Lumen-Apposing Metal Stents: Which One and Why?

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KEYWORDS

- Lumen-apposing metal stents • Pancreatic fluid collections
- Endoscopic ultrasonography • Transluminal stenting • EUS-guided biliary access
- EUS-guided gallbladder access

KEY POINTS

- Lumen-apposing metal stents (LAMS) have emerged as a primary endoscopic tool for management of complicated pancreatic fluid collections (PFCs) as well as rescue therapy for difficult biliary and gallbladder access.
- Multiple fully covered LAMS have been developed worldwide with a variety of sizes and features for transluminal procedures.
- LAMS delivery includes traditional multistep access via 19-G needle and guidewire insertion as well as a single-step or modified "hot" approach using electrocautery.
- Novel applications for LAMS continue to develop, and next-generation LAMS will be required to optimize their role for endoscopic ultrasound–guided transluminal procedures.

INTRODUCTION

Transluminal endoscopic therapies have evolved rapidly in recent years accompanied by the development of novel endoscopic ultrasound (EUS)-guided stenting devices. In 2012, the Atlanta criteria for acute pancreatitis and the management of pancreatic fluid collections (PFCs) updated terminology and management recommendations, including the importance of transluminal endoscopic approaches in the management of acute pancreatitis and its subsequent complications.[1] Updates to these criteria coincided with the evolution of natural orifice transluminal endoscopic surgery, which was shown to reduce the proinflammatory response and improve composite clinical outcomes in the management of walled off pancreatic necrosis (WON) when

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compared with surgical necrosectomy.[2–4] Subsequent randomized studies have confirmed endoscopic drainage for pancreatic pseudocysts to reduce hospital length of stay and cost compared with surgical drainage without sacrificing efficacy.[5] Recognition of the potential for nonsurgical approaches to PFCs spurred the development of various stent options for transluminal endoscopic drainage beyond traditional double pigtail plastic stents or metal biliary and esophageal stents used previously.[6,7]

Lumen-apposing metal stents (LAMS) represent a significant advancement in biomedical engineering because of their biflanged design and ability to hold 2 luminal structures in apposition. Their dumbbell shape and wide internal diameter offer theoretic advantages of improved drainage, reduced stent occlusion from necrotic debris, prevention of stent migration, as well as the option for direct endoscopic necrosectomy using a standard forward viewing endoscope when indicated. LAMS have been demonstrated safe (adverse event rates 5%–20%) and effective (clinical success 77%–95%) in expert centers, and their placement under EUS guidance for the management of PFCs is well documented.[8–16]

Despite this technical achievement, there remains a relative paucity of prospective, randomized data proving them superior to older methods. In one review comparing plastic stents with metal stents, including both fully covered self-expanding metal stents (FcSEMS) and LAMS, each stent type performed similarly well in the drainage of pancreatic pseudocysts (85 vs 83%) and WON (70 vs 78%).[17] Bang and colleagues[18] also performed a retrospective study of plastic stents versus LAMS for PFCs and found similar excellent efficacy between stent types (>90%) but a lower cost with plastic stents for pseudocysts.

More recently, multiple retrospective studies have demonstrated a benefit to using LAMS in complicated fluid collections, and the field appears to be progressing toward their use over plastic in this setting.[19] Siddiqui and colleagues[20] retrospectively compared plastic stents to FcSEMS and LAMS for use in WON in 2017, showing that the rate of complete resolution was superior with FcSEMS and LAMS compared with double pigtail stents (90%–95% vs 81%, $P = .001$). The LAMS group in this analysis also required fewer total procedures in comparison with other stent types, potentially offsetting some of the additional up-front cost of the new technology. Other cohort studies have indicated that LAMS use may decrease the need for repeat procedures, total adverse events, salvage surgery, and length of hospital stay when compared with plastic stents for use in complicated fluid collections and WON.[20–23] In light of this information, LAMS are thought to be more efficacious in achieving resolution of WON and are likely cost-effective when used in this setting.[20,21,23–25] Prospective and randomized data are needed to definitively guide their use in the future; however, the obvious design advantages and demonstrated efficacy of LAMS position them to remain the primary means for endoscopic management of complicated PFCs.

TECHNIQUE

Multiple LAMS have been developed and marketed for transluminal applications. First-generation LAMS require a multistep insertion approach without the use of electrocautery. Lesions are accessed via 19-G needle puncture under Doppler ultrasound guidance to ensure avoidance of large vascular structures (**Fig. 1**A). Aspiration of fluid can then be performed as needed for additional diagnostic testing. Needle puncture is followed by placement of a 0.025- or 0.035-inch guidewire to hold the position and subsequent dilation of the tract to facilitate easy passage of the LAMS delivery device (**Fig. 1**B). Dilation can be achieved with needle knife electrocautery or Cystotome