

ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

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Fine-Tuning Colorectal Polyp Detection With Image-Enhanced Endoscopy



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G&H What are the proposed benefits of image-enhanced endoscopy in colorectal polyp detection?

BJ The larger framing of this is, what can we as endoscopists do to better detect precancerous lesions and, if possible, distinguish precancerous lesions from nonprecancerous lesions—in other words, determine which lesions should be removed vs those that could be ignored? Additionally, can image-enhanced endoscopy (IEE) help as a tool, with or without use of artificial intelligence (AI), as the field evolves? Several clinical studies have addressed this question of benefit and confirmed that IEE does add value in terms of being able to both detect lesions and try to distinguish the more worrisome lesions based on various features. Currently, colorectal polyp detection is in a phase of research and discovery, where the different types of IEE are being compared against each other in an attempt to make existing technologies even better and more accurate. Although it is still very early in the course of this field, the findings of these studies are promising.

Another use of IEE is when the endoscopist is evaluating a lesion and trying to decide whether it is already cancer. Use of IEE technologies may be helpful in guiding where to take a biopsy from, for example, to make sure when sampling part of a large polyp that it is the area most likely to yield a cancer diagnosis. IEE could even be used to help the endoscopist decide whether a lesion should not be removed endoscopically. In this case, there would be enough evidence, based on imaging, that the lesion looks like an invasive cancer, which should go for more advanced resection methods.

G&H What are some of the key features or advantages of the various IEE modalities over white-light endoscopy?

BJ There is the simplicity factor of an equipment-based or built-in technology that, with the press of a button on the endoscope, the image switches from standard white-light endoscopy to enhanced imaging mode. That feature is so much easier than having to use various dyes, which may or may not be available. With dye-based real-time optical biopsy, the dyes have to be administered through

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certain spray catheters, which the endoscopist needs to have on hand, and they can be a little messy. There are still advocates for chromoendoscopy using dyes in certain situations; however, for many endoscopists, the advent of a digital-only chromoendoscopy technology is very welcome. One issue is whether the digital enhancements completely obviate the need for any kind of dye-based

staining; researchers are still figuring this out. For example, in the field of inflammatory bowel disease surveillance, where the endoscopist is looking for maybe very flat dysplasia, the role of these newer IEEs vs the traditional dye-spraying endoscopy remains to be determined.

There is also some thought that certain IEE techniques may help in the setting of gastrointestinal (GI) bleeding or with visualization of nonpolypoid lesions. Here is another example where the endoscopist can, with the press of a button, change the light filter and possibly see a pinpoint site of bleeding on the mucosa that would not be seen with white-light endoscopy because of too much blood in the field. This is an area of active research.

G&H With a plethora of IEE technologies available, how are they being differentiated, and is there a way to tell if one IEE technology is better than another?

BJ The different IEE technologies on the market are not standardized because the endoscope manufacturers have designed their own proprietary imaging systems. While some manufacturers are using red, blue, and green color wavelengths and optimizing them, others are restricting the wavelengths being used. Some systems process the image after the fact (a computer generates the image), whereas others are simply changing the light that is hitting the lining of the GI tract. Basically, a computer may alter the image that the endoscopist is seeing, or the endoscopist is physically seeing the image change in real time. The reason the image looks different or more highlighted is because the incident light being projected onto the mucosa has been changed. All of these different technologies are, again, areas of active research. It is still somewhat early in this field to say which IEE technology is best to use.

Although Narrow Band Imaging (NBI) may have a slight advantage over other technologies because it belongs to Olympus, which has the lion's share of endoscope sales—at least in the United States—so there is more experience with it, the jury is still out in terms of which method works best in which situation. Whether endoscopists use NBI, i-Scan by Pentax, or Fujifilm's Blue Light Imaging, or another IEE technology such as Texture and Color Enhancement Imaging (TXI), i-Scan and Optical Enhancement, or Linked Color Imaging, may depend on what they are trying to do. Is the endoscopist trying to find a polyp or trying to decide what type of polyp it is or how dysplastic a polyp is? There may be subtle differences in each of these technologies in each of those intended uses. Ultimately, the choice of technology for the average endoscopist may come down to the equipment he or she has access to. If the endoscopist happens to use equipment made by a specific manufacturer

and therefore is exposed to that technology, then that is what the endoscopist will likely use, which is fine.

Researchers who are developing IEE technologies are still learning and making improvements. For example, over the years, Olympus has introduced newer generations of NBI and recently introduced a combined NBI+TXI technology. As IEE technologies are used more in the field, they will continue to evolve. Another interesting question is, as the gastroenterology community increasingly uses AI, how will the combination of IEE plus computer-aided diagnosis impact colorectal polyp management? The two technologies together may ultimately prove very powerful. Again, this is just the beginning of the IEE field.

G&H How has IEE compared with white-light endoscopy in studies on its usefulness in adenoma and polyp detection?

BJ Many studies, including meta-analyses and scoping reviews of multiple randomized controlled trials, suggest that the endoscopist's adenoma detection rate is definitely higher with IEE. Improved detection rates for sessile serrated lesions have also been reported. One network meta-analysis showed sessile serrated lesion detection rates ranging from 61% to 82% across IEE modalities. This is very important because these neoplastic lesions are challenging to see. Having an IEE technology that can

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help endoscopists help their patients in this area is fantastic. The issue is, how big of an improvement is it, and does it translate into meaningful clinical outcomes, such as preventing more cancers? The answer to this is not yet known. Polyps and sessile serrated lesions are typically used as proxies because they are precancerous lesions. The assumption is that if endoscopists are finding and resecting more precancerous lesions, then they are lowering the cancer incidence rates. Ultimately, lower cancer rates

are expected because IEE technologies do detect more of these polyps. Another thing to note is that IEE is just one part of improving polyp detection rates. Regardless of how advanced the IEE technology is, endoscopists could still miss lesions if they are not taking the time to slow down, look carefully, inspect behind folds in the colon, clean up any leftover stool or areas that are not being seen well, and look twice, especially in the right colon. These are things that can be done without advanced technologies that have also been proven to improve polyp detection.

G&H In what ways are you (or gastroenterologists) using IEE to improve colorectal polyp detection in clinical practice?

BJ In my practice, IEE is helpful for determining whether or not a polyp is neoplastic and is often used with optical zoom to magnify the lesion. The close-up view with an enhanced image allows for detection of the pit pattern and other morphologic or vascular features of a polyp. These findings help the endoscopist in deciding definitively whether the lesion should be removed. Most endoscopists are probably not using a resect-and-discard strategy with IEE; they likely still want their pathologist to confirm the histology and cellular features of the resected polyp. However, if IEE technology continues to improve, perhaps with the combination of AI, there may come a time when endoscopists can decide to leave in a lesion that they normally would have removed, or decide to resect and dis-

card a lesion and avoid the pathology cost. Although the field is not quite there yet, that type of decision-making is potentially on the horizon.

G&H What should future research focus on?

BJ Having the combination of IEE plus AI would be very helpful not only to identify the lesion, but also to describe what the lesion is and with what confidence it can be either resected or left in place. Perhaps for larger lesions that may be malignant, it would be very helpful to have color overlays that assist with targeting biopsies or determining in real time the type of resection that might be best, whether endoscopic mucosal resection, endoscopic submucosal dissection, or surgical resection. IEE technologies that can provide this real-time information would be helpful for larger, very concerning lesions.

Disclosures

Dr Jacobson has no relevant conflicts of interest to disclose.

Suggested Reading

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