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Title:
Detection of premalignant gastric lesions using optical enhancement-guided advanced endoscopy versus Sydney protocol biopsies

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Table 2. Diagnostic accuracy for the Blue Crest sign (LBC) to detect metaplasia using magnification endoscopy and electronic chromoendoscopy

Statistic	Valor	IC95%
Sensitivity	96.1%	88.39 a 99.59%
Specificity	94.1%	87.75% a 97.83 %
Positive likelihood ratio	16.58	7.62% a 36.11
Negative likelihood ratio	0.04	0.01 a 0.14
Prevalence (gastric metaplasia)	36.4%	
Positive predictive value	90.47%	81.34% a 95.38%
Negative predictive value	97.98%	92.55% a 99.48%
Diagnostic efficacy	95.06%	95.50% a 97.84%

Table 3. Diagnostic accuracy for the White Opaque Substance (WOS) to detect metaplasia using magnification endoscopy and electronic chromoendoscopy

Statistic	Valor	IC95%
Sensitivity	52.17%	39.80 a 64.35%
Specificity	94.1%	91.72% a 99.40 %
Positive likelihood ratio	16.58	5.74% a 55.88
Negative likelihood ratio	0.04	0.38 a 0.63
Prevalence (gastric metaplasia)	36.4%	
Positive predictive value	91.11%	76.67.34% a 96.97%
Negative predictive value	78.01%	73.45% a 81.98%
Diagnostic efficacy	80.74%	74.74% a 86.34%

Our study demonstrates that biopsies guided by endoscopic imaging techniques reduce sampling error and allow for more accurate identification of extensive forms of intestinal metaplasia.

This study provides robust evidence that a targeted biopsy strategy, guided by advanced endoscopic imaging, achieves a comparative superiority over the Sydney protocol in the detection of premalignant gastric lesions, particularly within high-risk populations.

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Detection of premalignant gastric lesions using optical enhancement-guided advanced endoscopy versus Sydney protocol biopsies

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ABSTRACT:

Introduction: Early diagnosis of premalignant gastric condition, such as chronic atrophic gastritis and intestinal metaplasia, allow us to assess and stratify the risk of gastric cancer. Gastric mucosal cleaning, mucosal exploration, photo-documentation, and advanced technologies like optical enhancement, electron chromoendoscopy and magnification endoscopy improve lesion detection rates.

Objective: This study compares the detection rate of premalignant gastric lesions between biopsies guided Electron chromoendoscopy combined with optical enhancement and magnification endoscopy versus random biopsies (Sydney Protocol) with optical enhancement.

Methods: This is a prospective, observational, blinded comparative study. Outpatients were divided into two groups: group 1 (162 patients), biopsies were performed either under Electron chromoendoscopy combined magnification endoscopy guidance; and group 2 (160 patients), biopsies were performed under blinded mapping (updated Sydney system) with optical enhancement. The following clinical outcomes were assessed in each group: age, gender, adequate gastric clearance rate, gastric atrophy rate, intestinal metaplasia rate.

Results: A total of 322 patients were randomized, where 76 were excluded from the study. Detection rate for Intestinal metaplasia was significantly higher with Electron chromoendoscopy combined with optical enhancement and magnification endoscopy (37.6% versus 23.7%; $p < 0.0001$). Extensive Intestinal metaplasia was significantly more prevalent with Electron chromoendoscopy combined magnification endoscopy compared to mapping with optical enhancement ($p = 0.029$; $p = 0.048$, respectively).

Conclusion: Electron chromoendoscopy combined with optical enhancement and magnification endoscopy demonstrated a comparative superiority over Sydney System random biopsy protocol in the identification of patients with premalignant gastric

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conditions. By enabling more precise endoscopic targeting, directed biopsies help reduce sampling error; however, in high-risk populations, a complementary approach integrating both targeted and systematic random biopsies remains advisable to optimize diagnostic accuracy.

Keywords: Stomach neoplasms. Metaplasia. Gastritis atrophic.

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Abbreviations list:

CAG: Chronic atrophic gastritis

IM: Intestinal metaplasia

GC: Gastric cancer

OE: Optical enhancement

ECE: Electron chromoendoscopy

ME: Magnification endoscopy

OLGA: Operative Link on Gastritis Assessment

OLGIM: Operative Link on Gastric Intestinal Metaplasia Assessment

EGD: Esophagogastroduodenoscopy

IEE: Image-enhanced endoscopy

SACE: Systematic Alphanumeric Coded Endoscopy

LBC: Light Blue Crest

WOS: White Opaque Substance

EGGIM: Endoscopic Grading of Gastric Intestinal Metaplasia

EAG: Endoscopic atrophic gastritis

BE: Barrett's esophagus

GERD: Gastroesophageal reflux disease

Inclusion and diversity statement: We support inclusive, diverse and equitable research.

Conflict of interest: The authors declare no conflict of interest.

Declaration of data availability: Data supporting the study findings are available from the corresponding author upon request.

Artificial intelligence: This study does not include topics related to artificial intelligence, nor were any artificial intelligence tools used in its preparation.

INTRODUCTION

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Chronic atrophic gastritis (CAG) and intestinal metaplasia (IM) are key precursors in the gastric carcinogenesis cascade, with reported prevalences ranging from 12.2% to 22.0% and 17.6% to 36.8%, respectively (1). The risk of gastric cancer (GC) increases progressively with the severity of CAG, from 0.04–0.10% in mild disease to 0.31–1.60% in severe stages (2). IM itself shows a prevalence of 3.4–29.6% and an estimated annual progression rate to GC of approximately 0.25% (3)(4).

The Operative Link on Gastritis Assessment (OLGA) and Operative Link on Gastric Intestinal Metaplasia Assessment (OLGIM) systems provide standardized histopathological frameworks for risk stratification based on the severity and topographic extent of gastric atrophy and IM. Advanced stages (OLGA/OLGIM III–IV) are consistently associated with an increased risk of dysplasia and gastric adenocarcinoma, prompting international guidelines to recommend surveillance esophagogastroduodenoscopy (EGD) at three-year intervals in these high-risk patients (5-10).

EGD remains the gold standard for the detection and surveillance of premalignant gastric lesions and GC; however, omission rates of up to 11.3% have been reported (11-15). Diagnostic yield can be improved through high-definition white-light endoscopy, adequate mucosal preparation, prolonged inspection times, image-enhanced endoscopy (IEE), systematic photo-documentation, and adherence to standardized biopsy protocols. Recognition of specific endoscopic patterns, combined with chromoendoscopy-guided targeted biopsies and structured documentation using the Systematic Alphanumeric Coded Endoscopy (SACE) system, further enhances diagnostic reliability (16-21).

The aim of this study was to perform a blinded, controlled comparison of two biopsy strategies targeted biopsies guided by electronic chromoendoscopy (ECE), optical enhancement (OE), and magnifying endoscopy (ME) versus random mapping biopsies following the Sydney protocol under optical enhancement for the detection of premalignant gastric lesions.

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MATERIAL AND METHODS:

Patients and Study design

This was a prospective, observational, blinded comparative study. Data were extracted from a prospectively generated database, including consecutive outpatients who underwent screening gastroscopy between March and July 2025 for early neoplasia detection. Eligible participants were of both sexes aged ≥40 years, asymptomatic or presenting with dyspepsia and/or gastroesophageal reflux disease (GERD), referred for upper digestive endoscopy.

Exclusion criteria included alarm symptoms, recent gastrointestinal bleeding, significant cardiovascular, pulmonary, endocrine, renal, hematologic, or hepatic disease; any malignancy; severe psychiatric or neurological disorders; esophageal strictures, varices, achalasia, or gastroparesis; prior upper gastrointestinal surgery (except cholecystectomy); coagulation disorders; hypersensitivity to simethicone or N-acetylcysteine; substance abuse; pregnancy or breastfeeding; and inability to provide informed consent.

Patients were divided into two groups: Group 1: Targeted biopsies guided by electronic chromoendoscopy OE modes and magnifying endoscopy (n = 162). Group 2: Random mapping biopsies following the Sydney protocol using OE without magnification (n = 160).

Endoscopic Examination and Procedure

All examinations were performed using high-definition magnifying endoscopes (EG-2990Zi; Pentax) with an EPK-i8020c processor. Intravenous propofol sedation was administered by an anesthesiologist with continuous monitoring. Optical enhancement enhances mucosal and vascular contrast using hemoglobin absorption wavelengths (415, 540, and 615 nm), facilitating lesion detection, characterization, and demarcation. All endoscopists had >10 years of experience with image-enhanced endoscopy.

Patients fasted for ≥ 8 hours and received premedication with N-acetylcysteine (600 mg) and simethicone (200 mg) 20 minutes before EGD. High-definition white-light inspection was followed by systematic photo-documentation according to the SACE protocol (8). Image-enhanced endoscopy was applied to predefined sites in the antrum, incisura angularis, and gastric body. Total inspection time was 8–10 minutes, and 21 standardized gastric images were obtained per patient.

Targeted biopsies were performed in Group 1, whereas systematic mapping biopsies were obtained in Group 2. Additional biopsies were taken from any suspicious mucosal abnormalities. All procedures were performed by two expert endoscopists, each with >2,000 examinations per modality.

Endoscopic Definitions

Endoscopic atrophic gastritis was classified according to the Kimura–Takemoto system. Intestinal metaplasia was identified by characteristic endoscopic features, including whitish plaques, villous or rough mucosal patterns, and the Light Blue Crest (LBC) sign. Enlarged folds, nodularity, and diffuse redness were defined using established criteria and incorporated into the Kyoto classification score.

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Histopathological Assessment

Five biopsies were obtained per patient from the antrum, incisura angularis, and body. Specimens were fixed in formalin, paraffin-embedded, and stained with hematoxylin–eosin and Giemsa; Alcian Blue and PAS staining were added when IM was suspected. Histological assessment followed the updated Sydney system, with staging performed using OLGA and OLGIM classifications (4-6).

IM was defined by the presence of goblet and absorptive cells. Two expert gastrointestinal pathologists, blinded to endoscopic findings, independently reviewed all samples. Histological IM served as the reference standard for diagnostic accuracy analysis.

Ethical Considerations

The study was conducted in accordance with the Declaration of Helsinki. This study was limited to the analysis and description of the statistical calculations of two research arms comparing two taking biopsies strategies: targeted biopsies guided by chromoendoscopy, optical enhancement and magnifying endoscopy versus random mapping biopsies following the Sydney protocol under optical enhancement for the detection of premalignant gastric lesions, with the informed consent of all enrolled patients. This study was approved by the ethics committees of all participating centers. Clinical trial registration number: 2777 (March 2025).

Statistical Analysis

Descriptive statistics were used for demographic and clinical variables. Group comparisons were performed using Student's T test or Pearson's chi-square test, as appropriate.

Diagnostic performance metrics: sensitivity, specificity, Positive predictive value (PPV), Negative predictive value (NPV), likelihood ratios, and accuracy were calculated. Interobserver agreement was assessed using kappa statistics and Cronbach's alpha. A two-sided *p* value < 0.05 was considered statistically significant. Analyses were performed using SPSS v 22.0.

Sample size estimation was based on prior data indicating IM detection rates of 25% with random biopsies and 50% with targeted biopsies. Assuming 80% power and a 5% significance level, a minimum of 75 patients per group was required.

RESULTS:

A total of 322 patients were included (50.3% male; mean age 59.2 ± 12 years; BMI 26.4 ± 4.1 kg/m²). Among them, 9.2% were asymptomatic, 47.6% presented dyspeptic symptoms, and 43.2% had persistent gastroesophageal reflux symptoms (33% of these also had dyspepsia) (Figure 1). Statistically significant differences were observed in age (P < 0.001) and H. pylori infection (P = 0.0001) between patients with and without intestinal metaplasia (IM). Clinical characteristics are summarized in Table 1.

Adequate mucosal visibility (>90%) was achieved in all 21 gastric areas assessed. The greatest accumulation of mucus was observed on the greater curvature of the body (A18), and on the anterior (M15) and posterior (M17) walls of the middle third of the body. Foam was most abundant in the middle (Lc24) and lower thirds (Lc25) of the lesser curvature, and at the angularis (Lc26). Premedication and procedural tolerability were rated as satisfactory in 100% of cases, and no adverse events were reported.

Among 162 patients, 15 cases (9.25%) presented glandular crypt and/or hyperplastic polyps, two ectopic pancreas, and two xanthomas (Figure 2B). Eight patients had sessile polyps (5–10 mm) that were resected and reported as tubular adenomas without dysplasia on histology (Figure 2D). Superficial chronic gastritis was the most prevalent histological finding, followed by chemical gastritis. Helicobacter pylori infection was identified in 46 of 322 cases (14.2%).

Endoscopic atrophic gastritis (EAG) was observed in 96 patients, and histologically confirmed in 80 (83.3%): 50 cases in the antrum, 20 in the corpus, and 10 in both. Only four cases (5%) were classified as stage II. There were no significant differences between EAG detection rates by endoscopy and histology (p = 0.3). Endoscopic findings included diffuse erythema (9.3%), nodularity (4.6%), and enlarged folds (3.1%).

The overall prevalence of intestinal metaplasia (IM) in this study was 30.4% (98/322). It was significantly higher by using ECE, OE and ME compared to standard mapping protocol (Sydney system) with OE (37.6% vs. 23.7%, p = 0.006). (Table 1) The incomplete subtype of IM was predominant, observed in 85.8% (85/99) of cases, and was multifocal in 12%. There were no statistically significant differences between males and females regarding age (65.81 ± 1.9 vs. 63.1 ± 12.6 years, p = 0.19) or BMI (26.6 ± 4.4 vs. 26.2 ± 4.2 kg/m^2, p = 0.3). One patient was found to have low-grade dysplasia in the antrum, while no cases of high-grade dysplasia were identified.

The endoscopic Light Blue Crest sign demonstrated high sensitivity (96.1%), whereas the White Opaque Substance showed high specificity (94.1%) for the detection of antral IM, with or without extension to the corpus (Tables 2 and 3). (Figures 2A, 2C, 2E) IM was localized to the antrum in 97 out of 99 patients (97.0%), with 20 cases (20.2%) exhibiting proximal extension to the gastric body. Patients were stratified according to the OLGIM system as follows: OLGIM I: 95 patients (95.9%), II: 3 patients (3%), III: 1 patient (1%), and IV: none.

In our study, one patient was diagnosed with early gastric cancer (0.31%). (Figure 2F). Endoscopic findings of superficial slightly elevated with central depression (0-IIa+c) type early gastric cancer located in gastric body (lower third, posterior wall).

There was a highly significant association between Helicobacter pylori infection and the presence of IM (p < 0.00001). Interobserver agreement among endoscopists was very good, with a kappa coefficient > 0.8 and a Cronbach's alpha > 0.8, indicating strong diagnostic consistency.

DISCUSSION:

This study demonstrates that chromoendoscopy-enhanced imaging combined with optical enhancement and magnification significantly improves the detection of gastric cancer and intestinal metaplasia compared with random mapping biopsies performed according to the Sydney protocol under optical enhancement alone (37.6% vs. 23.7%).

Esophagogastroduodenoscopy remains the gold standard for the detection and surveillance of premalignant gastric lesions and early gastric cancer (7-9). However, omission rates of up to 11.3% have been reported within three years prior to diagnosis (9). Accurate recognition of subtle mucosal abnormalities, particularly early-stage gastric cancer, remains challenging even for experienced endoscopists. Diagnostic decision-making inherently involves the risk of false-negative and false-positive outcomes, with missed lesions directly impacting gastric cancer–related mortality (7-9).

In Western training programs, endoscopic education traditionally emphasizes the diagnosis of advanced pathologies such as overt cancer, esophagitis, and peptic ulcer disease. Consequently, early or superficial lesions may be overlooked due to limited pattern recognition, sampling errors associated with random biopsies, histological misinterpretation, or inadequate surveillance strategies. The endoscopic diagnostic process requires accurate lesion detection, differentiation, and assessment of size and depth, and failure at any stage may result in missed diagnoses (10-14). Structured training, optimized luminal visualization, and systematic photo-documentation have been shown to enhance diagnostic performance (15-18).

Uedo et al. (19) first described the Light Blue Crest (LBC) sign using narrow-band imaging with magnification as a reliable marker of IM. Subsequent studies have confirmed the high sensitivity of LBC and the high specificity of the White Opaque Substance (WOS) for IM detection. Intestinal metaplasia represents a critical step in gastric carcinogenesis and may constitute a biological point of no return. Accordingly, *Helicobacter pylori* eradication appears most effective before the development of IM. The relatively low prevalence of *Helicobacter pylori* infection observed in this cohort, compared with reported rates in Latin America, may reflect socioeconomic characteristics of the study population (20-22).

The Endoscopic Grading of Gastric Intestinal Metaplasia (EGGIM) system has emerged as a robust tool for real-time risk stratification, demonstrating high concordance with the OLGIM histological classification. Multiple studies have reported sensitivities and specificities exceeding 90%, with meta-analytic data showing an area under the curve approaching 0.97 for identifying high-risk OLGIM stages. High EGGIM scores have been associated with a 7- to 21-fold increased risk of gastric cancer, surpassing traditional OLGA/OLGIM prognostic performance (23-27). International guidelines increasingly recognize EGGIM as a valid alternative to systematic biopsies, enabling accurate risk assessment while reducing procedural invasiveness and cost (23,28-30).

Although advanced image-enhanced endoscopy techniques significantly improve the endoscopic detection and characterization of premalignant gastric lesions, these modalities are not intended to replace conventional histopathological assessment. Histology remains the reference standard for definitive diagnosis. The primary role of advanced endoscopic imaging is to optimize biopsy targeting, enhance lesion delineation and reduce sampling error, thereby increasing diagnostic yield and efficiency. When used as a complementary tool, image-enhanced endoscopy facilitates a more accurate and focused histological evaluation, rather than serving as a substitute for tissue-based diagnosis (31)(32). Likewise is important to highlight these new strategies should not be interpreted as a categorical replacement for conventional histological mapping protocols. Traditional standard protocols, such as the Sydney system, remain a fundamental cornerstone for the systematic assessment of the gastric mucosa. In this context, advanced endoscopic techniques should be regarded as complementary tools that enhance targeted detection and risk stratification, integrating synergistically rather than substitutively with established biopsy sampling schemes (33)(34).

Our study had some limitations. All procedures were conducted by highly experienced endoscopists within structured, high-volume endoscopic units, which may restrict the generalizability of the findings to endoscopic centers without comparable expertise or infrastructure, so the observed diagnostic performance may be influenced by operator experience and training. In addition, although the sample size may be considered relatively small when compared with large Asian and European studies, to the best of our knowledge, it represents, one of the largest Western cohorts to date directly comparing targeted biopsy strategies guided by image-enhanced endoscopy with the Sydney System protocol. The reproducibility of these results in routine clinical practice will likely depend on the implementation of structured training programs and standardized protocols, including Systematic Alphanumeric Coded Endoscopy system and validated pattern-recognition frameworks.

In conclusion, image-enhanced endoscopy–guided targeted biopsy strategies demonstrate a comparative superiority over the Sydney System random biopsy protocol for the detection of premalignant gastric conditions, including intestinal metaplasia, gastric atrophy, and dysplasia. By enabling a more precise identification of areas at risk, this approach improves diagnostic yield and represents a meaningful advancement in the endoscopic surveillance of patients at increased risk of gastric cancer. However, these findings were obtained in expert hands and within structured, high-quality endoscopic settings, which may limit their external validity and generalizability to broader clinical practice. Importantly, despite the diagnostic advantages conferred by advanced image-enhanced endoscopy, histopathological assessment remains indispensable and continues to constitute the diagnostic gold standard. Accordingly, these techniques should be regarded as complementary tools designed to optimize and refine biopsy targeting, rather than as definitive substitutes for established histological sampling protocols such as the Sydney System.

Summary Box

What is already known	**What the new findings are**
• Upper digestive endoscopy with enhanced imaging techniques (HD-WLE, virtual chromoendoscopy, endoscopic magnification) improves the detection of chronic atrophic gastritis and intestinal metaplasia compared to conventional endoscopy. • The Sydney systematic biopsy protocol remains the recommended standard for mapping preneoplastic lesions and stratifying histological risk (OLGA/OLGIM).	• The combination of electronic chromoendoscopy (ECE) + optical enhancement (OE) + endoscopic magnification detected significantly more cases of intestinal metaplasia than random Sydney mapping with OE (37.6% vs. 23.7%; $p < 0.001$). • Our study demonstrates that biopsies guided by endoscopic imaging techniques reduce sampling error and allow for more accurate identification of extensive forms of intestinal metaplasia.

• Classic endoscopic signs (Light Blue Crest and White Opaque Substance) have demonstrated high sensitivity and specificity for detecting intestinal metaplasia, validated in multiple Asian and Western cohorts.	• This study provides robust evidence that a targeted biopsy strategy, guided by advanced endoscopic imaging, achieves a comparative superiority in the detection of premalignant gastric lesions, particularly within high-risk populations. While this approach enhances diagnostic yield and optimizes endoscopic surveillance when compared with the Sydney protocol, it should be regarded as a complementary strategy aimed at refining biopsy targeting rather than as a definitive replacement for established histological sampling protocols. • Despite the diagnostic benefits provided by advanced image-enhanced endoscopy, histopathological evaluation remains essential and continues to represent the reference standard for definitive diagnosis. These endoscopic modalities are intended to optimize and target biopsy acquisition, thereby reducing sampling error and improving diagnostic yield, rather than serving as a substitute for conventional histological analysis.

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Table 1. Demographic characteristics of participants

	Endoscopic groups Patients total = 322					
	Group 1			Group 2		
	ECE + OE + ME			Sydney protocol using OE without ME		
Variables	n=162			n=160		
	Present n=61	Absent n=101	p	Present n=38	Absent n=122	p

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	(37.6%)	(62.4%)		(23.7%)	(66.3%)	
Age (years old) X̄ (DE)	64.5±12.7	56.3±11.3	< . 0001	62.3 ± 11.1	55.6±12.0	<.0001
Gender (M/F)	37/24	45/56	0.04	24/14	56/66	0.04
Smoking > 20 / day n (%)	7 (11.5%)	6 (5.9%)	0.3	9 (10.5%)	7 (5.3%)	0.3
Alcoholic consumption n (%)	6 (9.8%)	5 (4.9%)	0.3	5 (13.1%)	5 (4.1%)	0.3
Dispepsia n (%)	25 (41.0%)	52 (51.5%)	< .00001	15 (39.5%)	61 (50.0%)	< .00001
GERD n (%)	26 (42.6%)	44 (43.5%)	.03	18 (47.0%)	50 (40.9%)	< .00001
Asymptomatic n (%)	10 (16.4%)	7 (6.9%)	<.0001	5 (14.5%)	7 (5.7%)	.03

*ECE: Electronic chromoendoscopy, †OE: Optical Enhancement, ‡EM: Endoscopy magnification, §X̄: Mean, ||SD: Standard deviation, fjEGD: Esophagogastroduodenoscopy, **GERD: Gastroesophageal reflux disease.

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Statistic	Valor	IC95%
Sensitivity	96.1%	88.39 a 99.59%
Specificity	94.1%	87.75% a 97.83 %
Positive likelihood ratio	16.58	7.62% a 36.11
Negative likelihood ratio	0.04	0.01 a 0.14
Prevalence (gastric metaplasia)	36.4%	
Positive predictive value	90.47%	81.34% a 95.38%
Negative predictive value	97.98%	92.55% a 99.48%
Diagnostic efficacy	95.06%	95.50% a 97.84%

Table 2. Diagnostic accuracy for the Blue Crest sign (LBC) to detect metaplasia using magnification endoscopy and electronic chromoendoscopy

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Table 3. Diagnostic accuracy for the White Opaque Substance (WOS) to detect metaplasia using magnification endoscopy and electronic chromoendoscopy

Statistic	Valor	IC95%
Sensitivity	52.17%	39.80 a 64.35%
Specificity	94.1%	91.72% a 99.40 %
Positive likelihood ratio	16.58	5.74% a 55.88
Negative likelihood ratio	0.04	0.38 a 0.63
Prevalence (gastric metaplasia)	36.4%	
Positive predictive value	91.11%	76.67.34% a 96.97%
Negative predictive value	78.01%	73.45% a 81.98%
Diagnostic efficacy	80.74%	74.74% a 86.34%

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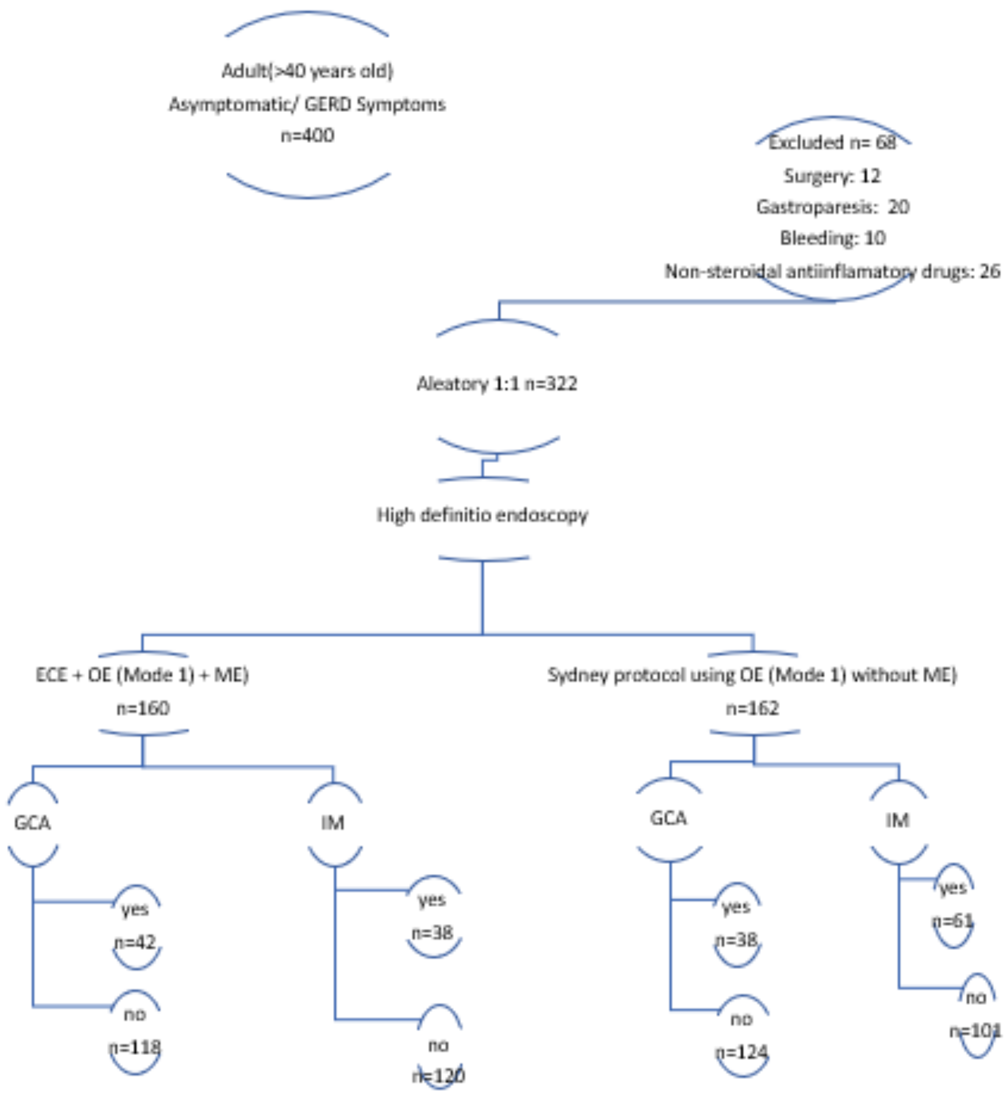

ECE: Electron Chromoendoscopy, OE: Optical enhancement, ME: Magnification endoscopy, IM: Intestinal metaplasia, CAG: Chronic atrophic gastritis, WLE: white-light endoscopy, GERD: Gastroesophageal reflux disease.

Figure 1. Study design

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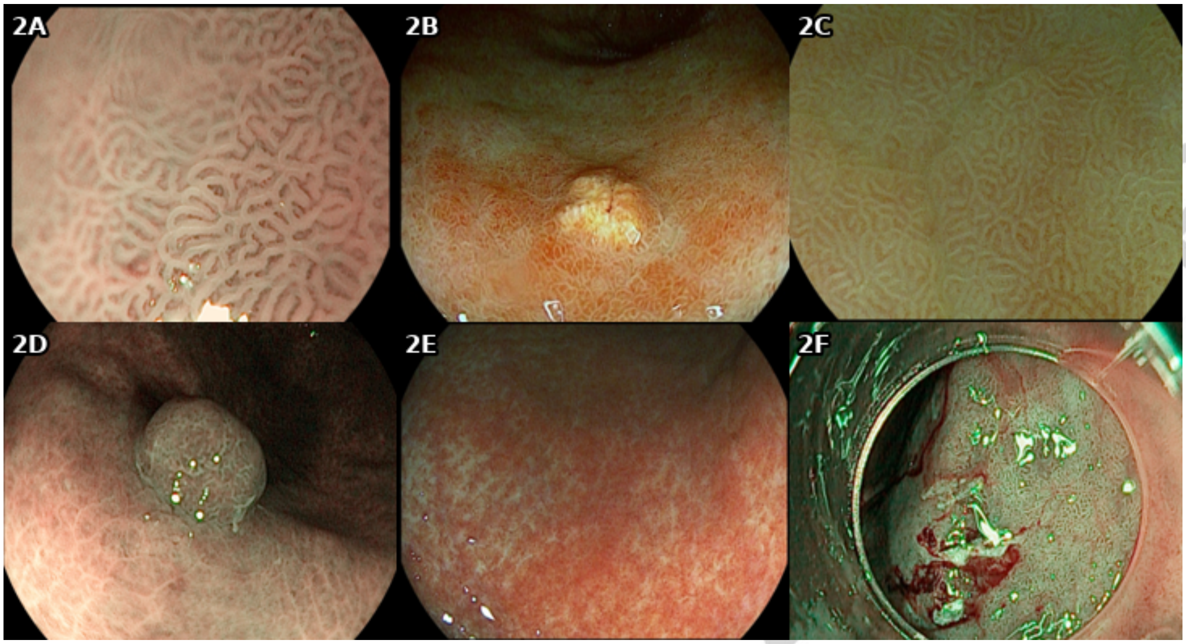

Figure 2A. Endoscopic images of Light blue crest sign using magnification endoscopy and optical enhancement. **B.** Endoscopic images of superficial gastric lesions (xantoma) using electronic chromoscopy. **C.** Endoscopic images of Light blue crest sign using electron chromoendoscopy and magnification endoscopy. **D.** Endoscopic images of superficial gastric lesions (sessile polyps) using optical enhencement. **E.** Endoscopic images of intestinal metaplasia (Optical enhencement and iScan 2) without magnification endoscopy. **F.** Endoscopic findings of superficial slightly elevated with central depression (0-IIa+c) type early gastric cancer located in gastric body (lower third, posterior wall).