A risk index for advanced neoplasia on the second surveillance colonoscopy in patients with previous adenomatous polyps

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Background: Predicting the risk of advanced colorectal neoplasia on the second surveillance colonoscopy could help tailor surveillance.

Objective: To derive and validate a risk index for advanced neoplasia on the second surveillance colonoscopy.

Design: Retrospective cohort.

Setting: Single-specialty practice; Veterans Affairs Medical Center.

Patients: A total of 965 patients with baseline adenomatous polyps, 2 surveillance colonoscopies, and no reported family history of colorectal cancer; validation cohort of 372.

Interventions: Multivariable logistic regression including demographics and previous colonoscopy results; derivation and validation of a risk index.

Main Outcome Measurements: Advanced adenoma ($\geq$1 cm in size, villous histology, or high-grade dysplasia) on the second surveillance colonoscopy.

Results: Mean age was 57.8 $\pm$ 9.8 years, 62% were men, and 36% had an advanced adenoma on the index colonoscopy. Associated with advanced adenoma on the second surveillance colonoscopy were age at index colonoscopy (scored 0 for younger than 55 years of age, 1 for 55-59 years of age, 2 for 60-64 years of age, and 3 for older than 65 years of age) and previous findings (non-neoplastic, nonadvanced, advanced [scored 0, 1, and 2, respectively]) on index colonoscopy and the first surveillance colonoscopy, with scores ranging from 1 to 7. Risks of advanced adenoma on the second surveillance colonoscopy with scores of 5 or less and more than 5 were 4.8% (95% confidence interval, 3.5%-6.4%) and 14.9% (95% confidence interval, 7.4%-25.7%), respectively, comprising 93% and 7%, respectively, of the cohort. Corresponding results in the validation cohort were 5.6% and 19.2%, respectively, comprising 86.1% and 13.9%, respectively, of the cohort.

Limitations: Retrospective study with potential for selection bias.

Conclusion: This index stratifies the risk of advanced adenoma on the second surveillance colonoscopy. If validated independently, it may be useful for tailoring surveillance. (Gastrointest Endosc 2014;80:471-8.)

(footnotes appear on last page of article)

Colonoscopy with polypectomy reduces both the incidence and mortality of colorectal cancer.[1-3] There are evidence and guidelines to support surveillance colonoscopy in patients with previous neoplasia.[4] The surveillance guidelines provide specific intervals for colonoscopy based on findings at the initial (or index) colonoscopy and attempt to balance early detection of subsequent, clinically relevant neoplasia with the associated costs and morbidity of colonoscopy.

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In contrast, recommendations for the timing of surveillance colonoscopy beyond the first surveillance are based on less evidence.[4] Previous research on patient cohorts who have undergone at least 2 surveillance colonoscopies has shown that the most recent previous results have a greater effect on future findings than do the more remote results.[5-7] For patients with a more recent advanced

adenoma, the risk of subsequent advanced adenoma ranges between 7% and 30%, whereas those with a more remote advanced adenoma have a risk of 3.8% to 13%.[5-7]

In a previous study of patients with index adenomas and 2 surveillance colonoscopies, we found a 13% to 15% risk of advanced adenoma on the second surveillance colonoscopy if the first surveillance colonoscopy showed an advanced adenoma and 3.8% to 5.9% if it did not.[8] To make these results more useful clinically, we conducted the current study, the objective of which was to create a risk index (or clinical prediction rule) for advanced neoplasia on the second surveillance colonoscopy as a function of findings on the index colonoscopy and the first surveillance colonoscopy. We hypothesized that we would identify either a high-risk group for which early surveillance colonoscopy would be high yield for advanced adenoma and/or a very low-risk group for which the interval between the first and second surveillance colonoscopies could likely be prolonged within the 5- to 10-year surveillance interval.

Take-home Message

- Risk of advanced neoplasia on the second surveillance colonoscopy has not been well quantified.
- The risk index derived and independently validated here, based on age and results of the 2 previous colonoscopies, effectively stratifies this risk. If validated in other settings, this index could help tailor subsequent surveillance.

METHODS

This retrospective cohort study was conducted at a single specialty gastroenterology practice (Indianapolis Gastroenterology and Hepatology) in Indianapolis, Indiana. The Institutional Review Boards affiliated with St. Francis Hospital and Health Centers (Beech Grove, Ind) approved this study, with a waiver of informed consent. The derivation set was collected from March 2005 to April 2010.

Study population

Eligible for study inclusion were patients with a history of neoplastic polyps (tubular adenomas, tubulovillous adenomas, and villous adenomas) on an index colonoscopy, which could have been done for any indication except for surveillance for previous adenomatous polyps or colorectal cancer. Patients had to have undergone at least 2 surveillance colonoscopies. Based on procedure indication, we excluded patients with any of the following: a high-risk family history of colorectal cancer (defined as any first-degree relative with a history of colon cancer diagnosed before the age of 60) because of the established 5-year surveillance interval recommendation for these patients, a personal history of colorectal cancer or inflammatory bowel disease, a personal or family history of familial adenomatous polyposis or hereditary nonpolyposis colorectal cancer syndrome, and colonoscopy subsequent to the index procedure performed because of any reason other than surveillance (for example, for signs or symptoms such as iron deficiency anemia or hematochezia, respectively). The index colonoscopy and/or first surveillance examinations could have been done at other institutions provided that the procedure reports and pathology results were available for review and data abstraction. The primary outcome was advanced adenoma, defined as an adenoma 1 cm or larger, or one with villous histology or high-grade dysplasia or adenocarcinoma of the colon or rectum.

Intervention

Colonoscopy was performed by 1 of 14 gastroenterologists. Conscious sedation was administered with meperidine, midazolam, and fentanyl with specific agents and dosing at the discretion of the individual endoscopist. Bowel preparation included sodium phosphate and polyethylene glycol. A split-dosing regimen was generally used for the sodium phosphate preparation, with half of the dose taken the day before the colonoscopy and the other half taken 6 before it. Split-dosing of polyethylene glycol solution was not standard during the first 3 years of the study but was used during the last 2 years of the study. The endoscopists used white-light pediatric and adult diagnostic colonoscopes from Fujinon (Wayne, NJ). The Collaborative Outcomes Research Initiative system (versions 3 and 4) was used for procedure documentation and report generation. Pathology was reviewed by 1 of 4 pathologists, 3 of whom specialize in GI pathology. Adenoma detection rates, quality of bowel preparation, and adherence to colonoscopy quality indicators of the participating endoscopists have been reported previously.[9]

Data abstraction

Each case considered appropriate for the study was reviewed by a single investigator who recorded the number, size, and histology of polyps found on the index colonoscopy and first and second surveillance colonoscopies, as well as the time intervals between colonoscopies. All data were abstracted on to a spreadsheet (Excel, version 14.0.6129.5000, 2009; Microsoft Corporation, Redmond, Wash). In cases in which more than 1 polyp was discovered, the most advanced finding in the proximal and distal portions of the colorectum was recorded, with the splenic flexure as the beginning of the proximal colon. Each patient was characterized as having advanced adenoma or nonadvanced adenoma for the index colonoscopy; results of the 2 subsequent surveillance colonoscopies were categorized as having no adenoma, nonadvanced adenoma, or advanced adenoma/neoplasia.

Analysis

All analyses were conducted by using SAS version 9.3 (SAS Institute Inc, Cary, NC). Descriptive findings for