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CASE REPORT

A surprising culprit for delayed gastrointestinal bleeding after endoscopic ultrasound-guided cholecystoduodenostomy: the double-pigtail stent

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Abstract

Endoscopic ultrasound-guided gallbladder drainage using a lumen-apposing metal stent has emerged as an accepted option for the treatment of acute cholecystitis in patients unfit for surgery. While metal stents carry a risk of intra- and post-procedural bleeding, the coaxial placement of a double-pigtail stents through lumen-apposing metal stents has been proposed to lower the bleeding risk by preventing tissue abrasion against the stent flanges. We present a case of an 83 year-old male who had previously undergone uncomplicated endoscopic ultrasound-guided cholecystoduodenostomy with this technique. Six months later, he presented with upper gastrointestinal bleeding due to a duodenal pressure ulcer from the coaxial 10-Fr double-pigtail stent originally employed to prevent such bleeding. The 10-Fr stent was replaced with two 7-Fr stents whose increased flexibility and distribution of pressure across multiple points of contact with the duodenal wall was theorized to reduce the likelihood of erosion or perforation. Following the procedure, the patient's clinical course improved significantly with complete resolution of his symptoms of choledocholithiasis and cholecystitis. While 10-Fr double-pigtail stents are generally preferred for this indication due to their stiffness that reduces out-migration, use of more flexible 7-Fr stents may be advisable in thin-walled structures such as the duodenum.

Keywords Endoscopic-guided gallbladder drainage · Cholecystoduodenostomy · Cholecystitis · LAMS · Double-pigtail stent

Abbreviations

LAMS	Lumen-apposing metal stent
DPS	Double-pigtail stent
EUS-GBD	Endoscopic ultrasound-guided gallbladder drainage

Introduction

Originally designed for internal drainage of pancreatic fluid collections, lumen-apposing metal stents (LAMS) are now frequently used for other indications, including endoscopic ultrasound-guided gallbladder drainage (EUS-GBD) in patients unfit for surgery [1]. LAMS placement is associated with a risk of intra-procedure and delayed post-procedure bleeding, which can be life threatening. Placement of a coaxial double-pigtail stent (DPS) has been reported to decrease the risk of delayed bleeding from fluid collections [2]. Extrapolating from these data, many endoscopists routinely place coaxial double-pigtail stents through LAMS, even in expanded indications such as EUS-GBD. We report here the case of delayed bleeding following LAMS cholecystoduodenostomy due to ulceration from a 10-Fr double-pigtail stent, originally placed to reduce that risk.

Case report

An 83 year-old male with a history of hypertension, paroxysmal atrial fibrillation, and aortic aneurysm was referred for management of acute cholecystitis. Due to his age and comorbidities, he was deemed high risk for cholecystectomy, and underwent uncomplicated endoscopic ultrasound-guided

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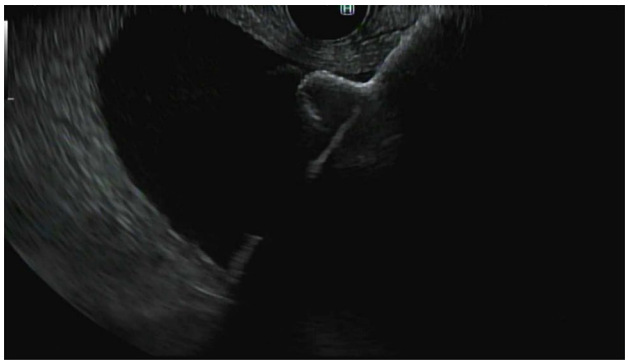

Fig. 1 Endoscopic ultrasound-guided deployment of the distal phalange of the lumen-apposing stent into the gallbladder lumen

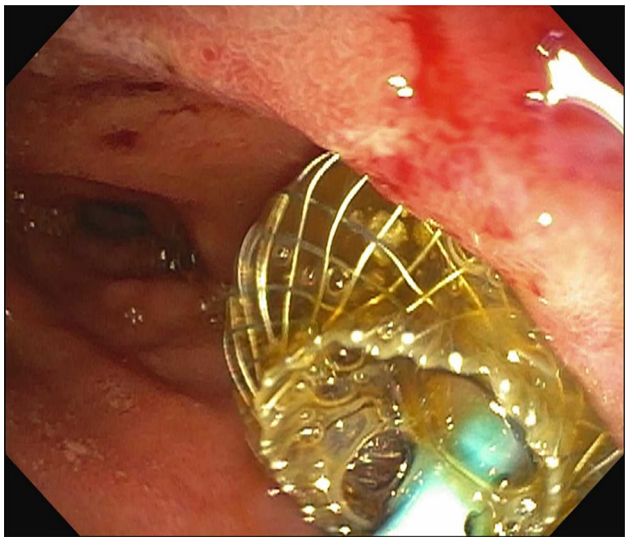

Fig. 2 Coaxial placement of a plastic 10-Fr double-pigtail stent through the lumen-apposing metal stent to prevent delayed bleeding and food impaction

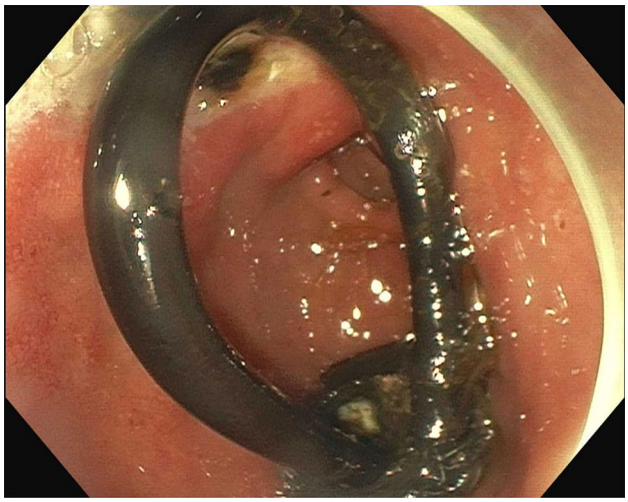

Fig. 3 Esophagogastroduodenoscopy demonstrating erosion of the previously placed 10-Fr double-pigtail stent into the wall of the anterior duodenal bulb

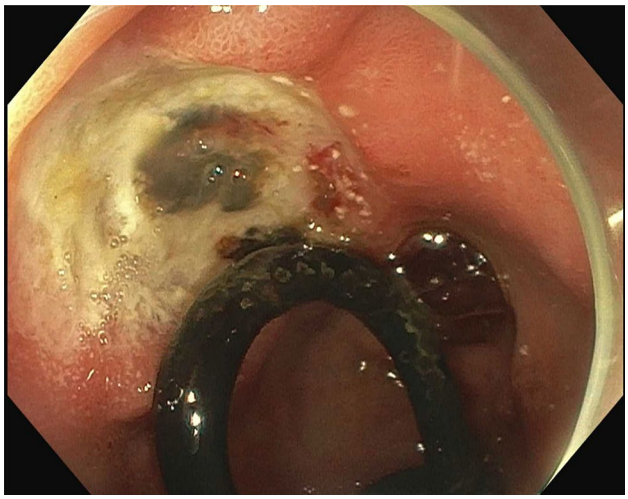

Fig. 4 Cratered ulcer measuring 20 mm in the anterior duodenal bulb secondary to pressure effect from the 10-Fr double-pigtail stent

cholecystoduodenostomy using a cautery-enhanced 10 × 10 mm LAMS (AXIOS, Boston Scientific, Marlborough MA) (Fig. 1). A coaxial 10-Fr × 5 cm DPS (Advanix Biliary Stent, Boston Scientific, Marlborough MA) was deployed through the LAMS, putatively for prevention of delayed bleeding and food impaction (Fig. 2). The patient did well and was discharged in stable condition, with a plan for follow-up stone clearance and LAMS removal within 3 months. However, due to the COVID-19 pandemic, this follow-up was delayed. Six months post-procedure, he presented with hematemesis, and an acute hemoglobin drop from a baseline of 13.4 to 10.5 g/dL. Esophagogastroduodenoscopy (EGD) was performed which revealed a 20 mm cratered ulcer in the anterior duodenal bulb arising due to pressure effect from the pigtail of the 10-Fr plastic DPS (Figs. 3 and 4). The endoscopic images demonstrated an intimate relationship between the DPS pigtail and the ulcer, supporting the pigtail's status as the causative agent rather than alternative etiologies, such as LAMS flange, which was distant from the erosion site. The LAMS and DPS were removed using rat tooth forceps. Using a sphincterotome and 0.025″ guidewire, the gallbladder was cannulated and swept of debris using an extraction balloon. To ensure continuous gallbladder drainage and maintain fistula patency, the decision was made to replace two 7-Fr × 5 cm plastic DPS (Fig. 5). Following replacement of the single 10-Fr DPS with two 7-Fr DPS, there were no post-procedural adverse events, and the patient's clinical course improved significantly. His hemoglobin returned to his baseline values with complete resolution of his symptoms of choledocholithiasis

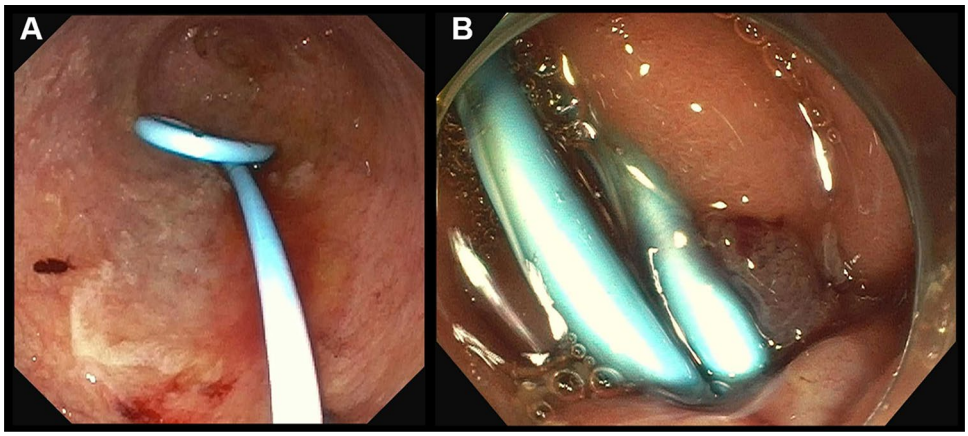

Fig. 5 **A** Placement of 7-Fr plastic double-pigtail stents to replace the prior single 10-Fr stent to maintain patency of the cholecystoduodenostomy and ensure continuous gallbladder drainage. **B** Endoscopic view of the two 7-Fr plastic double-pigtail stents

and cholecystitis. The patient had been maintained on a PPI following placement of the LAMS and throughout the events described. The patient was discharged home in stable condition on the same day.

Discussion

EUS-GBD has emerged as a safe and effective procedure for the treatment of acute cholecystitis in high-risk surgical patients unable to undergo emergent cholecystectomy. Compared to percutaneous gallbladder drainage, EUS-GBD has been shown to be comparable in terms of technical feasibility, efficacy, and safety [3]. However, initial limitations to the widespread of implementation of this technique included the potential leakage of bile into the peritoneal cavity and stent migration due to perforation and incomplete connections between the gallbladder, stomach, and duodenum [4, 5]. As such, LAMS were specifically developed to prevent leakage and migration due to their capacity to approximate the gallbladder wall to the gastrointestinal lumen. With the increasing usage of LAMS in EUS-GBD, existing literature has described improved technical and clinical success rates as high as 95.5% and 96.3% with lower rates of adverse events compared to conventional biliary-type metal stents [6–8].

The coaxial placement of DPS through LAMS has been suggested to reduce complication rates by preventing friction and impaction between the sharp flanges of the LAMS and adjacent mucosa and vessels [9]. Additionally, coaxial placement of a DPS is theorized to decrease the risk of LAMS occlusion caused by the trapping of debris and maintain patent drainage [10]. Previous studies seemingly confirmed this function by reporting that insertion of a DPS through an LAMS resulted in fewer adverse events, specifically bleeding and infection, in pancreatic cyst and necrosis drainage [9, 11]. Within EUS-GB specifically, a prior study used a 6-Fr DPS to address bleeding from LAMS flange-induced erosion ulcer [12]. Moreover, retrograde reflux of gastric contents into the gallbladder is a rare but serious complication of EUS-GBD with LAMS that can lead to stent occlusion [13].

We present here a case of a duodenal pressure ulcer due to a 10-Fr pigtail stent placed coaxially through the LAMS. Coaxial DPS measuring 10-Fr are generally preferred for this indication due to their stiffness that reduces out-migration, but the potential for erosion into the duodenum should be considered, in particular due to the thin wall of the duodenum. This complication suggests that using the use of a 7-Fr DPS as a first-line option over the 10-Fr DPS in the duodenal bulb may be advisable. The rationale for this strategy is that the 7-Fr stent's pigtail is significantly more flexible than the 10-Fr pigtail and hence cannot exert as much pressure on one mucosal site without deforming. Furthermore, two 7-Fr stents were utilized to distribute the pressure across multiple points of contact with the duodenal wall, thereby reducing the likelihood of erosion or perforation. Multiple DPS are commonly used to traverse LAMS in the cystogastrostomy setting to maintain fistula patency, and as such we extrapolated to support their use in this novel indication. Future randomized studies are needed to determine both the overall utility of combined DPS through LAMS placement and optimal DPS diameter selection for specific anatomical locations throughout the gastrointestinal tract.

Author contributions PM—drafting of the manuscript and final approval; DW—acquisition of images, critical revision of the manuscript for important intellectual content, and final approval; MS—critical revision of the manuscript for important intellectual content and final approval; SM—endoscopist performing the procedure, acquisition of images, critical revision of the manuscript for important intellectual content, supervision, and final approval.

Data Availability Data will be made available from the corresponding author, SM, upon reasonable request.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures followed have been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its subsequent amendments.

Informed consent Informed consent was obtained from the patient whose case details appear in this manuscript.

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