Techniques and Technologies to Maximize Mucosal Exposure

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KEYWORDS

• Mucosal exposure • Colonoscopy • Polyp • Adenoma

KEY POINTS

- Improving withdrawal techniques supported with different maneuvers, such as positioning of the patient, a second pass in the right colon if necessary, and removal of small polyps during insertion, are likely to improve the ADR of the individual endoscopist. This can be supported with new technologies.
- More research is needed, with ADR as the primary end point, to identify the optimal and cost-effective technology that results in a lower miss rate of polyps and adenomas, is easy to implement in daily practice, and does not significantly increase health care costs.

INTRODUCTION

Removal of polyps detected during colonoscopy protects against colorectal cancer.[1] Unfortunately, although colonoscopy is the gold standard for detecting and removing polyps, colorectal carcinomas diagnosed within just a few years following a colonoscopy (interval colorectal cancer) demonstrate the fallibility of current techniques of visualization of the colon. Several factors, such as incomplete resection of polyps or different tumor biology, have been related to these interval cancers, but most are thought to develop because of missed polyps. The endoscopist adenoma detection rate (ADR) has been shown to be inversely associated with the risk of interval cancer.[2,3] Recently, a large population-based study using data from the Kaiser Permanente Northern California health service organization showed that higher ADR (above the threshold of 22%) was associated with decreasing rates of interval colorectal cancers,[3] and that for each 1% increase in ADR, the risk of an interval cancer decreased by 3%.

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A systematic review of studies with tandem colonoscopies showed a pooled polyp miss rate of 22%.[4] The missed polyps were mainly small (5–10 mm; 13%) or diminutive (1–5 mm; 26%), but also 2.1% of the polyps greater than 1 cm were missed during colonoscopy. Virtual colonoscopy (computed tomography colography) has demonstrated that missed polyps are primarily located in the proximal colon and particularly on the proximal side of colon folds, making them more difficult to identify.[5] It is likely that an increase in ADR to a high level of detection (>40% in a symptomatic population and >50% in a Fecal immunochemical test (FIT)-based screening population) accounts for the detection of these small or diminutive polyps. Although most small or diminutive polyps will never develop into cancer, advanced histologic features are encountered in a subset of small adenomas,[6] especially in the proximal colon.[7] Risk factors for developing an interval colorectal cancer after a colonoscopy include age; location in the proximal colon; detection of an adenoma at baseline colonoscopy; advanced polyp features, such as villous histology; and a positive family history.[8,9] It therefore seems logical to assume that missing even small polyps in the proximal colon in the context of an increased risk of developing cancer (age, family history, number of polyps, and presence of advanced adenomas) is associated with an increased risk of developing an interval cancer.

Quality improvement programs should aim to train endoscopists to become high-level detectors. Several techniques and technologies are currently available to support current and future endoscopists in maximizing visualization of the mucosal surface of the colon with the objective to lower the polyp/adenoma miss rate.

TECHNIQUES TO OPTIMIZE COLONIC MUCOSAL VISUALIZATION

High-Quality Colonoscopy: Withdrawal Techniques

For complete visualization of the colon, intubation of the cecum is a necessity, and therefore proper scope and loop handling are basic skills required for a high-quality colonoscopy. Although the criterion cecum intubation rate of greater than 90% is often met in daily clinical practice, it is known that the ADR differs significantly between endoscopists.[2,3,10] This difference is partly explained by differences in the withdrawal technique. A video analysis of colonoscopy withdrawals performed by two endoscopists at opposite ends of the spectrum of ADR showed that the endoscopist with the higher ADR visualized a greater percentage of the colonic mucosa because this endoscopist (1) was more adequate in examining the proximal side of the haustral folds, flexures, and rectal valves; (2) was more thorough in removing remnant fluid or fecal material; (3) distended the colon better; and (4) spent more time viewing the mucosa. This was confirmed in another study by Lee and colleagues[11] showing that moderate-level (ADR between 21% and 42%) or high-level (ADR >42%) detectors had higher scores on their withdrawal technique after video analysis of 20 colonoscopies of each of 11 participants, all working in different facilities. The most important differences were found between low-level detectors and moderate- or high-level detectors, suggesting that proper withdrawal techniques are required for higher adenoma detection. Nonetheless, other skills, such as pattern recognition, may define even more the difference between moderate- and high-level adenoma detectors. Moreover, no difference was observed in withdrawal time between low- and high-level detectors. Increased detection of adenomas has, however, been associated with a withdrawal time of greater than or equal to 6 minutes, and this quality indicator is currently endorsed as a surrogate marker of the quality of withdrawal technique.[10,12] Nonetheless, introducing a protocol with a minimum time for withdrawal greater than or equal to 6 minutes has shown conflicting results with regard to an increase in ADR.[13,14] It is therefore likely that factors other than withdrawal time alone influence the ADR, and withdrawal skills in all aforementioned domains need to be improved.