



An effective and safe strategy for managing the accidental deployment of an over-the-scope clip during the closure of a duodenal perforation

Tiago Lima Capela, MD,^{1,2,3,4} Yohei Minato, MD,¹ Susumu Banjoya, MD,¹ Yoshiaki Kimoto, MD,¹ Yuki Kano, MD, PhD,¹ Kohei Ono, MD,¹ Tiago Cúrdia Gonçalves, MD,^{2,3,4} Ken Ohata, MD, PhD¹

Endoscopic submucosal dissection (ESD) for superficial nonampullary duodenal tumors enables a high en bloc curative resection but is a technically challenging procedure as a result of the anatomical features of the duodenum.¹⁻³ The incidence of adverse events is high, particularly intraoperative perforation, which is one of the most feared and frequently experienced adverse events, with reported rates as high as 50%.⁴⁻⁶ Managing this adverse event is also not straightforward, being frequently difficult or even impossible to achieve complete endoscopic closure of the perforation site, with reported rates of emergency surgery as high as 23.1%.⁷⁻⁹

Although various devices and endoscopic closure methods have been proposed, including through-the-scope clips, over-the-scope clips (OTSCs), and suturing devices, the most reliable and safest approach in this context has not yet been established.^{3,8,10-13} OTSCs generally are used alone or in combination with other methods to close GI perforations with a high rate of success and low rates of short- and long-term adverse events.^{5,14} Nevertheless, even with the development of assistive devices, the OTSCs may be difficult to deploy correctly, depending on the several factors, with misplacement of the OTSC one of the most common adverse events.¹⁵

A 76-year-old man without relevant comorbidities was submitted to ESD for a 30-mm Paris 0-IIa superficial nonampullary duodenal tumor located at the inferior duodenal angle (Fig. 1A and B, Video 1, available online at www.videoie.org). The procedure was performed using a pediatric

colonoscope with CO₂ insufflation. After local injection of a sodium hyaluronate solution, a circumferential mucosal incision and submucosal dissection were performed with a needle-type knife.

During the procedure, 2 small (5-mm) sites of perforation were evident in the post-ESD defect (35 mm diameter) (Fig. 1C). A grasping forceps was used to grasp the anal margin of the normal mucosa surrounding the mucosal defect and approximate it to the oral margin, with both margins then being pulled into the distal attachment to release an 11-mm type t OTSC. However, after deployment, it became evident that a mucosal defect, including the sites of perforation, was still visible, and the oral margin of the defect was not grasped by the OTSC (Fig. 1D). Therefore, an attempt to close the defect was undertaken by overlapping a second “rescue” OTSC, a technique we named “OTSC-on-OTSC” (Fig. 2). With double-jaw grasping forceps, the oral margin of the defect and the part of the anal margin grasped by the first misplaced OTSC were approximated, pulled into the cap, and another 11-mm OTSC was successfully deployed, effectively closing almost the entire mucosal defect. (Fig. 1E). Finally, a third 11-mm OTSC was used to close the remaining mucosal defect and 5 additional 11-mm through-the-scope clips were used to cover the inverted submucosa within OTSCs, as previously reported (Fig. 1F).¹

The patient resumed oral intake using liquid diet on the day after, progressing gradually to a solid diet, and remained asymptomatic during the 7 days of hospital stay. The perforation was managed conservatively without the need of antibiotics or other interventions, and no delayed adverse events occurred. Complete closure of the defect was confirmed after 1 week (Fig. 1G). Histologic examination of the specimen (Fig. 1H) revealed a curative resection of a 29- × 26-mm intramucosal well-differentiated tubular adenocarcinoma, Ly0, V0. The “OTSC-on-OTSC” is a novel, effective, and safe strategy which, by overlapping another OTSC, can overcome the misplacement of an OTSC during the closure of GI perforations.

Abbreviations: ESD, endoscopic submucosal dissection; OTSC, over-the-scope clip.

Copyright © 2025 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.2024.09.008>

Department of Gastroenterology, NTT Medical Center Tokyo, Tokyo, Japan (1), Gastroenterology Department, Unidade Local de Saúde do Alto Ave, Guimarães, Portugal (2), Life and Health Sciences Research Institute (ICVS), School of Medicine, University of Minho, Braga, Portugal (3), ICVS/3B's, PT Government Associate Laboratory, Guimarães/Braga, Portugal (4).

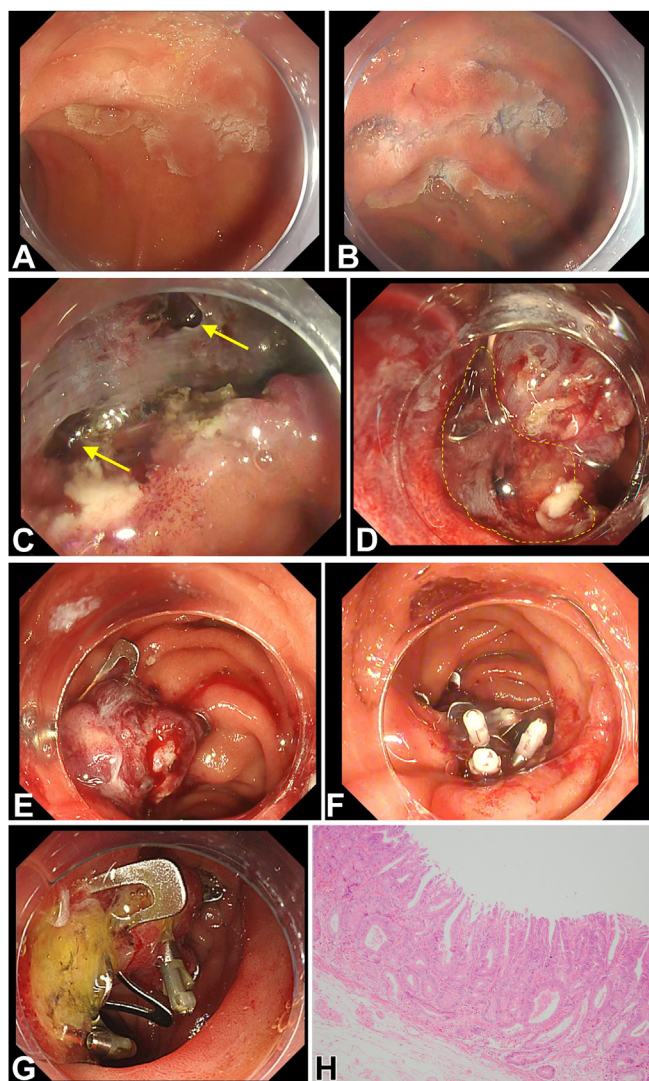


Figure 1. A 30-mm Paris 0-IIa superficial nonampullary duodenal tumor located at the inferior duodenal angle was observed in white light (**A**) and with dye chromoendoscopy using indigo carmine (**B**). After endoscopic submucosal dissection (ESD), 2 sites of perforation (*yellow arrows*) were observed in the post-ESD defect (**C**). After the deployment of the first over-the-scope clip (OTSC), it became evident that a mucosal defect (delimited by the discontinuous *yellow line*), including the sites of perforation, was still visible (**D**). The “OTSC-on-OTSC” strategy, in which a second “rescue” OTSC was successfully deployed, overlapping the first OTSC, and closing almost the entire mucosal defect (**E**). A third OTSC was used to close the remaining defect and 5 through-the-scope clips (EZ 11 mm; Olympus, Tokyo, Japan) were used to cover the inverted submucosa within OTSCs (**F**). On the first follow-up endoscopy, 1 week after ESD, the clips remained in situ, providing a complete closure of the defect (**G**). The histologic examination of the specimen in hematoxylin and eosin stain, 10× magnification, revealed an intramucosal well-differentiated tubular adenocarcinoma, Ly0, V0, VM0, HM0 (**H**).

PATIENT CONSENT

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

DISCLOSURE

The authors report no conflict of interest or funding source to declare.

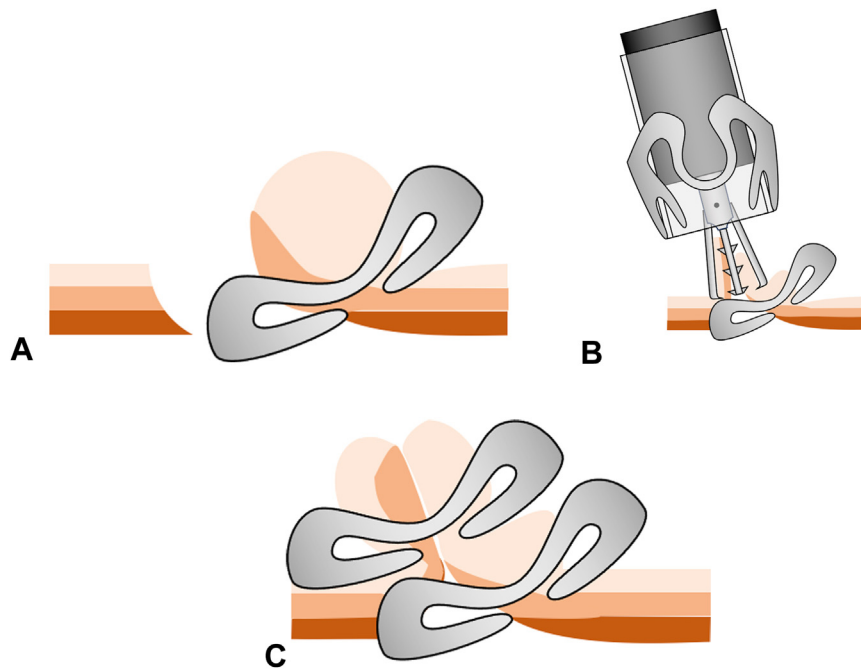


Figure 2. “OTSC-on-OTSC” technique: If, during the closure of a GI perforation, a misplacement of an over-the-scope clip (OTSC) occurs (A), another OTSC can be overlapped, enclosing the part of the margin grasped by the first misplaced OTSC and the other “free” margin of the defect (B), effectively and safely closing the entire defect (C).

REFERENCES

- Ohata K, Sakai E, Suzuki Y, et al. Risk factors of delayed bleeding after endoscopic resection of superficial non-ampullary duodenal epithelial tumors and prevention by over-the-scope and conventional clipping. *Dig Endosc* 2021;33:390-8.
- Kato M, Takeuchi Y, Hoteya S, et al. Outcomes of endoscopic resection for superficial duodenal tumors: 10 years' experience in 18 Japanese high volume centers. *Endoscopy* 2022;54:663-70.
- Tashima T, Ohata K, Sakai E, et al. Efficacy of an over-the-scope clip for preventing adverse events after duodenal endoscopic submucosal dissection: a prospective interventional study. *Endoscopy* 2018;50:487-96.
- Takahashi T, Ando T, Kabeshima Y, et al. Borderline cases between benignancy and malignancy of the duodenum diagnosed successfully by endoscopic submucosal dissection. *Scand J Gastroenterol* 2009;44:1377-83.
- Fukui H, Dohi O, Hirose T, et al. Clinical outcomes of the over-the-scope clip closure after duodenal endoscopic submucosal dissection: a multi-center retrospective study. *J Gastroenterol Hepatol* 2024;39:725-32.
- Watanabe D, Hayashi H, Kataoka Y, et al. Efficacy and safety of endoscopic submucosal dissection for non-ampullary duodenal polyps: a systematic review and meta-analysis. *Dig Liver Dis* 2019;51:774-81.
- Hatta W, Koike T, Abe H, et al. Recent approach for preventing complications in upper gastrointestinal endoscopic submucosal dissection. *DEN Open* 2022;2:e60.
- Fukuhara S, Kato M, Iwasaki E, et al. Management of perforation related to endoscopic submucosal dissection for superficial duodenal epithelial tumors. *Gastrointest Endosc* 2020;91:1129-37.
- Mizutani M, Kato M, Sasaki M, et al. Predictors of technical difficulty for complete closure of mucosal defects after duodenal endoscopic resection. *Gastrointest Endosc* 2021;94:786-94.
- Furukawa K, Miyahara R, Funasaka K, et al. Endoscopic closure of duodenal perforation with the over-the-scope-clipping system. *Intern Med* 2016;55:3131-5.
- Hoteya S, Yahagi N, Iizuka T, et al. Endoscopic submucosal dissection for nonampullary large superficial adenocarcinoma/adenoma of the duodenum: feasibility and long-term outcomes. *Endosc Int Open* 2013;1:2-7.
- Ma X, Yang L, Yu D, et al. Complete sealing of a duodenal perforation during endoscopic submucosal dissection using a novel through-the-scope twin clip. *Endoscopy* 2023;55:776-7.
- Kantsevov SV. Duodenal endoscopic submucosal dissection: is it ready for primetime? (with video). *Gastrointest Endosc* 2020;91:1138-9.
- Staudenmann D, Choi KKH, Kaffes AJ, et al. Current endoscopic closure techniques for the management of gastrointestinal perforations. *Ther Adv Gastrointest Endosc* 2022;15:26317745221076705.
- Abbas D, Ahmed K, Abdalla AO, et al. Analysis of reported adverse events related to over-the-scope clips: a MAUDE database analysis. *Tech Innov Gastrointest Endosc* 2023;25:106-12.