



Introducing antireflux mucoplasty with valve: a novel endoscopic treatment for GERD

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BACKGROUND

Refractory or dependent GERD poses a challenge even with acid-suppressive medications, but both antireflux mucosectomy (ARMS) and antireflux mucosal ablation (ARMA) offer effective solutions¹⁻⁴ supported by meta-analyses.⁵⁻⁷ ARMS involves resecting excess mucosa from the lesser curvature of the stomach, whereas ARMA entails ablation. Both procedures remove or ablate three-quarters to four-fifths of the mucosa to induce scar contraction. However, 3 to 4 weeks is necessary for the artificial ulcers to heal, with postoperative bleeding reported in 5% of cases, and approximately 13.0% leading to transient strictures.⁴⁻⁸ In response to these issues, we have developed antireflux mucoplasty (ARM-P) wherein the resected area is promptly closed and have demonstrated its effectiveness in preventing postprocedure bleeding or stenosis.^{9,10}

Recently, Lu et al¹¹ introduced antireflux mucosal valvuloplasty (ARMV), a technique that conserves the mucosa by using valvuloplasty through endoscopic submucosal dissection (ESD). ARMV enables the creation of a mucosal flap valve. However, like ARMS, it requires an incision of approximately three-fourths of the circumference via ESD, raising concerns about increased adverse events. Thus, we have successfully integrated ARM-P and ARMV into antireflux mucoplasty with valve (ARM-P/V). This adaptation upholds ARMV's mucosa-preservation principle (Fig. 1).

Abbreviations: ARMA, anti-reflux mucosal ablation; ARM-P, antireflux mucoplasty; ARM-P/V, antireflux mucoplasty with valve; ARMS, antireflux mucosectomy; ARMV, antireflux mucosal valvuloplasty; ESD, endoscopic submucosal dissection; P-CAB, potassium-competitive acid blocker.

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CASE

This study was approved by the institutional review board of Showa University (approval number: 1205-6, 2023-089B). A 38-year-old white woman with persistent acid reflux symptoms, despite treatment with a potassium-competitive acid blocker (P-CAB), underwent a comprehensive diagnostic evaluation, including upper endoscopy, high-resolution esophageal manometry, and 24-hour pH-impedance monitoring. Findings of the upper endoscopy revealed a sliding hernia measuring less than 3 cm with a Hill grade III gastroesophageal flap valve (Fig. 2). Pathologic acid reflux was confirmed by combined multichannel intraluminal impedance and pH monitoring, with an acid exposure time of 4.6%, a DeMeester composite score of 20.5, a total of 116 reflux episodes, and a symptom association probability of belching at 100%.

PROCEDURE

ARMV procedure

The ESD procedure used an electro-surgical unit (VIO3; Erbe Elektromedizin GmbH, Tübingen, Germany) using an ENDO CUT I current set at settings 1-3-3. A mucosal incision was performed to resect the lesser curvature mucosa using a therapeutic endoscope (H290T; Olympus, Tokyo, Japan) fitted with a super-soft hood (Space Adjuster; TOP, Tokyo, Japan)¹² and an electro-surgical knife (Triangle Tip Knife J; Olympus). Caustery markings were done along approximately one-third of the mucosal circumference along the lesser curvature (Fig. 3). After injecting saline solution containing indigo carmine, a mucosal incision was made, followed by submucosal dissection until a double flap with semifree mucosa was created (Fig. 4). Three reopenable endoclips (SureClip, 11 mm; ROCC-D-26-195-C; Microtech, Nanjing, China) were used to secure the free mucosal edge to the underlying muscle layer, preventing the mucosal flap from flattening (Fig. 5).

ARM-P/V procedure (closure)

Anchor pronged clips (MANTIS; Boston Scientific, Marlborough, Mass, USA) were used with the dead space-eliminating technique for closure.¹³ After the mucosal and submucosal edges were gripped, the clip was drawn across

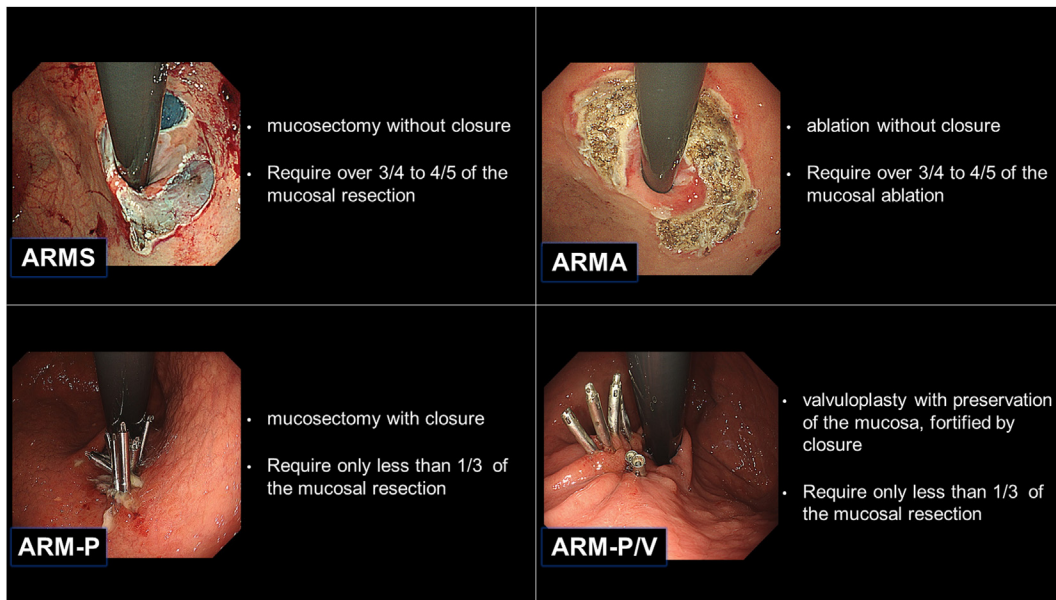


Figure 1. Summary of endoscopic antireflux therapy techniques. *ARMA*, antireflux mucosal ablation; *ARM-P*, antireflux mucoplasty; *ARM-P/V*, antireflux mucoplasty with valve; *ARMS*, antireflux mucosectomy.

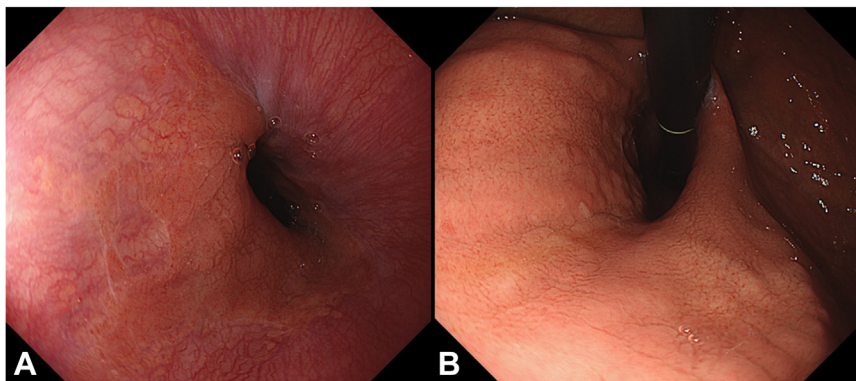


Figure 2. A Hill grade II hiatal hernia is shown before antireflux mucoplasty with valve. **A**, antegrade view. **B**, retrograde view.

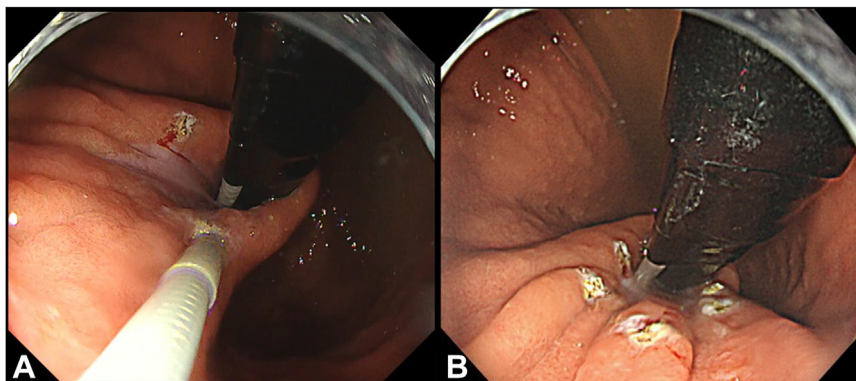


Figure 3. Application of cautery markings to approximately one-third of the mucosal circumference along the lesser curvature. **A**, Cauterization marking in progress. **B**, Cauterization marking completed.

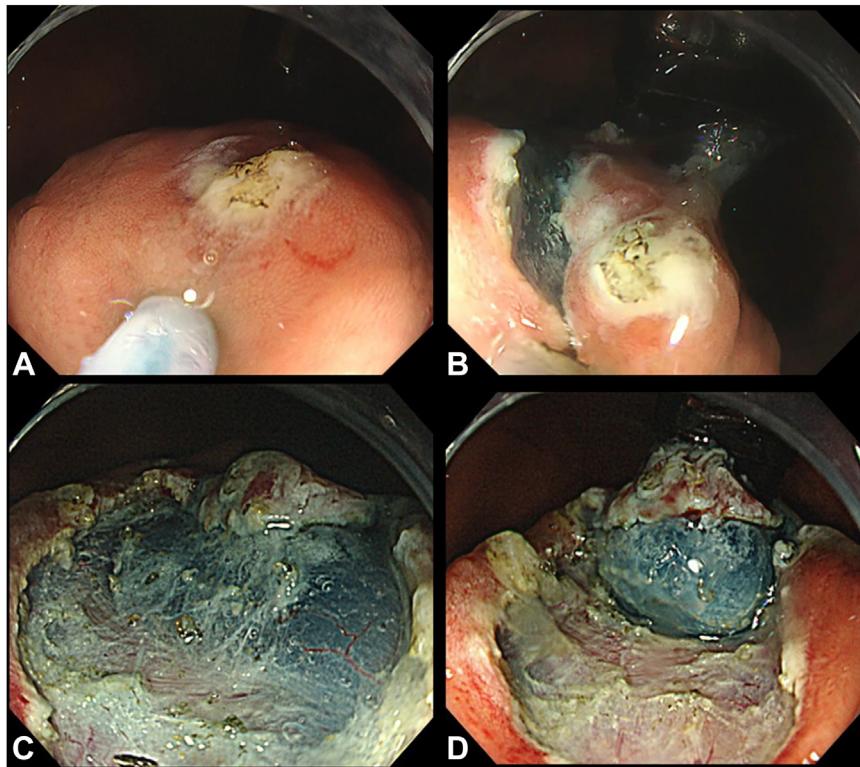


Figure 4. Shown is the injection of saline solution containing indigo carmine, the mucosal incision, and submucosal dissection to create a double flap with semifree mucosa. **A**, Injection of saline solution containing indigo carmine. **B**, Mucosal incision. **C**, Submucosal dissection. **D**, Creation of a double flap with semifree mucosa.

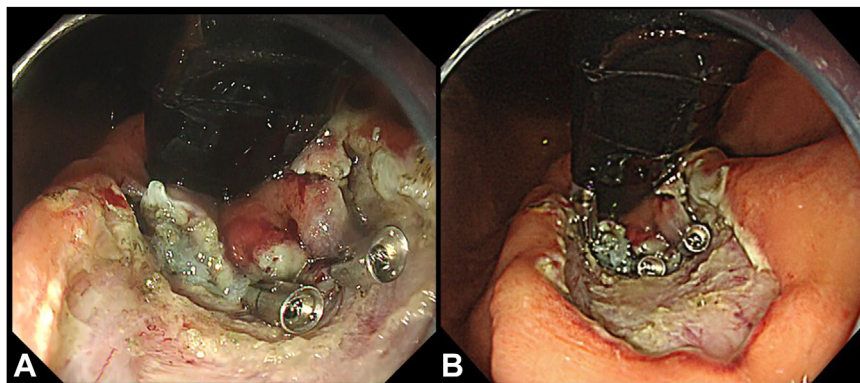


Figure 5. Deployment of reopenable endoclips to prevent flattening of the mucosal flap. **A**, Valve fixation in progress. **B**, Valve fixation completed.

to the opposite side and released over the defect. Additional clips were then applied alternately from different sides until full closure was attained (Fig. 6). The procedure, from marking to deploying the last clip, lasted 62 minutes and required a total of 5 clips (Video 1, available online at www.videogie.org).

OUTCOME

Follow-up conducted after 1 month confirmed a decrease in the size of the esophageal hiatal hernia and the formation

of a valve (Fig. 7). Despite her wish to continue taking a P-CAB, the patient reported significant symptom relief, with her GERD Health-Related Quality of Life score decreasing from 27 to 5, the F-scale improving from 29 to 12, and the GERD questionnaire (GerdQ) from 5 to 3. No adverse events were reported.

CONCLUSIONS

ARM-P/V enables valvuloplasty akin to ARMV. In addition, prompt closure fosters mucosal formation, thus mitigating

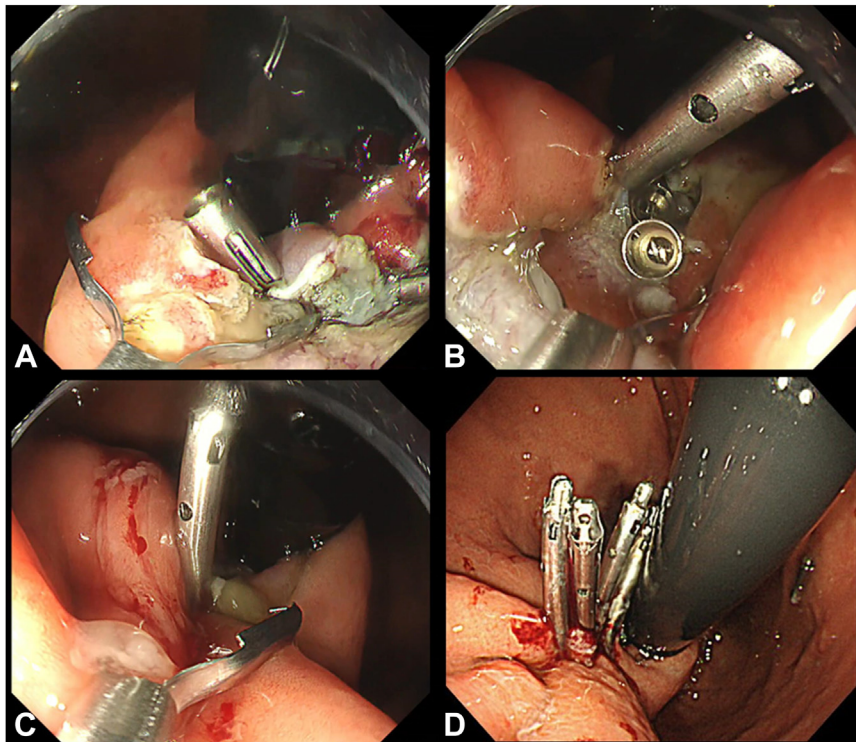


Figure 6. Dead space–eliminating technique for defect closure using anchor-pronged clips. **A**, Mucosal and submucosal edges were gripped for initiation of the dead space–eliminating technique. **B**, The next clip was applied from the contralateral edge. **C**, Additional clips were applied alternately in a zig-zag manner. **D**, Complete defect closure was attained.

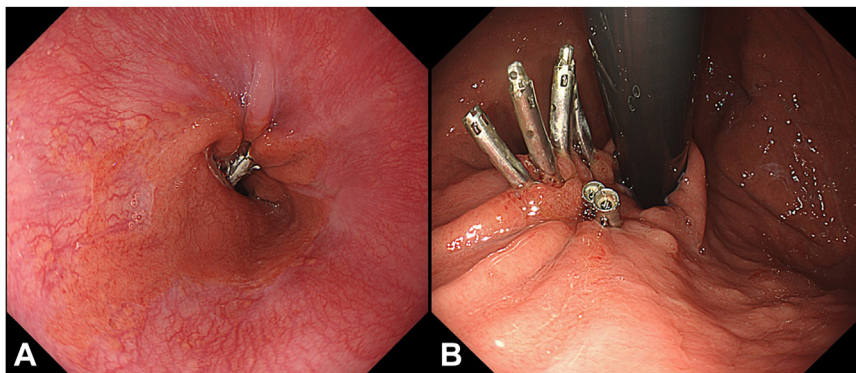


Figure 7. Shown is a reduction in the size of the esophageal hiatal hernia and the formation of a valve after antireflux mucoplasty with valve. **A**, Antegrade view. **B**, Retrograde view.

the likelihood of bleeding, whereas a more limited mucosal incision minimizes the risk of stricture formation.

PATIENT CONSENT

Not applicable.

DISCLOSURE

Dr Inoue is an advisor of Olympus Corporation and Top Corporation. Dr Sethi is a consultant for Olympus, serves

on the advisory board of Endosound, and is involved in research with Fujifilm. The other authors have no conflicts of interest to disclose.

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