



Lumen-apposing metal stent–related splenic artery erosion: diagnosis and management

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Lumen-apposing metal stents (LAMSs) have been shown to be easily placed during endoscopy and appear effective in draining symptomatic peripancreatic fluid collections. Several series have reported late adverse events, especially bleeding, which can be severe and can occur in up to 25% of patients. We report a particularly well-documented bleeding adverse event ([Video 1](#), available online at www.VideoGIE.org).

A 66-year-old woman presented with severe gallstone pancreatitis without definite CT evidence of necrosis. ERCP removed a common bile duct stone, and laparoscopic cholecystectomy was successful ([Fig. 1](#)). The patient was discharged without any adverse events. Eight months later, she presented with left upper-quadrant abdominal pain without evidence of bleeding or sepsis. CT revealed a large

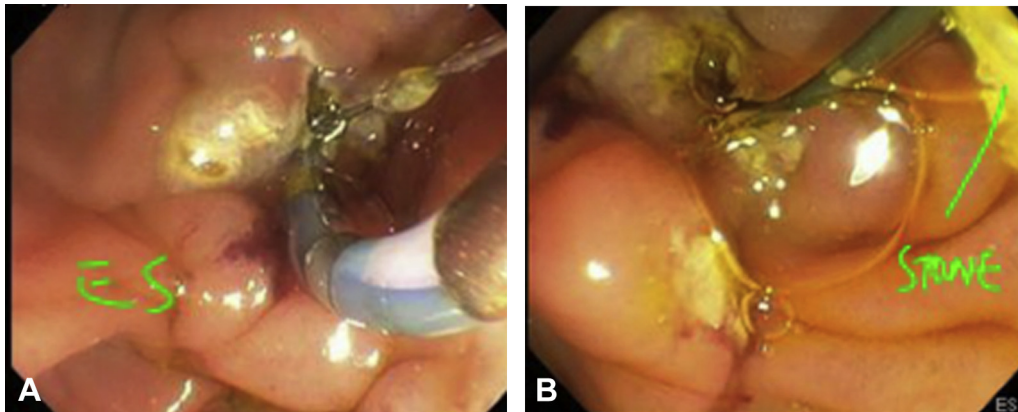


Figure 1. **A**, Initial ERCP performed for gallstone pancreatitis with endoscopic sphincterotomy. **B**, Removal of the offending common bile duct stone (*labeled*) with successful biliary flow.

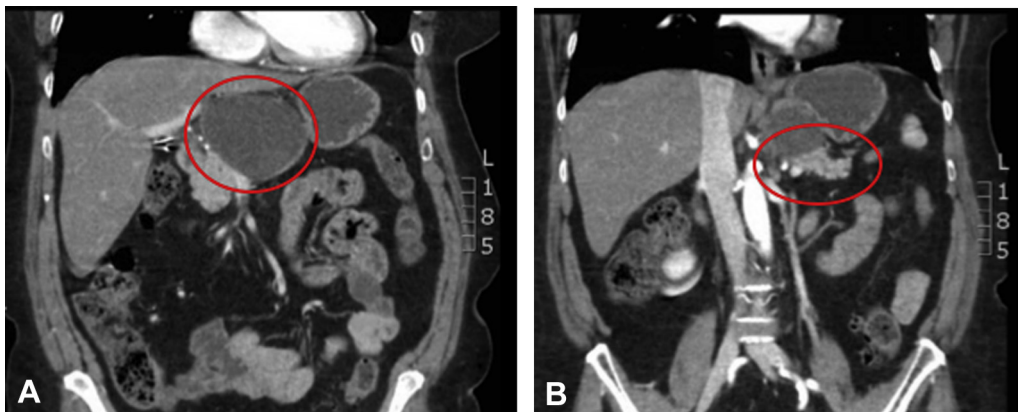


Figure 2. **A**, 6-cm × 8-cm cystic collection (*red circle*) in midpancreatic body demonstrated on CT imaging after the patient presented with left upper-quadrant abdominal pain 8 months after ERCP. **B**, Disconnected pancreatic tail (*red circle*) visualized on the same scan.

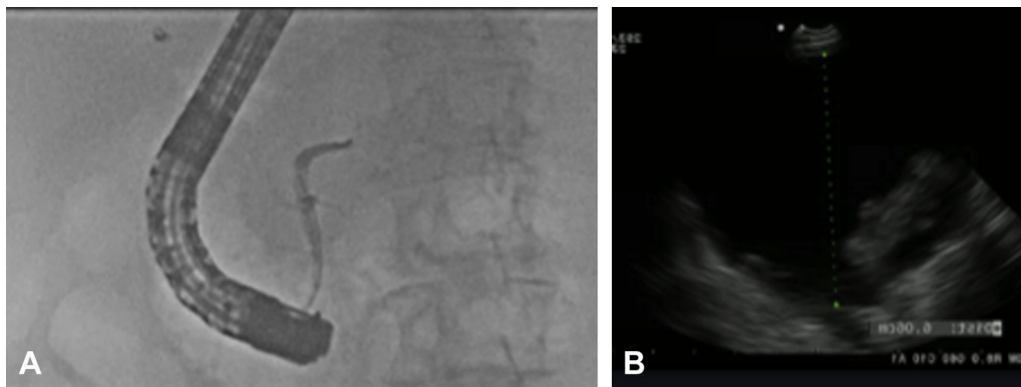


Figure 3. **A**, ERCP demonstrating a cut-off pancreatic duct consistent with central necrosis and a disconnected pancreatic tail. **B**, EUS demonstrating moderate necrotic debris.

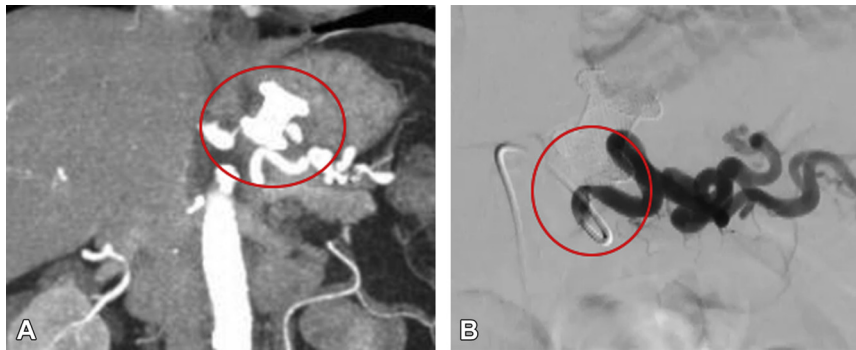


Figure 4. **A**, Urgent CT angiogram demonstrating the LAMS in close apposition to the splenic artery (*red circle*). **B**, Emergency visceral angiogram demonstrating compression and abnormality of the proximal splenic artery (*red circle*) in close proximity with the LAMS.

unilocular cystic collection replacing the midpancreatic body with an obviously disconnected tail (Fig. 2). Drainage was recommended.

At ERCP, the pancreatic duct was cut off in the proximal body consistent with a disconnected tail (Fig. 3A). Immediate EUS revealed no vascular abnormalities on Doppler view and only a modest amount of debris (Fig. 3B). The best access was high in the fundus, and a LAMS (15 mm lumen diameter, 10 mm saddle length, fully coated, Hot Axios; Boston Scientific, Marlborough, Mass) was easily placed. Brown thick liquid was observed without blood. No debridement was necessary. There were no immediate adverse events. Eleven days later, the patient collapsed with sudden hematemesis and incontinence of massive red rectal bleeding. She experienced hypovolemic shock, requiring transfusion of 5 units of blood. Emergency CT angiography revealed the LAMS to be in close apposition with the splenic artery, but no pseudoaneurysm was seen (Fig. 4). Emergency visceral angiography documented an irregular narrowing at the point of contact with the lower edge of the LAMS but

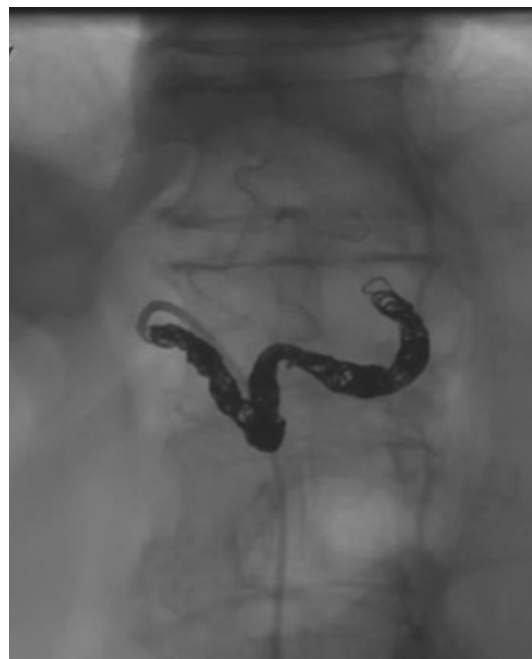


Figure 5. Splenic artery status after placement of multiple endovascular angiographic coils for presumed splenic artery erosion.

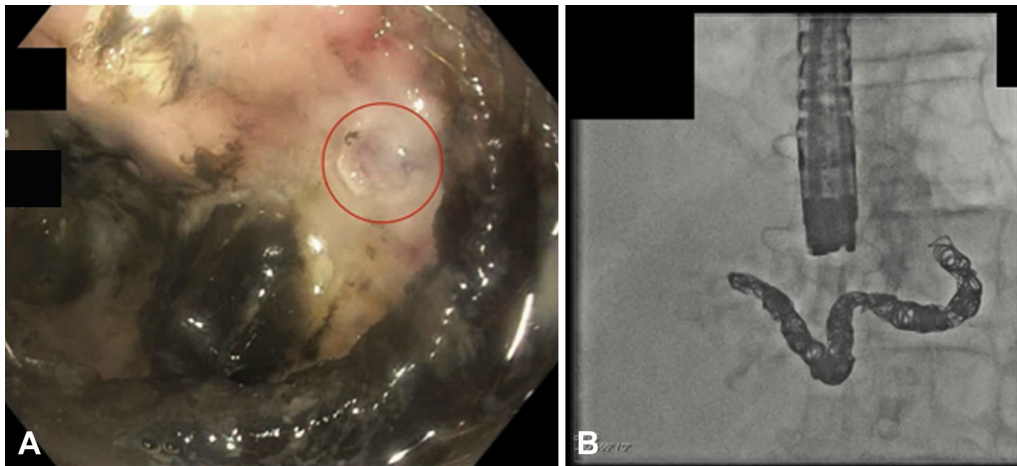


Figure 6. **A**, Endoscopic visualization of the presumed site of hemorrhage within the LAMS cavity. A vascular-appearing lesion is visualized (*red circle*) with residual clotted blood and purulent material without much debris. **B**, Palpation of the vascular lesion with a blunt-tipped ERCP catheter demonstrating compression of multiple coils within the splenic artery on fluoroscopy.

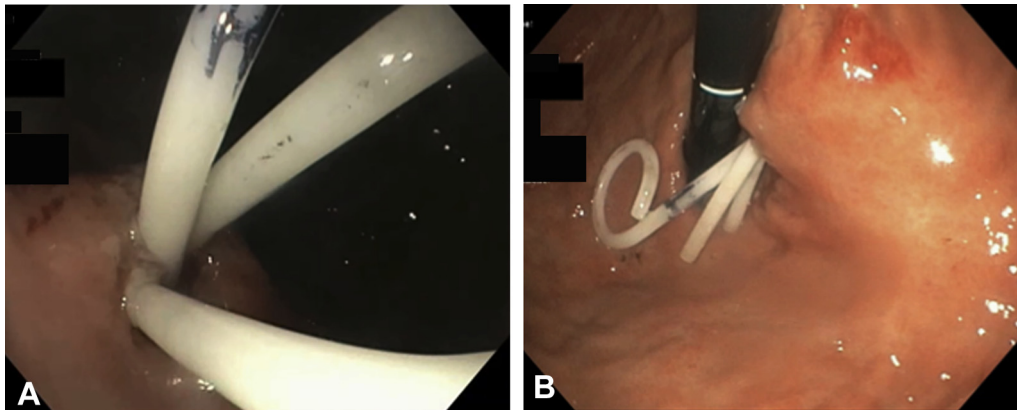


Figure 7. **A**, Replacement of the LAMS with two 10F single-pigtail stents and 1 double-pigtail stent for continued drainage of the disconnected pancreatic tail. **B**, Retroflexed view of the same.

no active bleeding. Multiple angiographic coils were then placed (Fig. 5).

At endoscopy, the LAMS could be traversed. A small amount of purulent debris and old clots were lavaged away. A prominent vascular-appearing defect was noted at the base of an ulceration at the lower edge of the LAMS (Fig. 6A). Palpation of this with an ERCP catheter confirmed it to be the point of splenic artery rupture (Fig. 6B). To safely remove the LAMS and to ensure drainage into the stomach from the disconnected tail, 2 single-pigtail soft polymer blend plastic stents (10F diameter, 7 cm length, Hobbs Medical, Stafford Springs, Conn) were placed through the LAMS. The LAMS was then grasped with rat-tooth forceps and removed without displacement of the stents. There was no leakage from

the apposed gastric wall even though the LAMS had been in place for only 13 days. A third and final double-pigtail stent (10F diameter, 7 cm length, Hobbs Medical) was placed to help maintain patency (Fig. 7). The patient made a good recovery, and her pain and collection had resolved at the 3-month follow-up visit. Her stents will permanently remain in place to drain the disconnected pancreatic tail, barring any adverse event necessitating replacement.

This case documents a severe bleeding adverse event from a LAMS erosion into the splenic artery. A higher risk of postdrainage bleeding after drainage of peripancreatic fluid collections with LAMSs has been compared with historical experience (Table 1). Using Doppler during placement of the stent does not

TABLE 1. Summary of studies documenting bleeding adverse events of LAMS-assisted peripancreatic fluid collection drainage, as of the end of 2018

| Author | Study type | Number of LAMSs placement | LAMS-associated bleeding rate (%) |
|---------------------------------|------------------------------|---------------------------|-----------------------------------|
| Hammad et al 2018 | Meta-analysis | 688 | 2.4 |
| <i>Lakhtakia et al 2017</i> | <i>Retrospective</i> | 205 | 2.9 |
| <i>Sharaiha et al 2016</i> | <i>Retrospective</i> | 124 | 1.6 |
| <i>Gornals et al 2016</i> | <i>Retrospective</i> | 13 | 15 |
| <i>Rinninella et al 2015</i> | <i>Retrospective</i> | 93 | 1.1 |
| <i>Bapaye et al 2017</i> | <i>Retrospective</i> | 72 | 2.7 |
| <i>Ang et al 2016</i> | <i>Retrospective</i> | 12 | 0 |
| <i>Mukai et al 2015</i> | <i>Retrospective</i> | 43 | 0 |
| <i>Bang et al 2017</i> | <i>Retrospective</i> | 20 | 0 |
| <i>Walter et al 2015</i> | <i>Prospective</i> | 60 | 6.7 |
| <i>Shah et al 2015</i> | <i>Prospective</i> | 30 | 6.7 |
| <i>Bang et al 2017</i> | <i>Early analysis of RCT</i> | 12 | 25 |
| Garcia-Alonso et al 2018 | Retrospective | 250 | 5.2 |
| Siddiqui et al 2017 | Retrospective | 86 | 7.0 |
| Siddiqui et al 2016 | Retrospective | 80 | 7.5 |
| Brimhall et al 2018 | Retrospective | 90 | 16.7 |
| Lang et al 2018 | Retrospective | 19 | 21 |

LAMS, Lumen-apposing metal stent.

There is a wide variation in bleeding rates among patients who receive LAMSs, with bleeding adverse events ranging from 0% to 25% of cases. A meta-analysis is included and demonstrates a total bleeding risk of 2.4%, with the 11 included cases italicized. It should be noted that although all studies documented major bleeding requiring intervention, some studies include self-limited bleeding as well.

minimize risk of delayed bleeding from the splenic artery. There is always unpredictability of where the edge of the stent will rest once the pseudocyst is completely drained and collapsed. LAMS-associated bleeding can be life threatening. Other potential adverse events include perforation, stent migration, and stent dislodgement. Awareness of these adverse events is essential when using LAMSs as an endoscopic drainage option.

DISCLOSURE

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Abbreviation: LAMS, lumen-apposing metal stent.

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