



Aberrant placement of functional lumen imaging probe into mediastinum during peroral endoscopic myotomy

Yusuke Fujiyoshi, MD, Christopher Teshima, MD, MSc, PhD

INTRODUCTION

Peroral endoscopic myotomy (POEM) is an established treatment for achalasia.^{1,2} The functional lumen imaging probe (EndoFLIP impedance planimetry system; Medtronic, Inc, Shoreview, Minn, USA) is a novel diagnostic device that permits measurement of the level of distensibility at the gastroesophageal junction (GEJ).³ EndoFLIP performed during POEM is useful for real-time evaluation of the lower esophageal sphincter, which may help confirm that an adequate myotomy was performed.⁴ When placing the EndoFLIP catheter, the distance to the GEJ is first measured by the endoscope. After removing the endoscope, the catheter is inserted, ensuring that the airway is protected. The EndoFLIP balloon is partially inflated, and the catheter position is adjusted until the desired hourglass shape is seen on the EndoFLIP monitor. We typically perform EndoFLIP measurements at the start of POEM and again after myotomy but before closing the mucosal incision so that additional myotomy can be extended. We experienced a case in which the catheter was inserted into the submucosal tunnel and was inflated in the mediastinum, leading to deeper injury and mediastinitis (Video 1, available online at www.videogie.org).

CASE PRESENTATION

Our patient was a 58-year-old man with esophageal dysphagia. EGD showed spastic contractions in the esophageal body and a tight GEJ. Esophagogram showed spastic contractions and stasis of barium (Fig. 1). High-resolution manometry showed esophagogastric junction outflow obstruction with hypercontractile esophagus. Pre-POEM

EndoFLIP measurements confirmed a tight GEJ (distensibility index: 2.7 mm²/mm Hg at 60 mL [normal: 3.1–9.0 mm²/mm Hg]). Given these results, POEM was performed using carbon dioxide for insufflation. After injecting saline, a mucosal incision was made at 30 cm from the incisors. The submucosal tunnel was then extended to the gastric side until 44 cm, 2 cm beyond the GEJ at 42 cm (Fig. 2). Myotomy was performed to the circular muscle from 32 to 44 cm (Fig. 3), although some longitudinal muscles were lacerated and a full-thickness defect was seen in some areas. Following completion of myotomy, the EndoFLIP catheter was blindly reinserted into the esophagus. The balloon was inflated to 30 mL but without visualized localization of the GEJ on EndoFLIP readout. Suspecting that the catheter may be mispositioned, the balloon was deflated and the endoscope was reinserted, which demonstrated that the EndoFLIP catheter had passed through the incision into the submucosal tunnel (Fig. 4). After the catheter was removed, the endoscope was advanced back into the submucosal tunnel, where a large muscular layer defect was seen extending into the mediastinum, suggesting that the balloon had been inflated within the tunnel and had expanded into the mediastinum (Fig. 5). Some vessels were newly visualized in the submucosal tunnel, which were coagulated (Fig. 6A). We then closed the mucosal incision with endoclips (Fig. 6B). The procedure duration was 96 minutes.

On postoperative day 1, the patient developed chest pain and desaturation (SpO₂ 89% in room air). He was febrile (38.3°C) with elevated white blood cells (13.6 E9/L). Second-look EGD showed no mucosal injury and no dehiscence of the incision. A CT scan showed pleural effusion and atelectasis, suggesting mild mediastinitis (Fig. 7). We kept the patient nil per os and treated with moxifloxacin 400 mg daily. Body temperature and white blood cell count decreased daily and mediastinitis improved. Oral diet was slowly reintroduced, and he was discharged on day 6 (Fig. 8).

DISCUSSION

We experienced a POEM case in which the EndoFLIP catheter was inserted into the submucosal tunnel and was inflated into the mediastinum, subsequently causing mild mediastinitis. Since EndoFLIP allows for real-time evaluation of the lower esophageal sphincter, performing

Abbreviations: GEJ, gastroesophageal junction; POEM, peroral endoscopic myotomy.

Copyright © 2023 American Society for Gastrointestinal Endoscopy. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). 2468-4481 <https://doi.org/10.1016/j.vgie.2023.06.011>

Advanced Therapeutic Endoscopy Centre, St Michael's Hospital, University of Toronto, Toronto, Ontario, Canada.

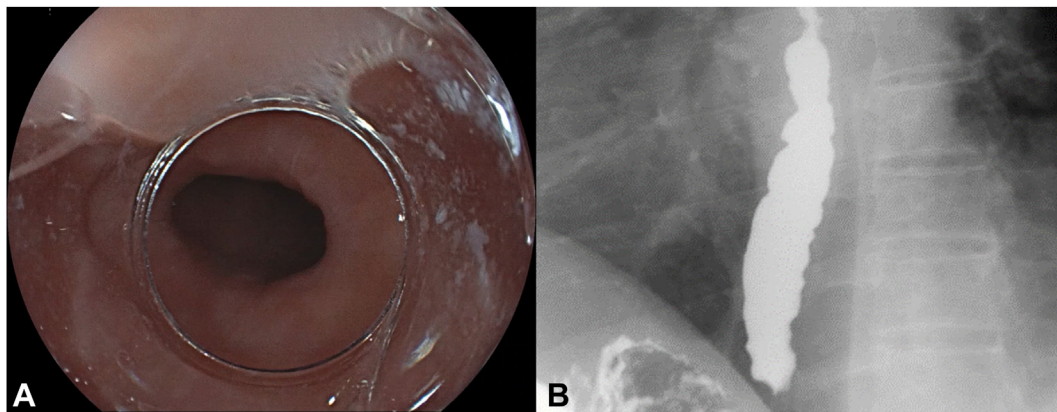


Figure 1. **A**, Spastic contraction in the esophageal body. **B**, Barium esophagogram showing spastic contractions and stasis of barium.

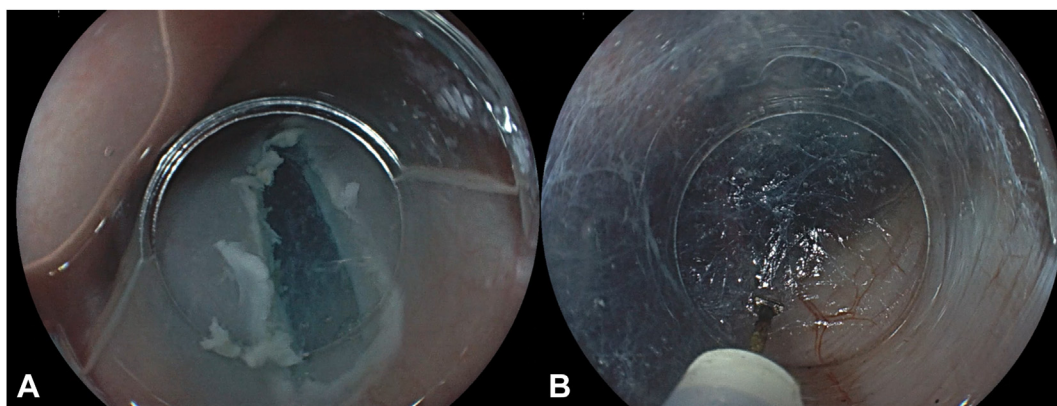


Figure 2. **A**, Mucosal injection. **B**, Submucosal dissection.

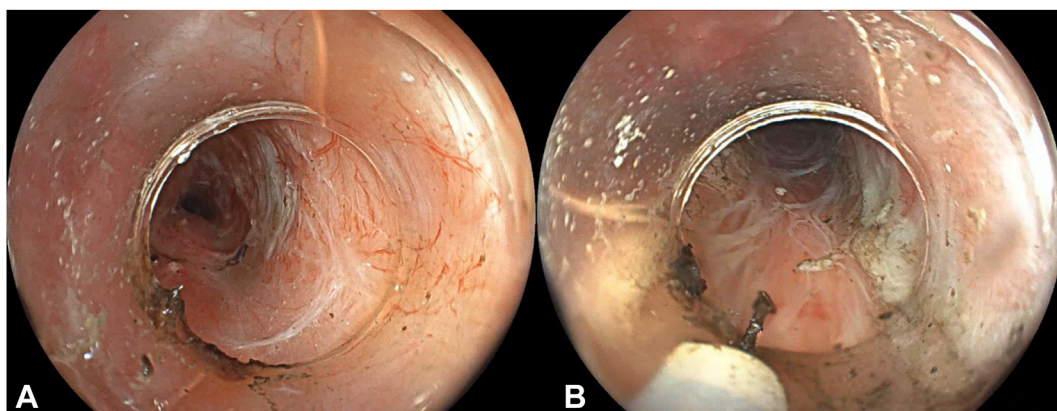


Figure 3. **A**, Submucosal tunnel premyotomy. **B**, Postmyotomy preserving longitudinal fibers.

EndoFLIP during POEM is increasingly common.⁴ However, there are few reports describing adverse events of EndoFLIP. Our case illustrates the potential risk of the En-

doFLIP catheter being inserted through the esophageal incision and into the submucosal tunnel, with inflation into the mediastinum. Therefore, we have subsequently

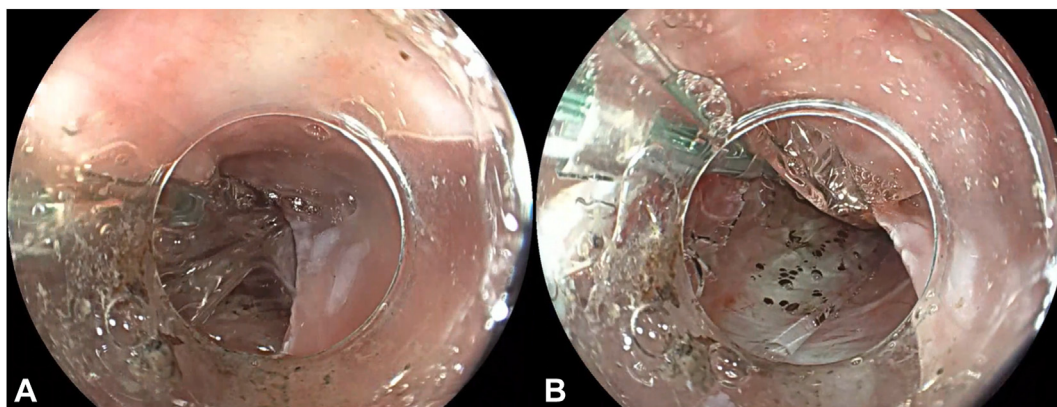


Figure 4. **A and B,** Aberrant EndoFLIP (Medtronic, Inc, Shoreview, Minn, USA) catheter in the submucosal tunnel.

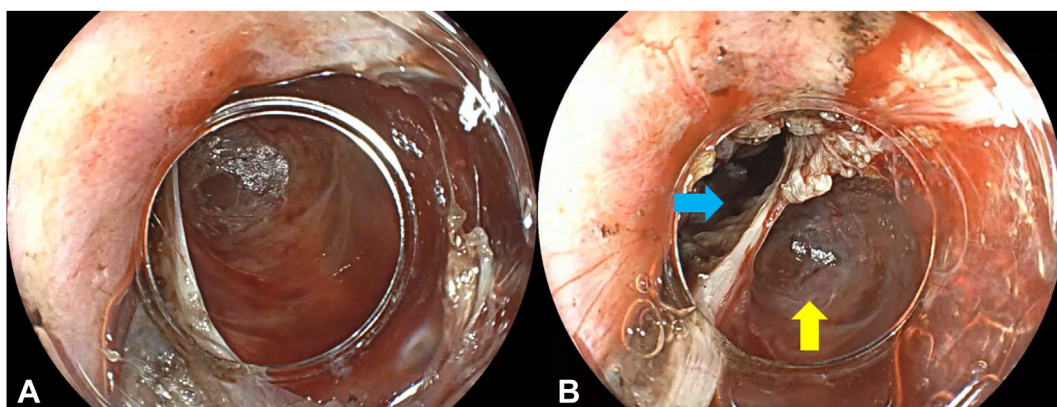


Figure 5. **A,** Mediastinum defect seen from inside the submucosal tunnel. **B,** Submucosal tunnel lumen (*blue arrow*) and adjacent mediastinum defect (*yellow arrow*) seen from inside the submucosal tunnel.

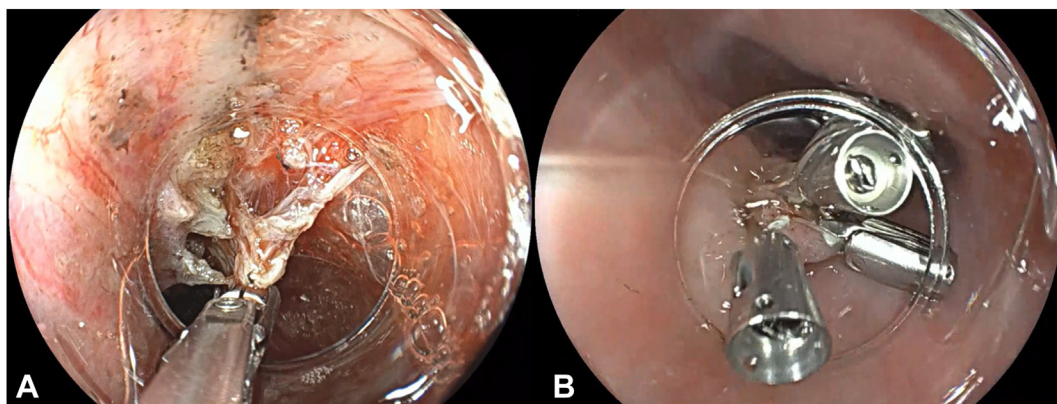


Figure 6. **A,** Coagulating vessels in the submucosal tunnel. **B,** Closure of incision site by endoclips.

modified our EndoFLIP during POEM such that the endoscope is reinserted before balloon inflation to confirm appropriate position of the catheter within the esophageal lumen.

DISCLOSURE

The authors did not disclose any financial relationships.

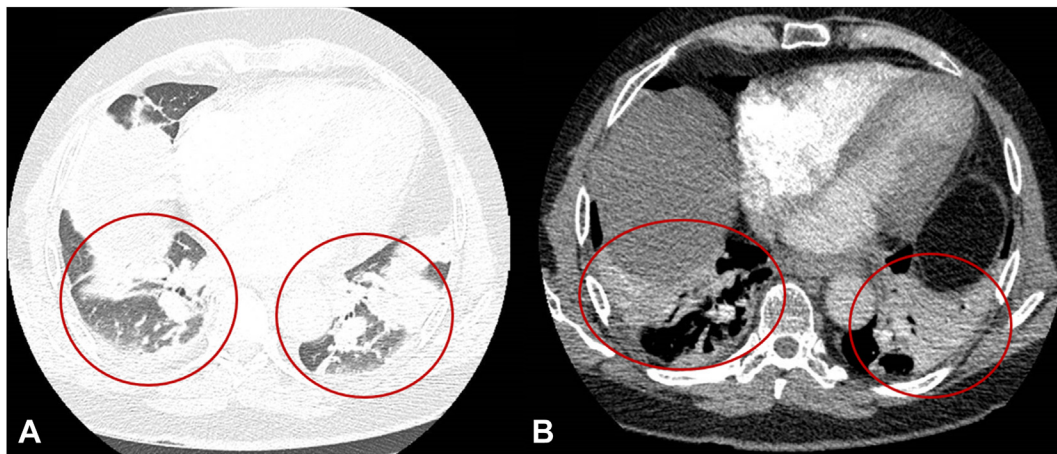


Figure 7. Chest CT image (A) and abdominal CT image (B) showing pleural effusion and atelectasis.

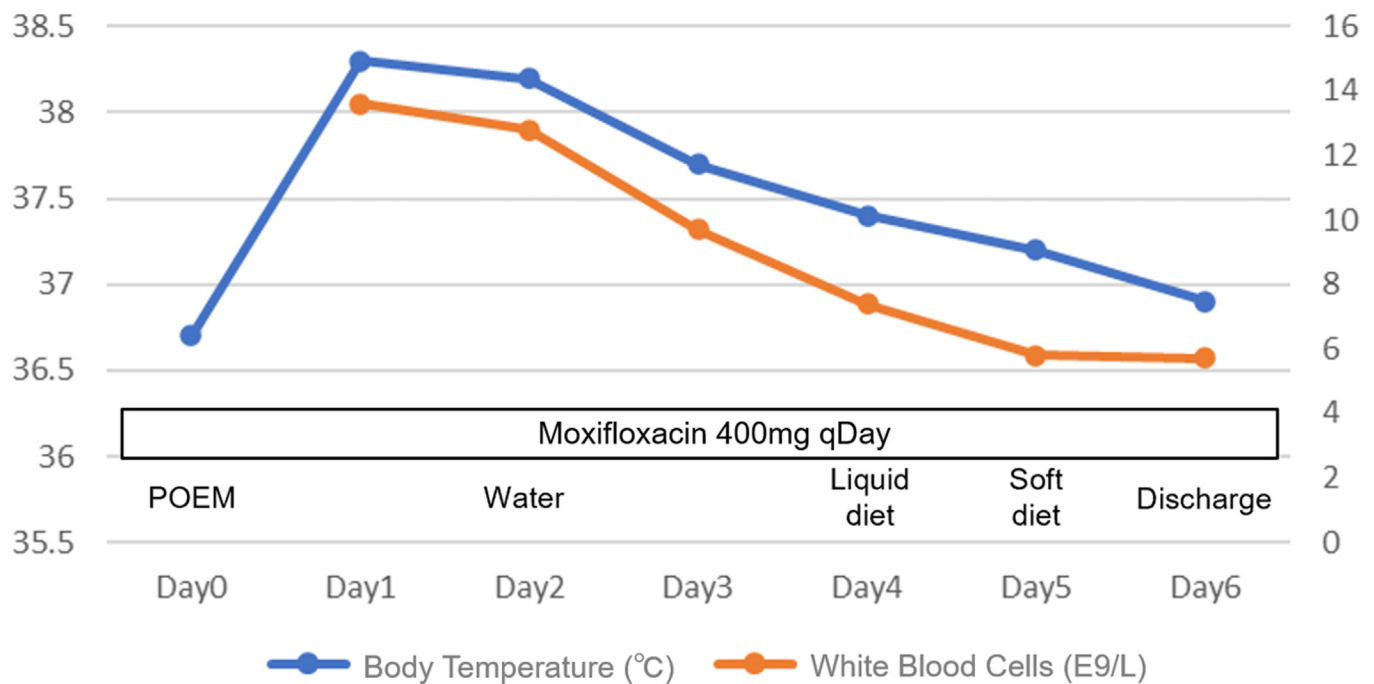


Figure 8. Postoperative clinical course. *POEM*, peroral endoscopic myotomy.

REFERENCES

- Inoue H, Minami H, Kobayashi Y, et al. Peroral endoscopic myotomy (POEM) for esophageal achalasia. *Endoscopy* 2010;42:265-71.
- Werner YB, Hakanson B, Martinek J, et al. Endoscopic or surgical myotomy in patients with idiopathic achalasia. *N Engl J Med* 2019;381:2219-29.
- Familiari P, Gigante G, Marchese M, et al. EndoFLIP system for the intraoperative evaluation of peroral endoscopic myotomy. *United European Gastroenterol J* 2014;2:77-83.
- Attaar M, Su B, Wong HJ, et al. Intraoperative impedance planimetry (EndoFLIP™) results and development of esophagitis in patients undergoing peroral endoscopic myotomy (POEM). *Surg Endosc* 2021;35:4555-62.