <i>H. pylori</i> (n=30)	P value
Endoscopy findings, n (%)	Normal (n=5)	3 (4.1)	2 (6.7)	0.727
	Mucosal Hyperemia (n=109)	66 (89.2)	28 (93.3)	0.784
	Ulceration (n=43)	28 (37.8)	7 (23.3)	0.277
	Incarceration (n=13)	8 (10.8)	2 (6.7)	0.62
Histopathological findings, n (%)	Atrophic gastritis (n=11)	6 (8.1)	3 (10.0)	0.95
	Non-atrophic gastritis (n=103)	63 (85.1)	26 (86.7)	0.891
	Metaplasia (n=24)	16 (21.6)	2 (6.7)	0.149

given the findings of ulcerations, mucosal nodularity are also common findings in *H. pylori* induced gastritis. Similar findings from other studies also showed that a variety of endoscopic findings including ulceration, mucosa hyperemia, polyps, erosions, plaques, and scars have been associated with gastric disease. However, gastric disease can also be associated with a normal endoscopy; we found five of the patients with normal endoscopy findings despite having symptoms of gastric disease [10-14].

Among the five patients with normal endoscopy findings, three had Hill II while two had Hill III hernia; all patients with Hill I grade of hernia had mucosal hyperemia. Three of the patients with normal endoscopy findings had *H. pylori* infection. Some studies conducted in other settings had similar findings. However, the study found no significant relationship between *H. pylori* infection and endoscopy findings. Our findings might imply that in the presence of *H. pylori* infection, even with a normal appearance of the gastric fundus mucosa on endoscopy, histopathological examination should also be performed to rule out any abnormalities. Patients presenting with abnormal endoscopy findings had similar symptoms. However, dyspeptic symptoms were more indicative of mucosal hyperemia compared to ulceration and incarceration as similarly reported by other studies. Our findings indicate that mucosal hyperemia is one of the common features for gastric endoscopy among patients with dyspeptic symptoms; there was also a relationship between dyspepsia and ulceration as well as incarceration although to a smaller extent [14-17].

Histopathological findings

Despite normal endoscopy appearance of the esophageal mucosa in a few of the patients, histological examinations of the biopsy specimens revealed changes in the fundus gastric mucosa of all the hiatus hernia patients. All had abnormal histopathological findings including: atrophic gastritis, non-atrophic gastritis and Gastric intestinal metaplasia. These findings are similar to those in previous studies done in other settings [15-19]. The findings in this study suggest a significant role of hiatus hernia and pre-malignant changes in the gastric fundus mucosa. In addition, the role of mechanical irritation from hiatus hernia in these findings cannot be overlooked. Gastric intestinal Metaplastic changes in gastric mucosa following an irritant have been widely studied like in cases of chronic *H. pylori* infection where there is progression from normal mucosa, through chronic gastritis, atrophic gastric gastritis, intestinal dysplasia and finally gastric cancer [20,21]. However, there is no available literature describing the role of mechanical irritation in Gastric intestinal metaplasia of gastric fundus mucosa like what happens in this study (Table 3).

Furthermore, given a positive history of *H. pylori* infection in majority of the participants, its role in mucosal changes cannot be denied. In this study, 71% of patients had history of *H. pylori* infection, which is considered a class 1 carcinogen according to international Agency for Research on Cancer (IARC). Several studies have shown a relationship between *H. pylori* infection and histopathological findings with disease progressing as gastritis followed by atrophy, gastric intestinal metaplasia and dysplasia that can lead to carcinoma of gastric mucosa. However, the relationship between *H. pylori* infection and mechanical irritation on the mucosal changes of the gastric fundus in patients with hiatus hernia is not well documented [22,23].

Relationship between endoscopy and histopathological findings

The majority of participants with abnormal endoscopy findings had non-atrophic gastritis. A considerable number of patients had Gastric intestinal metaplasia and atrophic gastritis involving the gastric fundus mucosa; it is well known that these are the main precursor lesions in gastric cancer [24]. In this study, Gastric intestinal metaplasia and atrophic gastritis combined represented 25% of the study group. This is a significant finding and it exhibits a relationship

between hiatus hernia and pre-malignant lesions of the gastric fundus. These findings could be explained by the possibility of mechanical irritation to the sliding fundus; a likely possibility since Gastric intestinal metaplasia was commonest among patients with incarceration. These findings are similar to others in different settings where mucosal irritation is key in gastric mucosal malignant transformation. However, there was no significant relationship between endoscopy and histopathological findings. Despite some studies reporting a correlation between endoscopy and histopathological findings [11], others have showed that there is a poor correlation between endoscopy findings and histological diagnosis of gastritis indicating that endoscopic finding is an unreliable predictor of histological gastritis. Others have shown that endoscopy is fairly imprecise with limited value in gastric evaluations [25-31].

Conclusion

Majority of patients diagnosed with hiatal hernia had significant endoscopy findings, and all had histopathological changes in their gastric fundus mucosa. The presence of Gastric intestinal metaplasia and atrophic gastritis, both premalignant lesions in a significant number of patients is of utmost concern and should warrant further investigation in a multicenter large study in our setting in order to design appropriate surveillance tools.

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