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Prevalence and predictors of interval colorectal cancers – what hypotheses should colonoscopists consider in planning studies to modify the undesirable outcome

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Title: Prevalence and predictors of interval colorectal cancers in Medicare beneficiaries
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Summary

A recent report on prevalence and predictors of interval colorectal cancers in Medicare beneficiaries was published in Cancer. The study was prompted by historical data that after a colonoscopy that is negative for cancer, a subset of patients may be diagnosed with colorectal cancer termed interval cancer. The frequency and predictors have not been well studied in a population-based US cohort. The authors used the linked Surveillance, Epidemiology, and End Results (SEER)-Medicare database to identify 57,839 patients aged ≥69 years who were diagnosed with colorectal cancer between 1994 and 2005 and who underwent colonoscopy within 6 months of cancer diagnosis. Colonoscopy performed between 6 and 36 months before cancer diagnosis was a proxy for interval cancer. The results showed that by using the case definition, 7.2% of patients developed interval cancers. Factors that were associated with interval cancers included proximal tumor location (distal colon: multivariable odds ratio [OR], 0.42; 95% confidence interval [CI], 0.390-0.46; rectum: OR, 0.47; 95% CI, 0.42-0.53), increased co-morbidity (OR, 1.89; 95% CI, 1.68 2.14 for ≥3 co-morbidities), a previous diagnosis of diverticulosis (OR, 6.00; 95% CI, 5.57-6.46), and prior polypectomy (OR, 1.74; 95% CI, 1.62-1.87). Risk factors at the endoscopist level included a lower polypectomy rate (OR, 0.70; 95% CI, 0.63-0.78 for the highest quartile), higher colonoscopy volume (OR, 1.27; 95% CI, 1.13-1.43), and specialty other than gastroenterology (colorectal surgery: OR, 1.45; 95% CI, 1.16-1.83; general surgery: OR, 1.42; 95% CI, 1.24-1.62; internal medicine: OR, 1.38; 95% CI, 1.17-1.63; family practice: OR, 1.16; 95% CI, 1.00-1.35). The authors concluded that a significant proportion of patients developed interval colorectal cancer, particularly in the proximal colon. Contributing factors likely included both procedural and biologic factors, emphasizing the importance of meticulous examination of the mucosa.

Opinion

In addressing approaches within the control of the colonoscopists to overcome the problem of interval cancers [1], points well-referenced in a recent editorial [2] bear repeating. A new water method with water exchange [3,4] has emerged with randomized controlled trial (RCT) data showing an impact on both colonoscopy pain [5] and adenoma detection rate (ADR) [6]. Practical steps to ensure success include complete air exclusion and water exchange in a collapsed lumen (Table 1).

Retrospective data hinted that poor bowel preparation limited adenoma detection. Data in prospective RCT, however, do not substantiate the speculation that better bowel cleanliness scores increase ADR. Split-dose preparation improved bowel cleanliness assessed by unbiased observers, but no comparative information on ADR was presented. Although bowel preparation scores (Ottawa scale) could be improved by morning preparation for afternoon colonoscopy, the improved cleanliness did not alter overall detection rate of polyps, adenomatous polyps or number of patients with adenomas. In the right colon one split-dose study showed 2 L polyethylene glycol (PEG) + ascorbic acid provided a signifi-

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Table 1 The water method with water exchange (adapted from references 2 and 3)

1. Confirm the air and water pump on the colonoscope and the accessory water pump used for delivery of water for water exchange are all working. Adjust suction to about half maximum and the water pump to almost maximum.
2. To avoid inadvertent air insufflation which can elongate the colon turn the air pump off.
3. To minimize angulations and loop formation at the flexures and shorten the colon, remove all residual air when air pockets are encountered. Point the tip of the colonoscope into the air pocket and apply suction to collapse the lumen. Removal of residual air and maintaining minimal distention of the lumen by water allow the colon to wrap around the tip of the colonoscope, enhancing the chance that the tip is pointing at the next lumen.
4. Direct the tip of the colonoscope to abut where the folds converge or the slit-like opening ahead.
5. If there is no obvious opening ahead, move the tip of the colonoscope systemically in a large circular fashion while infusing and suctioning water. If the colonoscope is equipped with a common water and suction channel, these maneuvers are carried out in rapid succession. If the colonoscope is equipped with separate water and suction channels, these maneuvers are carried out simultaneously.
6. Infuse sufficient amount of water to confirm that the lumen ahead opens up to allow passage of the colonoscope. Stop water infusion if the lumen does not open, pull back and redirect the tip of the colonoscope, and repeat the process. Slow deliberate movements are more likely than large "jerky" movements to yield the proper orientation to the next lumen.
7. Avoid suction of the mucosa by adjusting (i.e. decreasing) the intensity of wall suction, and by initiating water infusion just before pressing on the suction button. Another useful maneuver is to point the suction port (usually at 5 o'clock) towards the center of the lumen. This translates into seeing more of the mucosa on the left side and the upper part of the monitor screen.
8. If bowel preparation is suboptimal, be patient. Remove as much of the suspended residual feces as possible and infuse clean water for visualization of the lumen. Paradoxical as it may sound, it is easier to clean the mucosa in a collapsed water-filled colon during insertion with water exchange than in a distended air-filled colon during withdrawal with the water jet followed by suction.
9. Do not forget to remove the infused water by suction when the insertion is going smoothly. A distended colon even by water increases discomfort for the patient and predisposes to loop formation. If the appearance of the lumen surrounding the tip of the colonoscope is round rather than slit-like and narrowed, there is likely to be too much water in the colon and more suction than infusion needs to be implemented.
10. Note the under-water appearance of diverticular openings to avoid inappropriate infusion of water into the diverticular lumen.
11. The under-water appearances of the appendix orifice and red suction marks in the cecum indicate cecal intubation. Remove as much of the water in the cecum as possible before insufflating air to initiate the withdrawal process.
12. Colonoscope shortening maneuver, abdominal compression, and patient reposition are integral components of the water method. Employ these maneuvers if necessary (e.g. when lumen ahead cannot be seen, paradoxical movement occurs). These maneuvers may be needed less often than when the air method is used, but are necessary from time to time.

cantly better bowel preparation score than PEG + bisacodyl but not a significantly higher ADR. Parenthetically another split-dose study of similar regimen reproduced the superior cleansing effect but showed no increase in polyp/malignancy detection rate. Furthermore the best bowel cleanliness score was not associated with the highest odds of finding polyps in a study reporting better bowel preparation quality scores being associated with greater odds of polyp detection. The effects of other modern approaches in modifying polyp detection rate or ADR also have been conflicting. These include use of high-definition, wide-angle endoscope, dye-spray chromoendoscopy, and withdrawal time >6 min. Narrow band imaging did not enhance ADR. Monitoring and feedback could increase polyp detection but whether such measures will translate into increase in ADR, or if the observations can be reproduced by others is unknown. The third eye retroscope consistently increased total number of adenomas detected in the proximal colon in unblinded studies, but the impact on ADR was not described.

With regard to the explanation of the impact of the water method with water exchange on enhancing ADR, the following hypotheses deserve further testing. After appropriate water exchange the need for suction during the withdrawal phase to remove residual feces is reduced. This minimizes collapse/contraction of the colon and the need for re-insufflation of air to maintain a distended lumen for inspection. The withdrawal phase is not interrupted by "distractions" allowing the colonoscopist to concentrate on inspection for lesions. The increased proportion of time devoted to inspection during withdrawal of the endoscope may be the critical factor.

The performance of screening colonoscopy in the proximal colon is imperfect. The water method with water exchange developed to minimize discomfort during insertion may have yielded a serendipitous benefit of enhancing ADR. Whether the enhanced detection may provide a timely solution to the problem of missed lesions and ameliorate the problem of

interval cancers in the proximal colon is unknown. A multicenter RCT enrolling large numbers of subjects should be supported.

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