CASE REPORTS

A novel rescue maneuver for a distal dislodged lumen-apposing metal stent (LAMS): "LAMS-in-LAMS" technique

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ABSTRACT

Introduction: the appearance of the lumen-apposing metal stent (LAMS) has meant an authentic revolution. To date, the results are promising but it is necessary to note the technical incidents and LAMS-related complications.

Case report: an EUS-transmural guided drainage using a HotAXIOS was planned for a 36-year-old man with oral intolerance due to a voluminous walled-off necrosis. The distal flange was left in the collection, but a total distal malposition occurred during the proximal flange delivery, despite correct apposition with visualization of the black mark. A rescue technique was performed inserting a second LAMS over-the-guidewire salvaging the initial failed transmural drainage.

Discussion: This case is a reminder that in similar scenarios, extreme tension of the echoendoscope can cause a malfunction of the AXIOS stent delivery system, and lead to a total distal malposition. This "LAMS-in-LAMS" technique is feasible, effective, and a very helpful rescue technique in cases of dislodged LAMS.

Key words: Lumen apposing metal stent. Transmural drainage. Endoscopic ultrasound. Stent in stent.

INTRODUCTION

The appearance of the lumen-apposing metal stent (LAMS) has resulted in a revolution in the interventional endoscopic ultrasound (EUS) field. The results to date are promising, although the technical incidents and LAMS-related complications should be noted. We present the case of a 36-year-old male with oral intolerance due to a duodenal obstruction caused by a voluminous walled-off necrosis (WON), secondary to a severe acute pancreatitis. EUS-transmural guided drainage was decided upon by a multidisciplinary committee.

CASE REPORT

Interventional procedure

The choice of LAMS in this case was due to the duodenal location (a greater risk of technical incidents during the deployment step), significant dimensions of pancreatic fluid collection (80 x 200 mm in diameters) and the nature of the lesion (WON). Severe inflammatory duodenal stenosis impeded the advance of the linear echoendoscope (GF-UCT180, Olympus) to the second duodenal portion and involved excessive flexion of the tip portion. First, a 0.035-inch (MET-35-480, Cook) guidewire was inserted into the collection through a 19-G needle (ECHO-19, Cook). Then a Hot AXIOS™ Stent (Hot AXIOS, 10 x 10 mm, BostonSC) was used to facilitate the transduodenal drainage. The distal flange was left in the collection. However, a total distal malposition occurred during step #4 (proximal flange delivery) despite a correct apposition (step #3) by endosonography and endoscopic control, with visualization of the black mark.

Rescue technique

As the guidewire was inserted in the cavity, it was possible to perform a rescue technique by inserting a second stent over-the-guidewire. Another LAMS with a wider di-

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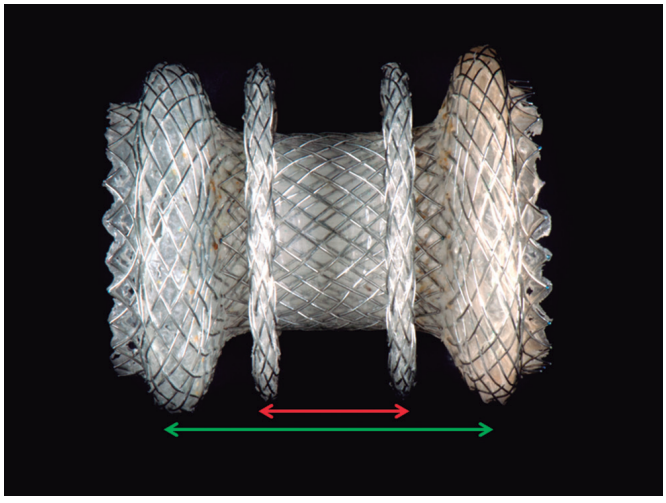

Fig. 1. Ex-vivo *image of the lumen-apposing metal stent (LAMS); "LAMS-in-LAMS" technique. Red line: the first displaced LAMS. Green line: the second LAMS.*

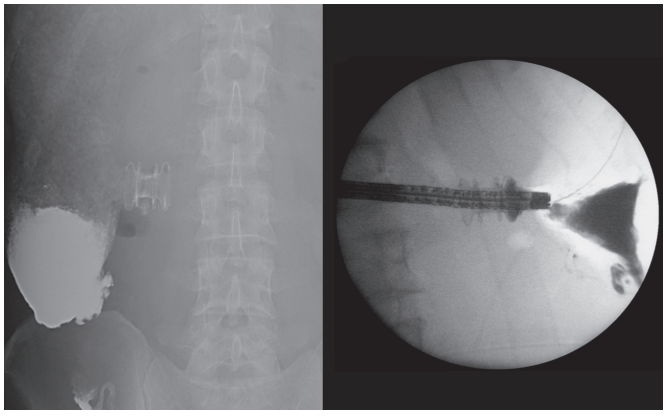

Fig. 2. *Radiological image showing the size and silhouette of the pancreatic fluid collection containing contrast inside and both LAMS stents located within the ostomy tract. B. Fluoroscopic image of the "LAMS-in-LAMS" technique, which salvaged the initial failed transmural drainage. The integrity of the ostomy allows the advance of an upper endoscope for cleaning the cavity.*

ameter (Hot AXIOS™ Stent, 10 x 15 mm) was used to drag the displaced LAMS during its apposition. It was correctly deployed, salvaging the initial failed transmural drainage. An oral GI contrast was performed one day later and the contrast leak at the area of the duodenal ostomy was not observed, thus confirming the technical success of the rescue technique. Therefore, cleaning sessions of the cavity were started with the use of a standard video gastroscope. The access to the interior of the voluminous cavity through the stable ostomy was performed without technical or clinical incidents. This facilitated the aspiration of the retained contrast fluid and accumulated detritus.

Figure 1 details an *ex-vivo* "LAMS-in-LAMS" image; a rescue stent (Hot AXIOS™ stent 10 x 15 mm, green line) is located inside the mal-positioned stent (Hot AXIOS™ stent 10 x 10 mm, red line). The large size of the pancreatic fluid collection can be seen on the radiological image (Fig. 2A), with part of the retained contrast and both LAMS stents within the ostomy tract. A fluoroscopy image (Fig. 2B) shows the integrity of the "LAMS-in-LAMS" technique, which allowed the advance of a video gastroscope through the ostomy into the cavity and the aspiration and cleaning of the cavity.

DISCUSSION

This case is a reminder that, in similar scenarios, extreme tension of the echoendoscope can cause a malfunction of the AXIOS™ stent delivery system and lead to a total distal malposition of the LAMS (1-3) (Table 1). In this particular case, and despite the dimensions of the collection, an initial EUS-guided puncture was performed for the placement of a guidewire within the cavity, prior to the use of the LAMS. The main reason was the sensation of instability and tension of the echoendoscope position in the duodenal bulb. The technical intention was to offer stability during the different LAMS steps, minimizing the risk of technical incidents and, in case of a failed technique, offer a potential rescue technique over-the-guidewire.

The selection of a second LAMS with larger flanges than the first LAMS ensured a perfect fit for both LAMS stents. This strategy was first tested (*ex-vivo* simulation) using two LAMS of 10 x 10 mm and 10 x 15 mm in diameter in the in-

Table 1. *Literature review of total distal dislodged lumen-apposing metal stent and the respective endoscopic rescue technique using stents*

Author	Country	Cases (n)	Procedure type	LAMS	Stent in the rescue technique	Final technical success
Ngamruengphong 2015	USA	1	Gallbladder	?	FCSEMS + pigtail	Yes
Tyberg 2017	USA	3	Gastrojejunostomy	15 x 10 mm	Esophageal FCSEMS	Yes
Ligresti* 2018	Italy	1	Gallbladder	8 x 8 mm	LAMS 10 x 10 mm	Yes
Our unit 2018	Spain	1	Pancreatic fluid collection	10 x 10 mm	LAMS 10 x 15 mm	Yes

LAMS: lumen-apposing metal stent; FCSEMS: fully covered metal stent. *Case of a buried LAMS stent, with the distal flange inside the gallbladder. "LAMS-in-LAMS" technique was applied one month after of the initial procedure.

terventional room. It confirmed a longer body of the second LAMS due the compression of the first LAMS.

CONCLUSION

To date, this novel technique has only been reported in a buried LAMS case, one month after a EUS-guided gallbladder drainage (4). To the best of our knowledge, this is the first case describing this "LAMS-in-LAMS" technique, which salvaged the failed EUS-guided transmural drainage of a pancreatic collection during the initial interventional procedure. In our opinion, this "LAMS-in-LAMS" technique is feasible, effective and a helpful rescue technique for cases of dislodged LAMS. We think that the intentional use of a second LAMS (same design) will fit better than other stent designs (i.e., tubular design).

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