ARTÍCULO ORIGINAL

White light imaging versus artificial intelligence-assisted white light imaging for colorectal neoplasia detection: a randomised trial

Imágenes con luz blanca versus imágenes con luz blanca asistidas por inteligencia artificial para la detección de neoplasias colorrectales: un ensayo aleatorizado

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Conflict of interest
Carlos Eduardo Oliveira dos Santos and Ivan David Arciniegas Sanmartin are speakers and/or proctor of Fujinon Latin America, Júlio Carlos Pereira-Lima is proctor of Wilson Cook and Boston Scientific Latin America. All Other authors have no conflict of interest. The authors declare that the research was conducted in the absence of commercial or financial relationships that could be construed as potential conflicts of interest.

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ABSTRACT

Introduction: Adenoma detection rate (ADR) and sessile serrated lesion (SSL) detection rate (SDR) are crucial quality indicators for colonoscopy, as their improvement contributes to effective prevention of colorectal cancer. Artificial intelligence (AI) has been shown to significantly increase ADR. This study compared white light imaging (WLI) versus AI-assisted WLI for neoplasia detection. **Materials and methods:** This was a prospective, randomised trial of screening, surveillance, and symptomatic patients. Our primary objective was to evaluate ADR. Secondary objectives included SDR, mean number of adenomas per patient (MAP), neoplasia detection rate (NDR), advanced ADR (AADR), and colonoscope withdrawal time. **Results:** A total of 621 adenomas were diagnosed in 711 patients, with 310 adenomas in the WLI group and 311 adenomas in the WLI+AI group (p=0.65). Eighty-three SSLs and two intramucosal carcinomas were also detected, totalling 706 neoplasms. ADR was 45.9% in the WLI group and 50.8% in the WLI+AI group (p=0.20). ADR was 54.4% for screening, 49.0% for surveillance, and 40.0% for symptomatic patients (p=0.01). Marginal significance was observed in the WLI+AI group for screening patients (61.5% vs. 49.2%, p=0.06). SDR was 9.0% for both groups. MAP (0.9 vs. 0.9, p=0.34), NDR (51.0% vs. 56.8%, p=0.13), and AADR (8.4% vs. 7.6%, p=0.78) did not differ significantly between the groups. Withdrawal time was similar for the WLI (12.4 ± 5.1 min) and WLI+AI (12.2 ± 4.1 min) groups (p=0.32). **Conclusions:** AI-assisted colonoscopy demonstrated high ADR and NDR. While without statistical relevance overall, marginal significance was observed for screening patients.
Keywords: *Colonoscopy; Polyps; Adenomas; Artificial Intelligence (source: MeSH NLM).*

RESUMEN

Introducción: La tasa de detección de adenomas (ADR) y la tasa de detección de lesiones serradas sésiles (SDR) son indicadores de calidad esenciales en la colonoscopía, ya que su optimización contribuye directamente a la prevención efectiva del cáncer colorrectal. La inteligencia artificial (IA) ha demostrado incrementar significativamente la ADR. El presente estudio comparó la detección de neoplasias mediante imagen de luz blanca (WLI) frente a WLI asistida por IA. **Materiales y métodos:** Se realizó un ensayo prospectivo y aleatorizado que incluyó pacientes en programas de tamizaje, vigilancia y pacientes sintomáticos. El objetivo primario fue evaluar la ADR. Los objetivos secundarios incluyeron la SDR, el número promedio de adenomas por paciente (MAP), la tasa de detección de neoplasias (NDR), la tasa de detección de adenomas avanzados (AADR) y el tiempo de retiro del colonoscopio. **Resultados:** Se diagnosticaron un total de 621 adenomas en 711 pacientes, con 310 adenomas en el grupo WLI y 311 adenomas en el grupo WLI+IA (p=0,65). También se detectaron 83 lesiones serradas sésiles y dos carcinomas intramucosos, sumando un total de 706 neoplasias. La ADR fue de 45,9% en el grupo WLI y de 50,8% en el grupo WLI+IA (p=0,20). La ADR fue de 54,4% para tamizaje, 49,0% para vigilancia y 40,0% para pacientes sintomáticos (p=0,01). Se observó una significancia marginal en el grupo WLI+IA para pacientes de tamizaje (61,5% vs. 49,2%, p=0,06). La SDR fue de 9,0% para ambos grupos. El MAP (0,9 vs. 0,9, p=0,34), la NDR (51,0% vs. 56,8%, p=0,13) y la AADR (8,4% vs. 7,6%, p=0,78) no mostraron diferencias significativas entre los grupos. El tiempo de retiro fue similar entre WLI (12,4±5,1 min) y WLI+IA (12,2±4,1 min) (p=0,32). **Conclusiones:** La colonoscopía asistida por IA presentó altos valores de ADR y NDR. Aunque no se observaron diferencias globales estadísticamente significativas, se identificó una tendencia favorable en pacientes sometidos a tamizaje.
Palabras clave: *Colonoscopia; Pólipos; Adenomas; Inteligencia Artificial (fuente: DeCS Bireme).*

INTRODUCTION

Colorectal cancer (CRC) is the fourth most common cancer worldwide, accounting for approximately 10% of all cancer-related deaths [1]. Screening colonoscopy allows for detection and resection of premalignant polyps, a strategy that has been shown to reduce CRC incidence and related mortality [2]. The term post-colonoscopy CRC (PCCRC) refers to cancers diagnosed after a negative colonoscopy that arise from missed cancers and missed or incompletely resected premalignant polyps [3]. The rate of PCCRC is directly related to the quality of a colonoscopy examination [4]. Gastroenterology society guidelines encourage performing and maintaining high-quality colonoscopy as determined by several procedural metrics including the adenoma detection rate (ADR), defined as the percentage of patients aged ≥ 45 years undergoing colonoscopy for screening, surveillance, or diagnostic indications who are found to have ≥ 1 adenomas [5,6]. To minimise the risk of PCCRC, endoscopists should maintain a minimal ADR of 35% in their practice [5]. Recent guidelines also recognise the malignant potential of sessile serrated lesions (SSLs) and propose calculating an SSL detection rate (SDR) with a performance threshold set at ≥ 6% [5].

In recent years, artificial intelligence (AI) systems capable of real-time detection of colorectal polyps by displaying a bounding box over the polyp have been brought to market. Randomised controlled trials comparing AI-assisted colonoscopy to conventional colonoscopy report an increase in ADR with the use of AI ranging from 8% to 20% in addition to a 78% reduction in the sessile serrated adenoma miss rate [7-9]. It is important to highlight that most randomised controlled studies on AI-assisted colonoscopy have been performed in Europe, Asia, and the United States and that limited data exist on the diagnostic characteristics of these systems in populations outside these regions. Validation of an AI model in its intended target population is an important step that ensures model reliability and generalizability. Herein, we report the results of the first prospective, randomised controlled study comparing AI-assisted to conventional white light colonoscopy in patients referred for screening, surveillance, or diagnostic indications in a single centre in Brazil. Colonoscopy metrics including ADR, SDR, mean number of adenomas per patient (MAP), neoplasia detection rate (NDR), and advanced ADR (AADR) are reported between groups.

MATERIALS AND METHODS

Study design

This single-centre, prospective, randomised trial was approved by the research ethics committee of our institution and conducted in accordance with the Declaration of Helsinki. All participants provided written informed consent. A computer-generated randomisation list was used to allocate participants to one of the two study groups. The allocation sequence was concealed in sealed envelopes, which were opened by a nurse before the start of colonoscope withdrawal.

Eligibility

Patients referred for screening, surveillance, and diagnostic colonoscopy from May 2024 to December 2024 were recruited for this study. Patients aged < 18 years, with inadequate bowel preparation (Boston scale < 6), CRC, scheduled adenoma removal (previous diagnosis of adenoma), previous colorectal resection, inflammatory bowel disease, acute lower gastrointestinal bleeding, actinic proctitis, or incomplete colonoscopy were excluded.

Randomisation

Patients were randomised in a 1:1 ratio into two groups: white light imaging (WLI) or AI-assisted WLI (WLI+AI). For analysis, patients were divided by sex (male and female) and age (< 50 years and ≥ 50 years).

Colonoscopic procedures

All colonoscopies were performed by an endoscopist with experience in AI (> 1000 procedures), using a high-definition colonoscope (EC-760ZP-V/L, Fujifilm Co, Japan) and the ELUXEO 7000 system. The computer-aided design (CAD) platform with deep learning used in the study was CAD EYE (Fujifilm Co, Japan).

Preparation involved the oral consumption of 1 L of 10% mannitol solution on the day of the examination, preceded by one-day fibre-free, clear-liquid diet for bowel cleansing. Bowel preparation was considered adequate if Boston scale > 6. Conscious sedation, with intravenous administration of midazolam and fentanyl, was used for all colonoscopies. The WLI mode was used for all patients during withdrawal, with AI-assisted WLI applied to one of the groups.

Lesion characteristics were evaluated, including size, morphology, location, and histology. An open biopsy forceps served as a guide for measuring lesion size, which was categorised into two groups: ≤ 5 mm and > 5 mm. Colonoscopy withdrawal time was > 6 min in all examinations. Lesion morphology was classified as polypoid or non-polypoid. Location was divided into the right colonic segment (from the transverse colon to the cecum) and the left colonic segment (from the rectum to the descending colon). All detected lesions were removed only during withdrawal of the colonoscope.

For histology, specimens were fixed in 10% formalin and assessed in accordance with the World Health Organisation guidelines for the classification of colorectal tumours [10]. Adenoma, SSL, and intramucosal carcinoma were defined as neoplastic lesions. Any lesion ≥ 10 mm in size, or with high-grade dysplasia or a villous component was considered an advanced adenoma (AA). ADR was defined as the proportion of patients in whom at least one adenoma was detected. Similar definitions were applied to the polyp detection rate (PDR), SDR, NDR, and AADR. MAP was calculated as the number of detected adenomas divided by the total number of colonoscopies.

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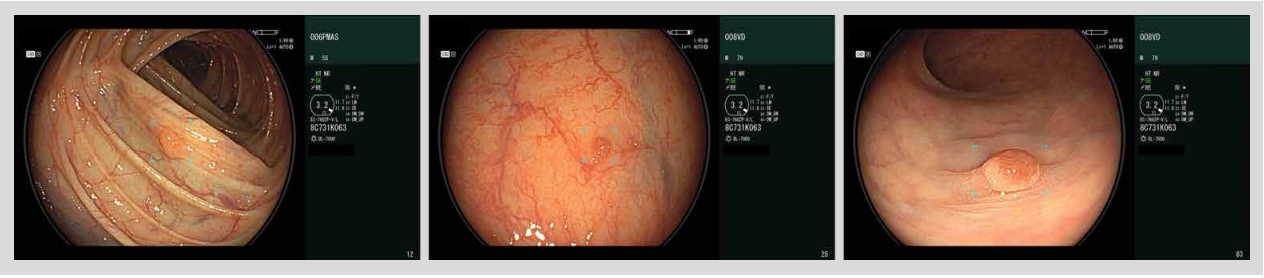

Figure 1. Lesions detected by AI-assisted WLI.

Statistical analysis

Data were tabulated in Excel and analysed in Stata 18.0. Descriptive analyses were performed using absolute and relative frequencies for categorical variables and means and standard deviations (SD) for numerical variables. Bivariate analyses were performed to compare each indicator between the two groups (WLI vs. WLI+AI) using Fisher's exact test or the chi-square test for categorical variables and the Mann-Whitney U test for numerical variables. Statistical significance was set at 5% for all two-tailed tests.

Ethical considerations

This trial was approved by the research ethics committee of the Hospital Santa Casa de Caridade de Bagé and conducted in accordance with the Declaration of Helsinki.

RESULTS

A total of 844 patients were considered eligible for the study. After excluding 133 patients, 711 remained for the final analysis. Of these, 357 were in the WLI group and 354 were in the WLI+AI group (Figure 1). The randomisation flow diagram is shown in Figure 2.

Patient and lesion characteristics are described in Table 1. A total of 865 polyps were detected in 465 patients. The mean (SD) patient age was 59.9 (13.2) years; 561 patients (78.9%) were ≥ 50 years of age. There was a predominance of women (65.8%). The mean (SD) lesion size was 4.1 (3.3) mm. The overall PDR was 65.4%. PDR was 63.0% in the WLI group and 67.8% in the WLI+AI group (p=0.21). The mean

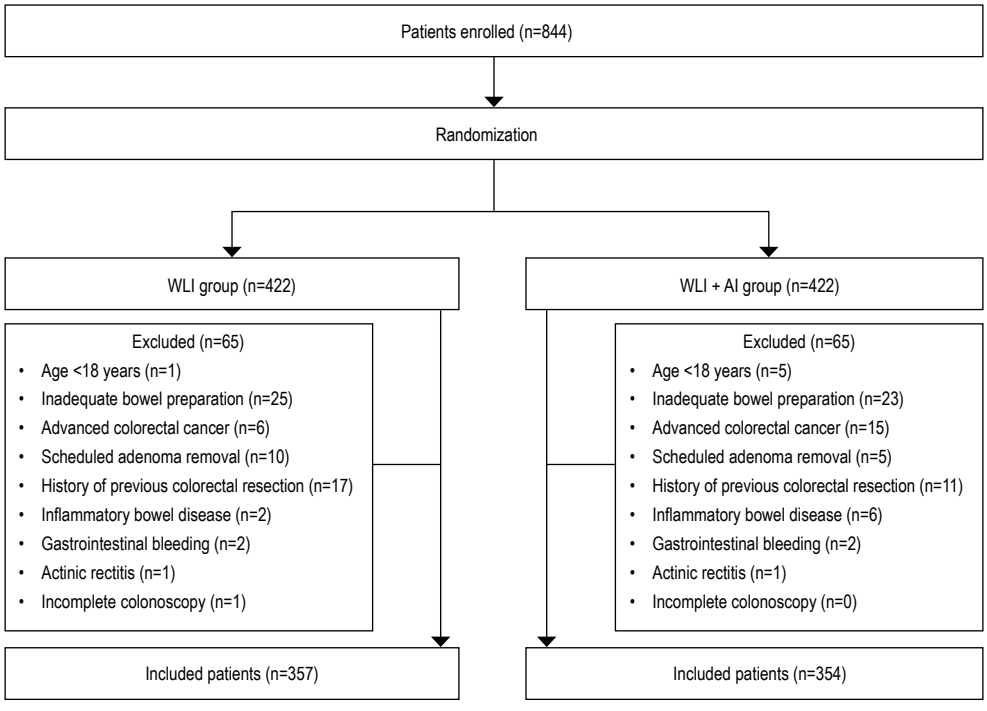

Figure 2. Randomisation flow diagram.

Table 1. Patient and lesion characteristics.

Variable	All	WLI group	WLI+AI group	p-value*
	n (%)	n (%)	n (%)	
Sex (n=711)				0.38
Male	243 (34.2)	128 (35.9)	115 (32.5)	
Female	468 (65.8)	229 (64.1)	239 (67.5)	
Age in years (n=711)				0.27
< 50	150 (21.1)	69 (19.3)	81 (22.9)	
≥ 50	561 (78.9)	288 (80.7)	273 (77.1)	
Morphology (n=865)				0.71
Non-polypoid	615 (71.1)	307 (70.4)	308 (71.8)	
Polypoid	250 (28.9)	129 (29.6)	121 (28.2)	
Size (n=865)				0.93
≤ 5 mm	732 (84.6)	368 (50.3)	364 (49.7)	
> 5 mm	133 (15.4)	68 (51.1)	65 (48.9)	
Location (n=865)				0.21
Right	513 (59.3)	268 (61.5)	245 (57.1)	
Left	352 (40.7)	168 (38.5)	184 (42.9)	
Histopathology (n=865)				1.00
Non-neoplastic	159 (18.4)	80 (18.4)	79 (18.4)	
Neoplastic	706 (81.6)	356 (81.6)	350 (81.6)	
Adenoma (n=865)				0.65
No	244 (28.2)	126 (28.9)	118 (27.5)	
Yes	621 (71.8)	310 (71.1)	311 (72.5)	
Serrated lesion (n=865)				0.49
No	782 (90.4)	391 (89.7)	391 (91.1)	
Yes	83 (9.6)	45 (10.3)	38 (8.4)	
Advanced adenoma (n=865)				0.51
No	805 (93.1)	403 (92.4)	402 (93.7)	
Yes	60 (6.9)	33 (7.6)	27 (6.3)	

WLI: white light imaging; AI: artificial intelligence.
* Fisher's exact test comparing groups.

(SD) number of polyps per patient was 1.04 (1.3) and 1.05 (1.1), respectively (p=0.36).

Adenoma characteristics are described in Table 2. A total of 621 adenomas (tubular, tubulovillous, and villous) were diagnosed in 344 patients, with 310 adenomas in the WLI group and 311 adenomas in the WLI+AI group (p=0.65); the mean (SD) patient age was 60.2 (12.7) years. Of these, 559 adenomas (90.0%) were detected in patients aged ≥ 50 years and 360 (58.0%) were detected in women, with

Table 2. Description of adenomas.

Variable	All adenomas (n=621)	WLI group (n=310)	WLI+AI group (n=311)	p-value*
	n (%)	n (%)	n (%)	
Sex				1.00
Male	261 (42.0)	130 (41.9)	131 (42.1)	
Female	360 (58.0)	180 (58.1)	180 (57.9)	
Age (years)				0.69
< 50	62 (10.0)	29 (9.4)	33 (10.6)	
≥ 50	559 (90.0)	281 (90.6)	278 (89.4)	
Morphology				0.73
Non-polypoid	426 (68.6)	215 (69.3)	211 (67.8)	
Polypoid	195 (31.4)	95 (30.7)	100 (32.2)	
Size				0.31
≤ 5 mm	550 (88.6)	279 (90.0)	271 (87.1)	
> 5 mm	71 (11.4)	31 (10.0)	40 (12.9)	
Location				1.00
Right	388 (62.5)	194 (62.6)	194 (62.4)	
Left	233 (37.5)	116 (37.4)	117 (37.6)	

WLI: white light imaging; AI: artificial intelligence.
* Chi-square test

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Table 3. ADR according to colonoscopy indications.

Indication	All	WLI group	WLI+AI group	p-value*
	n (%)	n (%)	n (%)	
Screening	127 (55.0)	60 (49.2)	67 (61.5)	0.06
Surveillance	148 (49.0)	76 (50.7)	72 (47.4)	0.57
Diagnostic	69 (40.0)	28 (32.9)	41 (44.1)	0.13
p-value	0.01	0.02	0.03	

ADR: adenoma detection rate; WLI: white light imaging; AI: artificial intelligence.
* Chi-square test

no significant difference between the groups (p=1.00). The mean (SD) MAP was 0.9 (1.3), with 0.9 (1.3) for the WLI group and 0.9 (1.2) for the WLI+AI (p=0.34). The mean (SD) adenoma size was 3.8 (2.8) mm, with 3.7 (3.2) mm for the WLI group and 3.8 (2.6) mm for the WLI+AI group (p=0.34). Most adenomas were up to 5 mm in size (88.6%), with no difference between the groups: 279 (90.0%) vs. 271 (87.1%) (p=0.31). Regarding morphology, there was a predominance of non-polypoid adenomas in both groups, with 215 (69.3%) in the WLI group and 211 (67.8%) in the WLI+AI group (p=0.73). In both groups, adenomas were more commonly located in the right colon (62.6% vs. 62.4%, p=1.00). The overall ADR was 48.4%, with 45.9% for the WLI group and 50.8% for the WLI+AI group (p=0.20).

When screening, surveillance, and symptomatic patients were analysed separately, ADR was 54.4%, 49.0%, and 40.0%, respectively (p=0.01). Marginal significance was observed in the WLI+AI group for screening patients (61.5% vs. 49.2%, p=0.06). The ADR results in relation to colonoscopy indications are shown in Table 3.

A total of 83 SSLs were detected in 64 patients: 45 in the WLI group and 38 in the WLI+AI group, with a predominance in women (72.3%) and individuals aged ≥ 50 years (77.1%). Most lesions were non-polypoid (78.3%), > 5 mm in size (61.4%), and located in the right colon (68.7%). Both groups showed a similar predominance of women (71.1% vs. 73.7%, p=0.81), individuals aged ≥ 50 years (82.2% vs. 71.0%, p=0.30), non-polypoid lesions (80% vs. 76.3%, p=0.18), and lesions > 5 mm (68.9% vs. 52.6%, p=0.18). The SDR was 9.0% overall and for each group. A total of 706 neoplastic lesions (81.6%) were detected, including 621 adenomas, 83 SSLs, and 2 intramucosal carcinomas. Of these, 356 were in the WLI group and 350 were in the WLI+AI group, with a percentage of 81.6% for both groups. The overall NDR was 53.9%, with 51.0% for the WLI group and 56.8% for the WLI+AI group (p=0.13). The overall AADR was 8.0%, with 8.4% for the WLI group and 7.6% for the WLI+AI group (p=0.78). A comparative description of the detection rates is shown in Table 4.

The mean (SD) caecal intubation and withdrawal times for the WLI and WLI+AI groups were 4.1 (1.9) min vs. 4.2 (2.2) min (p=0.58) and 12.4 (5.1) min vs. 12.2 (4.1) min (p=0.32), respectively.

DISCUSSION

AI is primarily used in colonoscopy for computer-aided detection (CADe) of lesions, which has enabled less experienced endoscopists to perform at a level comparable to that of experts. The European Society of Gastrointestinal Endoscopy (ESGE) guidelines, for the acceptance of AI in evaluating the completeness of mucosal visualisation and detecting colorectal polyps, suggest that AI-assisted detection rates should be comparable to those of experienced endoscopists [11]. Similar performance for ADR and MAP has been observed between AI-supported trainees and experts (38% vs. 40% and 0.93 vs. 1.07, respectively), demonstrating the impact of AI on the performance of inexperienced endoscopists [12]. Our study compared the performance of colonoscopy using WLI and AI-assisted WLI, evaluating the impact on neoplasia detection, especially ADR, which is considered the main quality indicator for colonoscopy and should be ≥ 35% [5].

Several studies have demonstrated that AI increases ADR. An Italian multicentre study involving 1158 patients identified a significantly higher ADR in the CADe group than in the control group (50.2% vs. 40.5%, p=0.001), as

Table 4. Analysis of detection rates.

Variable	All (n=711)	WLI group (n=357)	WLI+AI group (n=354)	p-value*
PDR (%)	65.4	63.0	67.8	0.21
ADR (%)	48.4	45.9	50.8	0.20
SDR (%)	9.0	9.0	9.0	1.00
NDR (%)	53.9	51.0	56.8	0.13
AADR (%)	8.0	8.4	7.6	0.78

WLI: white light imaging; AI: artificial intelligence; PDR: polyp detection rate; ADR: adenoma detection rate; SDR: serrated detection rate; NDR: neoplasia detection rate; AADR: advanced adenoma detection rate.

* Mann-Whitney U test.

well as a higher MAP (1.16 ± 1.82 vs. 0.80 ± 1.46, p<0.001). However, there was no significant difference in SDR (12.1% vs. 11.0%, p=0.631) [13]. Lee *et al.* [14] conducted a meta-analysis of 24 randomised trials, involving 17,413 colonoscopies, and showed that AI-assisted colonoscopy increased ADR (p<0.001), and this improvement was more pronounced in studies conducted in Asia compared with those in Europe and the United States (p=0.007). No significant difference was found between the different AI systems (p=0.29). Studies involving only experts and those involving both experts and non-experts showed similar results (p=0.90), both demonstrating an increase in ADR (p<0.001). In our study, both ADR and MAP were similar in the WLI and WLI+AI groups (45.9% vs. 50.8% and 0.9 vs. 0.9, respectively). The lack of a statistically significant difference in our findings may be attributed to the endoscopist being a high adenoma detector.

AI has also been shown to reduce miss rates. A meta-analysis by Jin *et al.* [15] showed a significantly lower adenoma miss rate (AMR) in the AI group compared with the control group (pooled relative risk [RR] 0.46; 95% confidence interval [CI], 0.36-0.59; p<0.001). The results also indicated that AI reduced the miss rate of SSLs (pooled RR 0.43; 95% CI, 0.20-0.92; p<0.05) and adenomas ≤ 5 mm (pooled RR 0.49; 95% CI, 0.26-0.93), but no significance was observed for AAs (pooled RR 0.48; 95% CI, 0.17-1.37; p=0.17). The mean number of adenomas detected during the second procedure also favoured AI (p=0.01). There was no difference in withdrawal time. Maida *et al.* [16] conducted a meta-analysis of six randomised controlled trials, involving 1178 patients, and observed a significantly lower AMR with CADe compared with WLI (RR 0.46; 95% CI, 0.38-0.55; p<0.001). No significant difference was observed in advanced AMR (RR 1.28; 95% CI, 0.34-4.83; p=0.71) or SSL miss rate (SMR) (RR 0.44; 95% CI, 0.15-1.28; p=0.13). A sensitivity analysis including only randomised controlled trials performed in the CRC screening and surveillance setting confirmed lower AMR (RR 0.48; 95% CI, 0.39-0.58; p<0.001) and SMR (RR 0.28; 95% CI, 0.11-0.70; p=0.007) for CADe compared with WLI. Failure to adequately expose the mucosal folds is considered a contributing factor to missed lesions and, consequently, to interval CRC, which may be attributed to insufficient training, poor technique or rapid colonoscope withdrawal (< 6 min), or even endoscopist fatigue during the procedure.

Spadaccini *et al.* [17] evaluated 10 randomised trials involving 5421 patients with a positive faecal immunochemical test (FIT) and found a higher ADR in the CADe group than in the control group (0.62 vs. 0.52; RR 1.19; 95% CI, 1.08-1.31). A per-polyp analysis showed that CADe also resulted in higher ADR (incidence rate ratio 1.16; 95% CI, 1.09-1.24) and SDR (incidence rate ratio 1.20; 95% CI, 1.05-1.38). No differences were found in AADR between the groups.

Makar *et al.* [8] analysed 23,861 participants from 28 randomised trials and demonstrated a 20% increase in ADR (RR 1.20; 95% CI, 1.14-1.27; p<0.01) and a 55% reduction in AMR (RR 0.45; 95% CI, 0.37-0.54; p<0.01) using CADe compared with routine unassisted colonoscopy. Similar results were found in subgroup analyses involving only experts (RR 1.19; 95% CI, 1.11-1.27; p<0.001). CADe significantly increased MAP (weighted mean difference 0.21; 95% CI, 0.14-0.29; p<0.01), primarily due to increased detection of lesions ≤ 5 mm (RR 1.46; 95% CI, 1.19-1.80; p<0.001). There was no significant difference in the detection of lesions measuring 6-9 mm (RR 1.11; 95% CI, 0.94-1.31; p=0.20) or ≥ 10 mm (RR 1.24; 95% CI, 0.94-1.62; p=0.12). SDR (RR 1.10; 95% CI, 0.93-1.30; p=0.27) and SMR (RR 0.44; 95% CI, 0.16-1.19; p=0.11) were similar. No significant difference was observed in AADR between the groups (RR 1.08; 95% CI, 0.95-1.22; p=0.23). AI-assisted colonoscopy led to a minor prolongation of withdrawal time by 0.15 min (9 s) (weighted mean difference 0.15; 95% CI, 0.04-0.25; p=0.01), but with a 39% increase in the rate of non-neoplastic resection (RR 1.39; 95% CI, 1.23-1.57; p<0.001). In our study, no differences were found between groups in the detection of adenomas ≤ 5 mm (90% vs. 87.1%), SDR (9.0% for both groups), AADR (8.4% vs. 7.6%), or withdrawal time (12.4 vs. 12.2 min).

Lagström *et al.* [18] demonstrated a significantly higher ADR in the AI group compared with the control group (59.1% vs. 46.6%, p<0.001). Most procedures (81.3%) were performed by expert endoscopists. A significant increase was observed among experts (59.9% vs. 47.3%, p<0.002) but not among non-experts (55.2% vs. 43.9%, p=0.19), potentially due to the small sample size. AI assistance led to an increased detection of adenomas ≤ 5 mm (413 vs. 323, p<0.001) but no difference in the detection of adenomas measuring 6-9 mm or ≥ 10 mm. AI assistance significantly increased ADR in screening colonoscopies (74.4% vs. 58.1%, p=0.003). ADR was higher in the AI group than in the control group both before (57.7% vs. 46.7%, p=0.014) and after 12 noon (61.9% vs. 46.3%, p=0.011). There was no significant difference between the two groups when comparing ADR before and after 12 noon (p=0.455 vs. p=1.0, respectively). Our study found a marginal significance of ADR in the AI-assisted group for patients undergoing screening colonoscopy.

Gangwani *et al.* [19], comparing AI, single observer, and dual observer, demonstrated that both AI and dual observer achieved higher ADR (p<0.001) than single observer. AI and dual observer showed similar results (p=0.3). The high performance of CADe suggests that AI can act as a second observer, reducing AMR. Performing full-day procedures has been associated with a decrease in ADR in the afternoon (RR 1.18), probably due to fatigue, leading to reduced efficacy of colonoscopy [20]. Richter *et al.* [21] showed a decreasing trend in ADR throughout the day in the control group (p=0.015), but this trend was not present in the CADe group (p=0.65).

The American Gastroenterological Association (AGA) guideline has acknowledged the 8% (95% CI, 6%-10%) increase in ADR and 2% (95% CI, 0%-4%) increase in AADR and/or SDR with CADe, validating the potential of AI.

However, the panel concluded that no recommendation could be made for or against the use of CADe-assisted colonoscopy due to the lack of evidence for critical outcomes (desirable and undesirable), increased number of surveillance colonoscopies, and cost and resource implications [22].

A microsimulation model, using a hypothetical cohort of 100,000 US individuals at average risk for CRC undergoing screening colonoscopy with and without AI, showed in the primary analyses, compared with no screening, a relative reduction in CRC incidence of 44.2% with screening colonoscopy without AI and of 48.9% with screening colonoscopy with AI, demonstrating a 4.8% incremental gain. Compared with no screening, the relative reduction in CRC mortality with screening colonoscopy without AI was 48.7%, reaching 52.3% when combined with AI (3.6% incremental gain). AI detection tools decreased the discounted costs per screened individual by US$ 57. At the US population level, implementing AI detection during screening colonoscopy could lead to an additional prevention of 7194 CRC cases and 2089 related deaths annually, along with a yearly saving of US$ 290 million [23].

The main limitation of our study is that all examinations were performed by the same endoscopist, who is a high adenoma detector. Another limitation is that this endoscopist is highly experienced in AI.

In conclusion, this study demonstrated high rates of adenoma and neoplasia detection in AI-assisted colonoscopy, although without statistical significance, possibly because the endoscopist is a high adenoma detector. When analysing only patients who underwent screening colonoscopy, the WLI+AI group showed marginal significance in ADR compared with the control group.

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