

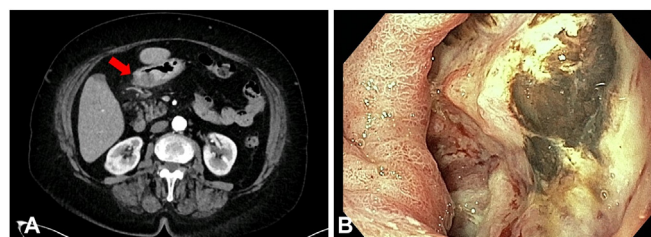


# Complete intraperitoneal maldeployment of a lumen-apposing metal stent during EUS-guided gastroenteroanastomosis for malignant gastric outlet obstruction: rescue retrieval with peritoneoscopy through natural orifice transluminal endoscopic surgery

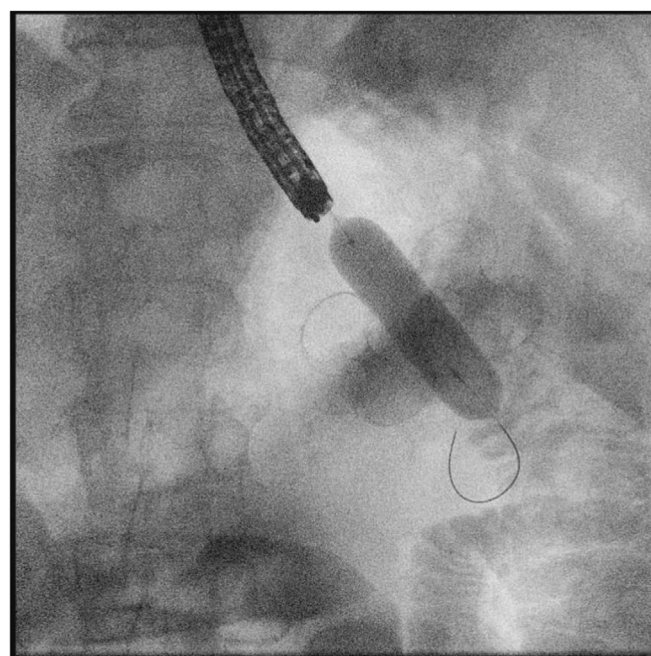
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A 75-year-old female patient developed nausea and vomiting because of gastric outlet obstruction consequent to a duodenal malignancy infiltrating the antrum-duodenal wall and causing stomach enlargement (Fig. 1A). Moreover, she was considered unfit for surgery because of her performance status and severe cardiomyopathy. The gastroscopy showed duodenal neoplastic tissue occluding the pylorus (tissue was acquired with histological confirmation) (Fig. 1B). After a multi-disciplinary board discussion, including an evaluation of internal protocols, we discussed the possibility of performing an alternative and off-label endoscopic procedure, an EUS-guided gastroenteroanastomosis (EUS-GEA), rather than duodenal stenting, with the patient and her family. After the meeting, the patient was aware of technical aspects, risks, benefits, and outcomes of both endoscopic procedures (duodenal stenting and EUS-GEA),<sup>1-4</sup> and she decided to undergo EUS-GEA. Therefore, we scheduled an EUS-GEA to resolve the gastric obstruction. EUS-GEA was performed using the single-balloon and freehand technique with deployment of a lumen-apposing metal stent (LAMS). Prophylactic antibiotics with piperacillin/tazobactam were administered, and carbon dioxide (CO<sub>2</sub>) was used during the procedure because it is safer and more easily absorbable than air. The endoscopic balloon was placed beyond the occluded side of duodenum, and the endoscopist identified the desired intestinal loop with the instillation of contrast, saline, and methylene blue. The LAMS was going to be placed from the stomach into the identi-

fied loop through the Hot AXIOS delivery system (20 × 10 mm; Boston Scientific, Marlborough, Mass, USA), but a double adverse event suddenly occurred. First, the first flange of the LAMS was deployed out of the jejunum, and after that the second flange was deployed into the



**Figure 1.** A, CT scan showing malignant infiltration of the antrum. B, Endoscopic view of the neoplastic tissue.



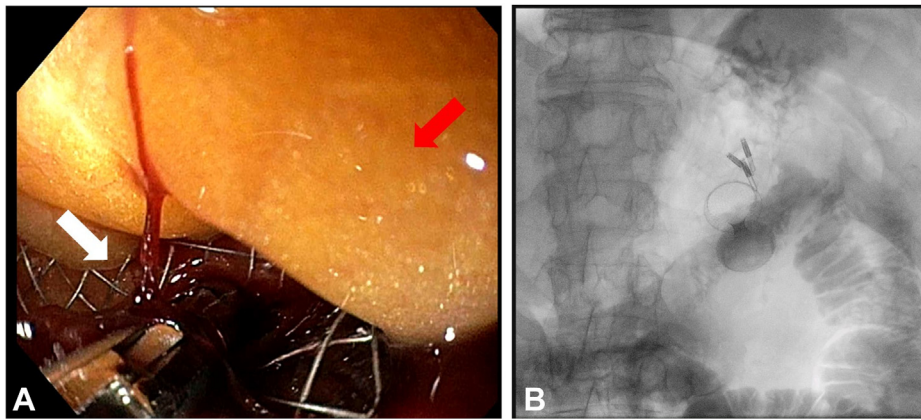
**Figure 2.** Radiologic view of balloon dilation of the gastric wall defect to achieve peritoneal access.

*Abbreviations:* CO<sub>2</sub>, carbon dioxide; EUS-GEA, EUS-guided gastroenteroanastomosis; LAMS, lumen-apposing metal stent; NOTES, natural orifice transluminal endoscopic surgery.

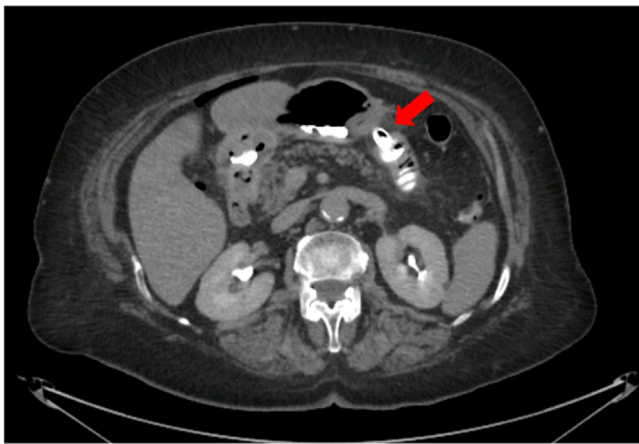
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**Figure 3.** **A**, Endoscopic view of the intraperitoneal LAMS rescue. The *white arrow* indicates the LAMS, and the *red arrow* indicates the peritoneal tissue. **B**, Radiologic view after EUS-guided gastroenteroanastomosis and natural orifice transluminal endoscopic surgery showing normal placement of the LAMS and the 3 metallic clips applied to close the gastric defect. LAMS, Lumen-apposing metal stent.



**Figure 4.** CT scan with oral contrast showing regular flow into the jejunal loop through the lumen-apposing metal stent (*red arrow*).

peritoneal cavity. In that moment, we immediately had to decide whether to refer the patient to surgery or keep performing the procedure with endoscopic retrieval of the LAMS. Considering the use of CO<sub>2</sub> and the patient's condition, we decided to achieve the EUS-GEA with a second but successful attempt. The second LAMS (20 × 10 mm, Hot AXIOS; Boston Scientific) was releasing with the same technique, but this time we focused on having a more comfortable and stable position during the fistula creation. We successively moved to manage the retrieval of the intra-abdominal LAMS using the natural orifice transluminal endoscopic surgery (NOTES) technique.<sup>5</sup> Therefore, we first identified the iatrogenic hole in the gastric wall with insertion of a guidewire through it, and then a dilation of the gastric wall defect to 18 mm of diameter was performed (Fig. 2), permitting us to cross it and perform a transgastric peritoneoscopy with the retrieval of the LAMS across the gastric defect by grasping it using a foreign body forceps (Fig. 3;

Video 1, available online at [www.videogie.org](http://www.videogie.org)). The iatrogenic gastric defect was then closed with 3 metallic clips, and no extraluminal diffusion of contrast was seen at the fluoroscopic view. After 12 hours, the patient's clinical status and laboratory tests were favorable, and her CT scan with oral contrast showed regular flow through the GEA with no extraluminal diffusion (Fig. 4) and an asymptomatic low amount of CO<sub>2</sub>, which was reabsorbed in 24 hours. Moreover, we closely talked to our infectious disease consultant, so we administered antibiotic therapy with quinolone (ciprofloxacin) and metronidazole for 5 days. The patient started a liquid diet after 24 hours and was discharged after another 48 hours of observation with a soft-solid diet. At our last follow-up call (4 months after the procedure), she was undergoing systemic chemotherapy and feeding with a soft-solid diet. Moreover, she did not complain about any late adverse event related to EUS-GEA. Currently, few reports discuss the use of NOTES as rescue therapy after LAMS maldeployment,<sup>6</sup> and to our knowledge, no reports discuss the application of NOTES for accessing the peritoneal space and retrieving a maldeployed LAMS.

## DISCLOSURE

*The authors did not disclose any financial relationships.*

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## INFORMED CONSENT

*Dr Tarantino acts as guarantor of the article.*

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