Evaluation of A Computer-Aided Device During Water Exchange Colonoscopy : A Pragmatic Implementation Study

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Background

- Computer-aided detection (CADe) increases adenoma detection in randomized controlled trials (RCTs) using gas-insufflated colonoscopy.
- Pragmatic implementation studies fail to find significant improvement.
- False positives (FPs) by CADe distract endoscopists and hamper efficiency.
- Water exchange (WE) improves bowel cleanliness and may optimize polyp detection with CADe.

Hypothesis and Study Aims

- **Hypothesis:** WE with CADe detected more adenomas than WE alone in a performance improvement program.
- **Study aims:**
  - To compare the ADR of WE colonoscopy before and after the use of CADe device (CAD-EYE, Fujifilm, Japan).
  - To assess the frequency and causes of FPs using WE with CADe.

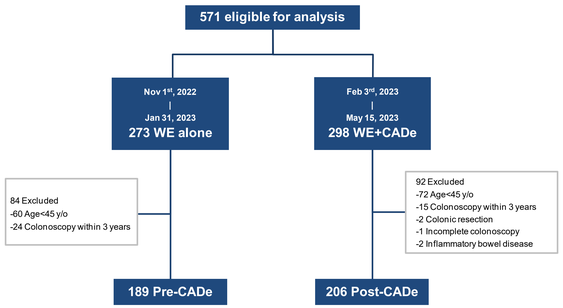
Methods

- **Study design:** A retrospective study with a historical control group.
- **Eligibility:** patients ≥45 y/o undergoing WE for screening, surveillance or diagnostic colonoscopy.
- **Exclusion:**
  - Previous surgical resection of the colon
  - Inflammatory bowel disease
  - Hereditary colorectal syndrome
  - Incomplete colonoscopy or polypectomy
  - Last colonoscopy within 3 years
  - Poor bowel preparation

Outcomes

- **Primary outcome:** ADR and adenoma per colonoscopy (APC)
- **Secondary outcomes:**
  - Proximal/right colon serrated polyp detection rates (SPDRs)
  - Clinically significant serrated polyp detection rate (CSSPDR)
    *CSSP: SSL, TSA, hyperplastic polyp (HP) ≥10 mm anywhere in the colon, or HP 6-9 mm in the proximal colon.
  - Frequency and causes of FPs

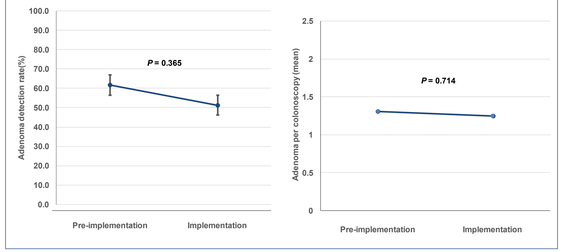
Study Overview



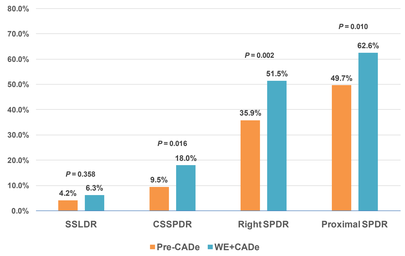
Results: Demographics

	Pre-CADe (N=189)	Post-CADe (N=206)	*P* value
Male, n (%)	86 (46)	100 (49)	0.545
Age, mean (SD), years	58.4 (8.9)	57.4 (8.6)	0.252
Active smoker, n (%)	17 (9)	47 (23)	**<0.001**
Indications of colonoscopy			0.674
Screening, n (%)	93 (49)	100 (49)	
Surveillance, n (%)	75 (40)	78 (38)	
Diagnostic, n (%)	12 (6)	12 (6)	
Positive FIT, n (%)	9 (5)	16 (8)	
Years since last colonoscopy			0.274

ADR and Adenoma per Colonoscopy (APC)



Serrated Polyp Detection Rate



Insertion and Withdrawal Times

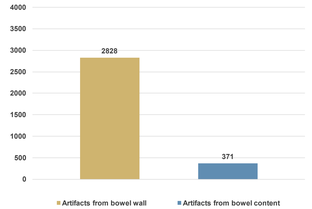
Variables presented as mean (SD)	Pre-CADe (N=189)	Post-CADe (N=206)	*P* value
Insertion time, min	14.8 (6.9)	14.7 (6.4)	0.966
Withdrawal time, min	20.5 (7.6)	21.9 (7.9)	0.076
Total procedure time, min	35.1 (11.1)	36.6 (10.1)	0.162
Water infused during insertion, mL	611 (269)	679 (243)	0.009
Water aspirated during insertion, mL	615 (249)	628 (228)	0.609

Colonoscopy Procedure Data

Variables presented as mean (SD)	Pre-CADe (N=189)	Post-CADe (N=206)	*P* value
Cecal intubation rate, n (%)	187 (99)	206 (100)	0.139
Total BBPS score	7.9 (0.9)	7.7 (1.0)	**0.011**
Right colon BBPS score	2.4 (0.5)	2.3 (0.5)	0.061
Insertion polypectomy performed, n (%)	14 (7)	29 (14)	**0.027**

BBPS, Boston Bowel Preparation Scale

Causes of False Positives by CADe



Frequency and Rate of Real-Time FP Results

Variables	False positives, n (%)	No. of FPs/colonoscopy, mean (SD)
Total FPs	3199	13.2 (6.9)
Artifacts from bowel wall	2828 (88)	11.7 (6.4)
Folds	2211 (69)	9.1 (5.8)
Normal mucosa	143 (5)	0.6 (0.9)
Hemorrhoids	196 (6)	0.8 (0.6)
Ileocecal valve	135 (4)	0.6 (0.6)
Suction	107 (3)	0.4 (0.7)
Artifacts from bowel content	371 (12)	1.5 (1.6)
Stool	275 (9)	1.1 (1.4)
Mucus	82 (3)	0.3 (0.8)

Discussion

- WE uniquely enhanced the performance of CADe in detecting proximal SP, CSSP.
- More patients were active smokers in the CADe group did not account for the observation as the effect of smoking was related to left colon SP detection.
- Use of CADe with WE did not improve ADR, APC consistent with prior pragmatic implementation trials.
- Most real-time FPs were due to artifacts from the bowel wall.

Conclusions

A COMBINATION OF **WATER ECXCHANGE AND ARTIFICIAL INTELLIGENCE** ACHIEVES COMPLIMENTARY BENEFITS IN FINDING SIGNIFICANTLY MORE **PROXIMAL/RIGHT COLON SERRATED POLYPS** AND **CLINICALLY SIGNIFICANT SERRATED POLYPS**.