Editorial

Expanding Role of Image-Enhanced Gastrointestinal Endoscopy in Clinical Practice

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The field of gastrointestinal (GI) endoscopy has witnessed rapid progress since the introduction of the first fiberoptic endoscope more than 50 years ago.[1] While the initial focus of diagnostic luminal endoscopy was on making the device more operator- and patient-friendly, and obtaining clearer and better quality white light images, the last two decades has been marked by significant progress in technology to appreciate more minute details of the mucosal surface (image-enhanced endoscopy [IEE]).[2] This has opened up a new avenue of diagnostic possibilities in real-time.[3] Some of these technologies add contrast to image by manipulation of wavelength of light and do not require dye spray (digital chromoendoscopy). Examples of digital chromoendoscopy technology include narrow-band imaging (NBI, Olympus), i-scan (Pentax), and blue light imaging (BLI, Fujifilm Corporation).[2] Since they provide a detailed, magnified view of the mucosal surface, the characteristics of surface (pits, villi, etc.) and small vessels can be well-appreciated. However, it requires training and practice to become familiar with the surface and vascular patterns seen in normal mucosa and in the presence of lesions. Identifying features associated with various pathological conditions and developing simple classifications is one of the cornerstones in promoting uniform, effective, and wider use of IEE technology. The quantum of research on IEE has been progressively increasing, indicating its growing popularity and widening clinical application. This issue of the journal contains two original research articles and one case report on clinical applications of IEE.[4-6] They highlight the potential of IEE in identifying lesions in different parts of the GI tract.

Helicobacter pylori (*H pylori*) infection of the stomach results in chronic inflammation, and in a proportion of patients, this may progress to atrophic gastritis, intestinal metaplasia and eventually gastric cancer in a minority. These pathological sequelae of infection alter the surface and vascular characteristics of the gastric mucosal surface which may be recognized in real-time during IEE.[7,8] The normal gastric body mucosa is characterized by round pits, honeycomb shaped subepithelial capillary network, and regular arrangement of collecting venules (CV). The most consistent finding observed in *H pylori* infected stomach is the loss of CV.[7,9] In addition, the microsurface (pits), which are round in the body of stomach, may enlarge in size or become elongated/tubular.[4,7] Taken together, these findings have shown a good accuracy in predicting *H pylori* infection.[10] The study by Balekudru et al[5] investigates the utility of IEE (i-scan) in detecting features associated with *H pylori* infection . In this prospective study, 68 patients with functional dyspepsia underwent magnification white light endoscopy (M-WLE), followed by i-scan. The diagnosis of *H pylori* infection was based on previously described surface and vascular patterns associated with this infection.[7] Gastric biopsies were obtained from the greater curve of the body of stomach for detecting *H pylori* infection (reference standard). i-scan had a sensitivity and specificity of greater than 90% in detecting *H pylori* infection. Magnification white light endoscopy alone did not perform well in detecting *H pylori* infection, although the criteria for diagnosing infection on M-WLE were not elaborated. The lack of biopsy from gastric antrum is likely to underestimate the frequency *of H pylori* infection in this study, and the authors have acknowledged this limitation. Overall, this study adds to the growing body of evidence on the utility of IEE for real-time diagnosis of mucosal pathology. Do the findings from this and other similar studies mean IEE can be used as a diagnostic tool for *H pylori* infection? Perhaps the answer currently is "no." More data are required which compares IEE with existing direct testing modalities for *H pylori* infection. Whether the mucosal pattern reverts to normal after successful eradication of bacteria also needs to be studied further in order to differentiate current from past infection.[11]

Another article by Desai et al[6] explores the performance of JNET classification in predicting histology of colonic polyps IEE has shown excellent performance in differentiating non-neoplastic from neoplastic polyps in the colon.[12] However, neoplastic polyps include adenoma with low- and high-grade dysplasia, superficial cancer, and deep invasive cancer. Further characterization of neoplastic polyps into the above pathological categories is essential to make decisions on management. A widely used classification for this purpose is the NICE

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classification.[13] The type 2 category in this classification pools together adenomas with various grades of dysplasia and superficial cancer together. The JNET classification improves upon this by creating subgroups 2A (adenoma with low-grade intramucosal neoplasia) and 2B (adenoma with high-grade intramucosal neoplasia or superficial cancer).[14] The authors applied JNET classification to images of 90 colonic polyps obtained using NBI in 80 patients. The final diagnosis was based on histopathology. The hyperplastic (non-neoplastic) polyps were accurately identified in > 95% cases. Among the neoplastic polyps, positive predictive value of type 2B classification in predicting adenoma with high-grade intramucosal neoplasia or superficial cancer was only 38%. Their observations convey an important message; classifications developed by experts need to be validated in clinical practice in different countries to confirm their utility. The authors must be commended for this important work. In fact, a study of around 3000 colorectal lesions form Japan showed a PPV of only 50.9% for type 2B lesions. Further work is required in improving discrimination of neoplastic colorectal lesions.[15] In addition, sessile serrated adenomas, which have malignant potential but may appear as non-neoplastic polyp on IEE pose another challenge in clinical application of NICE or JNET classification.[16]

The third paper reports an interesting and rare case of Olmesartan-associated collagenous gastroduodenitis.[11] The patient was a 54-year-old lady who presented with diarrhea, vomiting and weight loss. NBI of duodenum showed tubular structures on surface of nodules with micromucosal pattern. The patient recovered after stopping Olmesartan and repeat NBI showed normal duodenal villi. IEE may be a useful tool in evaluation of patient with chronic small bowel diarrhea and malabsorption, as it can show mucosal abnormalities in real-time and help taking targeted biopsies.[17] However, it is not a substitute for mucosal biopsy as all malabsorptive conditions may not show mucosal abnormality on imaging.

H pylori infection and colorectal polyps are common clinical conditions in the general population.[18] The clinician performing IEE should be familiar with the features associated with these lesions.[19] Since *H pylori* infection is a precursor for gastric preneoplastic and neoplastic lesions, its presence may warrant a more detailed and careful examination of the gastric mucosa. The challenge currently is in identifying the target group of patients where IEE could be useful.[20] Similarly, colorectal polyps can be managed by endoscopic mucosal resection, endoscopic submucosal dissection or referred for surgery, and IEE may help us in characterizing the lesion to decide on the optimum treatment. The cost of the procedure, prolonged procedure time and specialized training for interpretation of the enhanced images are some of the potential barriers for clinical application of IEE. Recent guidelines have started to define the role of IEE in clinical practice.[20] This, coupled with the ongoing research on artificial intelligence to interpret endoscopic images, is likely to make image enhancement technology more popular and user-friendly in the future.

Conflicts of Interest

None declared.

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