Impact of physician compliance with colonoscopy surveillance guidelines on interval colorectal cancer

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Background and Aims: Interval colorectal cancer (iCRC) incidence is the criterion standard benchmark for measuring the effectiveness of colonoscopy. Colonoscopy surveillance guidelines are designed to minimize iCRC cases. Our aims were to describe characteristics of iCRC patients and to assess whether development of iCRC is related to colonoscopy surveillance guideline intervals.

Methods: We performed a retrospective cohort study of postcolonoscopy iCRC cases in a large healthcare system. Guideline-based colonoscopy intervals were calculated based on the 2012 U.S. Multi-Society Task Force for Colorectal Cancer colonoscopy surveillance guidelines. Backward stepwise linear regression was used to determine predictors of iCRC before guideline-recommended follow-up intervals.

Results: We identified 245 iCRC cases (mean age, 69.4 years; 56.3% male) out of 5345 colon cancers evaluated for a prevalence of 4.60%. On index colonoscopy, 75.1% had an adequate preparation, 93.0% reached the cecum, and 52.5% had polyps. iCRC developed before the guideline-recommended interval in 59.1% of patients (94/159). Independent predictive factors of this finding were inadequate preparation (OR, .012; 95% CI, .003-.06; $P < .0001$) and ≥3 polyps on index colonoscopy (OR, .2; 95% CI, .078-.52; $P = .0009$). An endoscopist-recommended follow-up interval past the guideline-recommended interval was seen in 23.9% of cases (38/159). Most (34/38, 89.5%) of these iCRCs had inadequate preparation and were diagnosed after the guideline-based follow-up interval.

Conclusions: Current colonoscopy surveillance guidelines may be inadequate to prevent many iCRC cases. Physician noncompliance with guideline-based surveillance intervals may increase in iCRC cases, especially in patients with an initially inadequate bowel preparation. (Gastrointest Endosc 2017;85:1263-70.)

Colonoscopy improves colon cancer mortality by removal of premalignant lesions and early detection of colon cancer.[1] However, we know that colonoscopy is not a perfect screening examination. Interval colorectal cancer (iCRC), or postcolonoscopy colorectal cancer, is most often defined as colorectal cancer that develops within 5 years of the preceding colonoscopy. The reported prevalence of iCRC has ranged from 2.6% to 9.0%,[2-8] with a meta-analysis showing a pooled prevalence of 3.7%.[9] Factors shown to predispose to iCRC include patient, biologic, and endoscopic factors.[9]

Studies investigating the etiology of iCRC have shown preventable causes, including incompletely resected lesions and missed lesions, account for over 50% of cases.[8,10-12] To decrease rates of iCRC caused by any of these etiologies, colonoscopies must be performed at

Abbreviations: CI, confidence interval; iCRC, interval colorectal cancer; OR, odds ratio.

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optimal intervals. Surveillance guidelines recommend repeating a colonoscopy based on personal and family medical history, completion of the examination to the cecum, preparation quality, and number and pathology of resected polyps.[13] In addition to the clinical importance of recommending appropriate surveillance intervals, this metric is currently tracked in the Physician Quality Reporting System. Noncompliance with guidelines will ultimately affect Center for Medicare & Medicaid Services reimbursements. Prior studies that have looked at colonoscopy surveillance interval guidelines have shown a range of compliance from 58% to 90%.[14-17] To date, no studies have directly assessed the effect of the most recent colonoscopy surveillance interval recommendations on iCRC.

The primary aim of this study was to describe characteristics of patients, index colonoscopy findings, and tumors in patients with iCRC in a large healthcare system. Our secondary aim was to assess whether development of iCRC is associated with colonoscopy surveillance guidelines.

METHODS

Study cohort

Pathology databases in a healthcare system composed of 2 academic tertiary care hospitals and an affiliated community hospital were queried to identify patients diagnosed with colorectal adenocarcinoma between January 2007 and December 2014. An institutional data repository (Research Patient Data Repository) was used to obtain colonoscopy reports of these patients with a diagnosis of colon cancer. Patients who had a colonoscopy performed between 6 months and 5 years before their diagnosis of colon cancer were considered to have iCRC and were analyzed. An upper limit of 5 years was chosen because this definition has been used in prior iCRC studies.[7,11,13] We did not exclude patients with an increased risk of colon cancer, including those with a personal history of colon cancer, inflammatory bowel disease, genetic colon cancer syndrome, or a family history of colon cancer in a first-degree relative. This study was approved by the Partners Healthcare institutional review board at Brigham and Women's Hospital in September 2014.

For each case, data collected from the index colonoscopy report included the date of procedure, endoscopist performing the examination, indication for procedure, quality of bowel preparation based on a modified Aronchick assessment (fair and poor were considered inadequate), cecal intubation, number and size of polyps, polyp locations, and presence of diverticulosis. We defined the right side of the colon as cecum through transverse colon and the left side of the colon as splenic flexure through rectum. Recommended follow-up intervals were found in multiple different locations, including the colonoscopy report (if no tissue was removed), progress notes, and patient results letters. If there were varying recommendations in the chart, the most recent recommendation was used. Endoscopist experience at the time of the index colonoscopy was calculated from initial year of board certification or, if not available, year of fellowship completion. Data collected from surgical pathology reports included index colonoscopy polyp pathology, date of colon cancer diagnosis, and location of colon cancer. Data collected from the medical record included patient date of birth, patient gender, history of colon cancer, history of inflammatory bowel disease, history of inherited polyposis syndrome, family history of colon cancer, and presenting symptom of iCRC.

Determination of guideline follow-up

Guideline follow-up was determined based on the 2012 U.S. Multi-Society Task Force on Colorectal Cancer colonoscopy surveillance guidelines.[13] Patients with incomplete colonoscopies that did not reach the cecum were listed as recommended for immediate repeat colonoscopy. Colonoscopies were incomplete because of difficult anatomy, patient discomfort, hemodynamic instability, or poor preparation. Patients with an inadequate preparation were listed as recommended for repeat colonoscopy within 1 year. Patients with a normal colonoscopy without polyps were listed as 10-year follow-up unless they had a family history of colon cancer in a first-degree relative, in which case they were listed as 5-year follow-up, or a personal history of an inherited polyposis syndrome, in which case they were listed as 1-year follow-up. Patients with 1 to 2 adenomas less than 10 mm in size were listed as 5 years, 3 or more polyps less than 10 mm in size were listed as 3 years, and any polyp greater than 1 cm was listed as 3 years.

For patients with colon cancer, guideline follow-up was determined based on the National Comprehensive Cancer Network colon cancer surveillance guidelines.[18] Patients with a history of colon cancer were listed as recommended for repeat in 3 years if the index colonoscopy was within 4 years from the colon cancer diagnosis. If the index colonoscopy was over 4 years from the colon cancer diagnosis, the guideline interval was listed as 5 years or sooner if suggested by preparation quality or polyp findings on the index colonoscopy.

Patients with incomplete data on cecal intubation, preparation, or polyp pathology were excluded from this part of the analysis. Patients with no data available on endoscopist-recommended follow-up interval were excluded. If a range was listed for endoscopist-recommended follow-up, the guideline-recommended follow-up was considered equivalent if within the range of the endoscopist-recommended follow-up.

Statistical analysis

The prevalence of iCRC was calculated, and the characteristics of patients, index colonoscopy findings, and colon