Thieme

Standard screening high-definition colonoscopy without any optimization device is no longer relevant: Time to move to optimized screening colonoscopy

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Keywords
Polyps / adenomas / ..., CRC screening, Endoscopy Lower GI Tract, Diagnosis and imaging (inc chromoendoscopy, NBI, iSCAN, FICE, CLE...), Quality and logistical aspects, Quality management

received 3.1.2024
accepted after revision 16.2.2024

Bibliography
Endosc Int Open 2024; 12: E463–E466
DOI 10.1055/a-2280-7096
ISSN 2364-3722

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ABSTRACT

Optimizing the adenoma detection rate (ADR) is a major goal in colorectal cancer (CCR) screening, as it has long been established that ADR is inversely proportional to the risk of post-colonoscopy CRC occurrence. To achieve this goal, many optimization devices have been developed, and numerous randomized controlled trials have been conducted to evaluate the benefits of these devices compared with a "standard arm," which corresponds to date to high-definition white light (HD-WLI) colonoscopy. Numerous studies have confirmed the positive impact of various optimization devices, such as caps, computer-aided detection, and contrast-enhanced technologies. Moreover, the different ways in which the devices can impact ADR make them complementary. However, despite substantial and consistent data, practices remain unchanged, and HD-WLI colonoscopy, considered the "standard," is still routinely performed without any optimization devices. The objective of this viewpoint is to understand the barriers to change and to show why standard screening colonoscopy without the use of any optimization devices should no longer be considered relevant in 2024.

Introduction

Optimizing the adenoma detection rate (ADR) is a major goal in colorectal cancer (CRC) screening, because it has long been established that ADR is inversely proportional to the risk of post-colonoscopy CRC occurrence [1]. To achieve this goal, many optimization devices have been developed, and numerous randomized controlled trials (RCTs) have been conducted to evaluate the benefits of these devices compared with a "standard arm," which corresponds to date to high-definition white light (HD-WLI) colonoscopy. The main devices are listed below and their impact on ADR is described (▶ **Table 1**).

Caps

To explore colonic mucosa behind folds and thus avoid blind spots, caps can be attached at the tip of the colonoscope. Among them, Endocuff Vision (ECV) – which has been studied in large RCTs – has been shown to significantly increase ADR in routine colonoscopy (even in physicians whose ADR is already high), thus suggesting the systematic use of ECV in routine co-

▶ **Table 1** Synthesis on the impact of optimization devices on adenoma detection and adenoma miss rates.

	ADR	AMR
Caps (Endocuff Vision, Olympus)	↗	↘
Computer-aided colonoscopy systems	↗	↘
Contrast enhancement devices		
▪ LCI, Fujifilm	↗	↘
▪ TXI, Olympus	↗	No available data
Caps + Computer-aided colonoscopy systems	↗↗	No available data
Contrast enhancement devices + Computer-aided colonoscopy systems	↗↗	No available data

ADR, adenoma detection rate; AMR, adenoma miss rate.

lonoscopy [2, 3]. In contrast to the questionable impact of caps and the first generation of the Endocuff, an approximately 10% increase in ADR has been observed with ECV, and the device has been found to be useful in all colon locations, except for the rectum [3]. Other caps have yielded lower results when compared with ECV, which appears to be the best of the caps developed to date, and for which the literature is abundant [4, 5].

Computer-aided colonoscopy systems

Artificial intelligence systems recently developed to outperform human vision in polyp detection have been evaluated in many RCTs to date, with a significant increase of approximately 5% to 10% in ADR observed in routine colonoscopy thanks to computer-aided detection (CADe), even in non-academic units [6, 7, 8, 9, 10]. The benefit of CADe seems to be maximal in lower detectors, decreasing linearly in higher detectors [6]. The device, therefore, can help all endoscopists to maintain a high ADR – even at the end of an endoscopy session – and to avoid a decrease in vigilance when hunger or fatigue sets in. However, no one could reasonably claim to maintain high vigilance throughout the entire duration of a real-life endoscopy session. Moreover, CADe has been found to have a positive effect on ADR regardless of endoscopist experience in colonoscopy [9]. There are no reliable data for comparing the different CADe systems, and the fact the systems are constantly evolving due to software updates makes comparison difficult.

Contrast enhancement devices

Contrast enhancement devices have also been developed by many endoscopy companies. Among them, linked color imaging (LCI, Fujifilm) – the most promising – has been shown to have a positive impact on ADR in numerous RCTs [11], as well as on the sessile serrated lesion (SSL) detection rate [12]. However, conflicting data on the impact on proximal adenoma and SSL miss rates, which are strongly suspected to be implicated in post-colonoscopy CRC, mean that LCI could only have a moderate impact or not yet be the optimization contrast enhancement device of choice [13]. Contrast enhancement devices developed by other companies – such as new-generation narrow-band imaging (NBI, Olympus), I-scan (Pentax) or, more recently, texture and color enhancement imaging (TXI, Olympus) – also seem to yield good results when compared with HD-WLI colonoscopy [14, 15]. Few studies have compared contrast enhancement devices among themselves [16, 17]. In any case, every endoscopy unit has its own endoscope fleet from one of the aforementioned companies and is fairly captive to this company as regards the choice of the contrast enhancement device.

Combining the optimization devices

The optimization devices described above, each of which has been shown to have benefits in terms of ADR when compared with HD-WLI colonoscopy, seem to optimize ADR in three different ways. The first family of devices involves exposing more mucosal surface by unfolding the mucosa, as seen with Endocuff Vision. The second family is designed to enhance operator vigilance, thus helping every endoscopist maintain a high ADR throughout a real-life endoscopy session, as exemplified by CADe colonoscopy. The third aims to provide better visibility of invisible polyps by increasing the contrast between them and the normal mucosa, as achieved with contrast enhancement devices.

Arguably, combining these three different and complementary device families would have a synergistic effect on lesion detection. Some studies have attempted to pit them against each other to compare their impact on ADR [18], but such competition is arguably neither useful nor reflective of the reality of an endoscopy unit, which can use the devices in combination. Only a few studies to date have evaluated device combinations, with some examining the CADe-contrast-enhaced system pair [19] and others the “CADe-ECV” pair [20, 21, 22], with the latter pair demonstrating not only a significant increase in ADR but even a notable significant increase in advanced ADR when compared to HD-WLI alone [20].

Toward a change in practices

In light of the above, it is arguably no longer permissible to perform screening HD-WLI colonoscopy without the use of at least one ADR optimization device. However, optimization devices

are still not systematically used in routine practice, and their use is still not recommended [23, 24]. Barriers to their use undoubtedly stem from economic factors, such as the purchase of expensive equipment by healthcare facilities (e. g., CADe) or patient reimbursement (e. g., for the use of ECV). There are also human factors, such as endoscopist reluctance to change their habits. To overcome these barriers, the authorities need to be convinced to cover the additional cost of optimization devices and endoscopists need to be convinced of the benefits and ease of their use in routine practice. To act on these two fronts (authorities and endoscopists), new recommendations about the quality criteria for screening colonoscopy, specifically regarding the use of optimization devices, should be issued now. We should not wait for publication of many more RCTs about the benefits of combining the three types of optimization devices to make these recommendations and finally use the devices in routine practice. Furthermore, due to the diversity and complementarity of the devices, only an impractical eight-arm RCT study comparing the different "device families" could provide an answer. This study would become extremely complex, with numerous arms comparing various combinations of devices, all while the best CADe systems and the best contrast enhancement devices have yet to be determined. In the past, not so many RCTs were necessary to switch from non-HD to HD colonoscopy and to establish recommendations, probably because changes in image quality and definition were immediately visible to the endoscopist, and under-diagnosis with non-HD colonoscopes was obvious [25, 26]. In contrast, the benefit of optimization devices is not as immediately and obviously perceptible by human vision on the day of the procedure. Nevertheless, the literature on ADR optimization devices is already extensive enough to conclude that a "standard colonoscopy" represents a missed opportunity for patients. Of course, because ADR is influenced by a multitude of other factors (endoscopist education and training, bowel preparation, withdrawal time, and other colonoscopy quality criteria), using optimization devices will not make much sense if these quality criteria are not already fulfilled.

On the other hand, one could argue that increasing ADR is not a goal, or ask questions about the usefulness of diminutive polyp resection in reducing CRC incidence and mortality, and the risk of "overdiagnosis." As a counter argument, a recent retrospective study involving nearly 750,000 patients found that, compared with ADRs below the median of 28.3%, detection rates at or above the median were significantly associated with a reduced risk of post-colonoscopy CRC and related deaths [27]. And although the most relevant modalities for CRC screening are still being debated to date [28, 29], the objective of achieving optimal clearance of precancerous lesions in patients screened by colonoscopy, by detecting and removing all lesions on the day of their colonoscopy, cannot be criticized, especially in light of recommendations to reduce the frequency of screening colonoscopy [30].

Lastly, given that a minimum ADR threshold of 25% for a screening colonoscopy meeting quality criteria has been determined for "standard HD-WLI screening colonoscopy" [24], and that each device taken independently significantly increases ADR, the minimum threshold should be at least 35% for "optimized screening colonoscopy: combining the individual benefit of each optimization device.

Conclusions

To conclude, optimization devices represent a new step in screening colonoscopy, which can work in tandem with the standard procedure following the relevant quality parameters (with an already definite role in screening and surveillance procedures) to improve results. The literature and data available to date on the impact of optimization devices show that standard screening colonoscopy without any optimization devices should no longer be considered relevant in 2024. "Optimized screening colonoscopy" with the systematic use and combination of optimization devices will undoubtedly raise the minimum threshold of 25% required for "standard HD-WLI screening colonoscopy." While the use of ADR optimization devices represents an additional step in the contribution that colonoscopy makes to CRC screening, it is essential to improve access to and acceptance of screening programs, as there is no worse screening colonoscopy than a colonoscopy that is not performed.

Conflict of Interest

David Karsenti, MD: Consultant for OLYMPUS, COVIDEN and NORGINE; Support for attending meetings from ALFASIGMA, COOK and FUJIFILM

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