Radiographic staging practices of newly diagnosed colorectal cancer vary according to medical specialty

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Background: Since 2008, multiple guidelines have endorsed incorporation of chest CT in the radiographic staging assessment of newly diagnosed colorectal cancer (CRC). Radiographic staging practices performed after CRC is detected have not been studied.

Objective: To evaluate radiographic staging practices for newly diagnosed CRC between gastroenterologists versus non-gastroenterologists.

Design: Observational cohort study.

Setting: Single, tertiary-care referral center.

Patients: Patients newly diagnosed with a T1 or higher stage CRC at time of colonoscopy between 2008 and 2013.

Interventions: Radiographic staging.

Main Outcome Measurements: Radiographic preoperative staging examinations ordered by gastroenterologists in comparison to those ordered by non-gastroenterology specialists.

Results: This study included 277 patients with CRC newly diagnosed by colonoscopy. There were 141 total ordering physicians (68 gastroenterologists and 73 non-gastroenterologists). The majority of preoperative radiographic staging was performed by gastroenterologists (59.2% of patients, n = 164). Colorectal surgeons managed staging in 28.7% of patients (n = 47). Gastroenterologists were more likely to omit a staging chest CT than were non-gastroenterologists (64.6% vs 46.9%; $P < .001$). Physician practice setting, rectal location of tumor, and advanced endoscopic appearance of tumors were predictors of chest CT inclusion.

Limitations: Single center, moderate sample size of both providers and patients.

Conclusion: Gastroenterologists more frequently ordered the initial radiographic staging studies in newly diagnosed CRC patients. However, gastroenterologists were less likely to include chest CT in the initial staging of CRC despite current guideline recommendations to do so. If confirmed with further studies, educational efforts to improve compliance and standardization may be needed. (Gastrointest Endosc 2015;82:497-502.)

Abbreviations: CEA, carcinoembryonic antigen; CRC, colorectal cancer; NCCN, National Comprehensive Cancer Network.

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Colorectal cancer (CRC) is the third leading cause of cancer and cancer-related mortality in the United States.[1] An estimated 143,000 cases were diagnosed in 2013, and this accounts for 8.6% of all new cancer diagnoses.[2] CRC management decisions are dependent on the presence or absence of metastases. A variety of different specialists can be involved in the preoperative radiographic staging of CRC, including gastroenterologists, medical oncologists, and colorectal surgeons.

The incidence of pulmonary metastases in patients with CRC is as high as 10% to 18% in rectal cancers and 5% in colon cancers.[3-6] Earlier studies reported very poor prognoses for the approximately 10% of CRC patients presenting with isolated pulmonary metastases.[3,4] However, resection of pulmonary metastases in a select group of patients may lead to improved 5-year survival rates of 40% to 50% from $<5\%$ if untreated.[5-8] Recent revisions of societal guidelines have endorsed incorporating cross-sectional chest imaging into CRC preoperative staging. Since 2008, the National Comprehensive Cancer Network (NCCN) has recommended CT rather than plain film radiographic imaging of the chest (grade 2A).[9] The European Registration of Cancer Care and Standards Practice Task Force of the American Society of Colon and Rectal Surgeons (grade 1B), along with other international groups, have established similar standards.[10-15] Currently, to our knowledge there are no guidelines published by gastroenterology societies highlighting appropriate radiographic staging of CRC. Recent evidence estimates that only 1% to 2% of patients with CRC with an indeterminate pulmonary nodule will prove to have metastatic disease.[16-18] Numerous chest CTs with pulmonary nodules will be considered for metastases, most of which will not be metastatic disease. Despite the current recommendations, the routine use of chest CT in initial staging of CRC remains controversial, given the relative low frequency in which isolated pulmonary metastases occur.

There is a paucity of data describing compliance rates with current preoperative radiographic staging guidelines for CRC. The impact of provider, patient, and tumor characteristics on staging practices has not been defined. The goal of this study was to evaluate radiographic staging patterns of CRC diagnosed at colonoscopy based on various ordering physician and patient characteristics.

METHODS

Study design and patient selection

We included consecutive patients diagnosed with CRC by colonoscopy seen in the Coleman Foundation Comprehensive Clinic for Gastrointestinal Cancers at Rush University Medical Center. This was an observational cohort study of patients diagnosed with CRC between January 2008 and September 2013. January 2008 was the earliest inclusion time-point, based on the NCCN guideline update publication.[9] Included CRC cases had T1 or higher–staged lesions.[19] Patients with T0 CRC were excluded. Exclusion criteria also included CT imaging within 12 months before the time of CRC diagnosis, history of CRC, or other solid organ or hematologic malignancy within the preceding 5 years of diagnosis. Patients were excluded if all collected data could not be verified through colonoscopy, pathology, and radiology reports. Use of iodinated contrast agents was not considered when inclusion criteria were defined. The institutional review board of Rush University Medical Center granted study approval.

Data collection and study outcomes

Patients' electronic and paper charts were reviewed, and pertinent medical and demographic data were abstracted. Variables considered for association with staging practices included year of the procedure, tumor location, histologic differentiation, and carcinoembryonic antigen (CEA) level. Provider level variables considered were medical or surgical specialty training and academic or community-based institution. Tumors were defined as having *advanced endoscopic features* if the tumor was obstructive and the colonoscope was unable to pass the tumor or if the lesion occupied $>50\%$ of the luminal circumference. Information regarding type of preoperative imaging, CT study date, and CT-ordering physician were collected. Charts were reviewed for evidence of formal surgical or oncology consults or a multidisciplinary tumor board evaluation before radiographic staging. Staging practices were contrasted before and after a CEA level was obtained. Patients were considered to be staged without ordering physician knowledge of histopathology results when CT staging was obtained on the same day as colonoscopy.

The primary endpoint was the rate of chest CT scans ordered by gastroenterologists in the initial preoperative staging evaluation in comparison to providers other than gastroenterologists. Secondary outcome measures assessed factors associated with staging practices including physician practice setting, endoscopic tumor appearance, and tumor degree of differentiation by histopathology. Patients who did not undergo initial chest CT imaging were prospectively followed to assess whether a subsequent chest CT scan or alternative cross-sectional imaging was performed before treatment intervention (ie, surgical resection or chemo-radiotherapy).

Statistical analysis

Descriptive statistics were used to summarize continuous and discrete variables. Depending on the pertinent sample size, discrete variables were compared by using the chi-square or the 2-sided Fisher exact test. A univariate logistic regression analysis was performed. In these models, each of the following potential covariates was independently regressed. A P value $\leq .2$ was used as the initial variable selection criteria. Then a multiple logistic regression model with forward variable selection was used to identify the final covariates that would have