

ENDOSCOPY CORNER

Effect of a Time-Dependent Colonoscopic Withdrawal Protocol on Adenoma Detection During Screening Colonoscopy

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See Lieberman DA et al on page 1100 for the companion article in the October 2008 issue of *Gastroenterology*.

Background & Aims: Screening colonoscopy can prevent cancer by removal of adenomatous polyps. Recent evidence suggests that insufficient time for inspection during overly rapid colonoscope withdrawal may compromise adenoma detection. We conducted a study of the effect of a minimum prespecified time for instrument withdrawal and careful inspection on adenoma detection rates during screening colonoscopy. **Methods:** Baseline data consisted of neoplasia detection rates during 2053 screening colonoscopies performed without a specified withdrawal protocol. During a subsequent 13-month period we performed 2325 screening colonoscopies using dedicated inspection techniques and a minimum 8-minute withdrawal time. With colonoscopists comprising the study population, we compared overall and individual rates of neoplasia detection in postintervention procedures with those in baseline examinations. **Results:** As compared with baseline subjects, postintervention subjects had higher rates of any neoplasia (34.7% vs 23.5%, $P < .0001$) and of advanced neoplastic lesions per patient screened (0.080 ± 0.358 vs 0.055 ± 0.241 , $P < .01$). Twenty-five percent of advanced neoplastic lesions detected in postintervention examinations were 9 mm or less in diameter, versus 10% in baseline examinations ($P < .001$). Endoscopists with mean withdrawal times of 8 minutes or longer had higher rates of detection of any neoplasia (37.8% vs 23.3%, $P < .0001$) and of advanced neoplasia (6.6% vs 4.5%, $P = .13$) compared with those with mean withdrawal times of less than 8 minutes. **Conclusions:** After implementing a protocol of careful inspection during a minimum of 8 minutes to withdraw the colonoscope, we observed significantly greater rates of overall and advanced neoplasia detection during screening colonoscopy.

Colorectal cancer is the second leading cause of death from cancer in the United States.¹ The disease burden from colorectal cancer can be reduced through screening of asymptomatic individuals. Several studies have shown that screening colonoscopy can substantially decrease one's risk of colorectal cancer through identification and removal of benign adenomatous polyps.²⁻⁴ Thus, an important advantage of colonoscopy

compared with nonendoscopic screening methods is the ability to interrupt the polyp-to-cancer pathway at a premalignant stage. However, colonoscopy is imperfect in its ability to detect neoplasia and does not confer complete protection against colorectal cancer. For example, repeat colonoscopy⁵ or colonography via computed tomography⁶ performed in close succession to colonoscopy can identify neoplasia—so-called *missed lesions*—not seen during the index examination. Likewise, there are differences among experienced endoscopists with respect to the rates of detection of neoplasia during lower intestinal endoscopy.⁷⁻⁹ The phenomenon of a small but important number of colorectal cancers detected in the early phase of postcolonoscopy surveillance further underscores the limitations of screening colonoscopy in the prevention of colorectal cancer.¹⁰⁻¹²

Recent evidence has suggested that there is substantial variation in endoscopist performance with respect to neoplasia detection during screening colonoscopy. Specifically, more time devoted to the withdrawal (inspection) phase of screening colonoscopy is associated with significantly increased rates of detection of neoplasia.⁸ Although current guidelines^{13,14} recommend that endoscopists spend a minimum of 6 minutes inspecting the mucosa during withdrawal of the colonoscope, this recommendation is based largely on the opinion of experts rather than on empiric evidence. Indeed, recent evidence⁸ has suggested that a 6-minute minimum threshold may be insufficient for optimal neoplasia detection. In addition, the effect of specific inspection techniques on adenoma detection during a colonoscopy has not been examined prospectively. In response to these issues, we recently implemented a number of colonoscopist-based measures aimed at improving the quality of screening colonoscopy in our large, community-based gastroenterology practice, with an emphasis on rigorous mucosal inspection for polyps during a specified minimum length of time to withdraw the colonoscope. We then conducted a study to analyze the effect of this approach on colonoscopists' adenoma detection during screening colonoscopy. We did not believe that it was ethical to assign subjects to an arm in which the detection of neoplasia likely would be suboptimal. Therefore, this was an observational study rather than a randomized control study. We hypothesized that implementing a time-dependent, segmental withdrawal protocol of 2 minutes per major colonic segment would enhance adenoma detection by colonoscopists.

Methods

We conducted this study during routine clinical practice in a large, community-based gastroenterology practice. The physicians in this practice have clinical appointments at the University of Illinois College of Medicine at Rockford but their day-to-day functions closely resemble a private community-based gastroenterology practice. The University of Illinois institutional review board approved the study. Because the focus of this project was on the quality-improvement measures that we already had incorporated into our routine clinical practice, the review board waived the need for informed consent. However, as part of the routine consent for endoscopic procedures, we informed patients that data might be collected to monitor quality aspects of our practice.

Study Populations

The baseline population consisted of 12 physicians who performed screening colonoscopy in consecutive subjects in our ambulatory surgery center from January 1, 2003, to March 31, 2004,⁸ whereas the comparison (postintervention) population consisted of the same 12 physicians who performed screening colonoscopy in consecutive subjects in our ambulatory surgery center from April 1, 2005, to April 30, 2006. For both populations, screening subjects were either directly scheduled or had screening colonoscopy scheduled during a prior gastrointestinal clinic visit for an unrelated issue. Screening subjects were free of colonic symptoms. Patients who had undergone colonoscopy previously, whose insurance mandated a hospital procedure, or had a past history of colorectal neoplasia were not included. These restrictions, and the large volume of diagnostic procedures we perform, limited the number of screening subjects (Figure 1). Many patients undergoing diagnostic examinations had undergone screening colonoscopy in the past; overlap of symptoms and variable information about prior investigations precluded accurate categorization of patients undergoing surveillance examinations. The baseline and postintervention time periods and numbers of subjects differed because we tried to enroll at least 100 screening subjects for each physician in the postintervention arm.

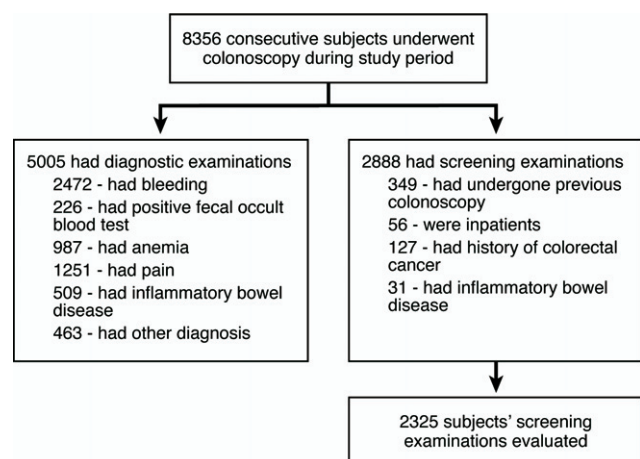


Figure 1. Enrollment of subjects. Some subjects had more than one indication for a diagnostic examination.

Quality-Improvement Intervention Protocol

Eight-minute withdrawal time. Although current expert panel guidelines^{13,14} recommend a minimum mean time of 6 minutes to withdraw the colonoscope during screening examinations in which no pathology is found, a recent analysis⁸ showed that endoscopists who spent longer than 6 minutes for withdrawal had progressively higher rates of adenoma detection. Analysis of these results suggested 8 minutes as a more appropriate minimum time for instrument withdrawal to balance the goals of lesion detection, patient comfort and safety, and scheduling constraints. We believe that it would be unrealistic to expect all physicians to comply with a longer minimum withdrawal time. To facilitate adherence to the 8-minute time for instrument withdrawal, we used a digital stopwatch device (Invisible Clock; eGeneral Medical Inc, Raleigh, NC), configured to count down from 8 minutes when activated. This device was programmed to emit audible beep(s) that would signify when 2 minutes (single beep), 4 minutes (2 beeps), 6 minutes (3 beeps), and 8 minutes (4 beeps) had elapsed. Once the cecal base was identified, endoscopists instructed the endoscopy nurse to activate the countdown timer. Endoscopists were instructed to use the intermittent audible signals from the timer to pace the examination during instrument withdrawal, devoting 2 minutes for examination of the cecum and ascending colon, 2 minutes for the hepatic flexure and transverse colon, 2 minutes for the splenic flexure and descending colon, and 2 minutes for the sigmoid colon and rectum. Although the timer was not stopped for interventions such as polypectomy or biopsy, we instructed physicians to continue to use feedback from the 2-minute intervals defined by the audible signals to try to pace the examination of remaining segments of the colon during instrument withdrawal.

Inspection techniques. Before the beginning of the study, in an effort to optimize neoplasia detection during instrument withdrawal, the 12 physicians in our practice met at a journal club setting to review an article describing inspection techniques to improve adenoma detection during colonoscopy.¹⁵ These techniques included the use of adequate insufflation, examination of flexures and proximal sides of haustral folds, suctioning of residual liquid, and adequate time for instrument withdrawal. In addition, we solicited advice from the 2 physicians in our practice who had shown the highest rates of adenoma detection in a quality-assessment study of screening colonoscopy.⁸ These physicians concurred with the earlier-described techniques; in addition, they recommended repetitive examination of colonic segments and torquing maneuvers to flatten and enhance visualization between haustral folds. All of the physicians who participated in this study were instructed to use the earlier-described inspection techniques during the prespecified 8-minute minimum withdrawal phase to optimize the detection of neoplasia.

Procedure Details

We performed colonoscopies during standard 30-minute time slots. Twelve full-time, board-certified gastroenterologists, all of whom had dedicated hands-on colonoscopic instruction as part of their gastrointestinal fellowship training, performed the procedures. All endoscopists had performed a minimum of 4000 colonoscopies before this study. Endoscopists used adult or pediatric variable-stiffness video colono-

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