



Colorectal Cancer Initial Diagnosis: Screening Colonoscopy, Diagnostic Colonoscopy, or Emergent Surgery, and Tumor Stage and Size at Initial Presentation

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Abstract

Nearly 90% of individuals with colorectal cancer were diagnosed only after developing a symptom or a laboratory or radiographic abnormality was detected. This study was a detailed chart review of 492 individuals with colorectal cancer. Tumors detected in symptomatic patients were larger and later-stage than tumors detected in asymptomatic screened patients. At least 26% of patients diagnosed at the time of emergent surgery had never had a screening colonoscopy. Colorectal cancer outcomes will be improved by improving rates of colorectal cancer screening.

Introduction/Background: Rates of colorectal cancer screening are improving but remain suboptimal. Limited information is available regarding how patients are diagnosed with colorectal cancer (for example, asymptomatic screened patients or diagnostic workup because of the presence of symptoms). The purpose of this investigation was to determine how patients were diagnosed with colorectal cancer (screening colonoscopy, diagnostic colonoscopy, or emergent surgery) and tumor stage and size at diagnosis. **Patients and Methods:** Adults evaluated between 2011 and 2014 with a diagnosis of colorectal cancer were identified. Clinical notes, endoscopy reports, surgical reports, radiology reports, and pathology reports were reviewed. Sex, race, ethnicity, age at the time of initial diagnosis, method of diagnosis, presenting symptom(s), and primary tumor size and stage at diagnosis were recorded. Colorectal cancer screening history was also recorded. **Results:** The study population was 54% male (265 of 492) with a mean age of 58.9 years (range, 25-93 years). Initial tissue diagnosis was established at the time of screening colonoscopy in 10.7%, diagnostic colonoscopy in 79.2%, and during emergent surgery in 7.1%. Cancers diagnosed at the time of screening colonoscopy were more likely to be stage 1 than cancers diagnosed at the time of diagnostic colonoscopy or emergent surgery (38.5%, 7.2%, and 0%, respectively). Median tumor size was 3.0 cm for the screening colonoscopy group, 4.6 cm for the diagnostic colonoscopy group, and 5.0 cm for the emergent surgery group. At least 31% of patients diagnosed at the time of screening colonoscopy, 19% of patients diagnosed at the time of diagnostic colonoscopy, and 26% of patients diagnosed at the time of emergent surgery had never undergone a screening colonoscopy. **Conclusion:** Nearly 90% of colorectal cancer patients were diagnosed after development of symptoms and had more advanced disease than asymptomatic screening patients. Colorectal cancer outcomes will be improved by improving rates of colorectal cancer screening.

Clinical Colorectal Cancer, Vol. 15, No. 1, 67-73 © 2016 Elsevier Inc. All rights reserved.

Keywords: Cancer detection, Colorectal cancer, Diagnostic colonoscopy, Screening colonoscopy, Screening compliance

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Submitted: Apr 10, 2015; Accepted: Jul 20, 2015; Epub: Jul 29, 2015

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CRC Tumor Stage and Size at Diagnosis

Introduction

Colorectal cancer is the third most common type of cancer and cause of cancer-related death in the United States.¹ An estimated 136,830 individuals were newly diagnosed with colorectal cancer and 50,319 people died as a result of the disease in the United States in 2014.¹ Colorectal cancer screening reduces mortality by identifying cancers at an earlier and more treatable stage and by identifying and removing precancerous adenomatous polyps.²⁻⁸ However, only approximately 34% to 59% of Americans for whom screening is recommended undergo recommended colorectal cancer screening.⁹⁻¹¹ The United States Preventive Services Task Force currently recommends screening for colorectal cancer using colonoscopy, sigmoidoscopy, or fecal occult blood testing beginning at age 50 years and continuing until age 75 years.¹²

Approximately 15% of colorectal cancers present as a surgical emergency in the United States.¹³ To our knowledge, no studies have reported on what percentage of colorectal malignancies is diagnosed at the time of screening versus diagnostic colonoscopy. Accurately extracting such information from claims databases is challenging.¹⁴⁻¹⁶ For example, a colonoscopy that begins as a screening colonoscopy in an asymptomatic individual is typically coded as a diagnostic colonoscopy if a biopsy is performed or a polyp removed.¹⁶

The purpose of this investigation was to determine through detailed chart review how patients who presented to our institution between 2011 and 2014 were diagnosed with colorectal cancer (screening colonoscopy, diagnostic colonoscopy, or emergent surgery) and tumor stage and size at the time of diagnosis.

Patients and Methods

Institutional review board approval was obtained, and a waiver of informed consent was granted for this Health Insurance Portability and Accountability Act-compliant study.

The (X [institution name blinded during the review process]) electronic data warehouse was searched for patient encounters in which the Current Procedural Terminology codes for new patient visit (99201, 99202, 99203, 99204, 99205) and the International Classification of Diseases, 9th edition codes for colorectal cancer (153.9, 154.0) occurred during the same encounter. The search was limited to adult patients ≥ 18 years of age and to dates of service between January 1, 2011, and June 1, 2014.

Electronic medical records were reviewed including clinical notes, endoscopy reports, surgical reports, radiology reports, and pathology reports. Records generated at our own institution and those generated at outside institutions and scanned into our institution's medical record system were reviewed. It is the usual practice at our institution to obtain outside medical records including clinical notes, endoscopy reports, surgical reports, radiology reports, and pathology reports for patients being evaluated for colorectal malignancy whose initial workup and/or treatment was performed at an outside institution.

Patient sex, race, ethnicity, and age at time of initial diagnosis along with primary tumor size (greatest dimension), cell type, and stage at diagnosis were recorded. Race and ethnicity information was self-reported by patients. Race and ethnicity information was recorded to determine if method of diagnosis varied by race or ethnicity. Tumor information was recorded from surgical pathology

reports when available. If the primary tumor was not resected and a surgical pathology report therefore not available (for example, individuals who presented with widely metastatic disease and non-obstructing tumors), the estimated tumor size from the initial staging radiology report was recorded. Whether or not an individual underwent neoadjuvant therapy before resection was recorded because neoadjuvant therapy could potentially affect the greatest dimension of the tumor at the time of resection. Patients who underwent neoadjuvant therapy before resection were excluded from the median tumor size determination.

Medical records immediately preceding the cancer diagnosis were reviewed to determine if the patient initially presented to medical attention because of a symptom, and these symptoms were recorded. If patients underwent diagnostic colonoscopy to evaluate rectal bleeding, charts were reviewed to determine if rectal bleeding was first noticed by the patient or first detected with a screening test for fecal occult blood. Information regarding the patients' colorectal cancer screening history before the diagnosis of colorectal cancer was also recorded on the basis of a review of clinical notes.

A screening colonoscopy was defined as an elective colonoscopy performed in an asymptomatic individual. A diagnostic colonoscopy was defined as a colonoscopy performed to evaluate a symptom or to further workup a laboratory or radiologic abnormality. A subset of individuals presented with acute gastrointestinal symptoms and went immediately to the operating room without colonoscopy. These individuals were defined as individuals diagnosed at emergent surgery.

Statistical Analysis

Statistical analysis was performed using the R Core Team software package (R Foundation for Statistical Computing; Vienna, Austria). A *P* value of $< .05$ was considered to be statistically significant. A 2-sample *t* test was performed to determine if there was a statistically significant difference in mean tumor size for the screening colonoscopy and diagnostic colonoscopy groups and for the screening colonoscopy and the emergent surgery groups. The multinomial goodness of fit test with full enumeration was performed to determine if there was a statistically significant difference in the distribution of tumor stages between the screening colonoscopy and diagnostic colonoscopy groups and between the screening colonoscopy and emergent surgery groups. The proportional test on the equality was performed to determine if there was a statistically significant difference in the proportion of races across the 3 groups.

Results

A data warehouse search yielded 527 patients. Based on chart review, 35 individuals (6.6%) were coded incorrectly because they did not have a diagnosis of colorectal cancer, and these individuals were excluded from the analysis. The remaining 492 individuals were our study population.

Patient Demographic Characteristics

Table 1 shows the demographic characteristics and mode of diagnosis of our study population. Fifty-four percent ($n = 265$) of our patients were male, and the mean age at diagnosis was 58.9 years (range, 25-93 years). Most patients (62%) were non-Hispanic Caucasian. There was no statistically significant difference in the

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