ORIGINAL ARTICLE

Peroral endoscopic myotomy plus natural orifice transluminal endoscopic wrap release for dysphagia after laparoscopic Heller myotomy and Dor fundoplication

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INTRODUCTION

Laparoscopic Heller myotomy with Dor fundoplication (LHM+F) is standard for patients with achalasia cardia (AC); however, 10% to 15% of patients may have persistent or recurrent dysphagia.[1] This can occur as the result of inadequate myotomy, tight fundoplication wrap, hiatal scarring, stricture, or end-stage achalasia.[2] Differentiating between inadequate myotomy and tight wrap is often difficult.[2] Pneumatic balloon dilation has demonstrated poor outcomes (<30% response),[3] whereas reoperation for wrap release and repeat LHM has high morbidity (35%).[4] This case demonstrates the endoscopic release of tight fundoplication wrap to treat persistent dysphagia after LHM+F for AC.

CASE DETAILS

Patient profile

A 61-year-old man presented with persistent dysphagia after LHM+F for type I AC performed 6 months previously followed by 2 failed sessions of pneumatic balloon dilation. EGD revealed a tight fundoplication wrap at esophagogastric junction (EGJ) and dilated esophagus with food residue (Fig. 1). A timed barium swallow demonstrated distal esophageal contrast holdup at 5 minutes and slow transit across the EGJ. A manometry catheter could not be negotiated across the EGJ because of extreme tortuosity. Given the diagnostic dilemma between treatment failure and tight wrap, we planned for peroral endoscopic myotomy (POEM) and endoscopic release or division of fundoplication wrap using a natural-orifice transluminal endoscopic surgery (NOTES) approach (Fig. 2). Although the authors had not performed the primary surgery, relevant surgical details were available from detailed surgical notes, thereby enabling us to plan this subsequent endoscopic procedure. The decision was taken after multidisciplinary team discussion, informed consent, and detailed discussion with patient regarding possible treatment options. The surgical team was informed to remain on standby for any potential adverse events that may require emergency surgical intervention.

Abbreviations: AC, achalasia cardia; EGJ, esophagogastric junction; LHM+F, laparoscopic Heller myotomy with Dor fundoplication; NOTES, natural orifice transluminal endoscopic surgery; POEM, peroral endoscopic myotomy; POEM+F, peroral endoscopic myotomy + endoscopic fundoplication.

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Procedure

An anterolateral POEM with full-thickness myotomy was performed in 2- to 3-o'clock orientation anticipating previous LHM at 12 o'clock, with standard steps and CO_2 insufflation applied[5,6] (Video 1, available online at www.videogie.org). A 2-cm gastric myotomy was performed. Dissection was continued deep to muscle on the gastric side to identify the fundic wrap adherent to the diaphragmatic crus. An ultraslim transnasal endoscope was passed alongside the scope in the tunnel and positioned in the fundus to guide dissection. Step-by-step dissection was performed to separate the wrap from the crus (Figs. 3 and 4). Blue-stained saline was used for layer identification and adhesiolysis. Four sutures anchoring the wrap to the crus were sequentially identified and divided. Adhesiolysis was continued to separate the wrap from the diaphragm. The scope was now advanced into the peritoneal cavity and left liver lobe was identified. Adhesions between the liver and fundus were divided. Care was taken to prevent hepatic and full-thickness gastric injury. Finally, the scope was fully advanced into the peritoneal cavity, retroflexed, and fundic adhesions with diaphragmatic undersurface were divided. The procedure was monitored via an ultra-slim endoscope positioned in the fundus. Although intraperitoneal pressure monitoring was not performed, the capnoperitoneum was drained by inserting a Veress needle in the right upper quadrant of the abdomen once the scope was passed into the peritoneal cavity. The needle decompression was maintained until the end of the procedure. After we confirmed complete wrap release, the endoscope was withdrawn, and the mucosal incision was closed using endoclips.

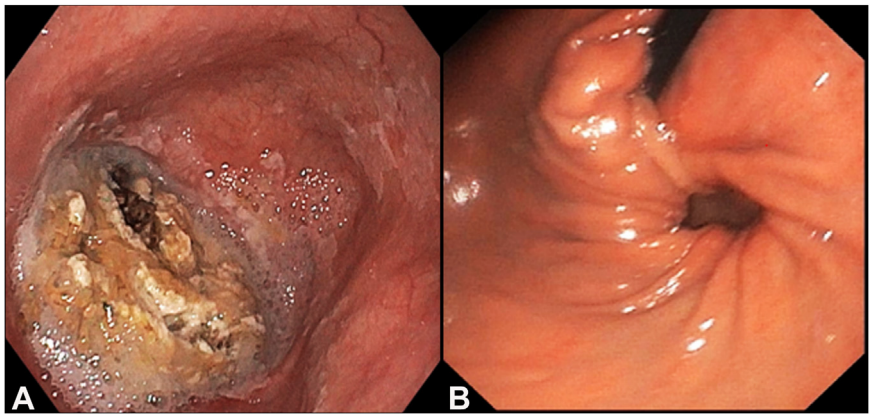

Figure 1. Preprocedure EGD findings: (**A**) dilated esophagus with food stasis at EGJ, gastroscope could be negotiated across EGJ with moderate resistance; (**B**) retroflexed view during same EGD demonstrating tight fundic wrap. *EGJ*, Esophagogastric junction.

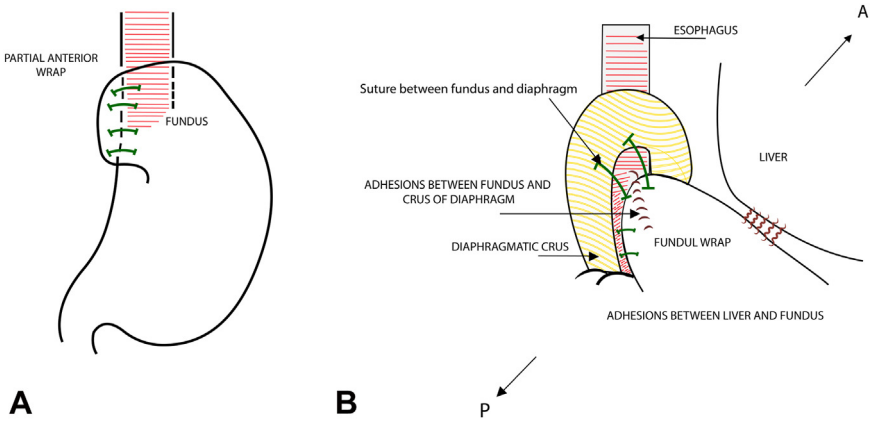

Figure 2. Schematic diagram of anatomy of EGJ after laparoscopic Heller myotomy with Dor fundoplication: (**A**) partial anterior fundic wrap around distal esophagus and EGJ (**B**) view seen as on forward endoscopy through the esophagus during the procedure, illustrating relations and attachments of fundic wrap to surrounding structures. Note: (i) *Green lines* represent sutures between fundic wrap and diaphragmatic crus. (ii) *Brown lines* represent adhesions between left lobe of liver and fundus. (iii) A and P represent anteroposterior orientation of the schematic diagram. *EGJ*, Esophagogastric junction.

Postprocedure and follow-up

Intravenous broad-spectrum antibiotics were administered periprocedure. An oral diet was gradually resumed by the patient, and he was discharged. At 1-month follow-up, the patient reported excellent dysphagia relief (Eckardt score = 1). EGD and barium swallow revealed open EGJ, near-total disappearance of fundic wrap on retroflexion, and unobstructed barium transit across the lower esophageal sphincter (Figs. 5 and 6).

DISCUSSION

Dysphagia after LHM+F may occur as the result of a tight fundoplication.[2] Treatment of tight fundoplication is challenging—balloon dilatation has poor outcomes and reoperation has high morbidity.[3,7,8]

The current case highlights several important aspects. The approach to the peritoneal cavity through an anterior POEM tunnel has been described for POEM + endoscopic fundoplication (POEM+F).[5] The current video case demonstrates utility of this NOTES approach to release the tight fundoplication wrap. Identifying and dividing the sutures anchoring the wrap to the diaphragmatic crus was crucial for success of the procedure. Clear delineation of tissue planes by repeated subserosal injection was instrumental for optimal adhesiolysis. An ultraslim scope in fundus provided a continuous roadmap and facilitated the dissection.

The operating author has received previous formal surgical training and, furthermore, has considerable experience in various NOTES procedures. Optimal identification of surgical and anatomical landmarks being crucial for the success of such procedures, this point assumes special significance. In conclusion, endoscopic release of tight fundoplication wrap using a NOTES approach is a feasible, safe, and effective procedure to treat persistent dysphagia after LHM+F in the presence of adequate technical expertise.

PATIENT CONSENT

The patient in this article has given written informed consent to publication of the case details.

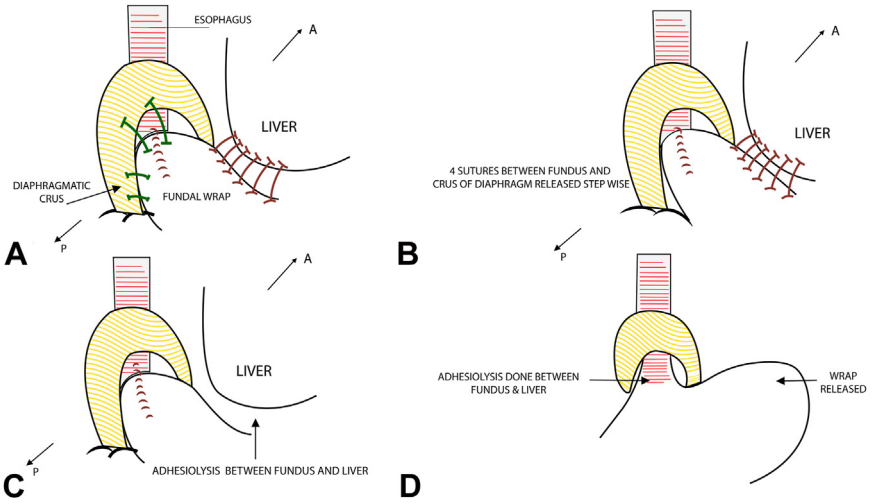

Figure 3. Schematic diagram of sequential steps of the procedure. Gastroscope (GIF-HQ190; Olympus Corporation, Tokyo, Japan) and ultra slim gastroscope (GIF-H190N, Olympus Corporation) were used for the procedure. For cutting, dissection, and adhesiolysis, we used TT-J knife (KD-645L; Olympus) and for hemostasis, a coagulation grasper (FD-411UR; Olympus) was used. A VIO 3 (Erbe, Tübingen, Germany) was used: the Endocut Q (effect 2, cut duration 3, cut interval 4) mode was used for mucosal incision, Precise-Sect mode (effect 4.5) for dissection and adhesiolysis, and soft coagulation (effect 5) for hemostasis. The figure (**A**) represents anatomy deep to the gastric myotomy. The *green line* represents sutures between fundic wrap and diaphragmatic crus; (**B**) all 4 sutures were sequentially identified and divided to separate the wrap from the diaphragm; (**C**) adhesiolysis between left lobe of liver and fundus; (**D**) adhesiolysis to release fundic wrap from diaphragm. A and P represent the anteroposterior orientation of the schematic diagram.

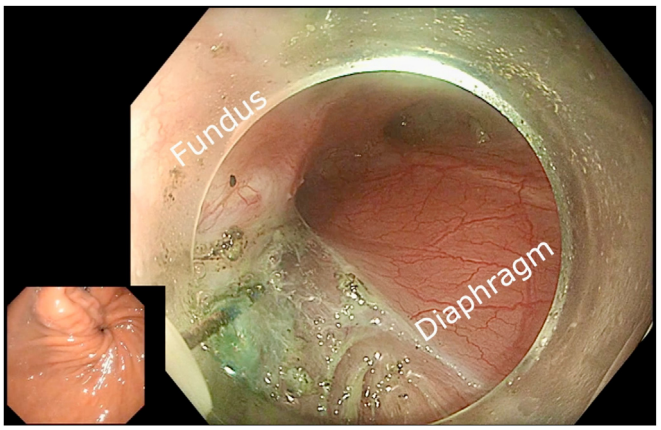

Figure 4. Dissection and separation of the fundic wrap from the diaphragm.

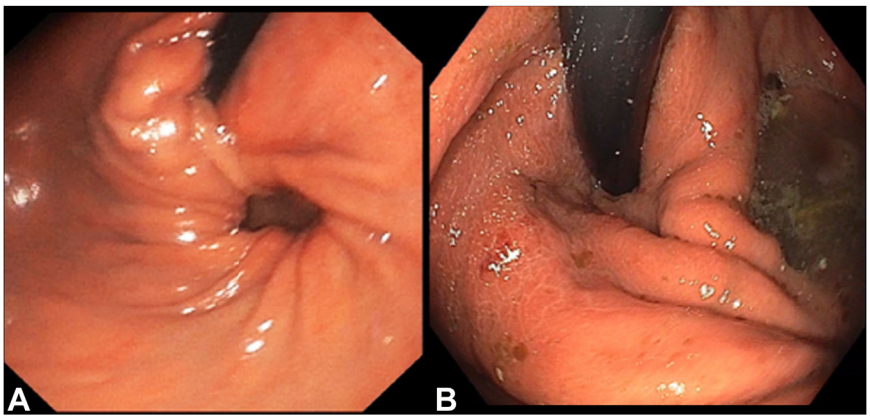

Figure 5. EGD images in retroflexion demonstrating (**A**) tight fundic wrap before the procedure and (**B**) released fundic wrap after the procedure.

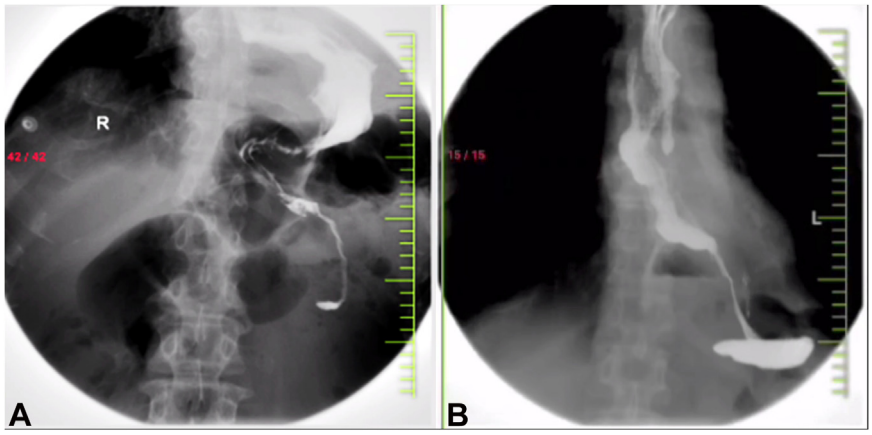

Figure 6. Comparison of timed barium swallow before and after the procedure: (**A**) preprocedure barium illustrating dilated esophagus with hold up in the distal esophagus; (**B**) free flow of barium across the esophagogastric junction on barium swallow 1 month after the procedure.

DISCLOSURE

All authors disclosed no financial relationships.

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