

## Comparison between the accuracy of conventional white light endoscopy, magnifying narrow band imaging endoscopy and histopathological findings in the diagnosis of gastroesophageal reflux disease

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**Abstract: Introduction:** Gastroesophageal reflux disease (GERD) is caused by the reflux of gastric contents into the esophagus. The diagnosis of GERD is based on the combination of clinical symptoms, endoscopic findings and histological changes. **Aim:** To compare the accuracy of narrow band imaging (NBI) endoscopy in diagnosing GERD with conventional white light (CWL) endoscopy and histopathology. **Subject and methods:** In the present study 150 patients suffering from symptoms suggestive of GERD underwent CWL endoscopy and NBI endoscopy, followed by multiple endoscopic biopsies. Biopsies were taken 2 cm above the esophagogastric junction and then transferred to the pathologist for histopathological evaluation. **Results:** The CWL endoscopy showed non erosive reflux disease (NERD) in 99 patients (66%), erosive reflux disease (ERD) in 46 patients (30.7%) and 5 patients (3.3%) were diagnosed as Barrett's esophagus (BE). While NBI showed NERD in 81 patients (54%), ERD in 61 patients (40.6%) and 8 patients (5.4%) were diagnosed as BE. Regarding histopathology 30 patients (20%) were diagnosed as normal appearing mucosa, 102 patients (68%) were diagnosed as erosive esophagitis, 11 patients (7.3%) patients were diagnosed as BE and 7 (4.7 %) were other diagnosis. Among Patients diagnosed as erosive esophagitis by histopathological examination (n=102). The CWL endoscopy showed that 69 (67.5%) patients had NERD, 14 (13.8%) had GERD grade A, 11 (10.9 %) had GERD grade B, 6 (5.9%) had GERD grade C and 2 (1.9%) had GERD grade D. On the other hand NBI endoscopy showed that 48 patients (47.5%) had NERD, 53 (51.7%) had ERD and 1 (0.8%) had BE. By The NBI endoscopy, 67 (44.7%) patients had increased number, 50 (33.4%) had dilated and 66 (44%) had Tortuous intra papillary capillary loops (IPCL). In patients diagnosed as erosive esophagitis by histopathology (n=102) the NBI endoscopy showed that 60 (58.8%) patients had increased number, 35 (34.3%) had dilated and 58 (56.9%) had Tortuous (IPCL). There was a statistically highly significant difference between finding of CWL endoscopy and NBI endoscopy in patients diagnosed as erosive esophagitis by histopathological examination ( $P < 0.01$ ). On the other hand there was no statistically significant difference between them in patients diagnosed as Barrett's esophagus by histopathological examination ( $P > 0.05$ ). **Conclusion and recommendations:** The NBI endoscopy may increase the diagnostic accuracy of GERD and Barrett's esophagus but histopathology will remain the gold standard for diagnosis. [Sherif monier Mohamed, Ragaa Ahmed Salem, Mostafa Hamed Abd Elaleem, Reda Saied. **Comparison between the accuracy of conventional white light endoscopy, magnifying narrow band imaging endoscopy and histopathological findings in the diagnosis of gastroesophageal reflux disease.** *Life Sci J* 2014;11(6):604-611] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 93

**Key words:** Narrow band imaging (NBI) endoscopy; Gastroesophageal reflux disease (GERD); Barrett's esophagus (BE).

### 1. Introduction

Gastroesophageal reflux disease (GERD) is one of the most frequent benign disorders of the upper gastrointestinal tract caused by the reflux of gastric contents into the esophagus either with or without complications.<sup>[1,2]</sup> It represents one major cause of development of Barrett's esophagus and eventually carcinoma.<sup>[3]</sup>

The ability to visualize mucosal surface abnormality of the gastrointestinal tract is essential to enhance early detection and make accurate diagnosis of the underlying disease. Upper gastrointestinal endoscopy is the standard diagnostic tool for evaluation and grading of esophagitis and excluding

other esophageal diseases.<sup>[4]</sup> However the sensitivity of endoscopy for the diagnosis of GERD is poor.<sup>[5,6]</sup>

Narrow band imaging (NBI) is a high-resolution endoscopic technique that enhances the fine structure of the mucosal surface without the use of dyes. NBI is based upon the phenomenon that the depth of light penetration depends on its wavelength; the longer the wavelength, the deeper the penetration. Blue light penetrates only superficially, whereas red light penetrates into deeper layers.<sup>[7-9]</sup>

In the esophagus, the only reliable index for characterizing the magnification endoscopy findings is not the microsurface structure but the microvascular architecture alone, because a crypt opening (e.g., a pit)

cannot be visualized even by magnification endoscopy. Because the capillaries are located within the papilla and just under the epithelium in the normal stratified squamous epithelium, the minimal unit of microvascular architecture is described as intrapapillary capillary loops(ICPL).<sup>[10,11]</sup>

### Aim of The Work

To compare the accuracy of narrow band imaging (NBI) endoscopy in diagnosing gastroesophageal reflux disease with conventional white light (CWL) endoscopy and histopathological examination

## 2. Materials and Methods

This study was done at the endoscopy unit of Ain Shams University Hospital and El Zaitoun Specialized Hospital during the period from January 2010 till December 2013 on 150 patients suffering from symptoms suggestive of GERD.

The patients had first given a written informed consent for study participation. Then, full history and full clinical examination was done to all patients, followed by endoscopic examination using the CWL endoscopy followed by magnifying NBI endoscopy in order to determine the pit pattern and vascular patterns of the mucosa. Biopsies were taken from the distal end of the esophagus for histopathological examinations. The endoscopy used was PENTAX EPK-I. I-scan uses post-image acquisition software with real time mapping technology embedded in the endoscopic processor. The computer controlled digital processing provides resolution of 1.25 megapixels per image, which allows for analysis and modification of the per pixel luminosity data. It does so by using various combinations of three software algorithms: surface enhancement (SE), contrast enhancement (CE), and tone enhancement (TE). Surface enhancement improves light/dark contrast, making dark areas appear darker and light areas appear lighter to better delineate edges and lesion borders. Contrast enhancement slightly suppresses red and green wavelength components of the white light image, while adding a minute blue hue to darker or more depressed areas of mucosa to allow for detailed observation of subtle mucosal irregularities. Tone enhancement analyzes all three components (red, blue, and green) of the white light image, and then dissects out and suppresses most of the dominant red, creating an image with an elevated blue/green contrast for detecting more subtle mucosal abnormalities. I-scan incorporates these three software algorithms into three distinct modes for the endoscopist: I-scan mode 1, I-scan mode 2, and I-scan mode 3. Each mode can be accessed or changed by a one button press on the endoscope. I-scan 1, designed as a surveillance mode uses SE and CE to provide more detailed topography of the mucosal surface and

delineation of lesion edges without altering color. I-scan 2 and 3 also use SE and CE, but adds in TE to dissect out the dominant red and leave an elevated blue/green contrast (I-scan 2 darker contrast compared to I scan 3).Tone enhancement enhances vessel structures and minute mucosal structures to further pronounce margins of identified lesions.

Multiple biopsies were taken 2 cm above the esophagogastric junction with biopsy forceps. The biopsies were then transferred to the pathologist in 10% formalin. The specimens were visually oriented with slight magnification during embedding in the paraffin wax blocks before hardening to ensure vertical cutting. They were cut and finally stained with haematoxylin and eosin. Histopathological examination was done by expert pathologist who was blinded to the endoscopic findings. The pathological diagnosis was regarded as the gold standard and was used to assess accuracy of endoscopic diagnosis. Cases were divided into normal appearing mucosa, erosive esophagitis and Barrett's esophagus according to histopathology. The accuracy of the NBI endoscopy was compared to CWL endoscopy and histopathological finding.

### Statistical analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS version 18). Numerical variables were described as mean  $\pm$ SD. Categorical variables were described as percentages. Categorical variables were compared using Chi-square test. A *p* value < 0.05 was accepted as statistically significant.

## 3. Results

This study included 150 patients [91 males (60.6%) and 59 (39.4%) females] with mean age of 37.1 $\pm$ 12.5 years.

Table (1) showed descriptive analysis of the main complaint of the patients. Forty patients (26.6%) presented with regurgitation, 39 patients (26%) presented with heartburn, 59 patients (39.3%) presented with regurgitation and heart burn and 12 patients (8.1 %) presented with other symptoms as epigastric pain, odynophagia, dysphagia and hematemesis.

Table (2) showed risk factors for gastroesophageal reflux disease. Sixty seven patients (44.7%) were NSAID abusers, 46 Patients (30.7%) were smokers, 24 Patients (16%) were diabetics, 11patients (7.3%) were ischemic and 41 patients (26.7 %) had hiatus hernia in endoscopy.

Table (3) showed descriptive analysis of the patient's findings by CWL endoscopy. Ninety nine patients (66%) had NERD, 46 patients (30.7%) had ERD and 5 patients (3.3%) had BE.

Table (4) showed descriptive analysis of the patient's findings by NBI endoscopy. Eighty one patients

(54%) had NERD, 61 patients (40.7%) had ERD and 8 patients (5.3%) had BE.

Table (5) showed descriptive analysis of the patient's findings by histopathology. Thirty patients (20%) had normal histopathology, 102 patients (68%) had erosive esophagitis, 11 patients (7.3%) had BE and 7 patients (4.7%) had other diagnosis (e.g. gastric mucosa). (Figure1)

Figure (2) showed descriptive analysis of different findings by CWL endoscopy according to Los Angeles classification. Ninety nine patients (66%) had NERD, 20 (13.3%) had GERD grade A, 15 (10 %) had GERD grade B, 9 (6%) had GERD grade C, 2 (1.4%) had GERD grade D and 5 (3.3%) had BE.

Figure (3) showed descriptive analysis of the findings by CWL endoscopy in patients diagnosed as erosive esophagitis by histopathological examination (n=102). Sixty nine (67.5%) patients had NERD, 14 (13.8%) had GERD grade A, 11 (10.9 %) had GERD grade B, 6 (5.9%) had GERD grade C and 2 (1.9%) had GERD grade D.

Figure (4) showed descriptive analysis of the findings by NBI endoscopy in patients diagnosed as erosive esophagitis by histopathological examination (n=102). Forty eight patients (47.5%) had NERD, 53 (51.7%) had ERD and 1 (0.8%) had BE.

Table (6) showed descriptive analysis of the finding by NBI endoscopy. Sixty seven (44.7%) patients had increased number, 50 (33.4%) had dilated and 66 (44%) had tortuous IPCL.

Table (7): showed findings of NBI endoscopy in patients with erosive esophagitis by histopathology (n =102). Sixty (58.8%) patients had increased number, 35 (34.3%) had dilated and 58 (56.9%) had tortuous IPCL.

Table (8) showed relation between CWL endoscopy and NBI endoscopy in patients diagnosed as normal appearing mucosa by histopathological examination (n=30). Chi-Square with *P* value was >0.05 which is statistically non significant.

Table (9) showed relation between CWL endoscopy and NBI endoscopy in patients diagnosed as reflux oesphagitis by histopathological examination (n=102). Chi-Square with *P* value was <0.01 which was statistically highly significant.

Table (10) showed relation between CWL endoscopy and NBI endoscopy in patients diagnosed as BE by histopathological examination (n=11). Chi-Square with *P* value >0.05 which was not statistically significant.

Figure (5): Picture showing NERD by CWL endoscopy and the same patient was shown to have

increased number with tortuous and dilated IPCL (ERD) by NBI endoscopy.

**Table (1): Descriptive analysis of the main complaint of the patients.**

Complaint	Number (%)
Regurgitation	40 (26.6%)
Heartburn	39 (26%)
Regurgitation and heart burn	59 (39.3%)
Others (Epigastric pain,odynophagia, dysphagia and hematemesis)	12 (8.1%)

**Table (2): Risk Factors for gastroesophageal reflux**

Risk factors	Number (%)
NSAIDs intake	67 (44.7%)
Smoking	46 (30.7%)
Diabetic	24 (16%)
Ischemic heart disease (IHD)	11 (7.3%)
Hiatus hernia (H.H.)	41 (26.7 %)

**Table (3): Descriptive analysis of the patient's findings by CWL endoscopy.**

Endoscopic finding by CWL endoscopy	Number (%)
Non erosive reflux disease (NERD)	99 (66%)
Erosive reflux disease (ERD)	46 (30.7%)
Barrett's esophagus(BE)	5 (3.3%)

**Table (4): Descriptive analysis of patient's findings by NBI endoscopy.**

Endoscopic finding NBI endoscopy	Number (%)
Non erosive reflux disease (NERD)	81 (54%)
Erosive reflux disease (ERD)	61 (40.7%)
Barrett's esophagus (BE)	8 (5.3%)

**Table (5): Descriptive analysis of the patient's finding by histopathology.**

Histopathological Finding	Number (%)
Normal appearing mucosa	30 (20%)
Erosive reflux esophagitis	102 (68%)
Barrett's esophagus (BE)	11 (7.3%)
Other diagnosis (gastric mucosa)	7 (4.7%)

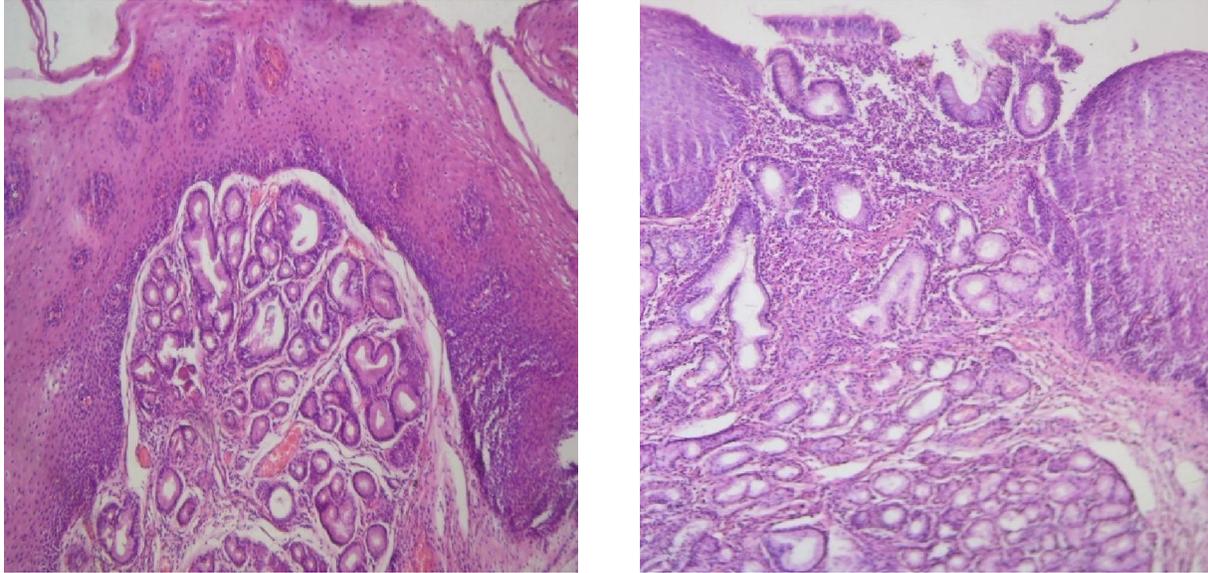


Figure (1): A) Reflux esophagitis (left), Barrett's esophagus (right)

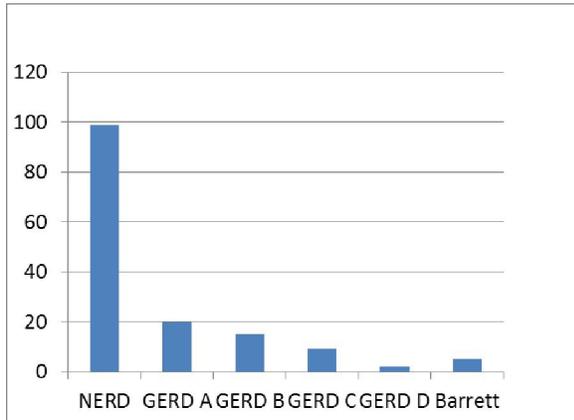


Figure (2): Descriptive analysis of different findings by CWL endoscopy according to Los Angeles classification

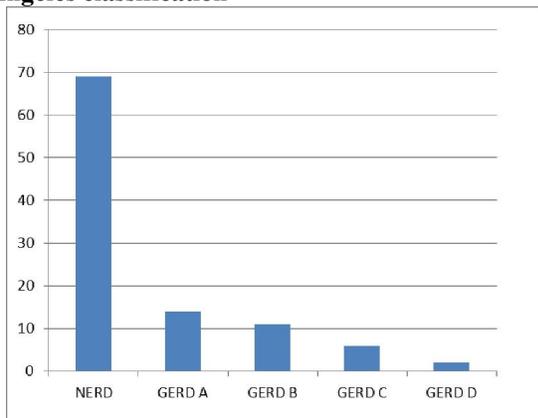


Figure (3): Descriptive analysis of the findings by CWL endoscopy in patients diagnosed as erosive esophagitis by histopathological examination (n=102).

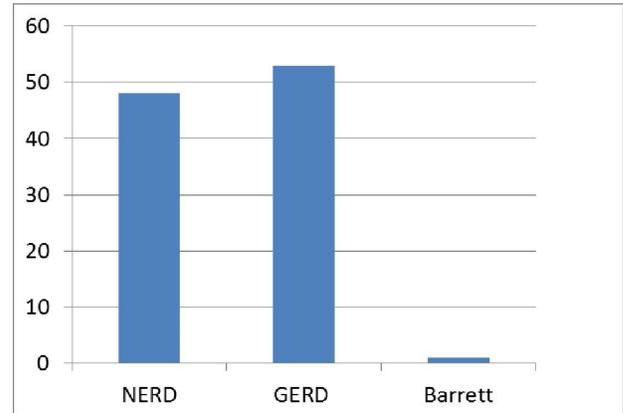


Figure (4): Descriptive analysis of the findings by NBI endoscopy in patients diagnosed as erosive esophagitis by histopathological examination (n=102).

Table (6): Descriptive analysis of the finding by NBI endoscopy.

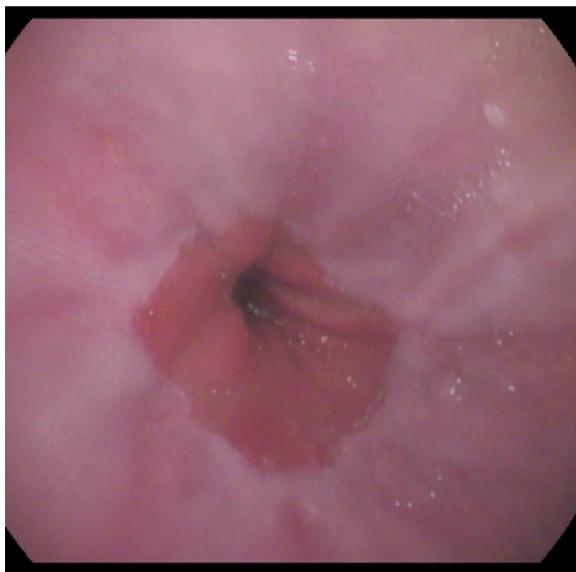
Finding by NBI endoscopy	No (%)	
	Number of IPCL	Normal
	Increased	67 (44.7%)
Diameter of IPCL	Normal	100 (66.6%)
	Dilated	50 (33.4%)
Tortuosity IPCL	Normal	84 (56%)
	Tortuous	66 (44%)

**Table (7): Findings of NBI endoscopy in patients with erosive esophagitis by histopathology (n =102).**

Finding by NBI endoscopy in patients with erosive esophagitis by histopathology	No (%)	
	Number of IPCL	Normal
Increased		60 (58.8%)
Diameter of IPCL	Normal	67 (65.7%)
	Dilated	35 (34.3%)
Tortuous of IPCL	Normal	44 (43.1%)
	Tortuous	58 (56.9%)

**Table (8): Relation between CWL endoscopy and NBI endoscopy in patients diagnosed as normal appearing mucosa by histopathological examination (n=30).**

Endoscopy	NERD	ERD	p-value
CWL endoscopy	28 (93.4%)	2 (6.6%)	>0.05
NBI endoscopy	29 (96.7%)	1 (3.3%)	

**Table (9): Relation between CWL endoscopy and NBI endoscopy in patients diagnosed as reflux esophagitis by histopathological examination (n=102).**

Endoscopy	NERD	ERD	BE	p-value
CWL endoscopy	69 (67.4%)	33 (32.6%)	0 (0%)	<0.01
NBI endoscopy	48 (47.5%)	53 (51.7%)	1 (0.8%)	

**Table (10): Relation between CWL endoscopy and NBI endoscopy in patients diagnosed as BE by histopathological examination (n=11).**

Endoscopy	NERD	ERD	BE	p-value
CWL endoscopy	2 (18.2%)	5 (45.4%)	4 (36.4%)	>0.05
NBI endoscopy	1 (9.1%)	4 (36.4%)	6 (54.5%)	

**Figure (5): Picture showing NERD by CWL endoscopy (left) and the same patient was shown to have increased number with tortuous and dilated IPCL (ERD) by NBI endoscopy (Right).**

#### 4. Discussion

In this study 99 (66%) patients were diagnosed as NERD, 46 (30.7%) patients were diagnosed as ERD and 5 patients (3.3%) were diagnosed as BE by CWL endoscopy. These results matches with the results of many studies [6,12-14], who found that fewer than 40% of GERD patients have endoscopic findings and that upper endoscopy is considered by many as an insensitive test for GERD as it often yields normal endoscopic findings. As a result it has been hypothesized that the use of NBI endoscopy may help in increasing the diagnostic accuracy over standard endoscopy in patients with GERD.

In our study, when NBI endoscopy was done. Eighty one patients (54%) were diagnosed as NERD, 61 patients (40.7%) as ERD and 8 patients (5.3%) were BE. These results mean that NBI endoscopy would accurately increase the diagnostic yield of reflux esophagitis. As 18 patients that were diagnosed as NERD by CWL endoscopy proved to be ERD or BE by NBI with more than 10% increase in the accuracy of diagnosis. These results matches with the results of the study done by Lee *et al* [15] who in a group of 230 patients with GERD symptoms, 65.6% of patients were graded as normal following CWL endoscopy, whereas only 59.1% of patients were

graded as normal following NBI endoscopy. Accordingly up to 6% of patients were reclassified from NERD to ERD by the utilization of NBI endoscopy. Also, Kasap *et al.*<sup>[6]</sup> proved that NBI endoscopy is more sensitive than CWL endoscopy in detecting inflammation in NERD patients. Their study was conducted on 60 patients, 40 of them were diagnosed as NERD with CWL endoscopy. Following further NBI endoscopic evaluation, 12 patients who were evaluated as having NERD with CWL endoscopy were reclassified as esophagitis and thus they concluded that NBI endoscopy was more sensitive than CWL endoscopy in distinguishing abnormal endoscopic findings ( $p < 0.01$ ). They demonstrated that by employing CWL endoscopy, esophageal erosive lesions were encountered in 33% of the patients with GERD. Application of NBI into the assessment of the squamocolumnar junction increased the ERD prevalence to 53% in the same study population. The results of the current study again matches with Huei *et al.*<sup>[16]</sup> who found that a substantial proportion of patients with NERD would change their diagnosis from NERD to ERD after the use of NBI endoscopy. In their study, total of 82 patients, 22 patients (26.8%) were diagnosed as ERD with CWL endoscopy, while 30 patients (36.6%) were considered as ERD with NBI endoscopy with a 9.8% increase in the accuracy of diagnosis.

Against this was a Chinese study done by Lv *et al.*<sup>[17]</sup> who found that there were no remarkable differences in the micro structural changes among patients with the three subtypes of GERD using NBI endoscopy. However in their study their aim was to assess the use of NBI in differentiating the three subtypes of GERD in relation to each other. As all the microvascular (MV) changes are found in the three subtypes of GERD, this might explain why they didn't find any differences in their studied patients. Another study against the results of our study was a study by Kiesslich *et al.*<sup>[18]</sup> who reported that patients with NERD didn't show a prominent vasculature pattern above the Z-line with no significant difference between NERD patients and the control group by NBI endoscopy. They attributed this to lack of intraobserver agreement on the criteria for diagnosing erosive disease.

In the current study, the subtypes of reflux esophagitis patients using CWL endoscopy according to Los Angeles classification were: 20 patients (13.3%) GERD A, 15 patients (10%) GERD B, 9 patients (6%) GERD C and 2 patients (1.4%) GERD D. This result comes in consistent with Kasap *et al.*<sup>[6]</sup> who studied patients with reflux esophagitis, there were 8 patients (13.5%) GERD A, 6 patients (10%) GERD B, 4 patients (6.7%) GERD C, and 2 patients (2.8%) GERD D.

Normal intra papillary capillary loops (IPCLs) appear to be hairpin-shaped and small in diameter.<sup>[17]</sup> In our study, when NBI endoscopy was done, 67 patients (44.6%) showed an increase in the number of IPCLs. When we focused on the patients diagnosed as erosive esophagitis by histopathology, 60 patients (58.8%) out of the 102 patients showed the increase in number of the IPCL. This matches with the study done by Lv *et al.*<sup>[17]</sup> in which they did quantitative analysis of the IPCLs increment. Their results showed that the numbers of IPCLs were significantly higher in GERD patients than in healthy controls ( $P < 0.05$ ).

In the current study, with the use of NBI endoscopy, 50 patients (33.4%) showed dilated IPCLs. When we focused on the patients diagnosed as erosive esophagitis by histopathology there were only 35 patients (34.3%) who showed dilated IPCLs. Also, 66 patients (44%) showed tortuous IPCLs. Focusing on the patients diagnosed as erosive esophagitis by histopathology only 58 patients (56.9%) showed tortuous IPCL using NBI endoscopy.

Almost all the 61 patients (40.6%) that were diagnosed as esophagitis by NBI, showed increased number and tortuosity of the IPCLs, where 60 patients showed increased number and 58 showed tortuous IPCL. This result agrees with the result of Sharma *et al.*<sup>[19]</sup> who conducted a study on 80 subjects (50 GERD and 30 control) and assessed the utility of NBI endoscopy in patients with GERD symptoms and found that a significantly higher proportion of patients with GERD had an increased number, dilatation and tortuosity of IPCLs compared with the control subjects. Also this goes with Lv *et al.*<sup>[17]</sup> who found that increment of IPCLs appeared in a significantly higher proportion of GERD patients than in healthy controls.

Unfortunately the current study showed that dilated IPCLs were found only in 35 patients (34.3%) which stand against Sharma *et al.*<sup>[19]</sup> who found dilated IPCLs together with other NBI endoscopic changes were found in higher proportion of the GERD patients. This finding can be explained as NBI endoscopy has a high intra and inter observer variation.

Histological esophagitis is identified by basal cell hyperplasia, increased papillary length, and infiltration by leukocytes/eosinophils.<sup>[6]</sup> Regarding histopathology in the study, 30 patients (20%) were diagnosed as normal appearing mucosa, 102 patients (68%) were diagnosed as erosive reflux esophagitis, 11 patients (7.3%) were diagnosed as BE and 7 patients (4.7%) were other diagnosis. These results showed that histopathology will remain the gold standard for diagnosis of different GERD patients. Conventional white light (CWL) endoscopy showed

that the erosive esophagitis were 46 patients (30.7%) and NBI showed them to be 61 patients (40.6%) and actually they were up to 102 patients (68%) by histopathology. This goes with Kasap *et al* [6] who found that histopathological findings were more prevalent than the endoscopic changes diagnosed by CWL and NBI endoscopy. But it goes against Calabrese *et al.* [20] study, which was done on 50 patients (38 GERD and 12 controls) and found a poor agreement of endoscopy and histology in GERD, most often because biopsies were taken not close to the z-line but from normal, more-proximal squamous epithelium of the esophagus.

In the current study, all cases diagnosed as ERD by CWL or NBI endoscopy were shown to have reflux esophagitis by histopathology and this match with the results of Zentilin *et al.* [21] who studied 135 patients with symptoms of GERD. They underwent upper GI endoscopy, Biopsies were taken and Histological alterations were found in 100 of 119 GERD patients (84%). Histology was abnormal in 96% of patients with ERD and in 76% of patients with NERD. on the other hand, Zuberi *et al.* [22] showed that in 196 GERD patients diagnosed by endoscopy, histological examination revealed presence of inflammation in 70 (35.7%) patients.

In patients diagnosed as reflux esophagitis by histopathology the number of patients was 102. When CWL endoscopy was done 69 patients (67.4%) were NERD and 33 patients (32.6%) were ERD. While by NBI endoscopy, 48 patients (47.5%) were NERD, 53 patients (51.7%) were diagnosed ERD and 1 patient (0.8%) was BE. The relation between CWL and NBI endoscopy in patients diagnosed as reflux esophagitis by histopathology was highly significant ( $P < 0.01$ ). Narrow band imaging endoscopy was proven to be more accurate in diagnosing cases with erosive esophagitis than CWL endoscopy. These results goes with Assirati *et al.* [23] who concluded that NBI endoscopy is more sensitive than CWL endoscopy in the detection of esophageal lesions in GERD patients. Also, the results go with Lee *et al.* [15] who found a statistically significant increase in diagnosis of erosive disease by NBI endoscopy.

Screening and surveillance of BE using endoscopy with random biopsies is the accepted practice and supported by the gastroenterology societies [19]. In the present study among patients diagnosed as BE by histopathology (11 patients), Conventional white endoscopy showed, 2 patients (18.2%) were NERD, 5 patients (45.4%) were ERD and 4 patients (36.4%) were BE. While by NBI endoscopy only 1 patient (9.1%) was NERD, 4 patients (36.4%) were ERD and 6 patients (54.5%) were BE. The relation between CWL and NBI endoscopy in patients diagnosed as BE by histopathology was not significant ( $P > 0.05$ ). This

could be explained by the small cohort number of the patients (11 patients only).

In a study carried out by Wolfsen *et al.* [24], they conducted a prospective, blinded endoscopy study on 65 patients with BE undergoing evaluation for previously detected dysplasia. Conventional white light endoscopy was used first to detect visible lesions. Narrow band imaging endoscopy was then used by another gastroenterologist to detect and biopsy areas of suspicious for dysplasia. Higher grades of dysplasia were found by NBI endoscopy in 12 patients (18%), compared with no cases (0%) with CWL endoscopy ( $P < .001$ ). Correspondingly, narrow band directed biopsies detected dysplasia in more patients ( $n = 37$ ; 57%) compared with random biopsies taken using standard resolution endoscopy ( $n = 28$ ; 43%). Narrow band imaging endoscopy was found to be superior to CWL endoscopy in the detection of dysplasia (57% vs. 43%). This matches with Singh *et al* [25] who concluded that endoscopic diagnosis with NBI endoscopy is an accurate test to diagnosis dysplasia of BE and with our study, however the small number of the cases limit the accuracy of the results, as actually only 2 extra patients were diagnosed as BE using NBI endoscopy (4 patients by CWL endoscopy and 6 by NBI endoscopy).

Also, the results of the current study goes with the study of Sharma *et al* [19] who conducted a study on 122 patients and found that the use of NBI endoscopy led to detection of more dysplastic BE areas than with CWL endoscopy (30% vs. 21%). Again it goes with Muto *et al* [4] who found that NBI endoscopy combined with high-resolution magnifying endoscopy allows endoscopists to perform targeted biopsies for specialized Intestinal metaplasia and high-grade dysplasia with high success. In contrast, Curvers *et al* [26] reported that the addition of NBI to white light imaging did not improve the accuracy of diagnosing BE.

## Conclusion and Recommendation

The NBI endoscopy may increase the diagnostic accuracy of GERD and Barrett's esophagus but histopathology will remain the gold standard for diagnosis. Correspondence should be addressed to Sherifmonier@yahoo.com, 02 01094161816

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