Editorial

Efficacy of Image Enhanced Endoscopy for Colorectal Polyps: Are we Ready for Prime Time?

Detection of colorectal polyps is of paramount importance for the prevention of colorectal cancer and death. Polyps are categorized as non-neoplastic (i.e., hyperplastic) and neoplastic lesions, and may be sessile, pedunculated, slightly elevated, flat, or depressed. It has been shown that adenomas in persons younger than 60 years of age are slightly more often found in the distal colon whereas their prevalence in persons 60 years of age or older is higher in the proximal colon.[1] According to their size, polyps are classified as diminutive (1–5 mm in diameter), small (6–9 mm) and large (≥10 mm) polyps. Various studies have reported the positive relationship of the polyp size and the likelihood of cancer, and colonoscopy is widely used as the reference standard for detection and treatment of colorectal polyps.[1,2] Most recently, Nishihara *et al*. showed that, among 88902 participants, followed over a period of 22 years, colonoscopy and sigmoidoscopy were associated with a reduced incidence of cancer of the distal colorectum whereas colonoscopy was only associated with a modest reduction in the incidence of proximal colon cancer.[3] Interestingly, negative sigmoidoscopy and colonoscopy with polypectomy were associated primarily with a lower incidence of distal colorectal cancer. One reason for the reduced incidence of colonoscopy in the proximal colon might be the increased incidence of nonpolypoid (i.e., flat) lesions in this part of the colon.[4] Accordingly, advanced endoscopic imaging techniques are widely studied to improve diagnostic outcomes in colonoscopy.

In the present meta-analysis by Lv *et al*., the diagnostic efficacy of autofluorescence imaging, narrow band imaging and the combined approach was evaluated for colorectal lesions.[5] Overall, 8 studies were identified including a total of 660 patients and 1426 lesions. It was found that both AFI and NBI have high sensitivities but low specificities in the differentiation of colonic lesions, although the combined approach of AFI and NBI has been associated with an increased diagnostic value as compared to AFI and NBI alone. The authors concluded that future research should be performed in order to validate the utility of image-enhanced endoscopy systems.

Overall, the study confirmed the results of a recent meta-analysis published by Evelyn Dekker's group evaluating the diagnostic performance of NBI, AFI, i-scan, FICE, and confocal laser endomicroscopy for optical diagnosis of colonic polyps.[6]

Importantly, when we are discussing image-enhanced endoscopy for the diagnosis of colorectal polyps, one should consider the recently introduced Preservation and Incorporation of valuable endoscopic innovations (PIVI) statement proposed by the American Society for Gastrointestinal Endoscopy (ASGE) for real-time endoscopic assessment of the histology of colorectal polyps.[7] The statement introduced two criteria. First, in order for diminutive polyps to be resected and discarded without pathologic assessment, endoscopic technology should provide ≥90% agreement in the assignment of post-polypectomy surveillance intervals. Second, in order for a technology to leave diminutive, suspected hyperplastic rectosigmoid polyps in place, the technology should provide a negative predictive value (NPV) ≥90% for adenomatous histology. We have specifically learned from the above-mentioned meta-analysis that most technologies so far did not reach the thresholds, as proposed by the ASGE PIVI statement. Of note, the NPV in the meta-analysis was calculated from all polyps assessed, not only for diminutive rectosigmoid lesions, as recommended in the PIVI statement. The NPV in real-time studies was found to be 82.5% for NBI, 86.5% for i-scan, 83.7% for FICE, 81.5% for AFI, and 94.8% for confocal laser endomicroscopy.[6,7]

The PIVI statement is also recommending that high-confidence prediction is necessary when an endoscopic imaging technique is used during daily practice for the diagnosis of colorectal polyps.[7] However, most studies so far did not assess the confidence levels; the present study also did not provide levels of confidence. Moreover, nonstructured and non-validated training programs and different classification systems were used in the included studies of the present meta-analysis, thereby potentially influencing the performance characteristics and the results.

Of note, the endoscopes evaluated in the present study are currently exchanged by a new generation providing more details of the surface pattern and vascular pattern morphology. Within the next years, we are expecting more convincing results from endoscopes using CMOS despite CCD sensor optics. Moreover, a new generation of endoscopes is introduced using novel LED techniques, lasers, or optical filters for application of a distinct light spectrum to the tissue in order to enhance detection and characterization capabilities.[8]However, even with these new technologies, the challenge will be to provide a well-structured training

with an efficacy review so that the new technologies may become valuable even in non-expert centers for the detection of lesions and guidance of therapy. One direction might be the development of novel computer-based detection and characterization systems. Our group has most recently shown that a novel introduced optical biopsy system, which is based on laser-induced fluorescence spectroscopy, is accurate enough for distal colorectal polyps to be left in place and nearly reaches the PIVI threshold to "resect and discard" them without pathologic assessment.[9] Separate from the development of traditional light-emitting endoscopes, increasing attention is also being paid to the development of molecular endoscopic imaging techniques. Most recently, Burggraaf *et al*. have shown that the intravenous injection of a specific fluorescence-labeled marker that binds to the human tyrosine kinase *c-Met* allows for additional detection of colorectal lesions as compared to white-light endoscopy by specifically highlighting neoplastic tissue.[10]

Taken together, the efficacy of image-enhanced endoscopy for colorectal polyps is not yet ready for prime time, especially when it is used outside specialized centers. However, future developments in the field of image enhancement will allow us to better detect, characterize, and finally treat lesions in the luminal gastrointestinal tract.

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