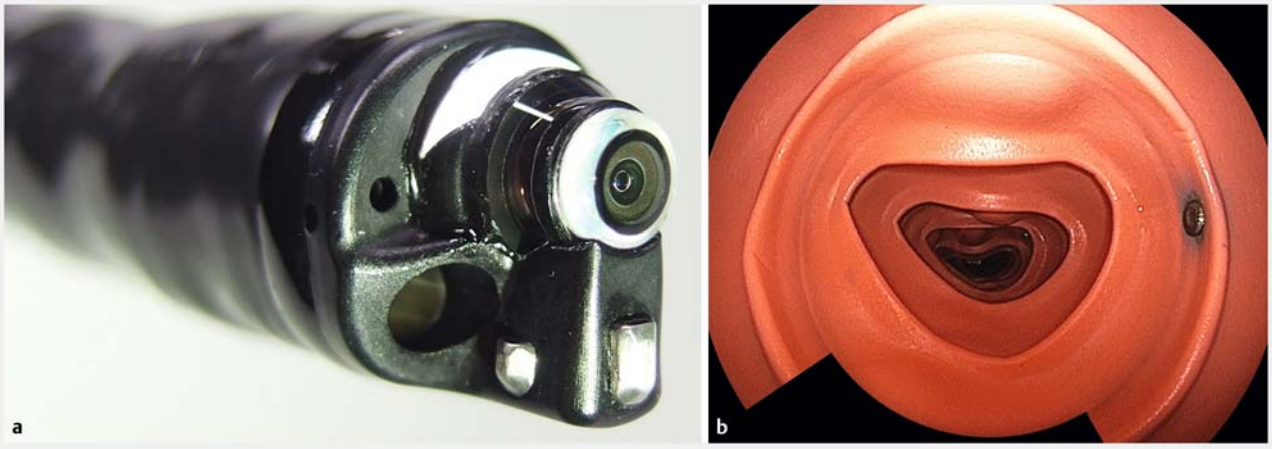
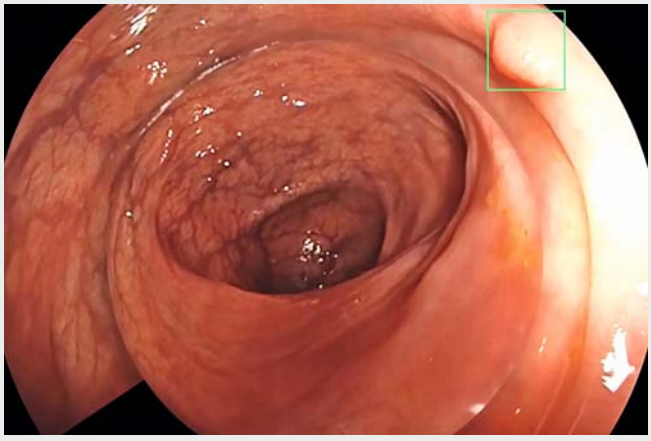
Computer-assisted detection of diminutive and small colon polyps by colonoscopy using an extra-wide-area-view colonoscope

Recently, artificial intelligence (AI), especially using deep learning such as convolutional neural networks, has made great improvements in image recognition. The application of AI to computer-aided diagnosis (CAD) and computer-assisted detection (CADe) in gastrointestinal endoscopic imaging is expected to assist the nonexpert colonoscopist. Moreover, in several reports high accuracy has been achieved for real-time detection and localization of colon polyps [1, 2]. However, previous reports have been limited to colonoscopes with the conventional angle of view, and the CADe system cannot detect polyps that are out of sight. A prototype extra-wide-area-view colonoscope (EWAVC) has two lenses, a 160°-to-240°-angle lateral – backward-view lens and a standard 160°-angle forward-view lens; views from both these lenses are simultaneously constructed and displayed on a video monitor as a single image (Olympus Co., Tokyo, Japan) (▶ **Fig. 1 a, b**) [3, 4]. This novel endoscopic image is expected to assist in achieving a higher adenoma detection rate and a reduced polyp miss rate. Current drawbacks are that endoscopists are not familiar with the lateral–backward view, and the wider-view monitor has the potential to cause endoscopists to overlook polyps that are in view.



▶ **Fig. 1** **a** Tip of a prototype extra-wide-area-view colonoscope (EWAVC) showing lateral–backward-view and forward-view lenses. **b** Endoscopic image of a simulated polyp behind a fold in the lateral–backward field seen with this colonoscope using an anatomic colorectal model.

▶ **Fig. 2** **a** Computer-assisted detection of a diminutive polyp (rectangle) in the forward field seen with the EWAVC. **b** Computer-assisted detection of a 5-mm polyp (rectangle) in the forward field seen with the EWAVC. **c** Computer-assisted detection of a 4-mm polyp (rectangle) behind a fold in the lateral–backward field seen with the EWAVC.



Video 1 Computer-assisted detection of diminutive and small colon polyps by colonoscopy using a novel extra-wide-area-view colonoscope.

We have developed a prototype novel CADe system for colon polyp detection using an EWAVC. In the video, we show first detection of a diminutive polyp in the conventional viewing angle (▶ **Fig. 2 a, b**). Second, we show detection of a diminutive polyp in the extra-wide-area view angle (▶ **Fig. 2 c, d**). The lateral–backward view lens can identify a polyp that is behind a fold. After detecting this polyp, we can remove it using the cold polypectomy technique. The working channel in this novel colonoscope is at five o'clock. After a little experience, polypectomy can be done without any problem. CADe with AI using EWAVC may be helpful for improving the adenoma detection rate and reducing the polyp miss rate of endoscopists with varying levels of experience.

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Competing interests

The authors declare that they have no conflict of interest.

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