ORIGINAL ARTICLE

Endoscopic adventitial dissection of a rectal GI stromal cell tumor

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Endoscopic adventitial dissection (EAD) is a novel resection technique that involves dissection in the "fourth space," the space between the outer longitudinal muscle and the tunica adventitia of the rectum. EAD is the retroperitoneal equivalent of endoscopic subserosal dissection (ESSD), which involves dissection between the serosa and muscularis propria. The space between these 2 layers mainly consists of loose connective tissue, similar to the submucosa. The submucosal layer has been coined as the "third space" in which endoscopic procedures can be performed.[1] In 2018, Liu et al[2] introduced "fourth space" endoscopy and used the newly developed ESSD technique to resect subepithelial tumors (SETs) in the upper GI tract. Several endoscopists have also reported resections of gastric SETs by ESSD in later years.[3,4] In this report, we expand the working field of "fourth space" endoscopy to the rectum by introducing EAD for local resection of a rectal SET (Fig. 1; Video 1, available online at www.giejournal.org).

A 38-year-old woman with no medical history was referred to our center for local resection of a 25-mm rectal SET protruding into the lumen (Fig. 2A). The tumor protruded into the luminal side at an obtuse angle and was classified as a type II according to the Kim classification.[5] Magnetic resonance imaging showed that the SET was located submucosally in the posterior wall of the distal rectum, with slightly increased restricted diffusion (Fig. 2B), which is indicative of a malignant tumor.[6] A prior EUS revealed a homogenous, hypoechoic, and well-demarcated lesion (Fig. 2C). The tumor was mistakenly classified as originating from the muscularis mucosae, as the muscularis propria was thought to be endosonographically intact. Based on these findings, additional tissue biopsies were not considered to be necessary, and the patient was scheduled to directly undergo endoscopic submucosal dissection (ESD).

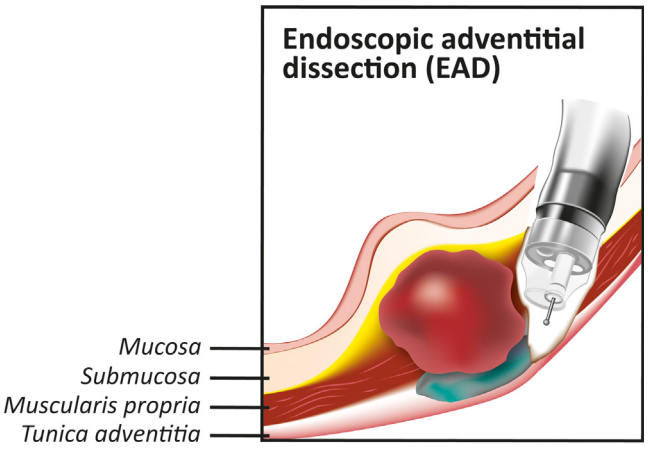

Figure 1. Schematic representation of endoscopic adventitial dissection.

ESD was performed using standard equipment (GIF-1TH190, Olympus, Tokyo, Japan; 1.5-mm BT-Flush Knife, Fujifilm, Tokyo, Japan; ERBE VIO-300D, ERBE Elektromedizin, Tübingen, Germany) and the tunneling technique. However, during submucosal dissection, it turned out that the entire tumor was located under the submucosa. To reach the deepest margin of the tumor, the inner circular muscle was incised and extended laterally for adequate exposure. Surprisingly, after extending the incision, the underlying longitudinal muscle layer could not be identified anymore at the level of the tumor (Fig. 3A), probably because it was dissected along or splayed apart upon cutting of the superficial circular muscle and release of the muscle traction resulting from the space occupied by the tumor. To evaluate whether there was still room for dissection under the tumor, we injected fluid into the outer longitudinal muscle and carefully incised the longitudinal muscle at the deepest tumor margin. This revealed a hollow space behind the incised longitudinal muscle (Fig. 3B). After further exposing this space by extending the muscular incision, we identified a dissection plane between a membranous layer and the deepest margin of the tumor, consisting of loose connective tissue (Fig. 4A). The thin membranous layer was identified as the tunica

Abbreviations: EAD, endoscopic adventitial dissection; ESD, endoscopic submucosal dissection; ESSD, endoscopic subserosal dissection; SET, subepithelial tumor.

2468-4481
https://doi.org/10.1016/j.vgie.2022.10.012

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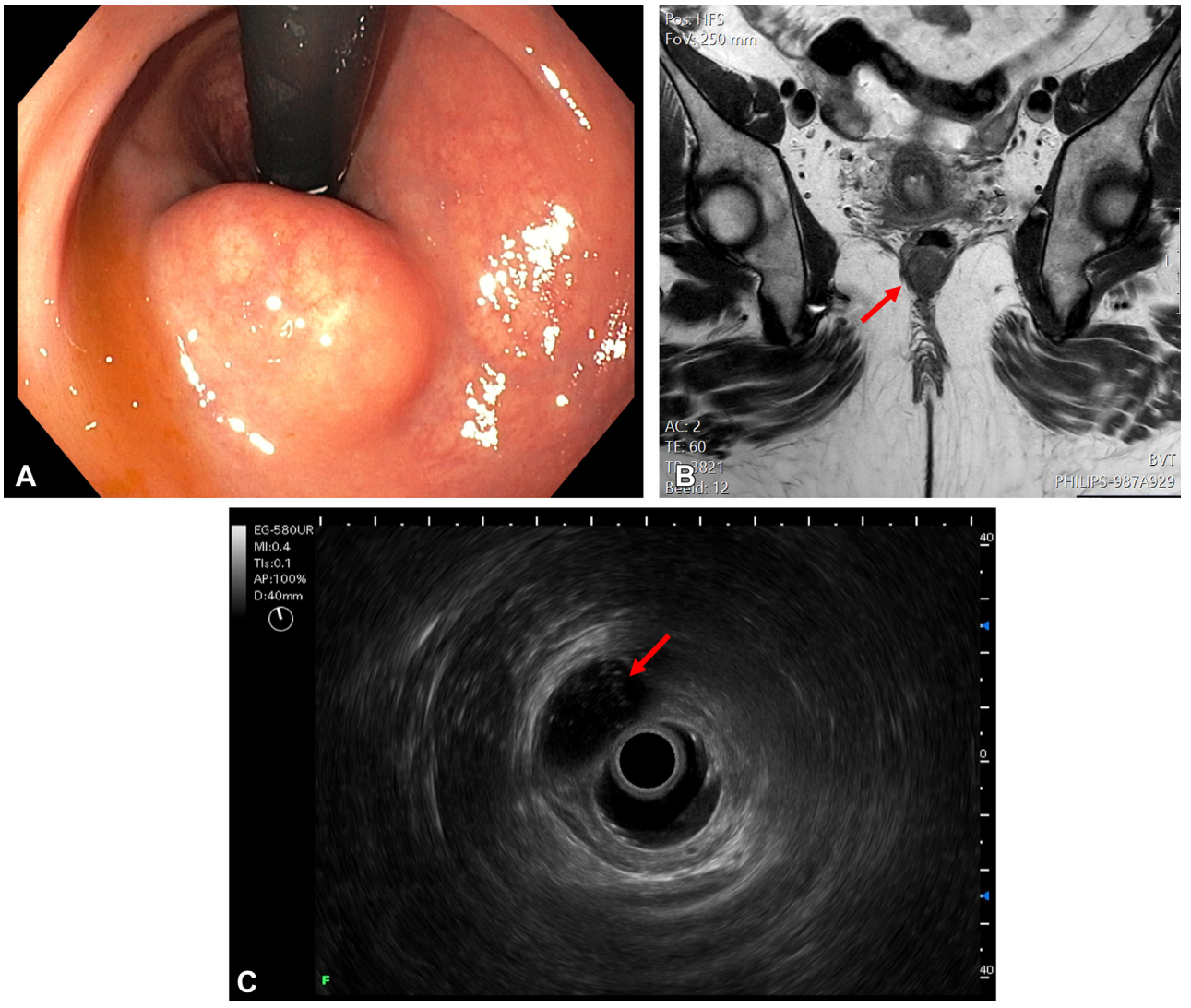

Figure 2. A, White-light, **B,** magnetic resonance, and **C,** EUS images of the tumor.

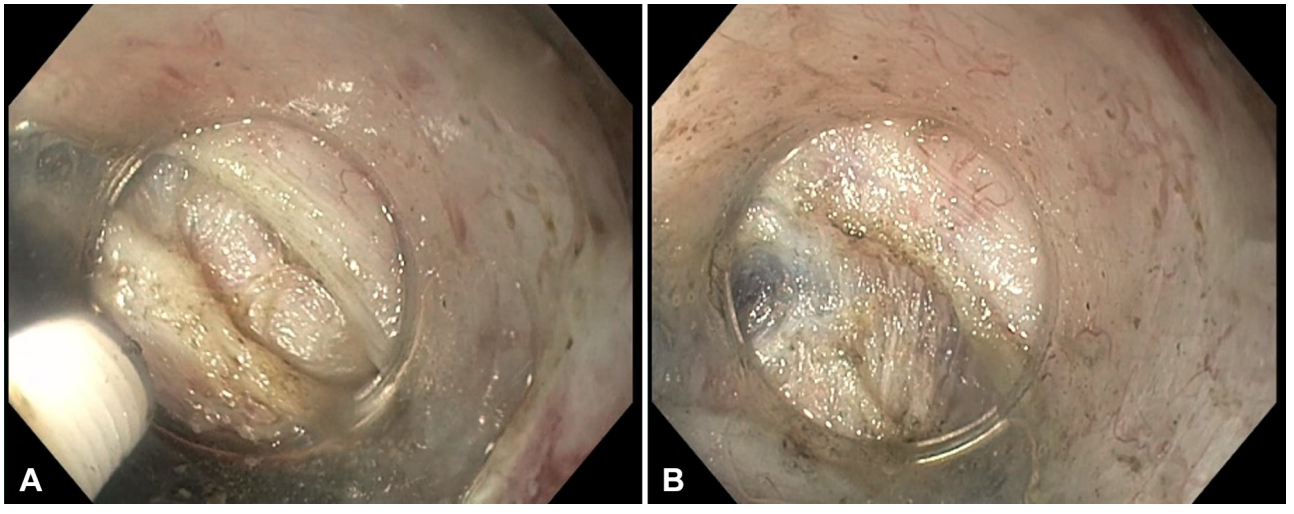

Figure 3. A, Absence of longitudinal muscle fibers at the level of the tumor. **B,** Hollow space behind the incised longitudinal muscle.

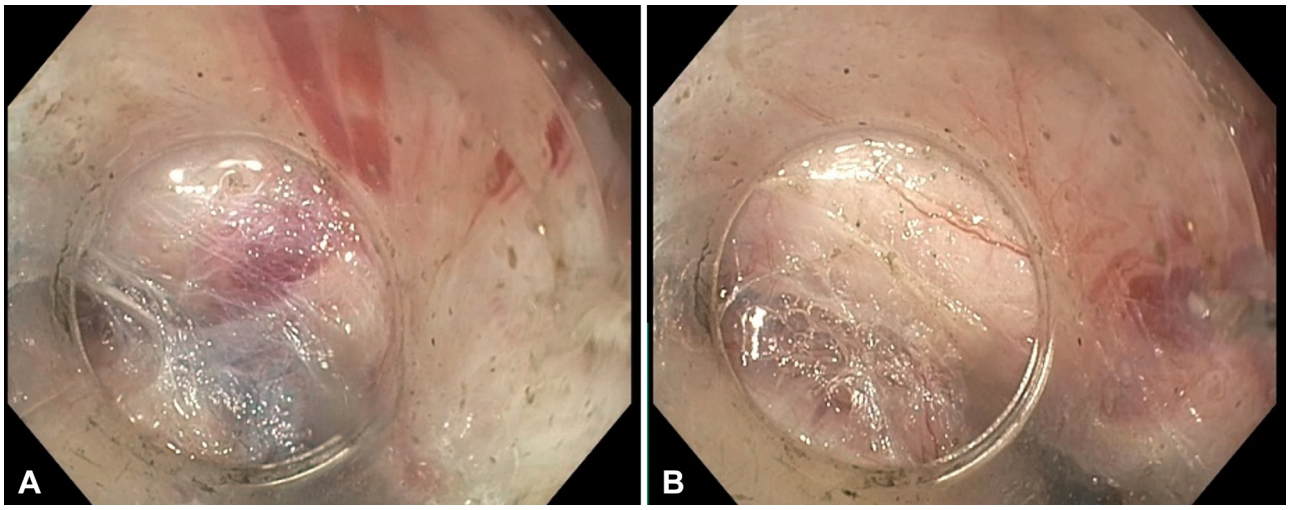

Figure 4. A, Identification of a dissection plane between a membranous layer and the deepest margin of the tumor consisting of loose connective tissue. **B,** Aspect of the adventitial plane.

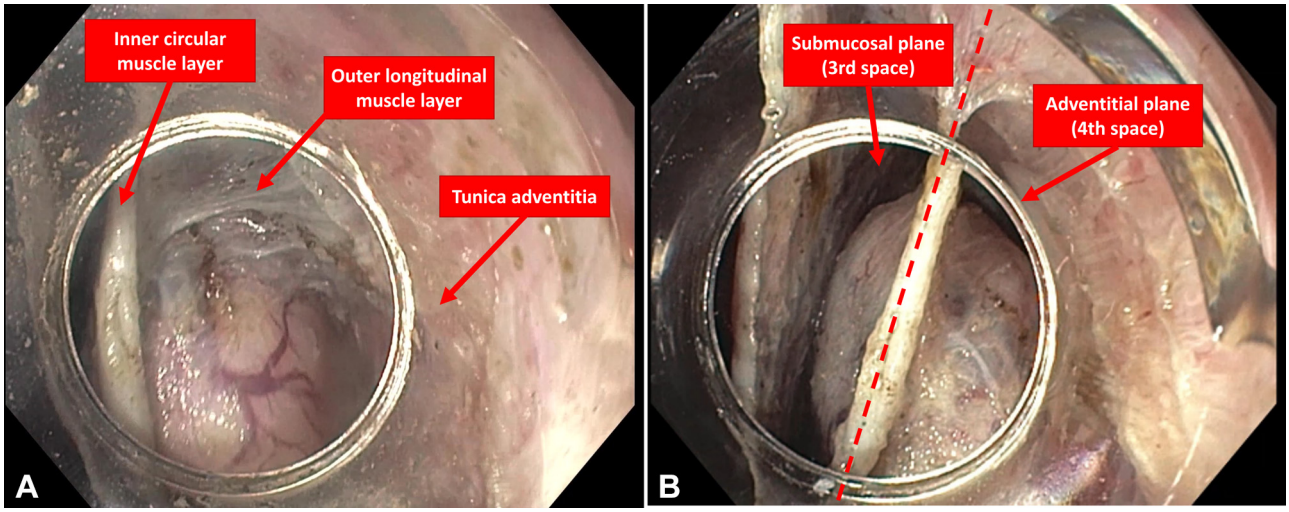

Figure 5. A, Overview of the different layers. **B,** Dissection planes during adventitial dissection.

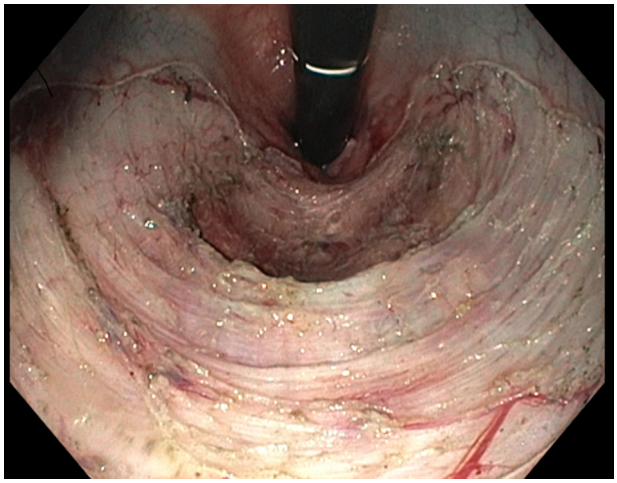

Figure 6. Resection site after endoscopic adventitial dissection.

adventitia and remained intact after detachment from the outer muscle layer. The dissection was continued in the adventitial plane to detach the bottom part of the tumor as much as possible. Optimal traction was achieved using gravity and a transparent hood (ST hood; Fujifilm) to ensure safe adventitial dissection without rupturing the tumor capsule. The aspect of the adventitial plane and an overview of the different layers and dissection planes during resection are shown in Figure 4B and Figure 5A and B, respectively. The tunica adventitia remained completely intact during adventitial dissection. After finishing the pocket under the tumor, dissection was resumed in the submucosal plane to remove the covering mucosal flap and to simplify the resection of muscular flap containing the tumor by exposing its upper part. The mucosal flap could not be resected simultaneously with the muscular flap, as it was already detached too much from its underlying layer by ESD. The muscular flap was

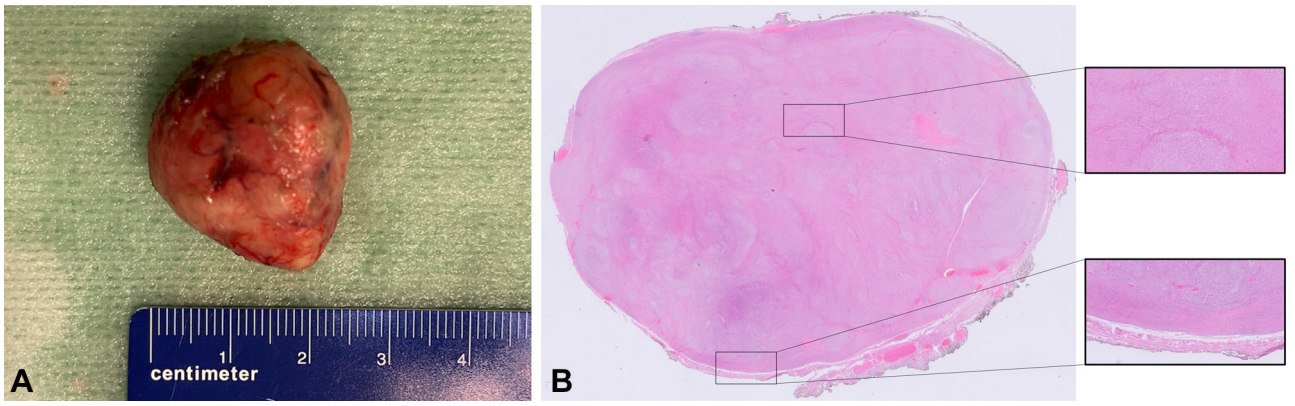

Figure 7. A, Macroscopic image. **B,** histology of the resected GI stromal cell tumor.

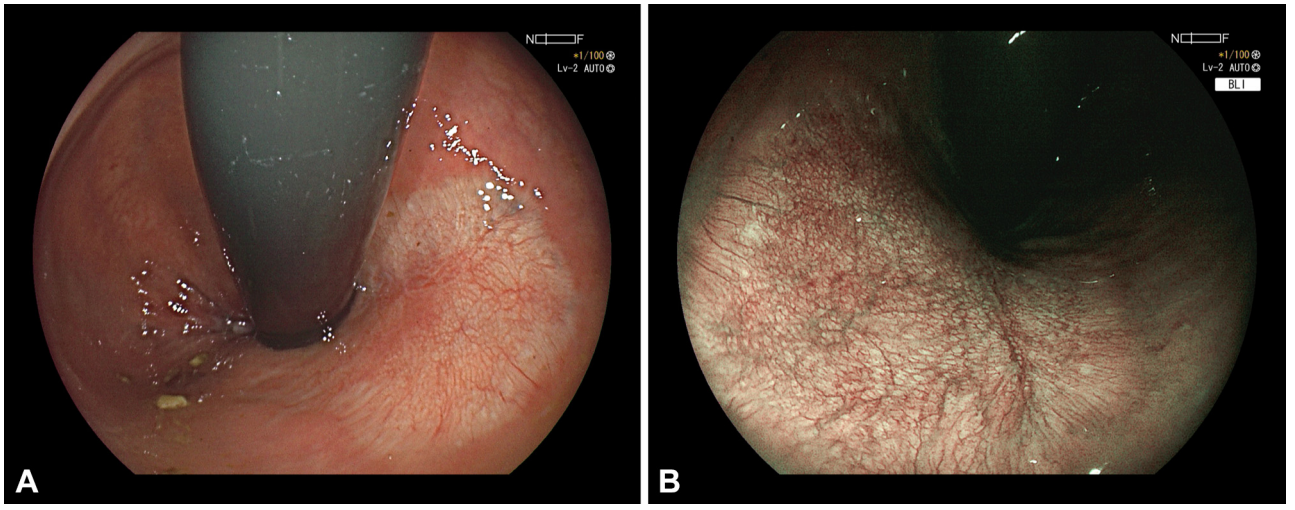

Figure 8. Post–endoscopic adventitial dissection resection scar after 12 months of follow-up, visualized using **A,** white-light, and **B,** advanced imaging.

mobilized from the lateral edges, and the resection specimens were retrieved for histology. The resection site was left open after the procedure (Fig. 6), since several studies suggested that leaving deep rectal wounds or even rectal perforations open is not associated with an increased risk of adverse events.[7-9] The patient was discharged the same day with prophylactic oral antibiotics for 5 days. No adverse events (eg, postprocedural infections, gas or fluid seepage, abscesses) occurred after the procedure. Histologic evaluation revealed a GI stromal cell tumor with a mitotic rate of 1/50 high power fields and an intact tumor capsule (Fig. 7A and B; Supplementary Text 1; Supplementary Figure 1, available online at www.giejournal.org.). A follow-up rectoscopy and abdominothoracic imaging at 12 months showed a well-healed resection scar (Fig. 8A and B) without signs of local or metastatic recurrence.

ACKNOWLEDGMENTS

We thank the patient for giving consent for publication of this case report. We also thank our expert GI pathologist Stijn Crobach (Department of Pathology, Leiden University Medical Center) for examining and providing histologic images of the resection specimen, and Robbert G.E. Notenboom (Department of Anatomy and Embryology, Leiden University Medical Center) for his expertise on the rectal wall anatomy.

DISCLOSURE

Dr Boonstra is a consultant at Boston Scientific. All other authors disclosed no financial relationships.

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