



# Combined Endoscopic Stent-In-Stent Placement by Lumen-Apposing Metal Stents Through Self-Expanding Metal Stents for Simultaneous Malignant Biliary and Duodenal Obstruction

Flavio Metelli, MD<sup>1</sup>, Alessandro Pezzoli, MD<sup>1</sup>, Carlo Fabbri, MD<sup>2</sup>, Elena Pizzo, PhD<sup>3</sup>, Rosario Arena, MD<sup>1</sup>, Viviana Cifalà, MD<sup>1</sup>, Loredana Simone, MD<sup>1</sup>, Riccardo Solimando, MD<sup>1</sup>, and Alberto Merighi, MD<sup>1</sup>

<sup>1</sup>Department of Gastroenterology and GI Endoscopy, University Hospital, Ferrara, Italy

<sup>2</sup>Department of Gastroenterology and GI Endoscopy, Forlì-Cesena, Italy

<sup>3</sup>Department of Health Economics, University College of London, London, United Kingdom

---

## ABSTRACT

The palliation of simultaneous biliary and duodenal obstruction in patients with advanced pancreatic cancer is a clinically and technically challenging scenario. Endoscopic procedures are a valid alternative to surgical or percutaneous transhepatic biliary drainage. The availability of self-expanding metal stents (SEMSs) and lumen-apposing metal stents (LAMS) have expanded therapeutic options. We describe a case in which biliary and duodenal obstructions were treated successfully with the combined use of SEMS and LAMS devices. Endoscopic ultrasound-guided biliary drainage with the use of new LAMS and a duodenal SEMS can be a valid option in expert hands as a palliative and minimally invasive treatment for gastric outlet and biliary obstruction.

---

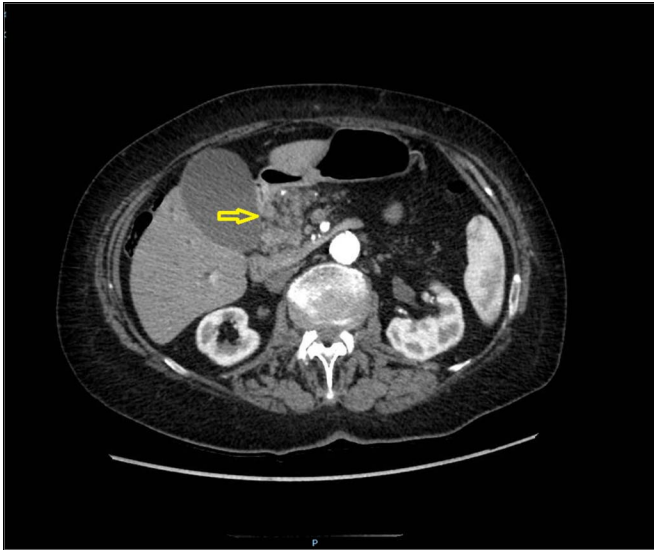
## INTRODUCTION

Systemic chemotherapy represents the only treatment strategy for patients with advanced pancreatic cancer (PC). However, patients with unresectable PC could present malignant biliary obstruction (MBO) and gastric outlet obstruction syndrome that impair the underlying conditions and prevents access to chemotherapy.<sup>1</sup>

Endoscopic interventions were revolutionized in 1979 by the first endoscopic biliary placement, and since then, a diverse range of devices for biliary drainage have been developed.<sup>1</sup> Endoscopic retrograde cholangiopancreatography (ERCP) is still the current first-line treatment for biliary drainage, with a high success rate, low complications, and high stent patency. The most frequent reason for ERCP failure is difficult access for cannulation; this can be due to surgically altered anatomy, duodenal obstruction, or ampullary infiltration. For decades, percutaneous biliary drainage was considered the salvage procedure for a failed ERCP. Nowadays, endoscopic ultrasound (EUS)-guided biliary drainage has demonstrated to be a valid alternative thanks to effective internal drainage, reduction in patients discomfort, and dramatic reduction in both short- and long-term adverse events.<sup>2-4</sup> Recently, electrocautery-enhanced lumen-apposing metal stent (LAMS) delivery system (Hot AXIOS®; Boston Scientific, Marlborough, MA) was demonstrated to be an effective tool for the treatment of pancreatic fluid collections, acute cholecystitis, and distal MBO.<sup>5-7</sup> We present a patient with locally-advanced PC complicated by MBO and duodenal stenosis, who was treated with a combined endoscopic end EUS approaches as palliative treatment.

## CASE REPORT

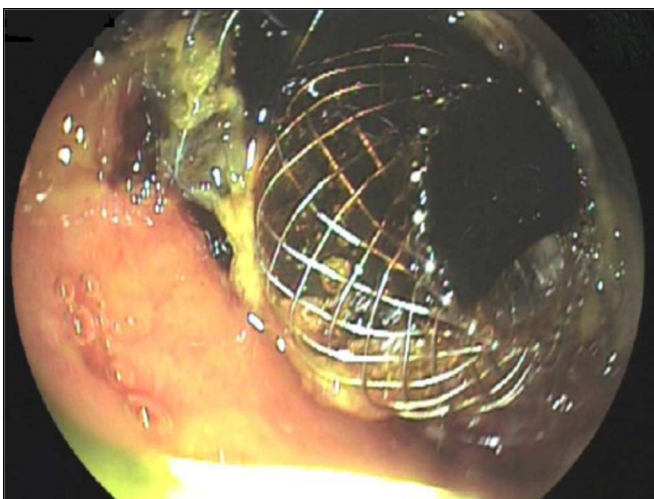
A 79-year-old woman was admitted to our hospital with painless jaundice. She had a history of stable oncohematological disease. On admission, laboratory tests showed increased total bilirubin (8.7 mg/dL) and direct bilirubin (5.2 mg/dL), associated with increased



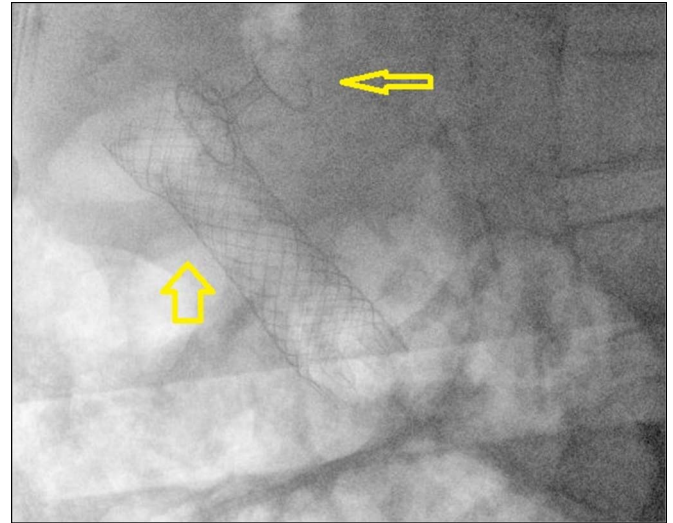
**Figure 1.** Computed tomography scan showing the pancreatic neoplasm.

white blood cell ( $13.5 \times 10^3/\mu\text{L}$ ) and C-reactive protein (148.5 mg/L) Computed tomography revealed the presence of pancreatic head neoplasm, with signs of duodenal infiltration and biliary tract dilation (Figure 1). An ERCP was attempted but failed because of complete duodenal stenosis. Therefore, an uncovered duodenal self-expanding metal stent (SEMS) (WallFlex Duodenal,  $22 \times 90$  mm, Boston Scientific, MA) was placed through the duodenal stenosis to resolve the obstruction. A EUS was scheduled few days later for tissue acquisition and biliary drainage with EUS-choledocoduodenostomy (EUS-CDS) because of progressive jaundice (total bilirubin had increased up to 15 mg/dL).

Three days later, the EUS-CDS was performed with a linear echoendoscope (GF-UCT-180; Olympus Corp., Japan). The



**Figure 2.** Endoscopic view of the lumen-apposing metal stents (Hot AXIOS) in the duodenal bulb.

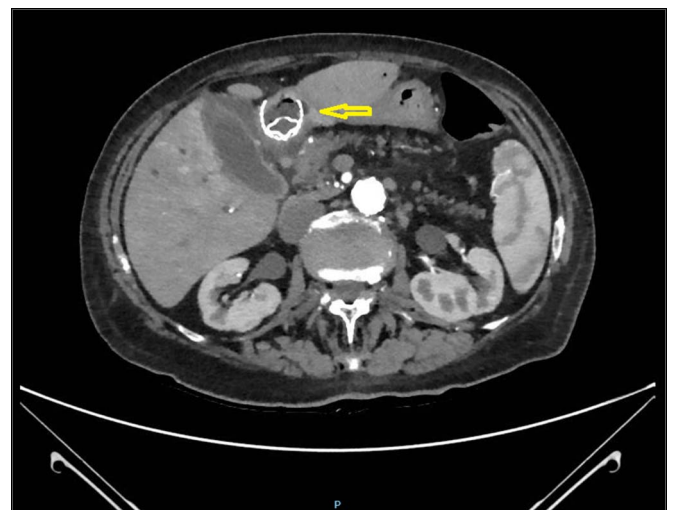


**Figure 3.** Radiological control after the procedures.

dilated common bile duct was directly punctured with a  $10 \times 10$  mm electrocautery-enhanced LAMS delivery system. The device was inserted through the duodenal bulb into the common bile duct, obtaining immediate biliary drainage (Figure 2). Radiological control showed the correct position of the LAMS through duodenal stent mesh (Figures 3 and 4). The procedure was well tolerated by the patient, and the serum bilirubin level reduced gradually to 5.5 mg/dL over the next 5 days. The patient was able to eat during the following 6 months. The patient was discharged 4 days later and referred to the oncologist for palliative chemotherapy.

## DISCUSSION

The clinical management of patients with advanced PC is often challenging because of the complexity of their clinical presentation. MBO is a frequent complication requiring biliary



**Figure 4.** Computed tomography scan control after the procedures.

intervention; however, 6%–9% of patients develop a duodenal obstruction requiring surgical or endoscopic palliation.<sup>1</sup> In the presence of duodenal stricture, ERCP is not feasible. The most frequent option is percutaneous biliary drainage, which has a high success rate but is associated to adverse events in more than 30% of cases and can affect the quality of life because of the presence of external drainage.<sup>2–4</sup> Currently, duodenal obstruction is generally treated with SEMs.<sup>8</sup> The clinical success rate of duodenal SEMs placement in patients affected by gastroduodenal obstruction is between 84% and 93%, with a technical success rate ranging between 93% and 97%.<sup>9,10</sup>

After the placement of a duodenal stent, an ERCP can be performed with the aim of placing a biliary stent through the mesh of the duodenal stent. This is a challenging technique because of the limited space for the duodenoscope inside the duodenal stent.<sup>11</sup> The reported technical success of duodenal and biliary stent insertion in synchronous bilioduodenal stenosis ranges from 71.4% to 94.4%.<sup>12–14</sup> EUS-guided transluminal drainage of obstructed bile duct can be a valid option. The use of EUS-hepaticogastrostomy (EUS-HGS) or EUS-guided choledochoduodenostomy (EUS-CDS) are 2 ultrasound-guided alternatives that can be effective in case of distal malignant biliary stenosis.<sup>15,16</sup> The superiority of EUS-BD over percutaneous procedures in expert centers has been reported in recently published data.<sup>17</sup> In particular, the use of LAMS for EUS-BD has improved the procedure in technical feasibility and safety.<sup>18</sup>

Our patient presented with jaundice secondary to biliary compression and a type I duodenal obstruction according to the Mutignani et al classification (type I: duodenal stenosis are present in the duodenal bulb or in the duodenal genu, type II: the duodenal stenosis involves the papilla, and type III: duodenal stenosis occurs distally from the papilla, without its involvement).<sup>12</sup> We treated this patient with a minimal invasive approach using a double stenting method through the duodenal bulb. A SEMs was placed for duodenal obstruction and a LAMS for biliary stenosis. To our knowledge, only 2 similar cases are reported in literature; in both cases, the LAMS were released through the mesh of the duodenal SEMs such as in our patient.<sup>19,20</sup>

Our report supports the use of EUS-CDS associated to SEMs placement in such challenging clinical scenarios. EUS biliary drainage is a salvage therapy that should be reserved for type I and type II bilioduodenal stenosis when ERCP is not feasible because of the presence of synchronous duodenal obstruction. We believe that patients with advanced disease should be treated with minimally invasive techniques to allow access to chemotherapy and preserve the quality of life. These patients should be treated in referral centers where multiple competences (interventional radiology, surgery, oncology, and endoscopy) are available.

## DISCLOSURES

Authors contributions: F. Metelli, A. Pezzoli, and R. Arena wrote the manuscript. A. Pezzoli and C. Fabbri performed the endoscopic examinations. All authors revised the manuscript for intellectual content and approved the final manuscript. A. Pezzoli is the article guarantor.

Financial disclosure: None to report.

Informed consent was obtained for this case report.

Received December 28, 2020; Accepted June 21, 2021

## REFERENCES

1. Shepherd HA, Royle G, Ross AP, Diba A, Arthur M, Colin-Jones D. Endoscopic biliary endoprosthesis in the palliation of malignant obstruction of the distal common bile duct: A randomized trial. *Br J Surg*. 1988;75:1166–8.
2. Smith AC, Dowsett JF, Russell RC, Hatfield AR, Cotton PB. Randomised trial of endoscopic stenting versus surgical bypass in malignant low bile duct obstruction. *Lancet*. 1994;344(8938):1655–60.
3. Téllez-Ávila FI, Herrera-Mora D, Duarte-Medrano G, et al. Biliary drainage in patients with failed ERCP: Percutaneous versus EUS-guided drainage. *Surg Laparosc Endosc Percutan Tech*. 2018;28:183–7.
4. Sportes A, Camus M, Greget M, et al. Endoscopic ultrasound-guided hepaticogastrostomy versus percutaneous transhepatic drainage for malignant biliary obstruction after failed endoscopic retrograde cholangiopancreatography: A retrospective expertise-based study from two centers. *Therap Adv Gastroenterol*. 2017;10:483–93.
5. Hammad T, Khan MA, Alastal Y, Sharaiha RZ, Tyberg A, Nawras A. Efficacy and safety of lumen-apposing metal stents in EUS-guided transmural drainage of pancreatic fluid collections: A systematic review and meta-analysis. Paper presented at ACG 2016 Annual Scientific Meeting; October 14, 2016; Las Vegas, NV.
6. Lisotti A, Linguerrri R, Bacchilega I, Cominardi A, Marocchi G, Fusaroli P. EUS-guided gallbladder drainage in high-risk surgical patients with acute cholecystitis—procedure outcomes and evaluation of mortality predictors. *Surg Endosc*. 2021.
7. Kunda R, Pérez-Miranda M, Will U, et al. EUS-guided choledochoduodenostomy for malignant distal biliary obstruction using a lumen-apposing fully covered metal stent after failed ERCP. *Surg Endosc*. 2016;30:5002–8.
8. van Hooft JE, Uitdehaag MJ, Bruno MJ, et al. Efficacy and safety of the new WallFlex enteral stent in palliative treatment of malignant gastric outlet obstruction (DUOFLEX study): A prospective multicenter study. *Gastrointest Endosc*. 2009;69:1059–66.
9. Dormann A, Meisner S, Verin N, Wenk Lang A. Self-expanding metal stents for gastroduodenal malignancies: Systematic review of their clinical effectiveness. *Endoscopy*. 2004;36:543–50.
10. van Hooft JE, Uitdehaag MJ, Bruno MJ, et al. Efficacy and safety of the new WallFlex enteral stent in palliative treatment of malignant gastric outlet obstruction (DUOFLEX study): A prospective multicenter study. *Gastrointest Endosc*. 2009;69:1059–66.
11. Khashab MA, Valeshabad AK, Leung W, et al. Multicenter experience with performance of ERCP in patients with an indwelling duodenal stent. *Endoscopy*. 2014;46:252–5.
12. Mutignani M, Tringali A, Shah SG, et al. Combined endoscopic stent insertion in malignant biliary and duodenal obstruction. *Endoscopy*. 2007;39:440–7.
13. Maire F, Hammel P, Ponsot P, et al. Long-term outcome of biliary and duodenal stents in palliative treatment of patients with unresectable adenocarcinoma of the head of pancreas. *Am J Gastroenterol*. 2006;101:735–42.
14. Katsinelos P, Kountouras J, Germanidis G, et al. Sequential or simultaneous placement of self-expandable metallic stents for palliation of malignant biliary and duodenal obstruction due to unresectable pancreatic head carcinoma. *Surg Laparosc Endosc Percutan Tech*. 2010;20:410–5.
15. Rimbaş M, Larghi A. Endoscopic ultrasonography-guided techniques for accessing and draining the biliary system and the pancreatic duct. *Gastrointest Endosc Clin N Am*. 2017;27:681–705.

16. Khan MA, Akbar A, Khan THS, et al. Endoscopic ultrasound-guided biliary drainage: A systematic review and meta-analysis. *Dig Dis Sci.* 2016;61: 684–703.
17. Sharaiha RZ, Khan MA, Kamal F, et al. Efficacy and safety of EUS-guided biliary drainage in comparison with percutaneous biliary drainage when ERCP fails: A systematic review and meta-analysis. *Gastrointest Endosc.* 2017;85:904–14.
18. Rinninella E, Kunda R, Dollhopf M, et al. EUS-guided drainage of pancreaticoid collections using a novel lumen-apposing metal stent on an electrocautery-enhanced delivery system: A large retrospective study (with video). *Gastrointest Endosc.* 2015;82(6):1039–46.
19. Sportes A, Airinei G, Kamel R, Raynaud JJ, Benamouzig R. Endoscopic ultrasound-guided choledochoduodenostomy with a lumen-apposing metal stent through an uncovered metal duodenal stent. *Endosc Int Open.* 2018;6: E1395–E1397.
20. De Davide L, Bureau MA, Toliopoulos P, et al. EUS biliary drainage with a lumen-apposing metal stent through a pre-existing duodenal metal stent. *VideoGIE.* 2019;26(4):131–2.

---

**Copyright:** © 2021 The Author(s). Published by Wolters Kluwer Health, Inc. on behalf of The American College of Gastroenterology. This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.