ORIGINAL ARTICLE

Antireflux mucoplasty, an evolution of endoscopic antireflux therapy for refractory GERD CME

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BACKGROUND

Medical treatment with acid suppressive medications is effective in managing GERD symptoms, but approximately 40% of patients still experience symptoms even on medications.[1] To address this, we have developed antireflux mucosectomy (ARMS)[2,3] and antireflux mucosal ablation (ARMA).[4] These interventions are less-invasive treatment options for GERD. In ARMS, we artificially create an ulcer by performing the cap-EMR (EMR-C) technique at the level of the gastric cardia. This procedure aims to narrow the cardiac opening through the scarring process. A meta-analysis of nonrandomized controlled studies has shown its effectiveness with good long-term follow-ups.[3,5] However, some challenges of ARMS and ARMA include the slow onset of therapeutic effect and the risk of delayed bleeding in patients who are taking antithrombotic medications. A potential solution to address these challenges is to perform mucosal defect closure immediately after mucosectomy. This report describes a new therapeutic approach called antireflux mucoplasty (ARM-P).

This study received approval from the institutional review board of Showa University (approval number: 1205-6).

CASE

A 68-year-old male patient with a history of proton pump inhibitor–refractory GERD for more than 15 years was referred to our hospital. He underwent upper endoscopy, high-resolution esophageal manometry to rule out esophageal dysmotility, and 24-hour pH monitoring. Upper endoscopy showed no erosive esophagitis with a hiatal hernia of Hill's flap grade II (Fig. 1A-B), and the 24-hour pH monitoring showed pathologic acid reflux: an acid exposure time of 8.7% and a DeMeester composite score of 14.5. All of these results were ARMS and ARMA inclusion criteria[2,4] (Video 1, available online at www.videogie.org).

Abbreviations: ARMA, antireflux mucosal ablation; ARM-P, antireflux mucoplasty; ARMS, antireflux mucosectomy; EMR-C, cap-EMR.

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PROCEDURE

Mucosectomy

Mucosectomy was performed using a therapeutic endoscope (H290T; Olympus, Tokyo, Japan) with an oblique distal attachment with rim (MAJ-296; Olympus) and a narrow crescent electrosurgical snare (SD-221L-25; Olympus) by means of the EMR-C technique.[6] The resection area's design was considered, and EMR-C with submucosal injections was repeated 3 to 4 times to remove two-thirds of the circumference centered on the lesser curvature mucosa (Fig. 2). Sufficient hemostasis was attained with thermal coagulation (Fig. 3). Conventional ARMS requires three-fourths to four-fifths circumference mucosal resection,[2,3] while less mucosal resection is performed in the ARM-P procedure (Fig. 4).

Defect Closure

Mucosal defect closure was performed using a novel method, the "Loop 11" technique, which enables continuous traction with a thread during the closure with endoscopic clips. As shown in Figure 5,[7] a loop was made using 5-0 nylon surgical suture (5-0 Nylon Suture, GA05NA; NescoSuture, Qingdao City, China) attached at both arms of the first repositionable endoscopic clip (QuickClip Pro, HX-202LR; Olympus). The support thread was hooked to the loop using a monofilament nylon line for traction. Removal of the support thread was achieved by pulling one end of the thread (Fig. 6). Clipping was performed on the anal side under the forward viewing position (Fig. 7A). The subsequent clip was deployed adjacent to the first clip, and the following clip was deployed onto the contralateral side (Fig. 7B). In this manner, the mucosa and submucosa were grasped and closed alternately. While pulling the thread, the submucosa at the base of the ulcer was grasped and clipped in a zigzag manner. Once complete closure was achieved,

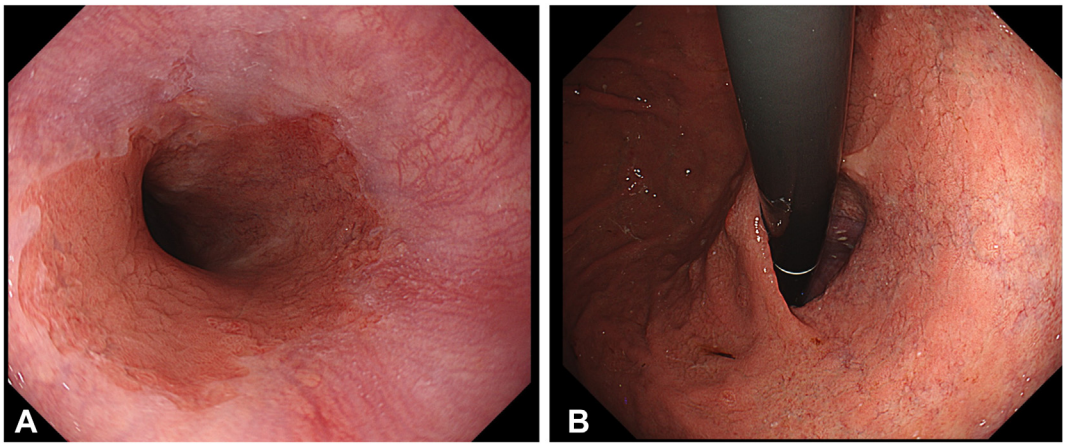

Figure 1. The endoscopic appearance and morphology before antireflux mucoplasty. **A,** Upper endoscopy revealed no signs of erosive esophagitis. **B,** The Hill's flap grade was classified as II.

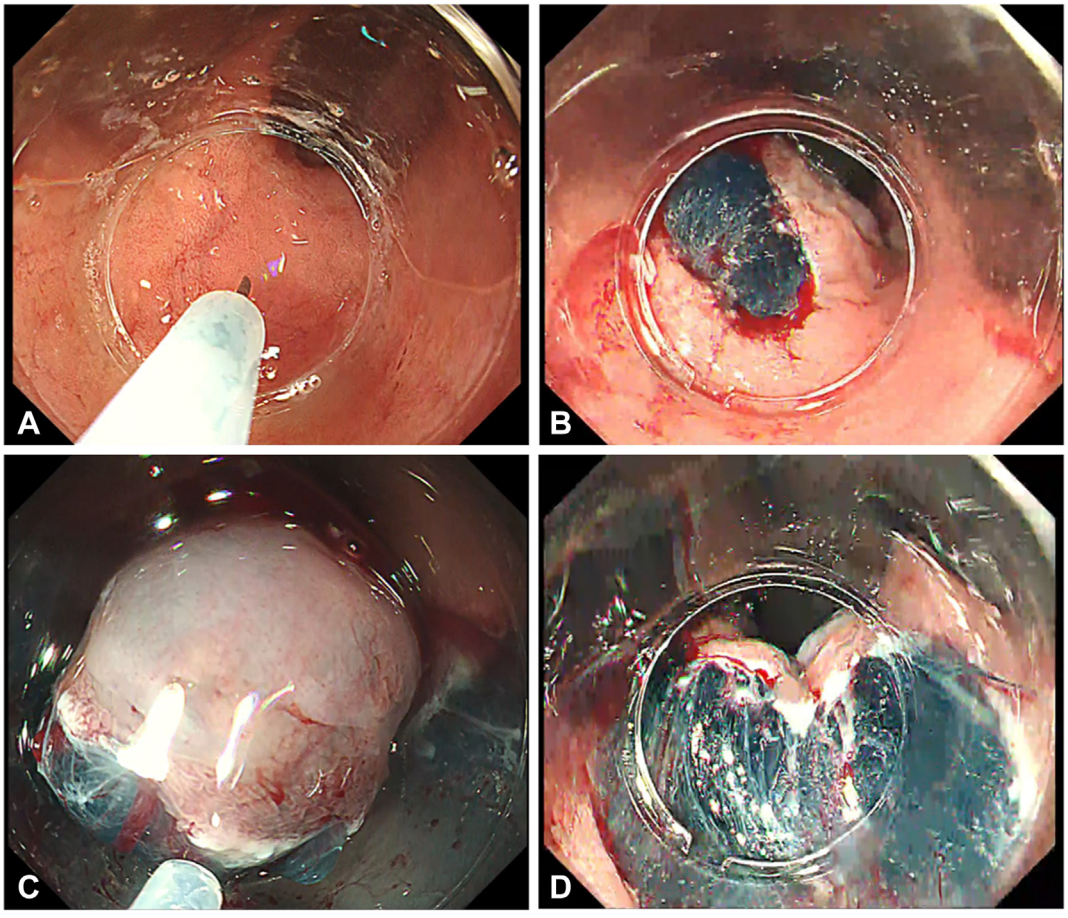

Figure 2. Mucosectomy: cap-EMR (EMR-C) was repeated 3 to 4 times to remove approximately two-thirds of the circumference centered on the lesser curvature mucosa. **A,** Submucosal injections administered before performing EMR-C. **B,** An image captured after the first EMR-C procedure. **C,** EMR-C was repeated 3 to 4 times. **D,** The final image of the mucosal defect after performing mucosectomy.

the support thread was removed from the loop (Fig. 7C). The final clip is deployed to the mucosa on the oral side for anchoring to prevent the sutures from loosening (Fig. 7D).

OUTCOME

A follow-up endoscopy 2 months postprocedure revealed that the hernia was tightened, and the mucosal

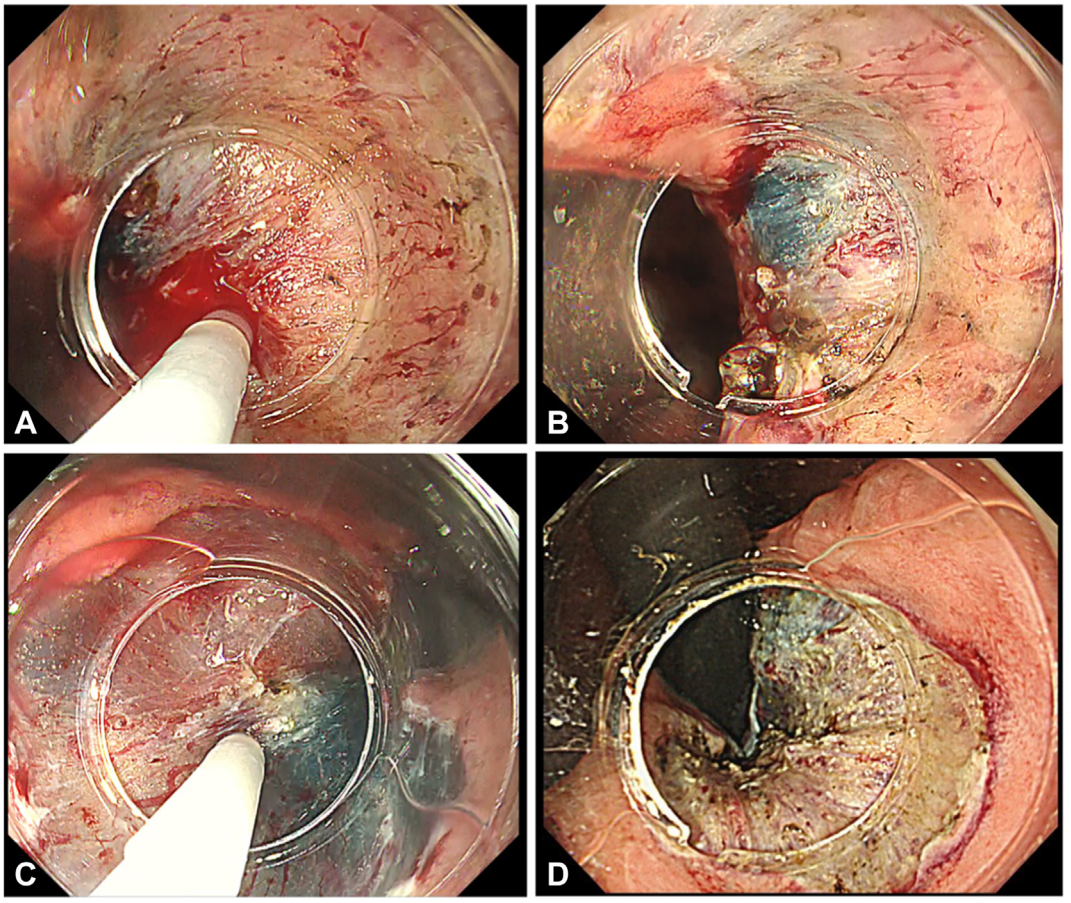

Figure 3. Hemostasis before the defect closure. **A,** An image depicting bleeding observed after cap-EMR (EMR-C). **B,** Adequate hemostasis was achieved through thermal coagulation. **C,** An image illustrating the attempt to prevent bleeding by applying thermal coagulation to the exposed vessel. **D,** A resected mucosa with secure hemostasis, ready for defect closure.

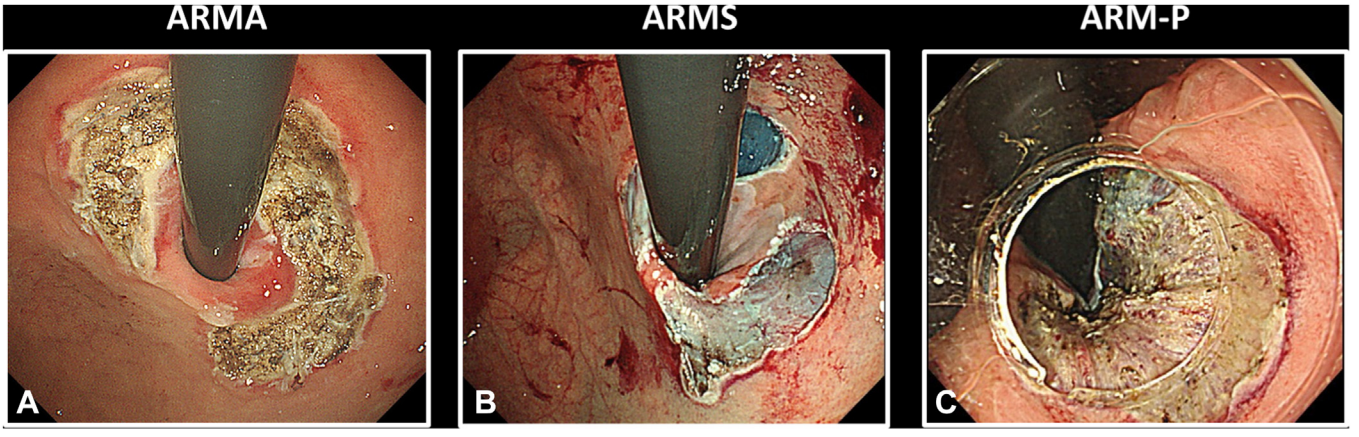

Figure 4. A comparison with antireflux cardioplasty. **A,** Mucosal defect after antireflux mucosal ablation. **B,** Mucosal defect after antireflux mucosectomy. **C,** Mucosal defect after antireflux mucoplasty.

flap valve had been reshaped (Fig. 8). Twenty-four-hour pH monitoring showed the improvement of acid exposure time and DeMeester score at 0% and 0.8%, respectively. The patient discontinued acid-suppressive medications after ARM-P. There were no adverse events including a stricture.

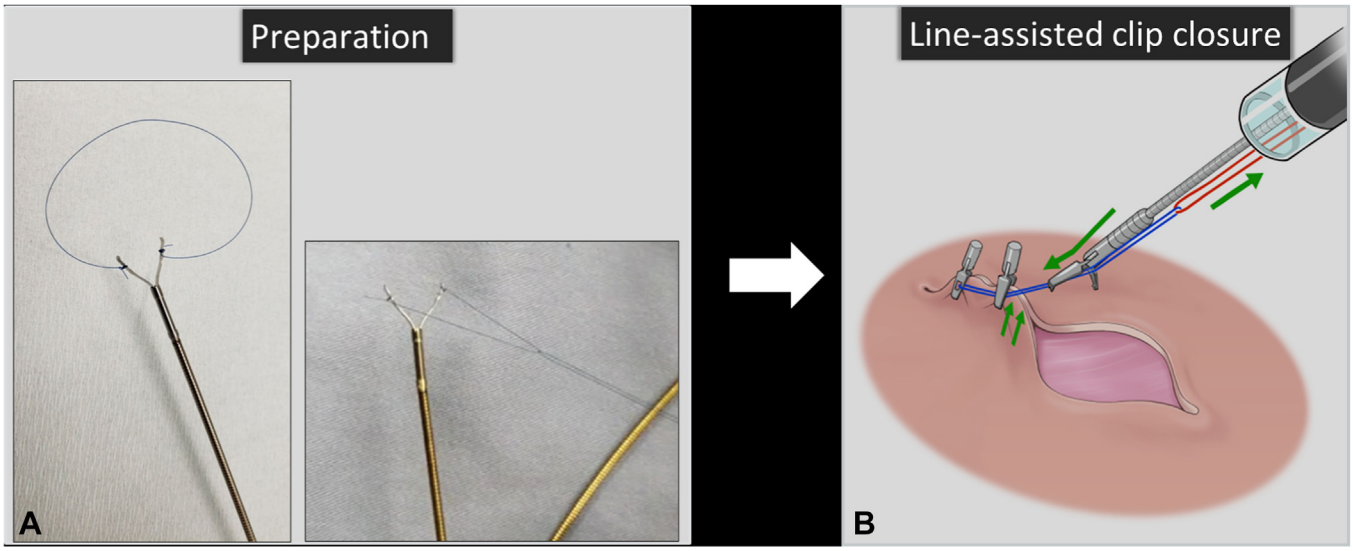

Figure 5. The Loop 11 technique, a novel closure method. **A,** An image illustrating the preparation of the Loop 11 closure technique. **B,** An illustration demonstrating a line-assisted clip closure.

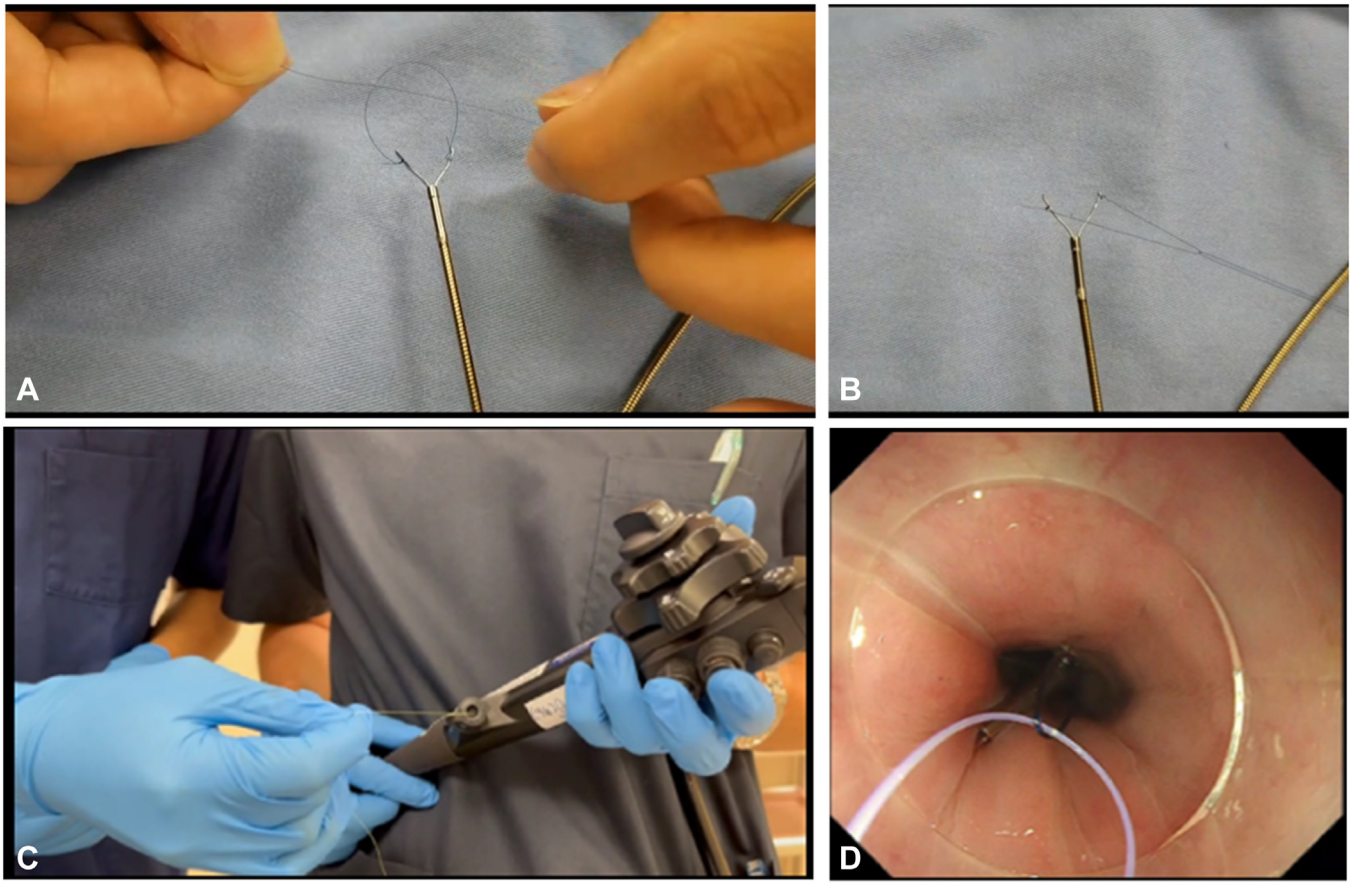

Figure 6. Traction using the support thread and removal of the support thread. **A,** The support thread is connected to the loop using a monofilament nylon line for traction. **B,** Traction is applied by pulling the support thread. **C,** An assistant removes the support thread by simply pulling it. **D,** An endoscopic image showing the support thread being removed by pulling one end of the thread.

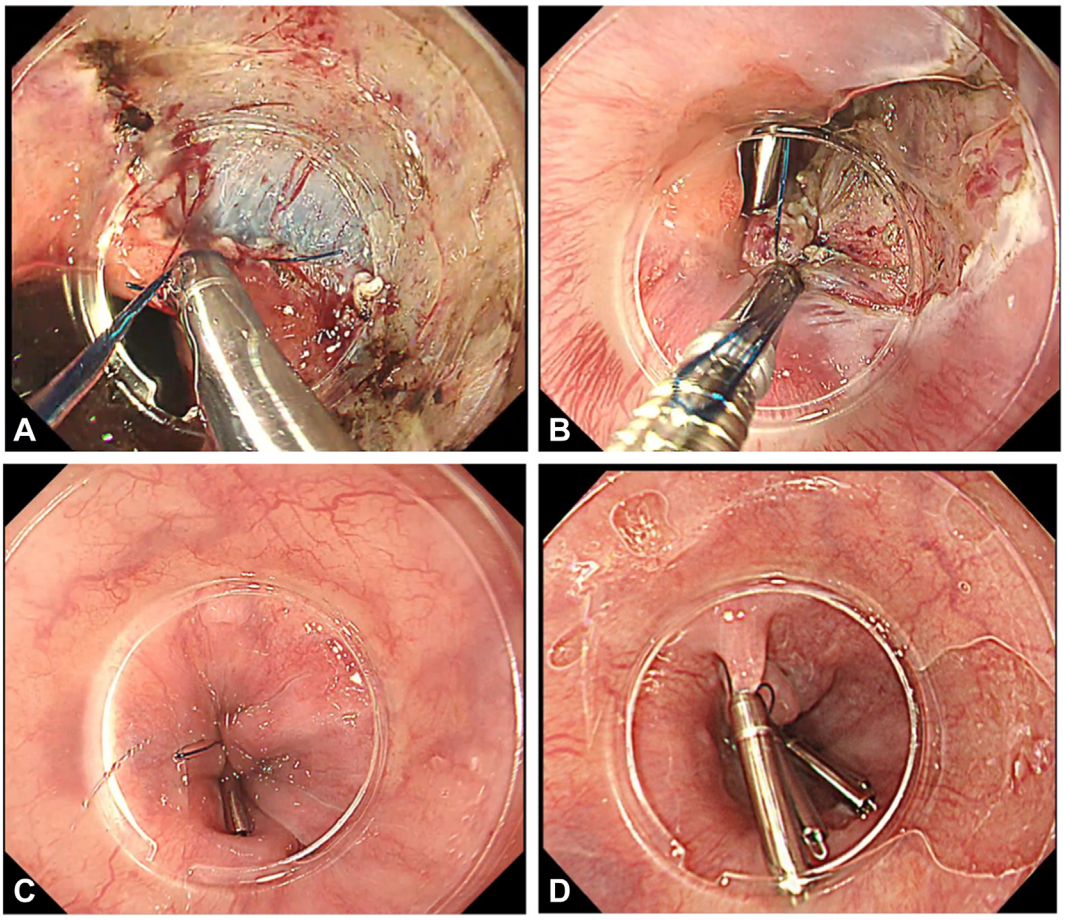

Figure 7. Defect closure using the Loop 11 technique. **A,** Clipping was performed on the anal side in the forward viewing position. **B,** Subsequent clips were deployed adjacent to the first clip, with the following clip being placed on the contralateral side. **C,** After achieving complete closure, the support thread was removed from the loop. **D,** The final clip is deployed to the mucosa on the oral side for anchoring to prevent the sutures from loosening.

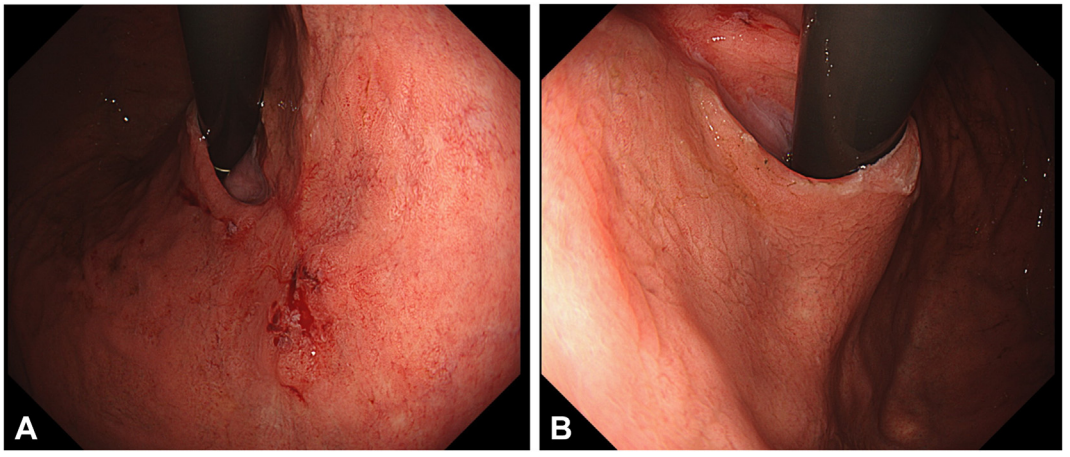

Figure 8. A follow-up endoscopy conducted 2 months post-procedure. **A,** The follow-up endoscopy revealed that the hernia had been tightened, and the mucosal flap valve had been reshaped. **B,** The Hill's flap grade showed improvement, now graded as I.

CONCLUSION

The ARM-P technique can address the challenges of ARMS by performing mucosal defect closure immediately after mucosectomy, which may provide a faster therapeutic effect and lower the risk of bleeding after the procedure.

DISCLOSURE

Dr Inoue is an advisor of Olympus Corporation and TOP Corporation. He has also received education grants from Olympus Corporation. All other authors disclosed no financial relationships.

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