ENDOSCOPIC AND HISTOPATHOLOGICAL CHARACTERISTICS OF GASTRIC LESIONS SUSPECTED OF EARLY GASTRIC CANCER AND PRECANCEROUS LESIONS

Nguyen Van De[1], Le Thi Thuy[2,3], Tong Duc Minh[2], Nguyen Hoang Trung[2*]

[1]*108 Military Central Hospital - 1 Tran Hung Dao, Hai Ba Trung Ward, Hanoi City, Vietnam*
[2]*Vietnam Military Medical University - 160 Phung Hung, Ha Dong Ward, Hanoi City, Vietnam*
[3]*Military Hospital 4 - Le Viet Thuat Street, Hung Loc Commune, Vinh City, Nghe An Province, Vietnam*

ABSTRACT

Objective: To describe the endoscopic and histopathological characteristics of gastric lesions suspected of early gastric cancer and precancerous lesions.

Methods: A cross-sectional study was conducted on 200 patients with gastric lesions detected on endoscopy at 108 Military Central Hospital from 2020 to 2024. All patients underwent magnifying narrow-band imaging (NBI) endoscopy and chromoendoscopy. Lesions suspected of early gastric cancer according to Japanese endoscopic criteria were biopsied for histopathological diagnosis.

Results: Most lesions had a size ≤ 1 cm (51.0%). NBI endoscopy showed that 51% of lesions had no clear demarcation line; nearly half exhibited a homogeneous microsurface pattern and regular microvascular pattern. Thirty-five lesions suspected of early gastric cancer were biopsied; histopathology revealed early gastric cancer in 42.9%, high-grade dysplasia in 34.2%, low-grade dysplasia in 17.1%, and chronic inflammation in 5.8%. Among the 35 lesions suspected of early gastric cancer on endoscopy, 94.2% were confirmed as early gastric cancer or precancerous lesions on histopathology.

Conclusion: This study shows that early gastric cancer and precancerous gastric lesions present with diverse endoscopic appearances and histopathological patterns.

Keywords: Early gastric cancer; Gastric precancerous lesions; Histopathology.

1. INTRODUCTION

Gastric cancer is one of the most common malignancies worldwide. According to GLOBOCAN 2020, more than 1 million new cases of gastric cancer are diagnosed each year, and gastric cancer is the fourth leading cause of cancer-related death globally; in Viet Nam, it ranks fourth in incidence and third in mortality among all cancers [1]. Because most patients are diagnosed at an advanced stage, the overall 5-year survival rate of gastric cancer is only about 20% [2]. This disease therefore carries a very poor prognosis when detected late. In contrast, if gastric cancer is diagnosed at an early stage, prognosis improves markedly. Studies have shown that when the tumor is confined to the mucosa or submucosa, the 5-year survival rate can exceed 90% [3].

Upper gastrointestinal endoscopy plays a pivotal role in the early detection of precancerous lesions and early gastric cancer. This technique allows direct visualization of the gastric mucosa to identify subtle abnormalities in color and morphology, while simultaneously enabling biopsy for definitive diagnosis. Detecting and describing the endoscopic characteristics of lesions is important for assessing the risk of progression to cancer and for guiding appropriate treatment and follow-up. However, gaps and challenges remain between endoscopic image-based diagnosis and histopathological findings. Many precancerous gastric lesions (such as atrophic gastritis, intestinal metaplasia, and dysplasia) may show endoscopic appearances that are difficult to distinguish from normal mucosa, whereas some endoscopically suspicious lesions do not yet meet the criteria for a definite diagnosis of cancer based solely on surface inspection. In practice, definitive diagnosis of gastric cancer still depends on histopathology from biopsy specimens or resected tissue. Therefore, close correlation between endoscopic findings and histopathology is essential in the diagnosis of

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precancerous lesions and early gastric cancer. A better understanding of the relationship between endoscopic appearances and histopathological characteristics can improve diagnostic accuracy and optimize early treatment of gastric cancer. For these reasons, we conducted this study with the objective: "To describe the endoscopic and histopathological characteristics of gastric lesions suspected of early gastric cancer and precancerous lesions."

2. SUBJECTS AND METHODS

2.1. Study population

The study was conducted on 200 patients with localized gastric lesions detected on conventional upper gastrointestinal endoscopy who presented for examination and treatment at 108 Military Central Hospital from January 2020 to January 2024.

- Inclusion criteria: Patients aged 18–90 years, both men and women, with localized gastric lesions (erosion, ulcer, polyp, discoloration) observed on conventional white-light endoscopy, who were capable of giving informed consent and agreed to participate in the study.

- Exclusion criteria: Patients with a previous confirmed diagnosis of gastric cancer; those with ongoing upper gastrointestinal or gastric bleeding; patients with large deforming gastric ulcers that precluded complete endoscopic examination; and patients with severe comorbidities (heart failure, pneumonia, renal failure, etc.) that were contraindications to upper gastrointestinal endoscopy.

- Sample size: A convenience sampling method was used. During the study period, 200 patients who met all inclusion and exclusion criteria were enrolled.

2.2. Study methods

- Study design: Descriptive cross-sectional study with analytic components.

- Study place: 108 Military Central Hospital.

- Equipment: A CV190 endoscopy system with magnifying narrow-band imaging (NBI) capability; chromoendoscopy solutions (1% methylene blue and 2% indigo carmine); and routine laboratory tests performed using the modern equipment available at 108 Military Central Hospital according to the hospital's standard operating procedures.

- Study variables:

    + General characteristics: age and sex.

    + Location and size of gastric lesions.

    + Characteristics of the lesion demarcation line (DL).

    + Microsurface (Ms) and microvascular (Mv) patterns of the lesions on NBI.

    + Histopathological diagnostic outcomes.

- Study procedures:

    + Design of case report forms; collection of data on medical history, gastrointestinal symptoms and comorbidities; and physical examination to obtain anthropometric indices and signs related to the gastrointestinal tract and other organ systems.

    + Performance of necessary laboratory investigations.

    + All patients underwent white-light upper gastrointestinal endoscopy following the Systematic Screening Protocol for the Stomach (SSS) to systematically inspect the entire stomach. After the scope was introduced into the antrum, the endoscopist sequentially observed all gastric regions in forward and retroflexed views and captured at least 22 images to minimize blind areas [4]. Suspicious mucosal areas were then reassessed using magnifying NBI and, when necessary, chromoendoscopy with indigo carmine and methylene blue. Lesions suspected of early gastric cancer were evaluated according to the VS (vessel plus surface) classification proposed by Kenshi Yao, based on abnormal microvascular (Mv) and microsurface (Ms) patterns in combination with a clear demarcation line (DL) [4]. The indication for multiple biopsies or endoscopic mucosal resection was further guided by the criteria for lesions with potential early gastric cancer recommended by the Japanese Gastric Cancer Association (JGCA) in its latest treatment guidelines (JGCA 2018/2021) [5]. Lesions fulfilling these criteria were selected for biopsy or mucosal resection for histopathological examination.

    + Patients with suspected gastric cancer were identified according to two sets of criteria for early gastric cancer: (1) white-light and chromoendoscopic criteria of Kenshi Yao [4], including a clearly defined lesion border with abnormal color and/or surface pattern; and (2) the 2020 guidelines of the Japan Gastroenterological Endoscopy Society (JGES) [6], emphasizing a clear demarcation line and abnormal microsurface and microvascular patterns.

    + Histopathological findings were compared with endoscopic diagnoses to assess concordance.

- Data collection and analysis: All data were entered and processed using SPSS version 26.0.

2.3. Ethical considerations:

The study protocol was approved by the Ethics Committee for biomedical research of the Vietnam Military Medical University (Decision No. 89/HĐĐĐ). All patients provided informed consent after being fully informed about the study objectives, potential benefits and risks. Personal information was kept confidential, and participants were free to withdraw from the study at any time without affecting their clinical care or treatment.

3. RESULTS

The mean age of the study population was 54.7 ± 12.4 years (range 29–83 years). The most common age group was patients older than 60 years, accounting for 48.0%, which is consistent with epidemiological data on gastrointestinal cancer in the elderly. Among patients with localized gastric lesions, males accounted for 67.5% (135/200) and females for 32.5% (65/200).

Table 1. Distribution of gastric lesion sites and sizes

Characteristic	Number (n = 200)	Percentage (%)
Location		
Lesser curvature	83	41.5
Antrum	57	28.5
Pylorus	38	19.0
Body	14	7.0
Cardia/fundus	8	4.0
Lesion size		
≤ 1 cm	102	51.0
1–2 cm	64	32.0
> 2 cm	34	17.0
Total	200	100.0

Among the 200 patients studied, gastric lesions were most frequently located along the lesser curvature (41.5%) and in the antrum (28.5%), together accounting for 70% of all lesion sites. Lesions in the pylorus and body represented 19.0% and 7.0%, respectively, whereas lesions in the cardia/fundus were least common (4.0%). Regarding lesion size, more than half of the lesions had a diameter ≤ 1 cm (51.0%). Lesions measuring 1–2 cm accounted for 32.0%, and those > 2 cm accounted for 17.0%.

Table 2. Characteristics of lesion demarcation line (DL)

Characteristic	Number (n = 200)	Percentage (%)
No demarcation line	102	51.0
Faint/indistinct DL	52	26.0
Clear DL	46	23.0
Total	200	100.0

Regarding the demarcation line (DL), more than half of the lesions had no clearly identifiable DL (51.0%), whereas only 23.0% had a clear DL and 26.0% showed an indistinct DL.

Table 3. Microsurface (Ms) and microvascular (Mv) patterns of gastric lesions

Characteristic	Number (n = 200)	Percentage (%)
Microsurface patterns		
Homogeneous microsurface pattern	103	51.5
Heterogeneous microsurface pattern	66	33.0
Loss of microsurface pattern	31	15.5
Microvascular patterns		
Regular and homogeneous microvasculature	97	48.5
Focally dilated and irregular vessels	74	37.0
Loss of visible microvasculature	29	14.5
Total	200	100.0

Among the 200 patients, lesions with a homogeneous microsurface pattern accounted for 51.5%, whereas complete loss of microsurface pattern was observed in 15.5%.

With respect to microvascular patterns, lesions with regular, homogeneous microvasculature were most common (48.5%), followed by lesions showing irregular or focally dilated vessels (37.0%). Lesions with loss of visible microvasculature accounted for 14.5%.

Table 4. Endoscopic findings according to the VS classification in lesions suspected of early gastric cancer

VS-based lesion pattern	Number (n = 35)	Percentage (%)
Abnormal microsurface and microvascular patterns (Ms + Mv)	25	71.4
Isolated abnormal microsurface pattern (Ms only)	6	17.1
Isolated abnormal microvascular pattern (Mv only)	4	11.4
Total	35	100.0

After white-light endoscopy in 200 patients with gastric lesions, magnifying NBI endoscopy combined with chromoendoscopy was performed. Based on the diagnostic criteria for early gastric cancer proposed by Kenshi Yao and the 2020 Japanese guidelines, 35 lesions in 35 patients were selected as suspected early gastric cancer or precancerous lesions. Among these 35 suspected early gastric cancer lesions, those with simultaneous abnormalities of both the microsurface (Ms) and microvascular (Mv) patterns were the most common, accounting for 71.4% (25/35). Lesions with isolated Ms abnormalities accounted for 17.1% (6/35), and those with isolated Mv abnormalities accounted for 11.4% (4/35).

**Table 5. Histopathological diagnoses
of the 35 suspected lesions**

Histopathological diagnosis	Number (n = 35)	Percentage (%)
Early gastric cancer	15	42.9
High-grade dysplasia	12	34.2
Low-grade dysplasia	6	17.1
Chronic inflammation	2	5.8
Total	35	100.0

Among the 35 lesions suspected of early gastric cancer that underwent biopsy, histopathology confirmed early gastric cancer in 42.9%, high-grade dysplasia in 34.2%, and low-grade dysplasia in 17.1%. Chronic inflammation was the least frequent finding, accounting for only 5.8%.

4. DISCUSSION

Analysis of lesion location in our study population showed that gastric lesions were predominantly distributed along the lesser curvature (41.5%), followed by the antrum (28.5%) and the pylorus (19.0%). Other sites such as the body (7.0%) and cardia/fundus (4.0%) were much less frequently involved. This pattern reflects the typical distribution of lesions in gastric cancer and is consistent with many international reports. The lesser curvature was the most commonly affected site (41.5%), which may be explained by its specific anatomical and physiological characteristics. The lesser curvature tends to have a relatively lower blood flow than other regions, which may favor accumulation of carcinogenic agents. In addition, it is considered a high-risk area for damage related to Helicobacter pylori (H. pylori) infection and the development of chronic inflammation, an important factor predisposing to malignant transformation [7]. The antrum (28.5%) and pylorus (19.0%) were the next most frequently involved regions. This may be related to the high density of glandular cells in these areas, which are easily stimulated and prone to chronic inflammation when exposed to H. pylori or bile reflux. Numerous studies have shown that the antrum is a common site for atrophic gastritis, intestinal metaplasia and glandular hyperplasia, all of which contribute to gastric carcinogenesis [7].

Most patients in our study had lesions measuring ≤ 2 cm, accounting for more than 80%, and lesions ≤ 1 cm were predominant (51.0%). These findings are similar to those of Chung et al., who reported that lesions < 20 mm accounted for 62.7% in early gastric cancer [7], and to Isomoto et al. (2009), who observed that among 589 EGC lesions with a mean size of 20 mm, 70.5% were < 20 mm [8]. However, the mean lesion size in our cohort was smaller than that reported by Pham The Phuong (26.4 mm) and by Prost in patients undergoing extended gastrectomy (34.39 mm). These discrepancies may be attributable to differences in patient selection criteria among studies.

The findings showed that among the 200 patients who underwent upper gastrointestinal endoscopy, lesions with a homogeneous microsurface pattern accounted for the highest proportion (51.5%), whereas complete loss of the microsurface pattern was observed in 15.5%. With respect to microvascular features, regular and homogeneous microvasculature was seen in 48.5% of lesions, while loss of visible vessels was present in 14.5%. These proportions are comparable to those reported by Yao in Japan, in which early gastric cancer lesions typically retain a preserved microsurface structure and a fine, regular network of microvessels in the initial stage [9]. However, the rates of loss of microsurface structure and microvasculature in our study were lower than in some other reports, which may be related to differences in lesion stage, endoscopic technique, or classification criteria. In a subset of precancerous gastric lesions, the microsurface and microvascular patterns may remain relatively preserved, making endoscopic recognition challenging and necessitating incorporation of additional indicators (such as a clear demarcation line or morphological asymmetry) to improve diagnostic accuracy.

Based on the diagnostic criteria for early gastric cancer proposed by Yao and the Japanese group in 2020, 35 of 200 patients (17.5%) in the present study had lesions fulfilling these criteria. Among them, 25 lesions showed combined abnormalities of both microsurface (Ms) and microvascular (Mv) patterns, 6 lesions had isolated Ms abnormalities, and 4 had isolated Mv abnormalities; 46 patients had lesions with a clearly defined demarcation line. This proportion is quite similar to the findings of Lee JW, who reported that approximately 20–25% of patients had lesions suspected of early gastric cancer that met the EGC criteria on magnifying NBI endoscopy [10]. The distribution of Ms and Mv abnormalities in our cohort underscores the complementary role of these two criteria: some lesions may exhibit abnormal microvasculature without loss of microsurface pattern, or vice versa. This supports the need to evaluate both features simultaneously during endoscopy to enhance sensitivity for detecting early gastric cancer.

After conventional white-light endoscopy in 200 patients with gastric lesions, magnifying NBI and chromoendoscopy were performed, and 35 patients were selected as having lesions suspicious for early gastric cancer or precancerous gastric lesions according to the EGC criteria of Kenshi Yao and the 2020 Japanese guidelines. Among these 35 suspected early gastric cancer cases that underwent biopsy, histopathology confirmed early gastric cancer in 42.9%, high-grade dysplasia in 34.2%, low-grade dysplasia in 17.1%, and chronic inflammation in only 5.8%.

5. CONCLUSION

In this study of 200 patients who met the inclusion criteria at 108 Military Central Hospital from January 2020 to January 2024, most gastric lesions had a diameter ≤ 1 cm (51.0%). Magnifying NBI endoscopy showed that 51%

of lesions lacked a clearly defined demarcation line, and nearly half demonstrated a homogeneous microsurface pattern with regular microvasculature. Thirty-five lesions suspected of early gastric cancer underwent biopsy; histopathology revealed early gastric cancer in 42.9%, high-grade dysplasia in 34.2%, low-grade dysplasia in 17.1%, and chronic inflammation in 5.8%. Among the 35 lesions suspected of early gastric cancer on endoscopy, 94.2% were confirmed histologically as early gastric cancer or precancerous lesions.

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