ORIGINAL ARTICLE

Long-term recurrent bleeding risk after endoscopic therapy for definitive colonic diverticular bleeding: band ligation versus clipping

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Background and Aims: Very few prospective studies with over 100 samples have evaluated the long-term outcomes of endoscopic therapy for colonic diverticular bleeding (CDB). This study sought to elucidate the recurrent bleeding risk of endoscopic band ligation versus clipping for definitive CDB based on stigmata of recent hemorrhage (SRH).

Methods: Patients emergently hospitalized for acute lower GI bleeding and examined by high-resolution colonoscopy were enrolled. Better visualization of SRH from a diverticulum was obtained using a water-jet device. Endoscopic band ligation or clipping was performed as first-line treatment, and patients were prospectively followed after discharge.

Results: No statistical difference was found between the ligation (n = 61) and clipping (n = 47) groups in baseline characteristics or follow-up period. The probability of 1-year recurrent bleeding was 11.5% in the ligation group versus 37.0% in the clipping group (P = .018). No patients required surgery or experienced perforation. One patient in the ligation group experienced diverticulitis the next day. In patients with recurrent bleeding within 7 days, the recurrent bleeding site was the same diverticulum, and ulceration was found in the ligation group on repeat colonoscopy. In patients with recurrent bleeding after 2 months, repeat colonoscopy identified that the recurrent bleeding site was different, and scar formation was seen in the ligation group. The left side of the colon was an independent predictor for recurrent bleeding in the ligation group but not in the clipping group.

Conclusions: Band ligation for definitive CDB has better outcomes than clipping during long-term follow-up after endoscopic therapy, probably because of complete elimination of the diverticulum. CDB can recur at the same diverticulum in the short term but at a different diverticulum in the long term. (Gastrointest Endosc 2018;■:1-13.)

Colonic diverticular bleeding (CDB) is the most common cause of acute lower GI bleeding (LGIB), accounting for 40% to 50% of LGIB cases.[1,2] Bleeding spontaneously stops with conservative therapy in 70% to 90% of CDB cases,[3,4] but some patients require endoscopic intervention for definitive CDB, defined as the presence of stigmata of recent hemorrhage (SRH) from a diverticulum.[5,6] Because the recurrent bleeding rate is high when definitive CDB is managed conservatively,[5,6] it would be beneficial to clarify the most

Abbreviations: CDB, colonic diverticular bleeding; CI, confidence interval; HR, hazard ratio; LGIB, lower GI bleeding; NSAIDs, nonsteroidal anti-inflammatory drugs; SRH, stigmata of recent hemorrhage.

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effective method of endoscopic hemostasis, especially in relation to long-term follow-up outcomes.

Various endoscopic procedures have been reported for CDB.[7,8] Coagulation and clipping have been widely used in Western countries,[7] whereas clipping and band ligation have been used in Asian countries.[7,9] A recent meta-analysis suggested that band ligation was more effective than coagulation or clipping in reducing the need for surgery and angiographic embolization and that it was as effective as coagulation or clipping for hemostasis and prevention of early recurrent bleeding.[7] However, most studies in the meta-analysis were retrospective in design[7] and had small sample sizes, making them potentially prone to recall or selection bias. More than 20% of patients with CDB experience recurrence within 1 year of follow-up,[3,10,11] but long-term outcomes of endoscopic therapy remain to be fully elucidated, especially in studies with a prospective design. In addition, most endoscopic studies have not included important risk factors such as severity of bleeding, comorbidities, and drug use.[7] In particular, no studies have assessed continuation or discontinuation of nonsteroidal anti-inflammatory drugs (NSAIDs), low-dose aspirin, and anticoagulants, which significantly affect LGIB recurrence.[12-14]

Our previous cohort study examining recurrent bleeding of CDB[14,15] involved only a small number of cases with definitive CDB (n = 27), and the sample was not large enough to provide detailed findings on endoscopic therapy-related outcomes. The present study includes analysis of these previous cases and 81 patients with definitive CDB newly added to our database and focuses on long-term outcomes after endoscopic therapy. Our aim was to elucidate the recurrent bleeding risk of endoscopic band ligation versus clipping (direct and indirect methods).

METHODS

Study design, setting, and participants

From September 2010 to August 2017, patients emergently admitted for management of acute LGIB to the endoscopy unit, National Center for Global Health and Medicine, Tokyo were enrolled. Data on baseline characteristics, endoscopy, and clinical factors during hospital stay were prospectively collected, and patients with CDB were prospectively followed after discharge. Inclusion criteria were age >18 years; Japanese nationality; overt, acute, or frequent LGIB; and inpatient management. Exclusion criteria were LGIB because of causes other than definitive CDB, barium impaction therapy for CDB (n = 54),[16] and history of colon resection. All inclusion and exclusion criteria were satisfied before data analysis.

The institutional review board at National Center for Global Health and Medicine approved this study (approval nos. 750 and 1580), and all clinical procedures conformed to Japanese and international ethical guidelines (Declaration of Helsinki). All patients gave informed written consent before enrollment.

Diagnosis of definitive CDB and endoscopic therapy

Definitive CDB was defined as colonoscopic visualization of a colonic diverticulum with SRH such as active bleeding (Fig. 1A), adherent clot (Fig. 1B), or visible vessel (Fig. 1C).[5,6] Better visualization of the SRH was obtained with a water-jet device (Olympus Flushing Pump; Olympus Optical Co, Ltd, Tokyo, Japan), particularly in cases of adherent clot in a diverticulum.[17] All patients were fasted and rested with a drip infusion after admission, and all colonoscopies were performed within 24 hours of admission on a weekday or within 72 hours on a weekend. A high-resolution electronic video endoscope (Olympus Optical Co, Ltd) was used for all procedures after full bowel preparation with polyethylene glycol-electrolyte lavage solution (Nifec; Ajinomoto Pharmaceuticals Co, Ltd, Tokyo, Japan). Patients were started on a liquid diet after cessation of bleeding was confirmed, with gradual introduction of a solid diet before discharge.[16]

Endoscopic band ligation or clipping was performed as first-line treatment for CDB. Which of the 2 strategies was adopted was at the discretion of the treating physician, but in principle the decision was made not on baseline characteristics but on the date of treatment or on the treating physician's experience performing band ligation. Specifically, all patients underwent clipping before December 2012. At this time, band ligation therapy for CDB was reported,[18] and we started to offer it as a treatment alternative for CDB at our hospital. Most patients came to receive band ligation, but some physicians who had no or limited experience of performing band ligation for esophageal varices or hemorrhoids tended to continue performing clipping.

In the band ligation method, when the SRH from a diverticulum was identified (Fig. 2A), it was marked with hemoclips (Fig. 2B) and the colonoscope was removed.[19] After attaching a band-ligator device (MD-48912S Endoscopic Hemorrhoidal Ligation Device; Sumitomo Bakelite Co, Tokyo, Japan) (Fig. 2C) to the tip of the colonoscope, it was reinserted and the SRH was suctioned into the band-ligator cup (Fig. 2D). The O-ring was then removed pneumatically to ligate the inverted diverticulum (Fig. 2E). If band ligation was not successful, endoscopic clipping was immediately performed. Colonoscopy for late recurrent bleeding or for follow-up cancer screening identified scar formation at the previously banded site (Fig. 2F).

When the SRH was identified, hemoclips (HX-600-090L, HX-600-135, HX-610-090L, or HX-610-135; Olympus Medical Systems, Tokyo, Japan) were placed directly on the vessel whenever possible (Fig. 2G).[18] When direct placement could not be performed because of dome location, massive bleeding, or a small diverticular orifice, indirect