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CLINICAL RESEARCH STUDY

Characterization of Ischemic Colitis Associated with Myocardial Infarction: An Analysis of 23 Patients

Mitchell S. Cappell, MD, PhD, FACG,[a] Deepak Mahajan, MD,[b] Vinod Kurupath, MD[c]

[a]Division of Gastroenterology, Department of Medicine, Albert Einstein Medical Center, Philadelphia, Penn; [b]Division of Gastroenterology, Department of Medicine, Brooklyn Hospital, Brooklyn, New York; [c]Department of Medicine, Brooklyn Hospital, Brooklyn, New York.

ABSTRACT

PURPOSE: The study characterizes the clinical presentation of ischemic colitis (IC) associated with myocardial infarction (MI) and helps determine whether the primary mechanism for this association is thrombus, embolus, or localized nonocclusive mesenteric ischemia (NOMI) associated with systemic hypotension.

METHODS: We compared 23 study patients presenting with IC occurring simultaneously with or within 3 days after MI who were admitted to 5 medical centers versus (1) 32 patients with IC without MI (IC-controls) or (2) 32 patients with MI without IC (MI-controls).

RESULTS: Of 17,500 patients admitted to the study sites with MI, 23 (0.13%) had IC. Study patients had a high in-hospital mortality of 39%. An Acute Physiology and Chronic Health Evaluation (APACHE) II score greater than 15 was a significant predictor of mortality in these patients ($P<.04$). Compared with the IC-controls, study patients had a significantly lower mean arterial pressure (MAP) (76.0 ± 17.1 mm Hg vs 98.3 ± 18.6 mm Hg, $P<.0001$) and a significantly higher rate of hypotension (57% vs 9%, odds ratio [OR] = 12.6, confidence interval [CI]: 3.10-49.7, $P<.001$). The 2 groups, however, had a similar mean number of risk factors for thromboembolism per patient. Study patients had more severe illness than IC-controls, as demonstrated by mean APACHE II scores (19.0 ± 5.5 vs 10.4 ± 4.8, $P<.0001$). Study patients had a significantly higher incidence of complications, including respiratory failure (57% vs 13%, $P=.001$), altered mental status (48% vs 13%, $P<.01$), and renal insufficiency or failure (61% vs 28%, $P<.04$). Study patients had a significantly lower minimum hematocrit. Study patients had a significantly higher rate of prolonged hospitalization (>30 days) or in-hospital death (74% vs 19%, OR = 12.3, CI: 3.47-43.5, $P<.0001$). Compared with MI-control patients, study patients had a significantly lower MAP, significantly higher rate of hypotension, much higher mean APACHE II score, much higher incidence of complications, and significantly worse hospital outcome.

CONCLUSIONS: Patients with both IC and MI present as a clinically distinct group from patients with either IC alone or MI alone. They have significantly more complications and worse in-hospital prognoses. They present with a dramatically lower MAP and a higher frequency of hypotension. This last finding suggests that the most common and most important mechanism for IC with MI may be hypotension from cardiogenic shock. Hypotension is the cardinal risk factor for generalized NOMI with acute mesenteric ischemia and may be an important risk factor for localized NOMI with IC. An APACHE II score greater than 15 may be a predictor of mortality from IC after MI.

KEYWORDS: Ischemic colitis; Acute mesenteric ischemia; Nonocclusive mesenteric ischemia; Cardiogenic shock; Lower gastrointestinal bleeding; Colitis; Colon; Sigmoidoscopy; Colonoscopy; Myocardial infarction

Requests for reprints should be addressed to Mitchell S. Cappell, MD, PhD, Director, Gastroenterology Fellowship Training Program, Division of Gastroenterology, Department of Medicine, Albert Einstein Medical Center, Klein Professional Building, Suite 363, 5401 Old York Road, Philadelphia, PA 19141.

E-mail address: mscappell@yahoo.com.

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The association of ischemic colitis (IC) with myocardial infarction (MI), although well recognized, is presently unstudied and uncharacterized other than in a few case reports.[1,2] Characterization of this association is, however, clinically important. The association, although uncommon, is not very rare. IC is the most common endoscopic diagnosis in patients undergoing sigmoidoscopy soon after MI[3] and the most common endoscopic diagnosis in patients undergoing colonoscopy soon after MI.[4] Characterization of this association may facilitate the diagnosis of IC, a diagnosis that is currently sometimes missed in the setting of MI because:

- the abdominal pain so characteristic of mesenteric ischemia may be masked or mistaken for the chest pain of MI, may be masked by morphine administration for the chest pain of MI, or may not be reported by the patient because of mental obtundation or endotracheal intubation consequent to MI;
- other manifestations of IC, such as unexplained sepsis, metabolic acidosis, or systemic hypotension may be attributed solely to the MI[5,6]; and
- the reluctance of endoscopists to perform sigmoidoscopy or colonoscopy after MI because of increased procedural risks.[3,4]

Also, characterization of this association may result in earlier diagnosis of IC in the setting of MI, earlier institution of therapy, and improved prognosis. Diagnostic delays can allow colonic ischemia to progress to colonic necrosis that requires colonic resection with its attendant increased mortality after MI,[7] increase colonic inflammation and sepsis from IC that can increase cardiac output and myocardial oxygen demand and thereby precipitate heart failure or recurrent MI, and result in lower gastrointestinal bleeding from unrecognized IC that is exacerbated by anticoagulation after MI. Clinical characterization may provide insight into the pathogenesis of this association and suggest methods of prevention. This study characterizes distinct features of IC associated with MI in a study comparing 23 patients with this association with 32 patients with IC alone and 32 patients with MI alone.

CLINICAL SIGNIFICANCE

- Patients with ischemic colitis associated with myocardial infarction present as a clinically distinct group from patients with either ischemic colitis or myocardial infarction alone.
- They present with a dramatically lower blood pressure and a much higher frequency of hypotension.
- They have significantly more complications and a significantly higher mortality.

METHODS

Study patients had IC presenting simultaneously with or within 72 hours after MI. MI was defined by a serum creatinine kinase level greater than 225 U/L (normal 25-225 U/L), a muscle-brain fraction greater than 5% (normal 0%-5%), and an affirmative diagnosis by an attending cardiologist. IC was diagnosed by colonoscopy or sigmoidoscopy with compatible pathologic findings on endoscopic biopsies; compatible patient history, physical examination, laboratory test results, and radiologic findings; and an affirmative diagnosis by an attending gastroenterologist (Appendix I). All study investigators reviewed all endoscopic videophotographs, endoscopic biopsies, and abdominal radiologic studies to verify the reported findings. Study exclusion criteria included: IC after abdominal aortic aneurysm surgery because of a different pathophysiology; colonic ischemia with acute mesenteric ischemia because of a different pathophysiology and natural history; and cases in which one or more of the investigators disagreed with the original diagnosis of IC on the basis of their review of the medical chart, endoscopic videophotographs, pathologic slides, and radiographic studies. Sigmoidoscopy was defined as colonic intubation distal to the splenic flexure.

Study patients were hospitalized at Maimonides Medical Center (Brooklyn, New York) from 1995 to 2001, at Robert Wood Johnson University Hospital (New Brunswick, New Jersey) from 1990 to 1995, at St. Barnabas Hospital (Bronx, New York) from 2003 to 2004, and at Albert Einstein Medical Center or its subsidiary Elkins Park Hospital (Philadelphia, Pennsylvania) from 2002 to 2004. Four of these hospitals (representing all but one of the study patients) provide tertiary cardiac care (cardiac catheterization laboratory, cardiology fellowship training program, and cardiac surgery service). Study patients were identified from the academic practice of the first author (n = 5); by communication with other physicians; by computerized analysis of primary or secondary disease codes (International Classification of Diseases, 9th revision) for MI, gastrointestinal bleeding, or IC; by computerized analysis of primary or secondary disease codes for MI and procedure codes for colonoscopy or sigmoidoscopy; and by manual review of all hospital sigmoidoscopy and colonoscopy reports.

IC-control patients had IC without MI. They were matched to the study patients in the proportion of inpatients from each hospital and in the proportion of patients with IC diagnosed by sigmoidoscopy versus colonoscopy. MI-control patients had MI without IC. They were matched to the study patients in the proportion of inpatients from each hospital. The presence or absence of fecal occult blood was determined using a stool specimen obtained by digital rectal examination and a guaiac-impregnated slide (Hemoccult; SmithKline Diagnostics, Sunnyvale, Calif). Analyzed thromboembolic risk factors include a history of diabetes mellitus, chronic hypertension, recent cigarette smoking