Clinical Gastroenterology and Hepatology 2016;14:558–564

Safety and Effectiveness of Early Colonoscopy in Management of Acute Lower Gastrointestinal Bleeding on the Basis of Propensity Score Matching Analysis

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BACKGROUND & AIMS: **We investigated the safety and effectiveness of early colonoscopy (performed within 24 hours of hospital admission) for acute lower gastrointestinal bleeding (LGIB) vs elective colonoscopy (performed 24 hours after admission).**

METHODS: **We conducted a retrospective study by using a database of endoscopies performed at the National Center for Global Health and Medicine in Tokyo, Japan from January 2009 through December 2014. We analyzed data from 538 patients emergently hospitalized for acute LGIB. We used propensity score matching to adjust for differences between patients who underwent early colonoscopy vs elective colonoscopy. Outcomes included rates of adverse events during bowel preparation and colonoscopy procedures, stigmata of recent hemorrhage, endoscopic therapy, blood transfusion requirement, 30-day rebleeding and mortality, and length of hospital stay.**

RESULTS: **We selected 163 pairs of patients for analysis on the basis of propensity matching. We observed no significant differences between the early and elective colonoscopy groups in bowel preparation–related rates of adverse events (1.8% vs 1.2%, $P = .652$), colonoscopy-related rates of adverse events (none in either group), blood transfusion requirement (27.6% vs 27.6%, $P = 1.000$), or mortality (1.2% vs 0, $P = .156$). The early colonoscopy group had higher rates than the elective group for stigmata of recent hemorrhage (26.4% vs 9.2%, $P < .001$) and endoscopic therapy (25.8% vs 8.6%, $P < .001$), including clipping (17.8% vs 4.9%, $P < .001$), band ligation (6.1% vs 1.8%, $P = .048$), and rebleeding (13.5% vs 7.4%, $P = .070$). Patients in the early colonoscopy group stayed in the hospital for a shorter mean time (10 days) than patients in the elective colonoscopy group (13 days) ($P < .001$).**

CONCLUSIONS: **Early colonoscopy for patients with acute LGIB is safe, allows for endoscopic therapy because it identifies the bleeding source, and reduces hospital stay. However, compared with elective colonoscopy, early colonoscopy does not reduce mortality and may increase the risk for rebleeding.**

Keywords: Colonoscopy Timing; Lower Gastrointestinal Hemorrhage; Urgent Colonoscopy; Diverticular Bleeding; Comparative Analysis.

See editorial on page 565.

Colonoscopy is essential for the diagnosis and treatment of acute lower gastrointestinal bleeding (LGIB).[1,2] The American Society for Gastrointestinal Endoscopy guidelines recommend that patients with severe acute LGIB are evaluated by colonoscopy within 24 hours of admission after a rapid bowel preparation.[2] However, the optimal timing of colonoscopy was controversial in several studies conducted in Western countries.[3–7]

Two prior randomized controlled trials (RCTs) on acute LGIB showed that urgent colonoscopy did not improve the outcomes of transfusion requirement, rebleeding, or mortality.[6,7] Although RCTs are regarded as

Abbreviations used in this paper: **GI, gastrointestinal; LGIB, lower gastrointestinal bleeding; LOS, length of stay; MDCT, multi-detector computed tomography; NSAID, nonsteroidal anti-inflammatory drug; RCT, randomized controlled trial; SRH, stigmata of recent hemorrhage.**

Most current article

1542-3565/$36.00
http://dx.doi.org/10.1016/j.cgh.2015.10.011

the most scientifically rigorous method of hypothesis testing available and the gold standard for evaluating the effectiveness of interventions, they are sometimes unfeasible or unethical to perform. In fact, enrollment was terminated in both these RCTs before the prespecified sample size had been reached because of difficulties in patient recruitment. In addition, one of the studies took 6 years to complete.[7] Conducting RCTs in the setting of acute LGIB may therefore be challenging. Furthermore, in the latter RCT, patients who underwent urgent colonoscopy had more severe bleeding at initial presentation (indicated by lower hemoglobin and a higher rate of transfusion) compared with those who underwent elective colonoscopy.[7]

Although observational studies with large patient samples can be alternatives to RCTs, they are potentially affected by physician factors including different preferences for conducting urgent or elective colonoscopy for elderly patients, patients with severe bleeding, comorbidities, hemodynamic instability, or other gastrointestinal (GI) symptoms, or patients admitted on the weekend.

To address these issues, we used propensity score matching to adjust for differences in baseline characteristics between patients who received early colonoscopy and those who did not. The specific objectives of this study were (1) to compare the safety of bowel preparation and procedures in early versus elective colonoscopy groups of patients emergently hospitalized with acute LGIB and (2) to compare between the groups the rates of detection of active bleeding, endoscopic therapies, rebleeding, transfusion, length of hospital stay (LOS), and mortality.

Methods

Study Design, Setting, and Participants

We conducted a retrospective study that used data from a prospectively recorded electronic admission database (MegaOak online imaging system; NEC, Tokyo, Japan) and an electronic endoscopic database (SolemioEndo; Olympus, Tokyo, Japan). This endoscopic database is a searchable collection of records that endoscopists input immediately after endoscopies. Between January 2009 and December 2014, we identified 681 consecutive patients who were admitted for acute overt LGIB to the gastroenterology department of the National Center for Global Health and Medicine, the largest emergency hospital (900 beds) in the Tokyo metropolitan area in Japan. The following patients were excluded: those with evidence of a bleeding source on upper endoscopy (n = 34), those who did not satisfy the criteria for acute LGIB (n = 25) as described below, those who did not undergo colonoscopy and had multidetector computed tomography (MDCT), angiography, or colonoscopy at another institution before admission (n = 69), and those whose vital signs could not be collected during bowel preparation or procedures (n = 25). After exclusion of ineligible patients, a cohort of 538 acute LGIB patients who underwent colonoscopy was analyzed. This study was approved by the institutional review board of the National Center for Global Health and Medicine, and patient consent was waived because this was a retrospective study.

Criteria, Bleeding Source, and Treatment of Acute Lower Gastrointestinal Bleeding

We classified the timing of colonoscopy as early colonoscopy if the procedure was performed within 24 hours of hospital admission and as elective colonoscopy if the colonoscopy was performed 24 hours after admission.[3] All colonoscopies were performed by using an electronic video endoscope (Olympus Optical, Tokyo, Japan) after full bowel preparation. Intestinal lavage for colonoscopy was performed by using sodium picosulfate on the day before assessment and 2 L of a solution containing polyethylene glycol on the day of assessment. In Japan, 2 L polyethylene glycol is the standard preparation volume in clinical practice.[8] An enema was performed in patients who were unable to take the polyethylene glycol solution, and a water-jet device (Olympus Flushing Pump; Olympus Optical) was used to obtain better visualization in cases of inadequate preparation.[8] Overt LGIB originating in the large or small bowel was diagnosed by endoscopy. Briefly, large bowel hemorrhage included melena or rectal bleeding with no evidence of a source on upper endoscopy, nasogastric tube use, capsule endoscopy, or double-balloon endoscopy, or a combination of these. Small bowel bleeding was diagnosed by capsule endoscopy or double-balloon endoscopy. Overt LGIB of unknown origin or hemorrhoidal bleeding was defined as a clinically significant absolute drop in hematocrit $\geq$10% and/or hemoglobin $\geq$2 g/dL from baseline levels according to previous criteria.[9] Patients who did not meet these criteria were excluded.

Stigmata of recent hemorrhage (SRH) were defined by the presence of active bleeding, an adherent clot, or a visible vessel[4,10] and were identified in cases of diverticular bleeding, radiation telangiectasia, angioectasia, rectal ulcer, or hemorrhoids, as well as after polypectomy/endoscopic mucosal resection. Nonvascular lesions were defined as those associated with the presence of inflammation (eg, colitis or inflammatory bowel disease) or tumor (eg, colorectal cancer). The diagnostic criteria for diverticular bleeding were divided into definitive and presumptive bleeding.[4,10] A definitive diagnosis was based on colonoscopic visualization of a colonic diverticulum with SRH.[4,10] A presumptive diagnosis was based on the presence of (1) fresh blood localized to the colon source in which there is a potential bleeding source on total colonoscopy and (2) bright red