



# Topflight endoscopic submucosal dissection: a novel strategy for the resection of gastric fundus tumors

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## INTRODUCTION

Gastric fundus is regarded as a technically difficult area for endoscopic submucosal dissection (ESD), even for experienced endoscopists, because of its anatomic features, thin wall, and abundant blood supply. Herein, we describe a novel ESD technique, the Topflight ESD, which uses a conventional endoscope and devices, enabling resection of large lesions in the fundus without the need for special instruments or devices.

## TOPFLIGHT ESD PROCEDURE

After detailed characterization of the lesion and its margins, marking dots are applied 5 mm outside the lesion margins using the tip of the ESD knife. Then, a mucosal incision is made in the distal esophagus, about 3 cm above the gastroesophageal junction. A tunnel is created in the gastric wall by using a conventional flexible distal cap. A subepithelial injection is performed using an endoscopic needle and the water flush from the ESD knife. Submucosal vessels are preventively coagulated with coagulation forceps or the tip of the knife. Afterward, extensive dissection of the submucosal space in the fundus and proximal corpus is performed. Then, the tumor is isolated from the surrounding tissues. Like in peroral endoscopic myotomy, tunnel dissec-

tion may be guided using transillumination or by the detection of the indigo carmine from the luminal side.<sup>1</sup> Following that, the endoscope is removed from the submucosal tunnel and is inserted into the gastric lumen. The mucosal incision from the luminal side is performed after tunnel creation and when the submucosa beneath the lesion is fully dissected. The mucosal incision is performed outside the dots rim using the ESD knife. Thereafter, en bloc resection is obtained and the specimen is retrieved. Finally, the esophageal incision is closed using conventional through-the-scope clips (Fig. 1).

## CLINICAL CASE

An 81-year-old male patient with history of a coronary bypass surgery, right lung lobectomy, and mucosa-assisted lymphoid tissue lymphoma was referred to us. On a previous EGD, a 6-cm flat lesion with no ulcer (Paris 0-IIa+b) was identified in the gastric fundus and greater curvature of the proximal body (Fig. 2). Biopsies revealed a mixed-type, moderately differentiated adenocarcinoma. The decision for ESD resection was made after a multidisciplinary team conference. The ESD was performed according to the steps described previously. After lesion characterization, marks were placed around the lesion (Fig. 3). Then, an incision was made in the distal esophagus (Fig. 4), and a wide tunnel was created, dissecting the submucosa under the lesion (Fig. 5). The tunnel dissection was guided by the detection of the indigo carmine from the luminal side. During the procedure, the scope was removed several times from the tunnel and inserted in the gastric lumen for proper tunneling orientation. Then, a mucosal incision from the luminal side was made. The incision started from the distal part to use the gravity subsequently. During this stage there was a 3-mm perforation, highlighting the risk of perforation when the cutting is done from the luminal side. An isolated tip knife might be used to prevent the risk of perforation during mucosa incision. This perforation was effectively closed with the use of through-the-scope clips. En bloc resection was achieved (Fig. 6).

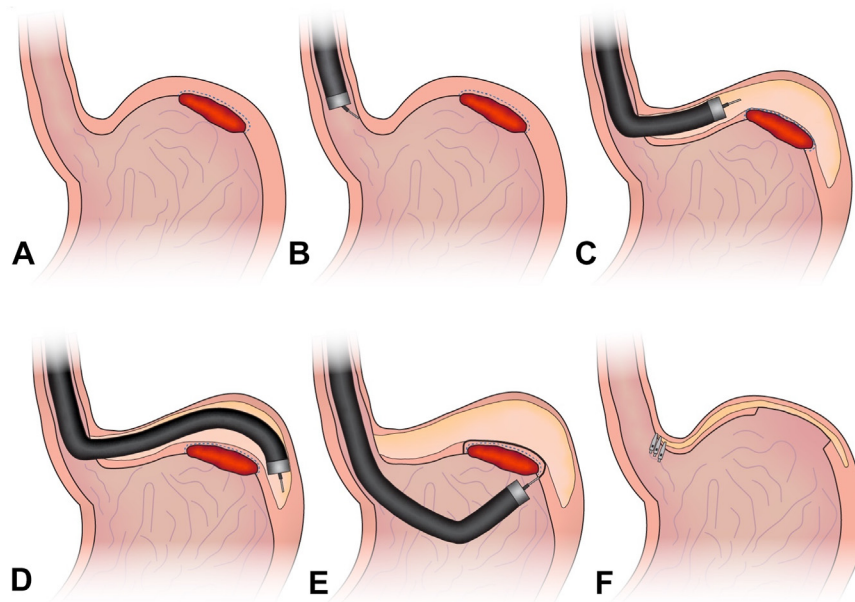
The esophageal incision was closed. Because of its size, the gastric mucosal defect could not be closed. However, a careful investigation was performed, and vessels were preventively coagulated. The procedure took 176 minutes. The obtained specimen was 75 × 50 mm in size (Fig. 6;

Abbreviation: ESD, endoscopic submucosal dissection.

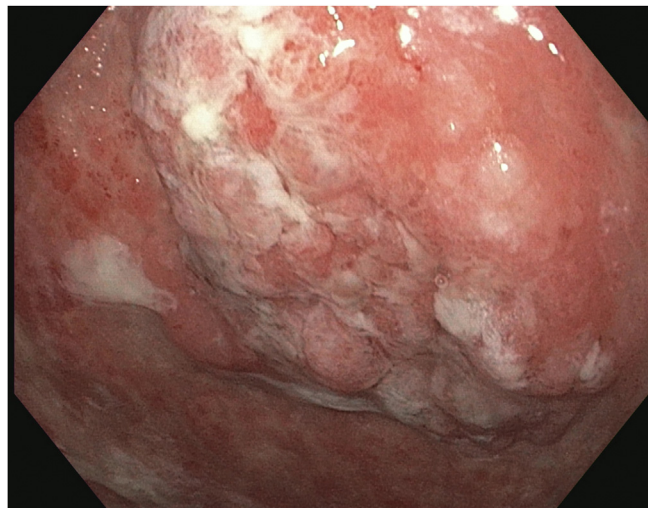
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**Figure 1.** Steps of Topflight ESD. **A**, Placement of dots around the lesion. **B**, Incision in the distal esophagus. **C**, Creation of a tunnel in the gastric submucosa. **D**, Dissection of the submucosa surrounding the lesion. **E**, Incision of the surrounding mucosa from the luminal side. **F**, Closing of the esophageal incision with through-the-scope clips.

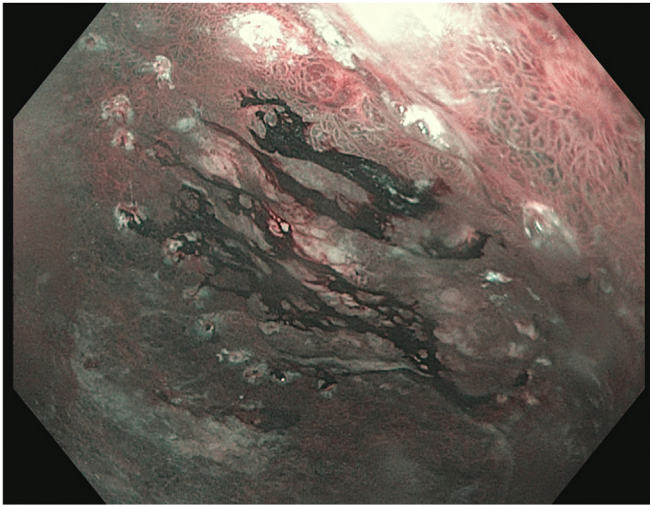


**Figure 2.** Lesion in the gastric fundus/proximal corpus, Paris 0-IIa-b, about 6 cm in size.

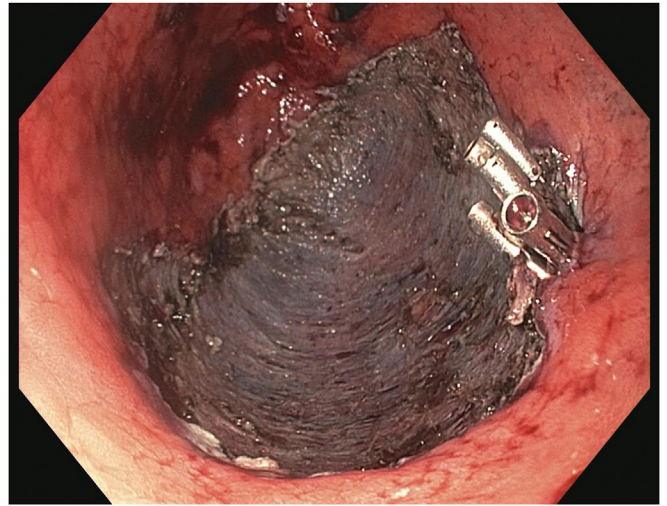
[Video 1](http://www.videogie.org), available online at [www.videogie.org](http://www.videogie.org)). The patient had suspended clopidogrel, which was restarted the following day. Oral liquids were started on day 1 and the patient was discharged as asymptomatic on day 2. Ten days after discharge, the patient was admitted for bleeding from the ESD ulcer, treated endoscopically, and remained asymptomatic 2 months after. The pathologic examination confirmed the presence of a mixed-type, moderately differentiated adenocarcinoma, SM2LOV0R0, pT1b (Figs. 7 and 8).

## DISCUSSION

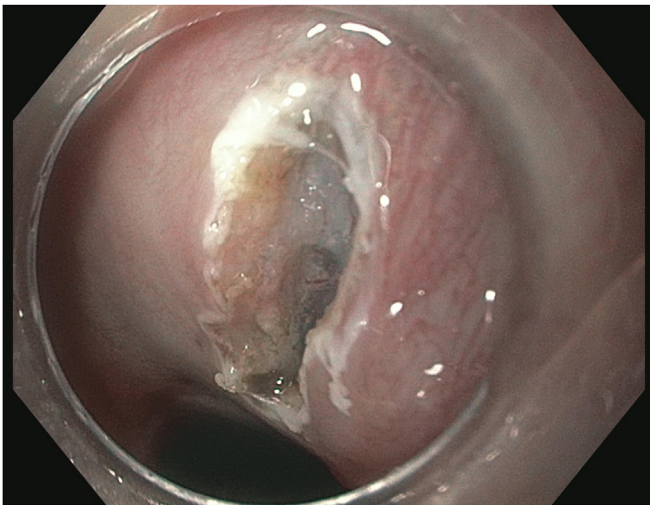
ESD in the fundus is performed with an endoscope in retroflexion, turning the dissection more difficult and more prone to perforation because of the perpendicular angulation of the knife. Some approaches have been used that try to overcome these constraints, namely multibending endoscopes,<sup>2</sup> the pocket-creation method,<sup>3</sup> and various traction devices and techniques.<sup>4-7</sup> However, all have



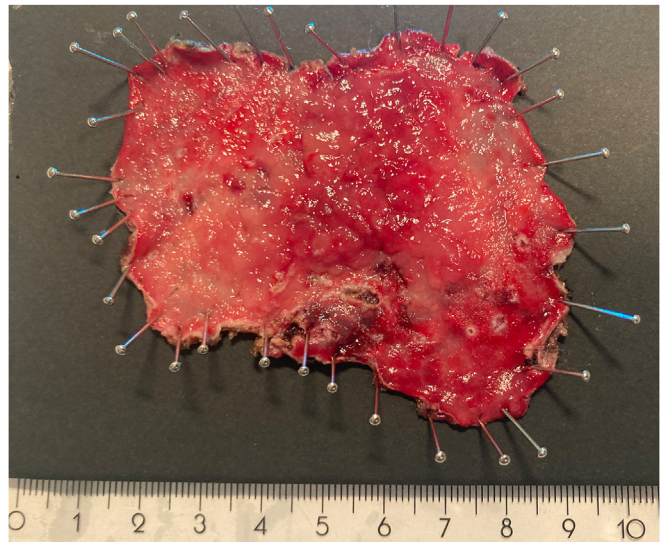
**Figure 3.** Marking dots were placed outside the lesion.



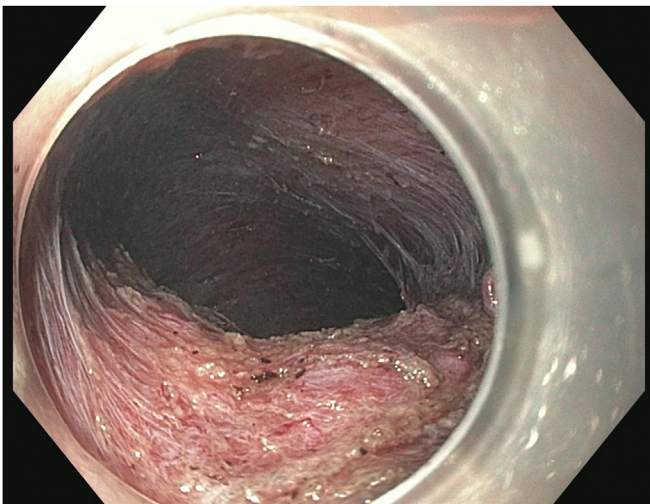
**Figure 6.** Mucosal defect after resection.



**Figure 4.** Incision in the distal esophagus.



**Figure 7.** Retrieved specimen 75 × 60 mm in size.

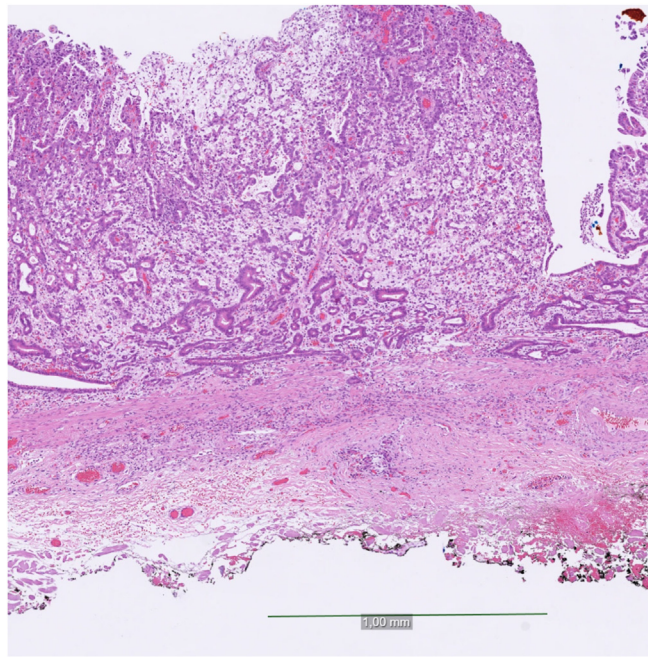


**Figure 5.** A large tunnel is created in the fundus.

limitations for ESD of large lesions in the fundus. Some need specific assistance, others enable only traction, and some need specific devices not available in many centers. We demonstrate a novel and minimally invasive endoscopic option that uses conventional ESD devices. To the best of our knowledge, this is the first report of a gastric fundus epithelial tumor resection using this technique. The Topflight ESD might be considered in such cases in the future.

#### DISCLOSURE

The authors did not disclose any financial relationships.



**Figure 8.** Pathology revealed a mixed-type, moderately differentiated adenocarcinoma engaging the superficial submucosa, pT1bSm2R0. The tumor was 61 × 47 mm in size.

## REFERENCES

- Baldaque-Silva F, Marques M, Vilas-Boas F, et al. New transillumination auxiliary technique for peroral endoscopic myotomy. *Gastrointest Endosc* 2014;79:544-5.
- Hamada K, Horikawa Y, Koyanagi R, et al. Usefulness of a multibending endoscope in gastric endoscopic submucosal dissection. *VideoGIE* 2019;4:577-83.
- Kitamura M, Miura Y, Shinozaki S, et al. The pocket-creation method facilitates gastric endoscopic submucosal dissection and overcomes challenging situations. *VideoGIE* 2021;6:390-4.
- Baldaque-Silva F, Vilas-Boas F, Velosa M, et al. Endoscopic submucosal dissection of gastric lesions using the "yo-yo technique." *Endoscopy* 2013;45:218-21.
- Baldaque-Silva F, Wang N, Rouvelas I, et al. Traction-assisted endoscopic submucosal dissection of a duodenal gastrointestinal stromal tumor. *Endoscopy* 2022;54:E318-9.
- Omae M, Wang N, Löhr JM, et al. Endoscopic submucosal dissection by using a new traction device. *VideoGIE* 2021;6:543-5.
- Baldaque-Silva F, Wang N, Omae M. Duodenal subepithelial neuroendocrine tumor removed by endoscopic submucosal dissection using internal traction with magnets. *VideoGIE* 2022;7:259-61.