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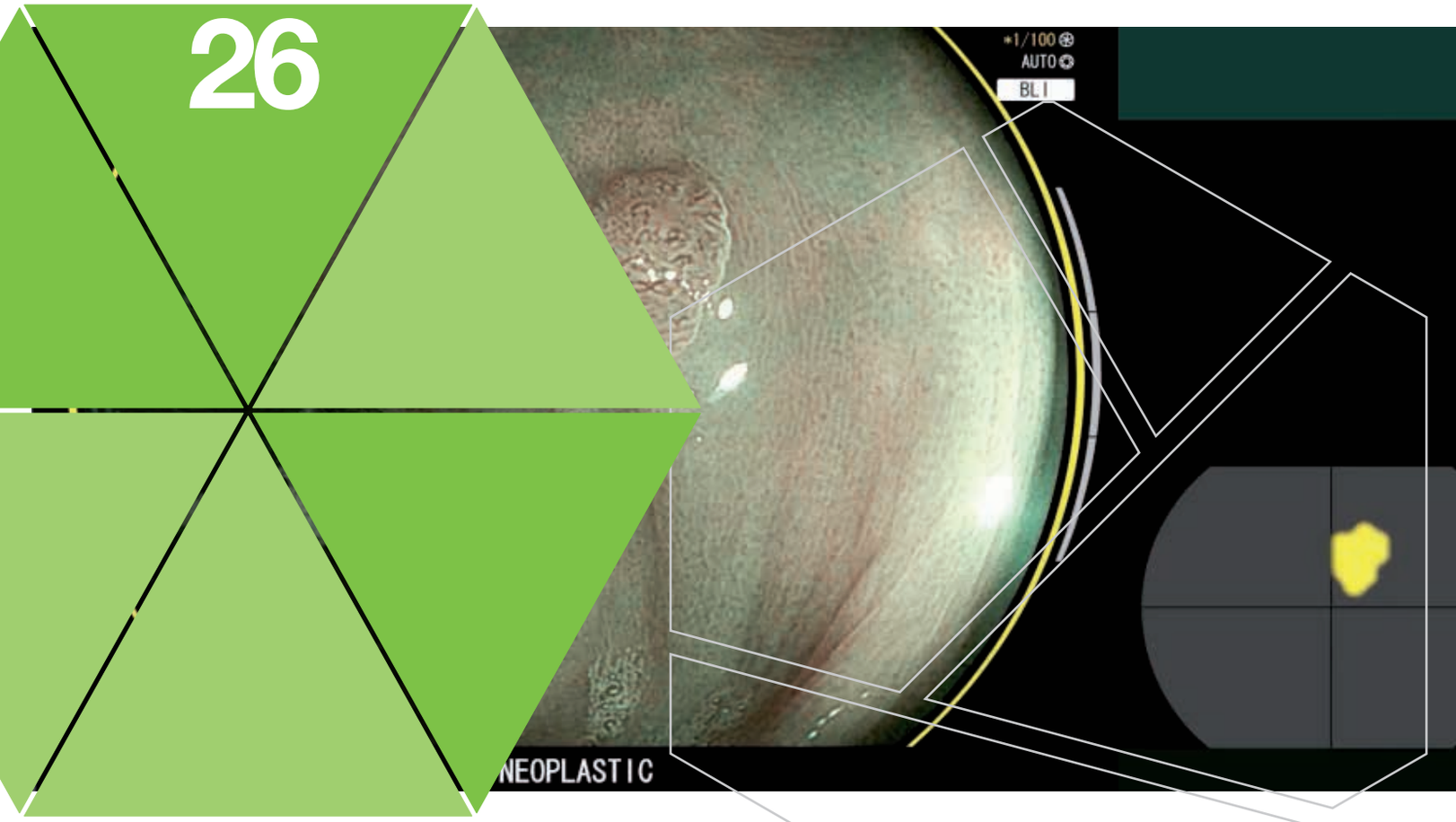

Endoscopy

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CAD EYE - The Endoscopist armed with a second set of eyes

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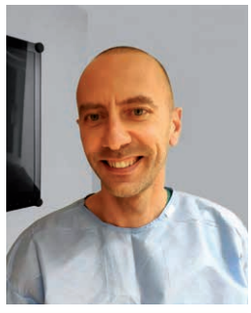

CAD EYE - How a second set of eyes could impact quality in colonoscopy

The need for good quality colorectal cancer screening programs is well established. Colorectal cancer is one of the most prevalent cancers and one of the leading causes of cancer death. Several quality indicators have been developed for colonoscopy. ESGE performance measures proposed for colonoscopy recommend a cecal intubation rate ≥ 90%, an adenoma detection rate (ADR) ≥ 25% and an appropriate polypectomy technique (≥ 80%), with low rate of complications as key intra-procedural performance measures. Concerning the detection of pathology, the ADR is the key performance measure to be audited, being the withdrawal time and the polyp detection rate (PDR) minor performance measures. In this regard, actions to improve the ADR are of utmost importance and extensively sought for.

Some studies have already evaluated the role of nurse endoscopists as a second set of eyes to improve polyp detection rates. Recent meta-analyses of randomized controlled trials have shown improved PDR and ADR with the participation of nurses as second observers. The rationale for a second set of eyes is also derived from previous studies showing polyp miss rates up to 24%, even for experienced endoscopists. Improvements in polyp detection rates, namely in the detection of adenomas are pivotal in colorectal cancer screening programs, as even a 1% increase in ADR has been associated with a 3% drop in the incidence of interval colorectal cancer.

This is the arena were artificial intelligence technologies to improve polyp detection can shine. Some polyps are more prone to be missed by the human eye, even for experienced endoscopists with high ADR, such as small polyps, polyps located behind folds, in poorly distended segments or in bowel segments with residues. Even significant adenomas in a well prepared and distended colon can be missed when they are near larger polyps that capture the attention of the endoscopist.

I had the opportunity to use the artificial intelligence platform from Fujifilm – **CAD EYE, that is an AI platform based on deep learning that works as a second set of eyes.**
It can be used with 700 series colonoscopes and will support the detection and characterisation of colonic polyps. CAD EYE can be easily activated on the endscope and works in real time in an unobtrusive way throughout the procedure. It is so unobtrusive that it can be used in the progression as well as during withdrawal without compromising the cecal intubation step. If a polyp is suspected during the procedure, a square detection box is superimposed in the suspected area and an acoustic signal is produced directing the attention of the endoscopist. If the endoscopist confirms that it is a true polyp, the polyp **characterization function** of CAD EYE can be activated simply switching to the BLI mode. The polyp is then classified as either neoplastic or non-neoplastic in real time without the need to freeze the image.

It is intuitive that the use of this technology will result in higher ADR and a reduction of polyp missing rates. However, the quantification of the real life impact of CAD EYE in the increase in the ADR is yet to be established.

In the procedures in which I have used **CAD EYE**, as a second set of eyes, I noticed that in several occasions the small detection boxes and the acoustic signals directed my attention to some parts of the image when I was initially focusing in different areas. Although subjectively, and not based on comparative data, I felt that using CAD EYE, as a second set of eyes, in all examinations could likely result in detecting more polyps, mostly difficult to find polyps, without adding any inconvenience to the procedure.

In the same sense, the characterization function is yet to be validated. Experienced endoscopists have already good prediction rates, when using high definition endoscopy accompanied by image enhancing technologies like BLI.

However, the main focus of this tool could be for less experienced endoscopist as the learning curve to accurately predict polyp histology is quite steep. In addition, it can also quantitatively support experienced endoscopists practicing "diagnose and leave" or "resect and discard" strategies.

CAD EYE, as a second set of eyes, seemed to be already a helpful technology at its current stage. As deep learning artificial intelligence technologies, they will be increasingly more accurate and their impact in colorectal cancer screening programs and likely other settings will be progressively more significant. And some day, like a seat belt or an air bag, probably mandatory.

Detection of a polyp between folds

Patient information / Indication

A 65 years old male was referred for colonoscopy after a positive fecal immunochemical test.

Methods & results

A small polyp hidden between two folds was detected by CAD EYE (figure 1) in the sigmoid colon. After detection, the polyp was properly evaluated under White Light Imaging (WLI) (Figure 2) and Linked Color Imaging (LCI) (Figure 3). After changing to the Blue Light Imaging (BLI) mode, the CAD EYE system classified the polyp as a neoplastic polyp (Figure 4).

Conclusion

After polypectomy, histological analysis demonstrated the presence of a tubulovillous adenoma with low-grade dysplasia (Figure 5, 6).

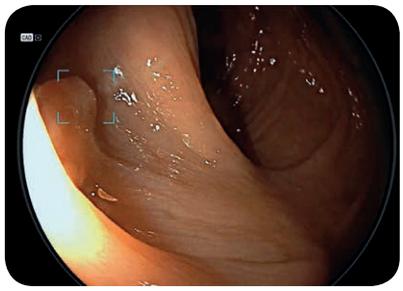

Figure 1

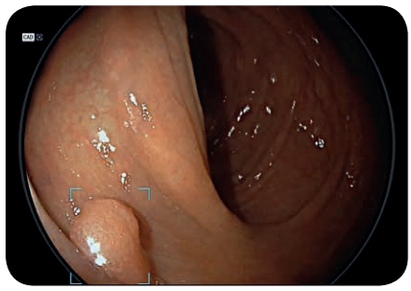

Figure 2

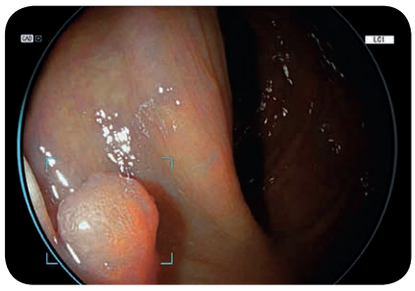

Figure 3

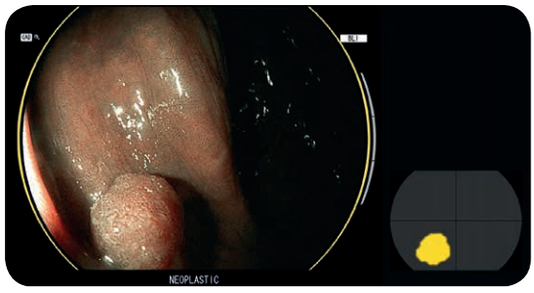

Figure 4

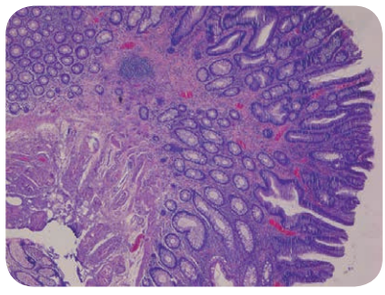

Figure 5

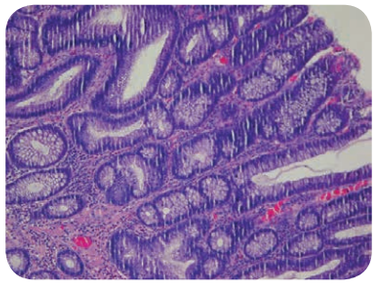

Figure 6

Detection of a polyp in a poorly distended spastic colon with fluid residues

Patient information / Indication

A 66 years old female underwent colonoscopy for post-polypectomy surveillance.

Methods & results

A small polyp was detected by CAD EYE in the sigmoid colon, which was poorly distended from persistent spastic contractions and obscured by some fluid residues (Figure 1). After proper distension and cleaning, a 6 mm polyp was clearly observed in WLI (Figure 2) and LCI (Figure 3). Under BLI, CAD EYE classified the polyp as a neoplastic polyp (Figure 4). Cold snare polypectomy was performed.

Conclusion

Histological analysis revealed a tubulovillous adenoma with low grade dysplasia (Figure 5, 6).

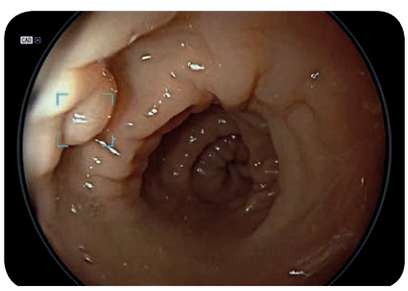

Figure 1

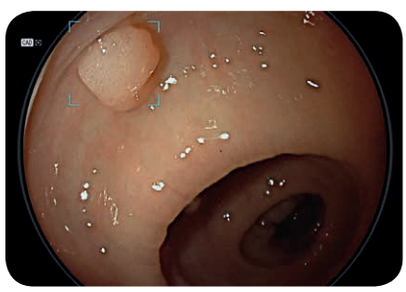

Figure 2

Figure 3

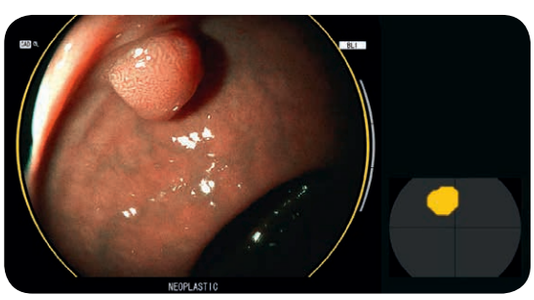

Figure 4

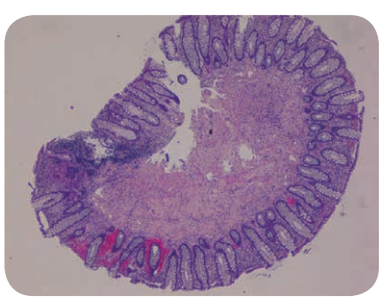

Figure 5

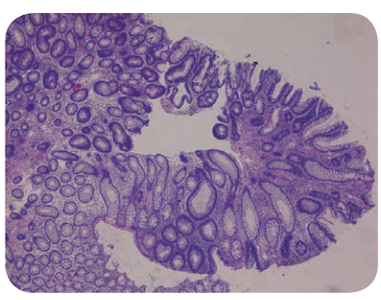

Figure 6

Impact of cad-eye on the detection of difficult to find polyps

Colonoscopy has the potential to decrease colorectal cancer (CRC) mortality by 60%[1]. However, even for experienced endoscopists, the polyp missing rate may be up to 24%[2].
On the other hand, a 1% increase in the adenoma detection rate has been associated with a 3% decrease in the incidence of interval CRC[3].
In this sense, Artificial Intelligence technologies like CAD EYE, as new tools in the armamentarium of Endoscopists to improve the detection of polyps, may likely have the potential to decrease the incidence of interval CRC.

1 Baxter, NN, et al. Association between colonoscopy and colorectal cancer mortality in a US cohort according to site of cancer and colonoscopist specialty. J. Clin. Oncol. 30, 2664–2669

2 Rex DK, et al. Colonoscopic miss rates of adenomas determined by back-to-back colonoscopies. Gastroenterology 1997; 112: 24-8

3 Corley, D. A. et al. Adenoma detection rate and risk of colorectal cancer and death. N. Engl. J. Med. 370, 1298–1306.