



Advanced resection and closure techniques for endoscopic full-thickness resection in the gastric fundus

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Most gastric subepithelial tumors (SETs) are gastrointest-
tinal stromal tumors (GISTs).¹ The National Comprehensive
Cancer Network guidelines recommend resection of GISTs
with symptoms, high-risk EUS features, or size ≥ 2 cm.²
Endoscopic full-thickness resection (EFTR) provides incision-
less, organ-sparing, en bloc resection of SETs < 5 cm.³ The gastric
fundus is a challenging location for endoscopic resection and
closure⁴ because it requires extreme retroflexion. In Asia,
a “double-bending” endoscope facilitates resection in the
fundus,⁵ but it is not available in the United States. In this
video (Video 1, available online at www.VideoGIE.org) we
demonstrate 3 techniques that facilitate EFTR in the fundus.
The operator’s experience includes > 120 EFTRs and > 700
endoscopic submucosal dissections.^{6,7}

CASE REPORT

A 61-year-old man presented with a 2.5-cm gastric
fundus SET with an extraluminal growth pattern (Fig. 1).
A GIST was suspected. EUS-FNA in another institution
had failed. Treatment options, including annual follow-
up, surgery, and EFTR,⁸ were discussed with the patient,
who elected EFTR, provided informed consent, and was
included in our institutional review board protocol of
endoscopic resection techniques for SETs (Winthrop
University Hospital IRB no. 14407).

ENDOSCOPIC TECHNIQUES

Technique 1: Formation of a 360° endoscope loop to
achieve stable access to the fundus. A 360° endoscope
loop was created by retroflexion in the antrum and deep
endoscope insertion, allowing an easier tangential
approach to the tumor (Fig. 2A-C). This is a novel
technique. We used cautery to mark the tumor’s borders.

Technique 2: Second endoscope traction with a pediatric
endoscope to facilitate dissection. After dissection of the
medial border of the tumor, its lateral attachment was func-
tioning as a hinge with the tumor prolapsing through the
EFTR defect into the peritoneal cavity adjacent to the
edge of the spleen, hindering further dissection (Fig. 2D).
We inserted a pediatric gastroscope into the stomach
alongside the operating gastroscope. We then used the
operating gastroscope to hand off the edge of the

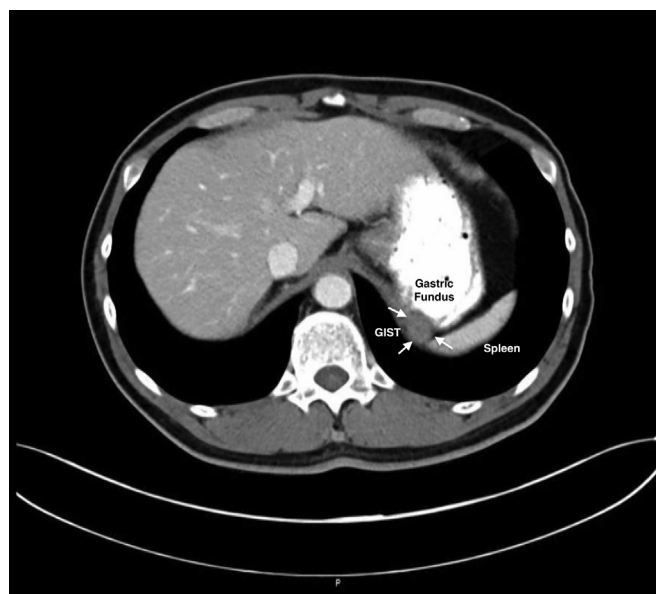


Figure 1. Abdominal CT showing 2.5-cm mural gastrointestinal stromal tumor (GIST) in the gastric fundus (arrows); approximately 2/3 of the tumor is extraluminal, abutting the spleen.

dissected specimen to a grasper inserted through the
pediatric gastroscope. The grasper exerted tension on
the tumor, pulling it back into the lumen and exposing its
lateral attachment, which was then easily cut (Fig. 2E, F).

Technique 3: Application of traction using a pulley sys-
tem to facilitate closure. Sutured closure was attempted,
but owing to the location of the defect, the stiff therapeutic
gastroscope carrying the suturing device could only reach
the lateral edge of the defect. This problem was solved
by creating a small pulley in the mid gastric body and pass-
ing a suture through it that was attached to the lateral edge
of the defect on one end and was brought out of the
mouth on the other end (Fig. 3). By applying tension to
this suture, we were able to pull the defect distally
toward the cardia and suture it easily with a running
suture, without a need for retroflexion (Fig. 2G, H). This
is a novel technique. After closure, the traction suture
was removed from the pulley, and a cinch-cutter catheter
was inserted over it and advanced to the defect, and the su-
ture was cut (Fig. 2I, J). The tumor was retrieved perorally
(Fig. 2K).

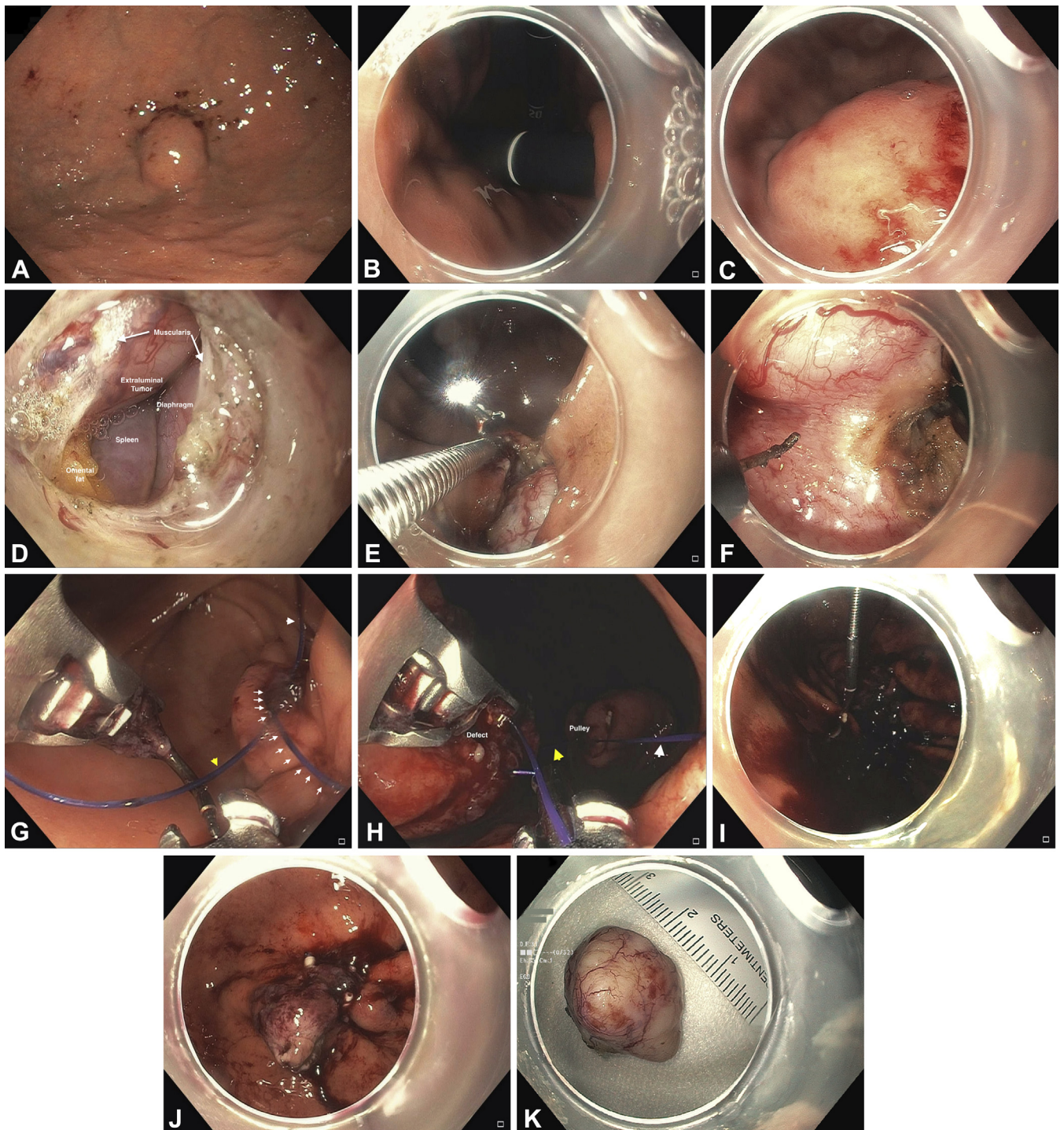


Figure 2. **A**, Initial en face visualization of the tumor by simple endoscope retroflexion. **B, C**, A 360° endoscope loop insertion allows tangential approach to the tumor (technique 1). **D**, After dissection of the medial aspect of the tumor, the extraluminal portion of the tumor can be seen next to the spleen, omental fat, and the diaphragm. At this point the tumor kept prolapsing through the defect, making further dissection challenging. **E, F**, A pediatric gastroscope exerts traction on the tumor, facilitating dissection (technique 2). **G, H**, A suture (yellow arrowhead) attached to the edge of the defect and passed through a suture-pulley (white arrows) at the mid gastric body and brought out of the mouth (white arrowhead) is used to pull the defect toward the cardia, where it can be easily sutured without retroflexion (technique 3). **I**, The cinch-cutter is used to cut the traction suture. It is inserted through the mouth next to the endoscope and can be seen in severe retroflexion in the fundus. **J**, Sutured endoscopic full-thickness resection defect. **K**, Excised gastrointestinal stromal tumor, 2.2 cm, with intact capsule.

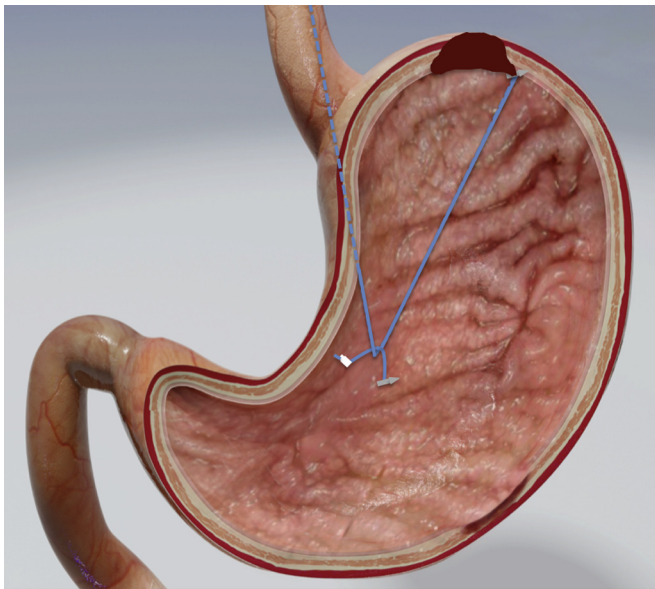


Figure 3. Illustration of the pulley that was created to facilitate closure of the endoscopic full-thickness resection defect.

Outcome

Resection and closure were completed in 72 and 56 minutes, respectively. The patient received maintenance intravenous fluid, proton pump inhibitor, and prophylactic antibiotic (meropenem) for 48 hours, at which point a liquid diet was initiated after a contrast study confirmed the absence of a leak. He tolerated a liquid diet and was discharged on postoperative day 3 to complete 4 more days of antibiotic prophylaxis. Pathologic analysis revealed en bloc resection of a 2.5-cm GIST with intact pseudocapsule and a mitotic rate of 3/50 hpf (low risk).

DISCLOSURE

Dr Stavropoulos is a consultant for Boston Scientific and the recipient of honoraria from ERBE USA. All other

authors disclosed no financial relationships relevant to this publication.

Abbreviations: EFTR, endoscopic full-thickness resection; GIST, gastrointestinal stromal tumor; SET, subepithelial tumor.

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