ADVANCES IN GERD

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New Endoscopic Techniques for Detecting Dysplasia in Barrett Esophagus

Prateek Sharma, MD
Professor of Medicine
Director, GI Fellowship Training
University of Kansas School of Medicine
Kansas City, Kansas

G&H Could you discuss the use of chromoendoscopy in the detection of dysplasia in Barrett esophagus?

PS Chromoendoscopy involves the utilization of dyes or stains during standard white-light endoscopy examination of patients with Barrett esophagus who are suspected of harboring dysplasia. The dye, typically indigo carmine, methylene blue, or Lugol's solution, is applied in these patients to highlight any subtle mucosal changes that are not otherwise clearly visible or to help delineate any visible mucosal changes. For example, because methylene blue deeply stains any nondysplastic Barrett esophagus tissue, the presence of dysplasia can be confirmed by heterogeneous staining and an irregular uptake of the dye.

Although chromoendoscopy has been around for several years, it is not recommended in routine clinical practice for all patients with Barrett esophagus. As results have varied among different investigators and centers, we are not completely certain whether chromoendoscopy is useful in all patients with Barrett esophagus. There are issues regarding the operator-dependence and time-effectiveness of the technique, as well as questions regarding the use of the spray catheter and how much dye should be sprayed and for how long. However, a dye such as Lugol's can be used in other applications, to better delineate the squamocolumnar junction and islands of residual Barrett esophagus in patients undergoing ablation therapy for high-grade dysplasia, for example.

G&H Could you discuss the use of other new techniques such as narrow-band imaging and confocal microscopy in the detection of dysplasia in Barrett esophagus?

PS Narrow-band imaging is essentially an electronic method of chromoendoscopy. Rather than using a dye or stain, narrow-band imaging uses preferentially blue light, which has a shorter wavelength and offers a very effective contrast between squamous tissue and Barrett mucosa. In addition, because the blue light is reflected superficially from the Barrett epithelium, it reveals specific mucosal as well as vascular patterns in Barrett esophagus. Preliminary studies in Barrett esophagus have demonstrated increased accuracy for diagnosing high-grade dysplasia and early cancer with narrow-band imaging.

Confocal microscopy is a technique that offers not only surface, but subsurface, analysis of the Barrett segment. This technique provides further characterization of lesions, as it allows for the examination of a very small surface area of the Barrett esophagus in much greater detail. Confocal microscopy involves either a confocal endomicroscope, which is incorporated within an endoscope, or a confocal probe, which can be passed through the channel of a standard endoscope.

As both narrow-band imaging and confocal microscopy are relatively new techniques, there have been only a few preliminary studies conducted thus far. Although the results appear promising, further research is needed and is currently ongoing. Once additional data are available using these techniques, they may have the potential for routine clinical application.

G&H How do each of these new techniques show an advancement over the use of traditional endoscopy in the detection of dysplasia in Barrett esophagus?

PS Traditionally, the detection of dysplasia is based upon random four-quadrant biopsies obtained every 2 cm in

the Barrett segment, from the gastroesophageal junction up toward the proximally displaced squamocolumnar junction. Although this is the standard protocol for performing biopsies in these patients, these biopsies are purely random in nature; we truly do not know where the dysplastic or cancerous tissue lies. In contrast, the goal of newer endoscopic techniques such as chromoendoscopy, narrow-band imaging, and confocal microscopy is to highlight high-yield areas in order to perform targeted, rather than random, biopsies. Targeting the biopsies can increase the yield of dysplasia detection and, more importantly, show where biopsies are not needed, thus avoiding the majority of unnecessary biopsies. These are all potentially significant advantages over the standard biopsy protocol.

G&H Could you expand on the clinical application of these procedures in terms of improving the detection rate of dysplasia or changing the standard biopsy protocol?

PS As mentioned above, the ultimate goal of these techniques for clinical practice is to highlight the location of abnormal areas during endoscopy, in real-time, in order to target these areas for biopsy and avoid biopsy of normal areas. Furthermore, this could allow immediate treatment of abnormal areas. For example, if these techniques detected an area of what appeared to be high-grade dysplasia or early cancer, therapeutic procedures such as mucosal resection could be performed immediately. In one study, for example, Dr. Irving Waxman and colleagues showed how narrow-band imaging could help direct endoscopic mucosal resection in Barrett esophagus patients with high-grade dysplasia.

It should be noted that advanced endoscopic imaging will likely have a significant impact on clinical practice in the relatively near future. There will likely be widespread clinical application of these techniques in subgroups of patients not merely in Barrett esophagus but in early detection of squamous cell cancer, gastric cancer, dysplasia in inflammatory bowel disease, and for the differentiation of colonic polyps. Thus, we should be aware of well-designed studies in these different disease areas, in order to begin applying these techniques in clinical practice.

G&H What do you foresee as the next steps of research regarding these techniques?

PS Thus far, only open trials and proof-of-principle studies have demonstrated that narrow-band imaging and confocal microscopy may be helpful in patients with Barrett esophagus; randomized studies are now needed to compare these techniques with the current standard practice (four-quadrant biopsies every 2 cm). A multicenter, randomized controlled, crossover trial is currently being conducted in Kansas City, Charleston, and Amsterdam. This study, which will be completed over the next few months, is comparing targeted biopsies obtained with narrow-band imaging versus those obtained via the standard biopsy protocol. Similar studies with confocal microscopy are also being currently performed and/or are in the planning phases. These studies will provide additional information on how to better use these techniques in clinical practice.

G&H Are there any other emerging endoscopic techniques, beyond those mentioned above, that show promise?

PS Numerous other techniques are currently being evaluated in patients with Barrett esophagus. Several techniques of postprocessing electronic chromoendoscopy, such as optimal band imaging and I-Scan, are now available. However, as they have been introduced fairly recently, there is not yet much published literature evaluating their role in the detection of dysplasia in Barrett esophagus. Other imaging techniques, that are probe-based, are also currently under evaluation, including light-scattering spectroscopy, Raman spectroscopy, multimodality spectroscopy, autofluorescence, and optical coherence tomography.

Suggested Reading

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