ORIGINAL ARTICLE

Endoscopic mucoplasty for benign esophageal strictures (multiple Schatzki rings)

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BACKGROUND

Schatzki rings are ring-like benign strictures of the distal esophagus, typically occurring a few centimeters proximal to the gastroesophageal junction (GEJ). Symptomatic strictures, which do not respond to initial medical therapy, require endoscopic treatment. Treatment is aimed at reducing the diameter of the benign stricture via esophageal dilation with the use of a bougie or balloon. However, endoscopic dilation may be refractory in some cases.[1] Herein, we present a case with symptomatic multiple Schatzki rings not responding to pharmacotherapy and balloon dilation. We opted to perform an endoscopic mucoplasty (EMP; mucosal incision and closure), which was an effective treatment with complete symptom resolution.

CASE PRESENTATION

A 50-year-old man with persistent dysphagia was referred to our institution. He underwent EGD with random biopsies (Fig. 1), high-resolution manometry (Fig. 2), and a barium swallow (BS). EGD revealed multiple ring-like stenoses at 1 to 5 cm proximal to the GEJ. A retroflexed view showed esophageal mucosa wrapping around the scope, which pulled out toward the gastric side. Random biopsies did not fulfill the criteria for diagnosing eosinophilic esophagitis.[2] High-resolution manometry showed normal peristalsis without lower esophageal sphincter dysfunction. BS showed a narrowing area at the distal esophagus and a delay in the passage of contrast. Medical therapy with proton pump inhibitors and topical corticosteroids did not improve his symptoms. Endoscopic balloon dilation up to 20 mm did not improve his symptoms. After discussing the benefits and the risks with the patient, we opted to perform EMP and additional closure to the incision line to prevent restenosis.

Abbreviations: BS, barium swallow; EMP, endoscopic mucoplasty; GEJ, gastroesophageal junction.

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PROCEDURE

Endoscopic Mucoplasty

The procedure was carried out using a single-channel therapeutic endoscope (GIF-H290T; Olympus Corp, Tokyo, Japan) with a super-soft hood (Space Adjuster; TOP Corp, Tokyo, Japan) as a distal attachment. A longitudinal mucosal incision was made at the 2-cm proximal side from the area of stenosis using a triangle-tip knife with a water jet function (Olympus Corp) to create a submucosal tunnel. The tunnel was extended beyond the area of stenosis, 2 cm distally from the GEJ on the gastric side. The submucosal tunneling method was used to properly evaluate the depth of stricture involvement. No involvement of the esophageal muscle layer was identified. Moreover, the tunneling method enabled a sufficient longitudinal incision with a minimal transverse incision, which was easier for defect closure. A mucosal incision was performed and extended in the longitudinal direction from the initial mucosal entry to the end of the submucosal tunnel. To prevent restenosis, the mucosal defect was approximated and closed in a horizontal, short-axis direction with purse-string suture techniques using "loop 9"[3] and "loop 10"[4] (Fig. 3; Video 1, available online at www.videogie.org). This closure prevented restenosis by pulling the esophageal mucosa toward the stomach, which led to stretching and widening of the distal lumen.

OUTCOME

Postoperatively, the patient recovered uneventfully (Fig. 4). He started on clear fluids the following day and advanced his diet as tolerated. His symptoms dramatically improved postprocedure, and he was discharged 5 days postprocedure. We followed up with him 1 month after the procedure, and he remained asymptomatic. EGD did

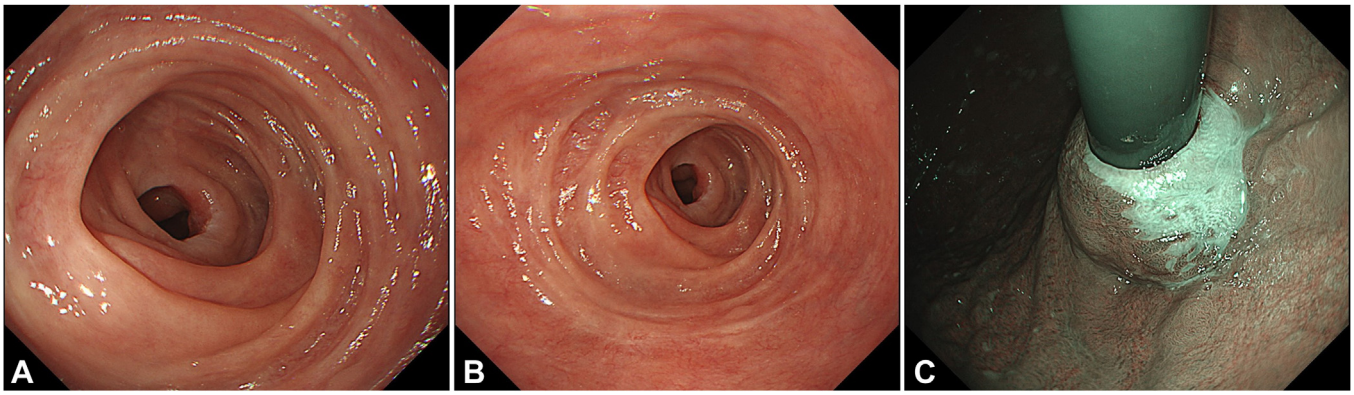

Figure 1. Preoperative endoscopic findings. **A and B,** Multiple ring-like stenoses at 1 to 5 cm proximal to the gastroesophageal junction. There was no significant narrowing at the gastroesophageal junction. **C,** Retroflexed view in the stomach with narrow-band imaging showing esophageal mucosa wrapped around the scope and pulled out toward the gastric side.

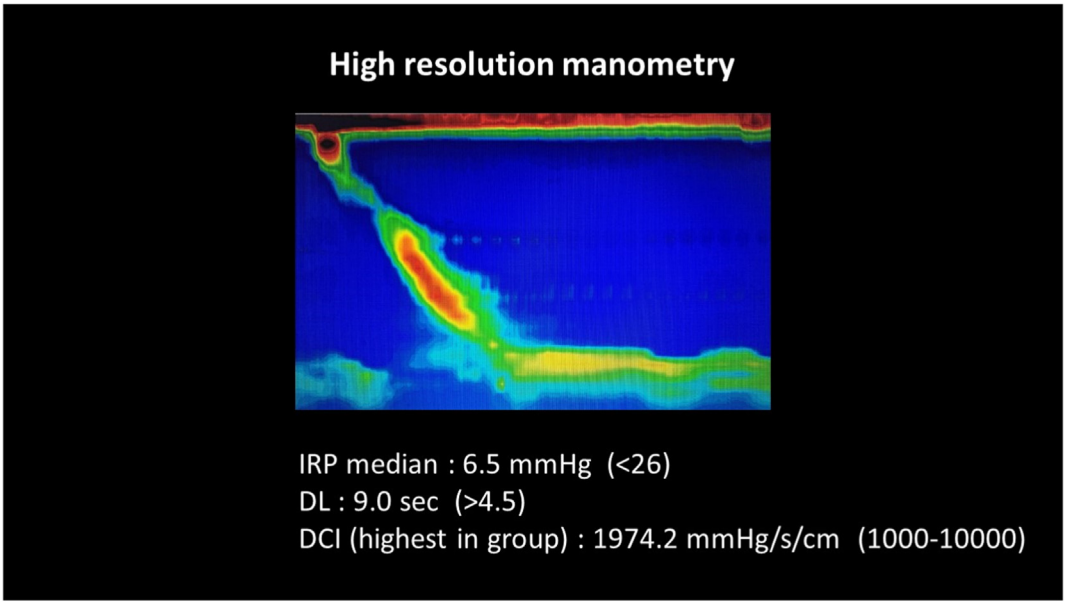

Figure 2. High-resolution manometry demonstrating normal peristalsis without lower esophageal sphincter dysfunction. The value of the IRP median was 6.5 mm Hg, DL was 9.0 seconds, and DCI (highest in the group) was 1974.2 mm Hg/s/cm. *DCI*, distal contractile integral; *DL*, distal latency; *IRP*, integrated relaxation pressure.

not show any esophageal stricture (Fig. 5). BS revealed no delayed outflow of the contrast (Fig. 6).

We successfully performed EMP for benign esophageal strictures. This technique is an offshoot of submucosal endoscopy and was completed with our novel defect closure techniques. Endoscopic closure in the horizontal direction prevented the esophagus from restenosis. The principle was similar to the surgical approach such as pyloroplasty for pyloric stenosis[5] and Heineke-Mikulicz strictureplasty for Crohn disease.[6] The closure enabled the plasty by stretching and widening the lumen. Moreover, a completed form could be expected just after the procedure without waiting for the mucosal incision to heal. Thus, the patient's symptoms could improve immediately after the procedure. EMP could be a treatment option in case of refractory esophageal stricture.

DISCLOSURE

Dr Inoue is a consultant and research grant recipient at Olympus Corporation, a research grant recipient at Takeda Pharmaceutical Co, and a consultant at TOP Corporation. All other authors did not disclose any financial relationships.

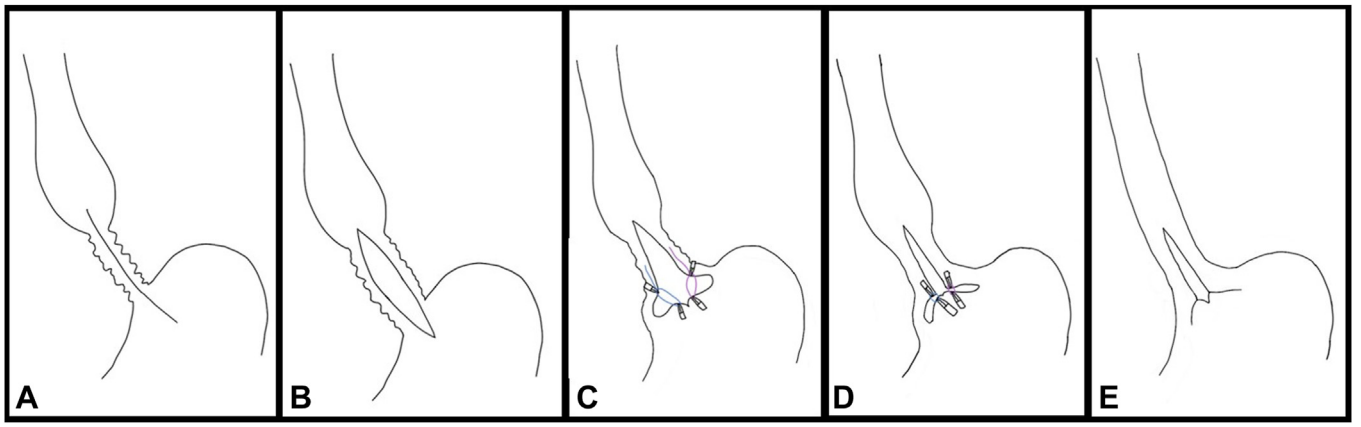

Figure 3. Endoscopic mucoplasty. **A and B,** A longitudinal mucosal incision is made at the 2-cm oral side from the area of stenosis to create a submucosal tunnel. The tunnel is extended beyond the area of stenosis, 2 cm distally from the gastroesophageal junction on the gastric side. The mucosal incision is performed longitudinally from the initial entry to the end of the tunnel. **C and D,** Mucosal defect is approximated in a horizontal, short-axis direction using "loop 9" and "loop 10." **E,** Completion of the procedure.

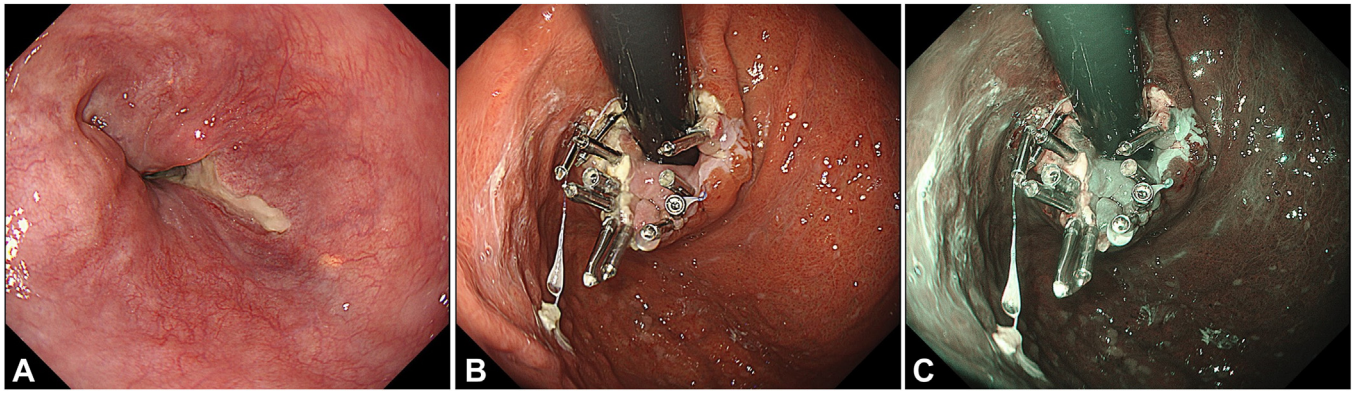

Figure 4. Endoscopic images from postoperative day 3. **A,** Disappearance of Schatzki rings is confirmed. **B and C,** Retroflexed view shows the stretching of the esophageal mucosa pulled out toward the stomach side. This indicates that not only resection but also mucoplasty could be performed by the closure.

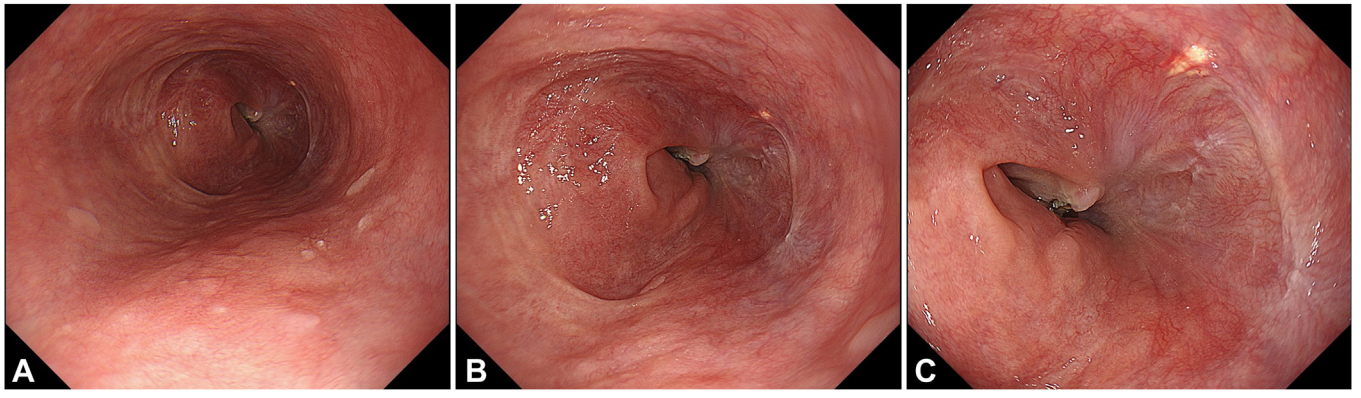

Figure 5. An endoscopic image on postoperative day 30 showing no restenosis.

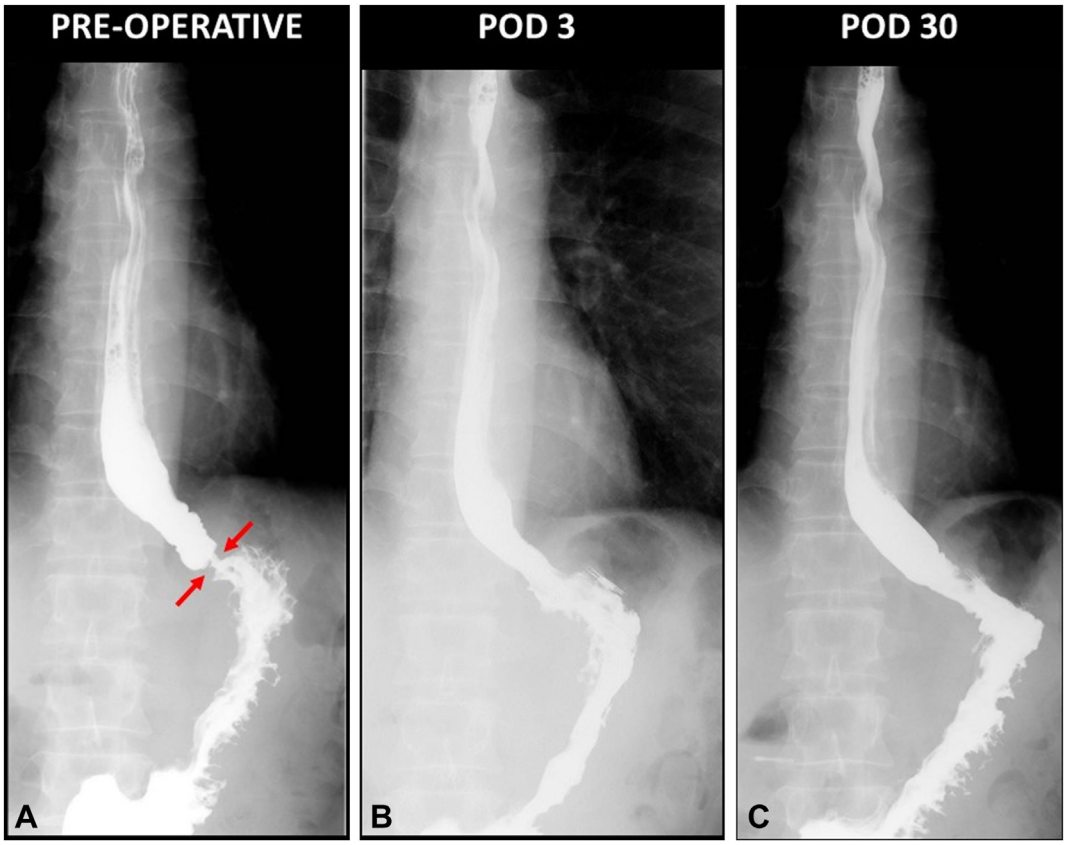

Figure 6. Barium swallow (BS) findings. Preoperative BS shows a delayed passage with narrowed area at the site of the stenosis. **B and C,** BS on postoperative days (PODs) 3 **(B)** and 30 **(C)** shows no narrowed and no delayed outflow.

REFERENCES

1. Müller M, Gockel I, König J, et al. Long-term recurrence rates following dilation of symptomatic Schatzki rings. Dig Dis Sci 2011;56:1432-7.
2. Vinit C, Dieme A, Courbage S, et al. Eosinophilic esophagitis: pathophysiology, diagnosis, and management. Arch Pediatr 2019;26:182-90.
3. Inoue H, Tanabe M, Shimamura Y, et al. A novel endoscopic purse-string suture technique, "loop 9", for gastrointestinal defect closure: a pilot study. Endoscopy 2022;54:158-62.
4. Inoue H, Shimamura Y, Fukuda M, et al. "Loop-10" line-assisted clip closure method: closure of perforation in re-do peroral endoscopic myotomy. VideoGIE 2023;8:186-8.
5. Søreide K, Sarr MG, Søreide JA. Pyloroplasty for benign gastric outlet obstruction–indications and techniques. Scand J Surg 2006;95:11-6.
6. Jobanputra S, Weiss EG. Strictureplasty. Clin Colon Rectal Surg 2007;20:294-302.