CrossMark

Clinical Science

Colon cancer surgery following emergency presentation: effects on admission and stage-adjusted outcomes

Ramzi Amri, M.Sc., Liliana G. Bordeianou, M.D., M.P.H.,
Patricia Sylla, M.D., David L. Berger, M.D.*

*Division of General and Gastrointestinal Surgery, Massachusetts General Hospital and Harvard
Medical School, Boston, MA, USA*

Abstract
 BACKGROUND: Emergency presentation with colon cancer is intuitively related to advanced disease. We measured its effect on outcomes of surgically treated colon cancer.
 METHODS: A retrospective cohort of 1,071 surgical colon cancer patients (2004 to 2011), with 102 emergency cases requiring surgery within the index admission, was analyzed.
 RESULTS: Emergency patients required longer surgeries (median 141 vs 124 minutes; $P = .04$), longer median admissions (8% vs 5%; $P < .001$), more readmissions (12.7% vs 7.1%; $P = .040$), and perioperative mortality (7.8% vs .8%; $P < .001$). Surgical pathology displayed higher rates of node-positive disease (56.6% vs 38.6%; $P < .001$), extramural vascular invasion (39.6% vs 29.1%; $P = .021$), and metastatic disease (19.6% vs 8%; $P < .001$). Consequently, adjusting for staging, emergency presentations had considerably higher mortality (odds ratio = 2.07; $P = .003$) and shorter disease-free survival (hazard ratio = 1.39; $P = .042$).
 CONCLUSIONS: Emergency presentation is a stage-independent poor prognostic factor associated with aggressive tumor biology, resulting in longer surgeries and admissions, frequent readmissions, worsening outcomes, and increasing healthcare costs.
 © 2015 Elsevier Inc. All rights reserved.

Colon cancer is a malignancy where outcomes are strongly related to the stage of disease on presentation. Timely detection leads to 5-year survival rates that can be as high as 97.4% for early stage disease.[1] Conversely, late detection with widespread metastatic disease can lower this survival rate to 8.1% at 5 years.[2] Screening initiatives

---

are currently being assessed and implemented worldwide to lower the disease burden and to stimulate early detection.[3] On the other side of the spectrum, research has also focused on factors that predict delayed presentation, worse staging at baseline, and thus poorer outcomes. Emerging evidence has already shown that certain symptoms on presentation predict advanced disease and poorer outcomes.[4] Higher risk of advanced disease on presentation has also been identified in certain demographic groups, including underprivileged socioeconomic groups,[5] and especially ethnic minorities.[6,7]

Intuitively, emergency presentation is expected to be an unequivocally poor prognostic factor in patients with colon cancer, as the symptoms that lead patients to present at an emergency department (ED), including intestinal bleeding, perforation, or obstruction, are usually attributable to advanced disease.

This article analyzes colon cancer patients who are admitted after emergency presentation and eventually undergo surgical resection for colon cancer. It assesses the magnitude of the effects associated with emergency presentation on staging, surgical stay, and cancer-related outcomes.

Methods

Patient population

All colon cancer patients surgically treated at Massachusetts General Hospital in the 2004 to 2011 timespan were included for analysis. Data on all cases were collected from prospectively maintained internal data repositories or accrued from patient records under an institutional review board-approved protocol.

Definitions and objectives

Emergency presentation is defined as presentation or referral to our center through the ED with symptoms and clinical findings requiring admission and urgent surgical treatment within the index admission. All cases had a working diagnosis of colon cancer, or at least colonic malignancy as part of the differential diagnosis before operation, which was in all cases followed by subsequent confirmation of malignancy through surgical pathology. Cases where the presence of colonic adenocarcinoma was never confirmed pathologically were not part of the included sample.

Differences between emergency admissions and the remainder of patients were assessed on 4 main levels: presentation characteristics, surgical pathology, surgical stay outcomes, and long-term outcomes. Presentation characteristics included general demographics (age, sex, ethnicity), lifestyle (alcohol and tobacco consumption, body habitus), comorbidity (expressed through a colon cancer-adjusted Charlson comorbidity score as well as type 2 diabetes, separately), and finally symptoms present at baseline

presentation. The pathological characteristics compared included the tumor, node, metastasis (TNM) classification as well as pathological characteristics with prognostic significance. Poor prognostic factors compared included positive resection margins (expressed as R+), tumor grade (expressed as high-grade disease), extramural vascular invasion,[8] perineural invasion,[9] infiltrating tumor border configuration,[10] and absence of peritumoral lymphocytic response.[11]

Inpatient characteristics which were analyzed included surgical duration, rates of laparoscopic surgery and conversion to open surgery, rates of multivisceral resection, and characteristics of the surgical admission including length of stay, rates of major surgical complications, and 30-day rates of readmission, reoperation, and death. Finally, the long-term outcomes compared were the need for postoperative chemotherapy as well as survival and disease-free survival, both expressed as duration and dichotomized as death, colon cancer-related death, overall metastatic disease, and metastatic recurrence. These end outcomes were also analyzed in multivariate models controlling for any significant covariates encountered during baseline analysis, as well as staging, expressed in the American Joint Committee on Cancer (AJCC) 7th edition classification (ie, subdividing disease in stages 0, I, IIA, IIB, IIIA, IIIB, IIIC, and IV)[12]

Statistical analysis

A 2-tailed P value below .05 was considered statistically significant. We compared dichotomous outcomes among emergency and elective patients using the chi-square test and a relative risk (RR) calculation, while a 1-way analysis of variance or a univariate linear regression, with the unstandardized B regression coefficient as a point estimate, was used for continuous outcomes. Multivariate analysis was performed to control the findings for any potentially significant confounders found during univariate analysis. The Cox proportional hazards model was used for time-related outcomes, while binary logistic regression was used for dichotomous outcomes.

Results

We included 1,071 patients, of whom 102 were emergency admissions, 83 of which came directly from our ED.

Baseline characteristics

Baseline characteristics are displayed in Table 1. There were nonsignificant differences in general characteristics, with patients with emergency presentation being slightly older, with lower body mass index, more ethnic minority patients, and a relative overrepresentation of women. Emergency patients had lower but nonsignificant rates of polyposis, a previous history of colorectal carcinoma, and inflammatory bowel disease and otherwise comparable