Improvement in the visibility of colorectal polyps by using blue laser imaging (with video)

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Background: Fujifilm developed blue laser imaging (BLI) via a laser light source with a narrow-band light observation function. It has a brighter BLI bright mode for tumor detection.

Objective: To investigate whether the BLI bright mode can improve the visibility of colorectal polyps compared with white light (WL).

Design: We studied 100 colorectal polyps (protruding, 42; flat, 58; size, 2–20 mm) and recorded videos of the polyps by using the BLI bright mode and WL at Kyoto Prefectural University of Medicine and Fukuoka Chikushi University Hospital. The videos were evaluated by 4 expert endoscopists and 4 nonexperts. Each endoscopist evaluated the videos in a randomized order. Each polyp was assigned a visibility score from 4 (excellent visibility) to 1 (poor visibility).

Setting: Japanese academic units.

Main Outcome Measurements: The visibility scores in each mode and their relationship to the clinical characteristics were analyzed.

Results: The mean visibility scores of the BLI bright mode were significantly higher than those of WL for both experts and nonexperts (experts, 3.10 ± 0.95 vs 2.90 ± 1.09; $P = .00013$; nonexperts, 3.04 ± 0.94 vs 2.78 ± 1.03; $P < .0001$). For all nonexperts, the visibility scores of the BLI bright mode were significantly higher than those of WL; however, these scores were significantly higher in only 2 experts. For experts, the mean visibility scores of the BLI bright mode was significantly higher than those of WL for flat polyps, neoplastic polyps, and polyps located on the left side of the colon and the rectum.

Limitations: Small sample size and review of videos.

Conclusions: Our study showed that polyps were more easily visible with the BLI bright mode compared with WL. (Clinical trial registration number: UMIN000013770.) (Gastrointest Endosc 2015;82:542-9.)

(footnotes appear on last page of article)

Colorectal cancer is a common GI malignancy in the United States, Europe, and Japan. According to the adenoma-carcinoma sequence concept, most colorectal cancers are thought to arise from preexisting adenomas.[1] Therefore, adenomatous polyps should be detected and resected by using endoscopic techniques such as endoscopic mucosal resection (EMR) and endoscopic submucosal dissection.[2-4] Colonoscopy is considered to be an effective examination for detecting colorectal neoplastic lesions. However, a meta-analysis of 6 studies found that the miss rate for polyps of any size was 22% with white light (WL) observation.[5] The reasons behind the high miss rate were considered to be the quality of bowel preparation, lesion characteristics (location, number, morphology, and size), and the endoscopist's experience, especially insertion and withdrawal techniques.[5] Recently, image-enhanced endoscopy (IEE) has been used to diagnose GI tumors. This method is very different from conventional

This video can be viewed directly from the GIE website or by using the QR code and your mobile device. Download a free QR code scanner by searching "QR Scanner" in your mobile device's app store.

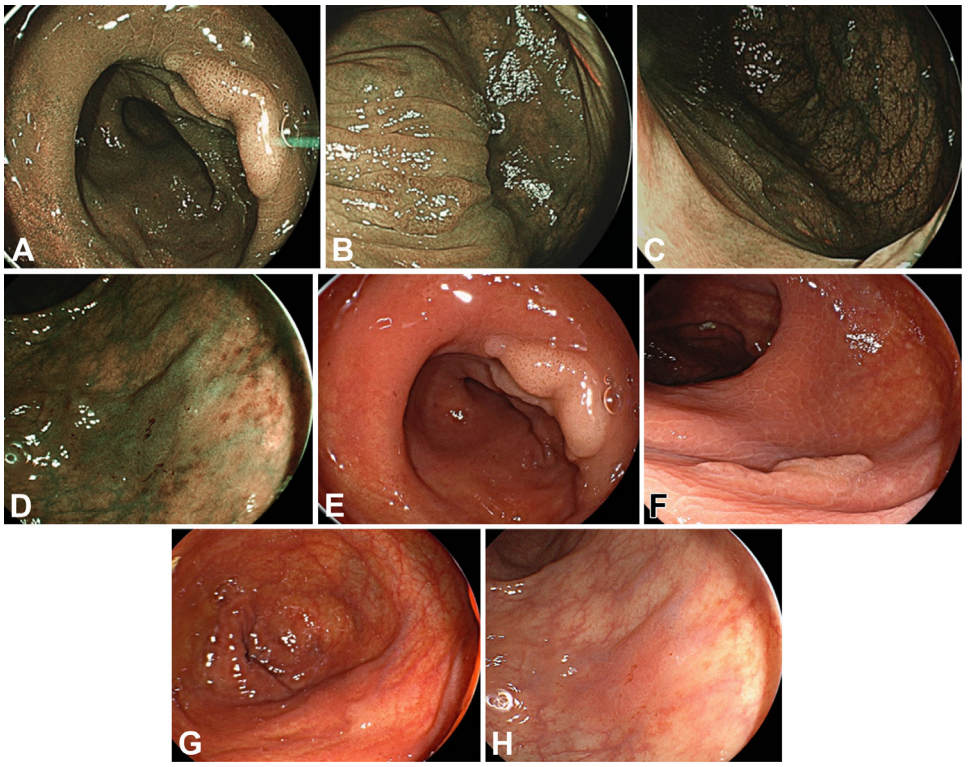

Figure 1. Colorectal polyp visibility scores with the BLI bright mode and white light. **A**, BLI bright mode: visibility score, 4. **B**, BLI bright mode: visibility score: 3. **C**, BLI bright mode: visibility score, 2. **D**, BLI bright mode: visibility score, 1. **E**, WL: visibility score, 4. **F**, WL: visibility score, 3. **G**, WL: visibility score, 2. **H**, WL: visibility score, 1. *BLI*, blue laser imaging; *WL*, white light.

chromoendoscopy and requires only the push of a button without the need to use a dye solution.

In IEE such as narrow-band imaging (NBI) (Olympus Medical Co, Tokyo, Japan), flexible spectral imaging color enhancement (FICE) (Fujifilm Co, Tokyo, Japan), and autofluorescence imaging (Olympus Medical Co, Tokyo, Japan), many clinical studies, including randomized, controlled trials, have reported an improvement in the detection rate in colonoscopy.[6-11] However, the efficacy of these IEEs for tumor detection remains controversial. Recently, Fujifilm developed a new endoscope system with a semiconductor laser light source. The system has 2 types of lasers with wavelengths of 410 nm and 450 nm. It enables blue laser imaging (BLI) via narrow-band light observation.[12-15] There are 2 modes such as BLI and BLI bright mode. The BLI mode is useful for magnified observations and enables the acquisition of mucosal surface information about vascular and surface patterns. On the other hand, the BLI bright mode is brighter than the regular BLI mode and is intended to improve the detection of GI neoplastic lesions.

We believe that polyp detectability depends on many factors, and one of the most important factors is polyp visibility. It is important to determine whether a new IEE can improve polyp visibility. However, there are no reports about the visibility of colorectal polyps by using BLI. In this study, we aimed to investigate whether the BLI bright mode can improve the visibility of colorectal polyps compared with WL by using recorded polyp videos.

MATERIALS AND METHODS

This open, prospective, multicenter study was conducted at the Department of Molecular Gastroenterology and Hepatology, Kyoto Prefectural University of Medicine, and at the Department of Gastroenterology, Fukuoka University Chikushi Hospital. We examined consecutive colorectal polyps and captured videos of the polyps by using the BLI mode, the BLI bright mode, and WL at Kyoto Prefectural University of Medicine from April 2013 to November 2013. The inclusion criterion was the presence of a colorectal polyp between 2 and 20 mm in size that had been detected by routine colonoscopy with the BLI bright mode or WL. A single expert (N.Y.) recorded 3 videos for each polyp by using the BLI mode, the BLI bright mode, and WL. Each video included a range of 5 cm proximal from the polyp to 5 cm distal from the polyp. The evaluation of the visibility of the polyps was performed by using the following visibility scores: 4, excellent visibility (easily detectable); 3, good visibility (detectable with careful observation); 2, fair visibility (hardly detectable without careful examination); and 1, poor visibility (not detectable without repeated careful examination) (Figs. 1 and 2;