Impact of a computer-based teaching module on characterization of diminutive colon polyps by using narrow-band imaging by non-experts in academic and community practice: a video-based study (CME)

Amit Rastogi, MD,[1,2] Deepthi S. Rao, MD,[3] Neil Gupta, MD, MPH,[4] Scott W. Grisolano, MD,[2]
Daniel C. Buckles, MD,[2] Elena Sidorenko, MD,[2] John Bonino, MD,[2] Takahisa Matsuda, MD, PhD,[5]
Evelien Dekker, MD, PhD,[6] Tonya Kaltenbach, MD,[7] Rajvinder Singh, MD,[8] Sachin Wani, MD,[9]
Prateek Sharma, MD,[1,2] Mojtaba S. Olyaee, MD,[2] Ajay Bansal, MD,[1,2] James E. East, MD[10]

Kansas City, Missouri, USA

Background: Experts can accurately characterize the histology of diminutive polyps with narrow-band imaging (NBI). There are limited data on the performance of non-experts.

Objective: To assess the impact of a computer-based teaching module on the accuracy of predicting polyp histology with NBI by non-experts (in academics and community practice) by using video clips.

Design: Prospective, observational study.

Setting: Academic and community practice.

Participants: A total of 15 gastroenterologists participated—5 experts in NBI, 5 non-experts in academic practice, and 5 non-experts in community practice.

Intervention: Participants reviewed a 20-minute, computer-based teaching module outlining the different NBI features for hyperplastic and adenomatous polyps.

Main Outcome Measurements: Performance characteristics in characterizing the histology of diminutive polyps with NBI by using short video clips before (pretest) and after (posttest) reviewing the teaching module.

Results: Non-experts in academic practice showed a significant improvement in the sensitivity (54% vs 79%; $P < .001$), accuracy (64% vs 81%; $P < .001$), and proportion of high-confidence diagnoses (49% vs 69%; $P < .001$) in the posttest. Non-experts in community practice had significantly higher sensitivity (58% vs 75%; $P = .004$), specificity (76% vs 90%; $P = .04$), accuracy (64% vs 81%; $P < .001$), and proportion of high-confidence diagnoses (49% vs 72%; $P < .001$) in the posttest. Performance of experts in NBI was significantly better than non-experts in both academic and community practice.

Limitations: Selection bias in selecting good quality videos. Performance not assessed during live colonoscopy.

Conclusion: Academic and community gastroenterologists without prior experience in NBI can achieve significant improvements in characterizing diminutive polyp histology after a brief computer-based training. The durability of these results and applicability in everyday practice are uncertain. (Gastrointest Endosc 2014;79:390-8.)

There has been a recent surge in the development of several novel endoscopic imaging modalities such as electronic chromoendoscopy (narrow-band imaging [NBI, Olympus America Inc, Center Valley, PA, USA], Fuji Intelligent Chromo Endoscopy [FICE, Fujinon Inc, Wayne, New Jersey, USA], and i-Scan [Pentax America Inc, Montvale, New Jersey, USA]), confocal endomicroscopy, autofluorescence, endocytoscopy, and spectroscopy. These innovations have afforded endoscopists the capability to characterize the histology of colon polyps in real time during colonoscopy. Several studies from academic institutions by investigators with special interest in these imaging technologies have shown that reasonably high accuracies can be achieved in the in vivo diagnosis of polyp histology.[1-12] Of these imaging modalities, NBI has been the most extensively evaluated. NBI is a filter-based technology that is easy to use, practical, and does not require excessive capital investment because it is incorporated in the current generation of endoscopy systems (Olympus America, Inc). A recent meta-analysis showed that the pooled sensitivity and specificity of NBI for differentiating neoplastic from nonneoplastic polyps were 92% and 83%, respectively.[13]

Diminutive polyps ($\leq$ 5 mm) constitute the majority of polyps detected during colonoscopy, and these lesions uncommonly harbor advanced histology like high-grade dysplasia, villous features, or cancer.[14] Hence, the current practice of resecting and submitting these low-risk lesions to pathology essentially serves the purpose of knowing whether they are adenomas or not, and this determines the after-polypectomy surveillance interval recommendations.[15] If this same goal can be accomplished by the endoscopist by characterizing these diminutive polyps in real time during colonoscopy, then the histopathologic evaluation of these polyps can be avoided, a strategy called "characterize, resect, and discard."[15,16] The potential cost savings of the resect and discard strategy has been estimated to be $1 billion annually in the U.S.[17] However, before this can be incorporated into routine clinical practice, teaching tools will have to be developed to train endoscopists without experience in characterizing polyp histology during colonoscopy so that they can consistently achieve an acceptable level of accuracy. Computer or Web-based teaching methods offer the unique opportunity of easy and inexpensive widespread dissemination as opposed to interactive didactic teaching. Published studies evaluating the impact of teaching on non-experts have used still images, with limited applicability to real time assessment in clinical practice.[18,19]

The aim of this study was to assess the impact of a computer-based teaching module on the accuracy of predicting polyp histology with NBI by non-experts (in academic and community practices) and to compare their accuracy with that of experts in NBI. Specifically, we used video clips of diminutive polyps rather than still images to try to improve fidelity to clinical experience.

Take-home Message

- By reviewing a 20-minute computer-based teaching module, non-experts in academics and community practice can achieve a significant improvement in their accuracy for polyp histology characterization by using narrow-band imaging. However, the performance of non-experts remained inferior to that of experts, implying that further experience will be required to achieve competence.
- The durability of these results and the applicability in every day practice remains uncertain.

METHODS

Teaching module

An audiovisual teaching presentation was prepared in Power Point (Microsoft Corp, Redmond, Wash) by one investigator with experience in polyp histology characterization with NBI (A.R.). This presentation included 34 slides and was approximately 20 minutes in duration. The contents of this presentation included a brief introduction on NBI, followed by a demonstration of the different NBI surface patterns that can help differentiate between hyperplastic and adenomatous polyps. The NBI patterns for hyperplastic and adenomatous polyps have been described previously[7,20,21] and were used for this study as well. The patterns for hyperplastic polyps are fine capillary network but absent mucosal pattern (bland pattern) and circular pattern with dots (dark dots surrounded by clear white areas) (Figs. 1A and B). The patterns suggestive of adenomatous polyps are round and/or oval pattern (dark round or oval lines surrounding clear white areas) and tubulogyrus pattern (linear and convoluted tubular structures) (Figs. 2A and B). Several examples of these NBI patterns characterizing adenomas and hyperplastic polyps were included in the presentation. Areas of confusion and reasons for misinterpretation of the patterns were also discussed. Finally, in the concluding slides, the different NBI patterns were summarized.

Participants

We recruited 3 groups of participants with 5 in each group. Group A—experts in NBI. This group was made up of international experts in NBI. All had conducted studies using NBI for polyp histology characterization and had performed at least 500 colonoscopies with NBI. Group B—non-experts in NBI in academic practice. Endoscopists in this group did not have any prior experience in using NBI for polyp histology characterization. Group C—non-experts in NBI in community practice. Endoscopists in this group also did not have any prior experience in using NBI for polyp histology characterization.