Survival in patients with colorectal cancer diagnosed by screening colonoscopy

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Background: In Germany, screening colonoscopy was first established in 2002 as part of the national cancer screening program.

Objective: To evaluate whether colorectal cancer (CRC) survival differs when CRC is diagnosed by screening colonoscopy (S-CRC) versus diagnostic colonoscopy (D-CRC).

Design: Long-term, retrospective, multicenter, observational study.

Setting: Study centers: 10 private gastroenterology practices in Germany.

Patients: A total of 60 patients diagnosed with CRC during screening colonoscopy and 252 patients during diagnostic colonoscopy in 2002, 2003, and 2004.

Interventions: Colonoscopy.

Main Outcome Measurements: Survival of patients up to December 2013.

Results: Mean (± standard deviation [SD]) follow-up time was 81.0 (± 40.1) months. Union Internationale Contre le Cancer (UICC) stages I and II were found more often in S-CRC (81.6%) compared with D-CRC (59.9%; $P < .002$). Kaplan-Meier analysis showed significantly reduced overall survival for patients with D-CRC (mean [± SD] 86.9 [± 3.0] months; 95% confidence interval [CI], 81.0-92.8) compared with S-CRC (mean [± SD] 107.1 [± 4.9] months; 95% CI, 97.4-116.9; $P = .003$). When deaths not related to CRC were excluded, survival was still shorter for D-CRC patients (mean [± SD] 89.4 [± 3.0] months; 95% CI, 83.5-95.4) compared with S-CRC (mean [± SD] 109.6 [± 4.7] months; 95% CI, 100.2-119.0; $P = .004$).

Limitations: Retrospective study design.

Conclusion: In this long-term, retrospective study, patients with CRC diagnosed during screening colonoscopy lived significantly longer when compared with patients with CRC diagnosed during diagnostic colonoscopy. (Gastrointest Endosc 2015;82:133-7.)

In 2002, screening colonoscopy was introduced to the German national cancer screening program as an alternative to the fecal occult blood test (FOBT). Every public health insurant aged 55 years or older has a choice of screening method (screening colonoscopy or FOBT). Several European countries and the United States implemented colonoscopy as part of colorectal cancer (CRC) screening programs because it is believed to reduce

Abbreviations: CRC, colorectal cancer; D-CRC, CRC diagnosed by diagnostic colonoscopy; FOBT, fecal occult blood test; S-CRC, CRC diagnosed by screening colonoscopy; UICC, Union Internationale Contre le Cancer.

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CRC-related mortality. Indeed, numerous studies have shown that colonoscopic removal of adenomatous polyps prevents CRC development and CRC-associated deaths.[1-4] A German, single-center study reported a 2.43% CRC prevalence during diagnostic colonoscopy (presence of symptoms indicative of CRC or a positive FOBT result before colonoscopy) and 0.9% during screening colonoscopy (absence of symptoms indicative of CRC). The benefit of screening colonoscopy is attributed to polyp resection, but data on long-term follow-up of patients diagnosed with CRC during screening colonoscopy are limited. Ten years after the implementation of screening colonoscopy to the German cancer screening program, we sought to investigate whether survival rates of patients with CRC differed, based on whether CRC was diagnosed during screening or diagnostic colonoscopy.

METHODS

This was a retrospective, multicenter, observational study investigating the influence of screening colonoscopy on survival of patients with CRC. Patients diagnosed with CRC in 2003, 2004, or 2005 were classified, based on indication for the examination (screening vs diagnostic colonoscopy) and followed until 2013. According to the 2002 German CRC guideline, patients aged ≥55 years can choose between 2 CRC screening methods: screening colonoscopy or FOBT. Patients with positive FOBT results underwent colonoscopy, which was considered diagnostic colonoscopy. Besides positive FOBT results, patients with symptoms indicative of CRC such as abdominal pain, iron deficiency anemia, weight loss, changes in bowel habits, or rectal bleeding were considered for diagnostic colonoscopy. Therefore, screening colonoscopy is defined as the absence of these symptoms, and any FOBT performed must have negative results. No patient had undergone colonoscopy before the examination that diagnosed CRC. All patients diagnosed with CRC received endoscopic follow-up care, which included colonoscopy within 3 years after surgical intervention followed by 5-year colonoscopy intervals if first colonoscopy after surgery was without pathologic findings. Patients not treated surgically received radiologic abdominal imaging at regular intervals.

Ten private gastroenterology practices already established in 2003 and located within a 50-mile radius of our center were asked to participate. Clinical data during follow-up were obtained by contacting the treating physician, the hospital responsible for tumor treatment, and registry authorities. We identified basic clinical parameters, initial tumor stage, time of survival, and cause of death. Initial tumor stage was determined according to the international classification of the Union International Contre le Cancer (UICC) in stages I through IV. Patients were followed until December 2013. The study was approved by the Ethics Committee of the University of Heidelberg and carried out in accordance with the declaration of Helsinki in its present form.

Descriptive data are presented as mean ± standard deviation (SD). Statistics were calculated with the use of the paired *t* test and the chi-square test when appropriate. The actuarial survival rate was estimated by the Kaplan-Meier method. Differences between the actuarial estimates were analyzed by using the log-rank test and presented as mean ± SD with 95% confidence interval (CI). All statistical computations were performed by using SPSS version 21 (IBM Germany, Ehningen, Baden-Wuerttemberg, Germany).

RESULTS

Study setting

All 10 private gastroenterology practices agreed to participate. A total of 372 patients were diagnosed with CRC in the years 2003, 2004, or 2005 at the 10 practices. Follow-up was complete in 312 patients; these patients were the cohort for further analysis, based on the study protocol. Reasons for loss of follow-up were inability to contact (n = 34), withdrawal of consent (n = 7), and incomplete data collection (n = 19). Mean (± SD) follow-up time was 81.0 (± 40.1) months.

Patient cohort

A total of 125 of the 312 patients were female (40.1%). Mean (± SD) age at diagnosis of CRC was 66.1 (± 10.5) years (women: mean [± SD] 66.6 [± 11.2] years; men: mean [± SD] 65.7 [± 10.1] years). Overall, 7980 screening colonoscopies and 20,664 diagnostic colonoscopies were performed from 2003 to the end of 2005. A total of 60 patients were diagnosed with CRC during screening colonoscopy (S-CRC) and 252 patients during diagnostic colonoscopy (D-CRC). Therefore, the CRC-detection rate for screening colonoscopy was 0.75% and 1.12% for diagnostic colonoscopy.

A total of 101 (32.4%) of the CRCs were rectal, 100 (32.1%) were in the sigmoid colon, 17 in the descending colon (5.4%), 31 in the transverse colon (9.9%), 45 in the ascending colon (14.4%), and 18 were cecal (5.8%). Therefore, the majority of CRC were left sided (n = 223; 71.5%). There was no difference in age at diagnosis of CRC between patients with D-CRC (mean [± SD] 66.2 [± 11.2] years) or S-CRC (mean 65.8 [± 7.1] years; $P = .783$). Sex distribution was similar (Table 1). Of all patients diagnosed with CRC, we observed no post-colonoscopy, missed CRCs during the course of follow-up.

UICC stages

A total of 104 patients were diagnosed with UICC stage I (33.3%), 96 with stage II (30.8%), 102 with stage III